

VARIATIONS IN PULMONARY FISSURES: AN ANATOMICAL STUDY

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ABSTRACT

Background: Pulmonary fissures are invaginations of the visceral pleura that extend from the outer surface of the lung into its substance. The fissures are grouped into normal and accessory fissures. The oblique fissure and horizontal fissures are the normal pulmonary fissures which may be complete, incomplete or absent. Incomplete pulmonary fissures are considered to be markers of collateral ventilation. They play a significant role in determining clinical response following valve replacement surgery in emphysematous patients. The Accessory fissures occurring within an individual lobe may be confused with other lesions such as linear atelectasis, pleural scar. Knowledge of the variations in the pulmonary fissures is useful for clinical interpretation. It is in this regards that this study was undertaken to assess the morphology of pulmonary fissures.

Materials and methods: The study was conducted on 60 formalin preserved adult human lungs (32 right, 28 left) of unknown age and sex obtained during dissection of embalmed cadavers for undergraduate teaching in Department of Anatomy, Rajarajeswari medical college and hospital. The anatomical classification proposed by Craig and Walker is followed to determine the completeness of pulmonary fissures. Four grades of fissures have been described. Grade 1- complete fissure with entirely separate lobes. Grade 2- complete visceral cleft but parenchymal fusion at the base of the fissure. Grade 3 - visceral cleft evident for a part of the fissure. Grade 4 - complete fusion of lobes with no evident fissure line. The data was tabulated and analysed using descriptive statistics. The study was undertaken after obtaining approval from the institutional ethics committee.

Results: Oblique fissure was incomplete in 13.33% of the right lungs while horizontal fissure was found to be incomplete in 30% of the right lungs. Horizontal fissure was found to be absent in 2 (3.33%) of the right lungs. A superior accessory fissure in the lower lobe separating the upper part of the lobe from the rest of the basal segments was found in one right lung.

Conclusions: The present study shows that the horizontal fissure is more frequently incomplete or absent when compared to the oblique fissure in the right lung. Superior accessory fissure in the lower lobe of a right lung was observed in 1 (1.66%) specimen. Knowledge of the varying degrees of completeness of pulmonary fissures and accessory fissures is essential to avoid misinterpretation of radiological signs.

KEY WORDS: Pulmonary Fissure, Oblique Fissure, Horizontal Fissure, Incomplete Fissure, Superior Accessory Fissure.

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INTRODUCTION

Fissures are invaginations of the pleura that extend from the outer surface of the lung into

its substance. They are traditionally considered in two groups: normal fissures that separate the lungs into the three right-sided and two left-

sided lobes and accessory fissures that occur within one of the lobes [1]. The pulmonary fissures may be complete, incomplete or absent. The oblique fissure extends from the surface of the lung to the hilum and divides the organ into separate upper and lower lobes which are connected only by the lobar bronchi and vessels. On the right lung a horizontal fissure passes from the anterior margin into the oblique fissure to separate a wedge-shaped middle lobe from the upper lobe [2].

Incomplete fissures may alter the usual patterns of collapse seen in patients with endobronchial lesions. An incomplete major fissure causes an odd appearance of fluid tracking within the fissure in pleural effusion [3].

Presence of accessory fissures in lung specimens is not uncommon, but it is difficult to appreciate them on radiographs and CT scans hence they are either not appreciated as distinct entities or are completely misinterpreted [4].

Knowledge of the variations in the pulmonary fissures is useful for clinical interpretation. It is in this regards that this study was undertaken.

Aim of the Study: To study the morphology of pulmonary fissures.

Objectives of the Study: To assess the extent and completeness of the oblique and horizontal pulmonary fissures and to assess the extent of accessory fissures.

MATERIALS AND METHODS

The study is conducted on 60 formalin preserved adult human lungs (32 right, 28 left) of unknown age and sex obtained during dissection of embalmed cadavers for undergraduate teaching in Department of Anatomy, Rajarajeshwari medical college and hospital.

Inclusion criteria: Normal adult human lungs

Exclusion criteria: Lung specimens with pathological lesions, lungs damaged during removal.

The approval for the study was obtained from the institutional ethics committee. The specimens were observed for the presence and completeness of normal fissures and accessory fissures. The anatomical classification proposed by Craig and Walker, as quoted by Meenakshi et al [5] is followed to determine the comple-

teness of pulmonary fissures. Four grades of fissures have been described.

Grade 1- complete fissure with entirely separate lobes.

Grade 2- complete visceral cleft but parenchymal fusion at the base of the fissure.

Grade 3 - visceral cleft evident for a part of the fissure.

Grade 4 - complete fusion of lobes with no evident fissure line.

The data was tabulated and analysed using descriptive statistics.

RESULTS

Out of 60 lungs, 32 lungs belonged to the right side and 28 lungs to the left side. The pattern of the fissures observed is as shown in the Tab. 1. The classification of the fissures based on Craig and Walker's criteria [1] is shown in Table 2.

Oblique fissure was incomplete in 13.33% of the right lungs while horizontal fissure was found to be incomplete in 30% of the right lungs. Horizontal fissure was found to be absent in 2 (3.33%) of the right lungs (Fig. 1). A superior accessory fissure in the lower lobe separating the upper part of the lobe from the rest of the basal segments was found in one right lung (Fig.2).

Among 28 left lungs, accessory fissures were noted in 2 specimens. An accessory fissure was noted near the apex of a left lung. The fissure was incomplete, ran horizontally across the apex of the upper lobe, it did not communicate with the left oblique fissure (Fig.3).

In a specimen of the left lung, an incomplete oblique fissure belonging to Class III group under Craig and Walker's that partially separated the upper and lower lobes was noted (Fig. 4). The two lobes of the lung were fused in the upper part and were partially separated by the fissure in the lower part.

Table 1: The pattern of pulmonary fissures in the present study (n=60).

	Complete	Incomplete	Absent
Right Lung (32)			
Oblique fissure	24 (40%)	8 (13.33%)	-
Horizontal fissure	12 (20%)	18 (30%)	2 (3.33%)
Left lung (28)			
Oblique fissure	11 (18.33%)	17 (28.33%)	-

Table 2: Classification of the oblique fissure based on Craig and walker's criteria.

Oblique fissure	Grade I	Grade II	Grade III	Grade IV
Right Lung	24	6	2	-
Left lung	11	15	2	-

Table 3: Comparison of pulmonary fissural pattern in different studies.

	Varalakshmi et al, 2014 [7] (n=64)	Ambali et al, 2014 [8] (n=100)	Thapa et al, 2016 [9] (n=40)	Gopalakrishna et al, 2017 [10] (n=100)	Shivleela et al, 2017 [11] (n=84)	Present study n=60
Right Oblique fissure (%)						
Incomplete	16.7	14	30	14	63	13.33
Absent	0	4	0	0	1	-
Right Horizontal fissure (%)						
Incomplete	30	28	50	20	63	30
Absent	10	8	20	6	26	3.33
Left Oblique fissure (%)						
Incomplete	29	18	25	8	70	28.33
Absent	3	4	15	6	9	-

Fig. 1: Absent horizontal fissure in right lung.**Fig. 2:** A superior accessory fissure in the lower lobe of the right lung separating the upper part of the lobe from rest of the basal segments

DISCUSSION

The oblique fissure is also known as the Major fissure. The oblique fissures of each lung are indicated by a line joining the spine of the T3 vertebra, which is opposite the posterior end of the fifth rib, to the sixth rib in the midclavicular line. More simply, this is approximately the line of the fifth rib, or level with the vertebral border of the scapula when the arm is fully abducted above the head [2].

**Fig.3:** An accessory fissure near the apex of left lung.

The horizontal fissure is also known as the Minor fissure. The middle lobe of the right lung may not be completely separate from the upper lobe, the fissure separating it from the upper lobe being incomplete or even absent. The fourth costal cartilage overlies the horizontal fissure between the upper and middle lobes; continued horizontally this line meets the oblique fissure in the midaxillary line [2].

Horizontal fissure was more frequently found to be incomplete when compared to the oblique fissure of right lungs in our study (Table 1). This finding is similar to the results of other studies



as shown in Table 3 [7-10]. The horizontal fissure was absent in 2(3.33%) right lungs while the oblique fissure was present in all the specimens. Our findings is similar to that of Raasch et al [6] who opined that incompleteness of the minor fissure was far more common than the incompleteness of any portion of either major fissure. Fusion was more common and usually more extensive between the middle and upper lobes (across the minor fissure) than between the middle and lower lobes (across the major fissure) [6]. Development of incomplete fissures may be attributed to the influence of genetic and environmental factors during the development of lung.

An incomplete major fissure causes an odd appearance of fluid tracking within the fissure in pleural effusion. Also, pneumonia may spread to adjacent lobes though the incomplete fissures. Odd lobar involvement with carcinoma of the lung may be explained on a similar basis [3]. Interlobar collateral ventilation is due to the absence of interlobar lung fissures with consequent anatomical and functional communication between the lobes. Thus, incomplete interlobar fissures and interlobar collateral ventilation are strictly related to one another [12]. Incomplete fissures may alter the usual patterns of collapse seen in patients with endobronchial lesions. Due to incomplete fissures, collateral air drift may keep the obstructed lobe aerated even though the bronchus supplying the lobe is obstructed [3].

Gompelmann et al [13] in his review concluded that completeness of interlobar fissures is a crucial factor in predicting a good clinical outcome following valve treatment in patients with emphysema. Also, that the incomplete interlobar fissures can be considered as markers of collateral ventilation.

Taverne Y et al. opined that perioperative identification of the completeness of fissures is imperative before performing lobectomy to prevent postoperative air leakage [14].

Anatomically, an accessory fissure is a cleft of varying depth lined by visceral pleura. Radiographically its appearance is similar to oblique and horizontal fissures, except for the location [6]. Accessory fissures correspond to the planes of division between bronchopulmonary

segments and account for many of the previously reported accessory lobes [15]. Accessory fissures can be mistaken for interlobar fissure, a scar, the wall of a bulla, or a pleural line made visible by pneumothorax [6].

The most common accessory fissures are the azygos, inferior, and superior accessory fissures and the left minor fissure [1]. The inferior accessory fissure separates the medial basal segment from the remainder of the lower lobe [1]. The cardiac lobe is the medial basal segment of the lower lobe, which is demarcated by the inferior accessory fissure [15].

The superior accessory fissure separates the superior segment of the lower lobe from the basal segments. When it is present, the superior segment has been called the posterior or dorsal lobe. The fissure lies at about the same level as or slightly lower than the horizontal fissure[16].

In our study, we came across a specimen of right lung with the superior accessory fissure in the lower lobe. Horizontal fissure was found to be absent in the specimen.

The azygos fissure is created by downward invagination of the azygos vein through the apical portion of the right upper lobe. It is manifested radiographically as a curvilinear tear drop shadow caused by the azygos vein itself . Because the vein runs outside the parietal pleura, four pleural layers (two parietal and two visceral) form the fissure. The fissure is visible on about 0.5% of chest radiographs [1]. The azygous fissure is almost invariably in the right lung, although left azygous fissures have been reported with the vein at the base of the fissure being the left superior intercostal vein[16]. In the present study an accessory fissure was noted near the apex of a left lung. The fissure was incomplete, ran horizontally across the apex of the upper lobe.

Accessory fissures may be confused with areas of linear atelectasis, pleural scars, or walls of bullae. Presence of accessory fissures in lung specimens is not uncommon, but it is difficult to appreciate them on radiographs and CT scans hence they are either not appreciated as distinct entities or are completely misinterpreted [4].

CONCLUSION

The present study shows that the horizontal fissure is more frequently incomplete or absent when compared to the oblique fissure in the right lung. Superior accessory fissure in the lower lobe of a right lung was observed in 1 (1.66%) specimen. Knowledge of the varying degrees of completeness of pulmonary fissures and accessory fissures is essential to avoid misinterpretation of radiological signs.

Conflicts of Interests: None

REFERENCES

- [1]. Muller NL, Silva C Isabela S. Imaging of the Chest. Volume 1. Saunders; 2008: 6-18.
- [2]. Sinnatamby CS. Last's Anatomy. Regional and Applied. 12th Edition. Elsevier.Churchill Livinstone; 2012: 214-218.
- [3]. Tarver RD. How common are incomplete pulmonary fissures, and what is their clinical significance? *Am J Roentgenol* 1995; 164(3):761.
- [4]. Godwin JD, Tarver RD. Accessory fissures of the lung. *AJR Am J Roentgenol* 1985; 144(1):39-47.
- [5]. Meenakshi S, Manjunath KY, Balasubramanyam V. Morphological variations of the lung fissures and lobes. *Indian J. Chest. Dis. Allied Sci.* 2004;46: 179-182.
- [6]. Raasch BN, Carsky EW, Lane EJ, O Callghan JP, Heitzman ER. Radiographic anatomy of the interlobar fissures: A study of 100 specimens. *AJR* 1982; 138 : 1043-49.
- [7]. Varalakshmi KL, Jyothi NN, Sangeetha M. Morphological variations of fissures of lung. *Indian J Appl Res* 2014;4:457 69.
- [8]. Ambali MP, Jadhav SD.; Doshi MR, Patil; Roy P, Desai RR. Variations of Lung Fissures: A Cadaveric Study. *Journal of Krishna Institute of Medical Sciences University.* 2014; 3(1):85-89
- [9]. Thapa P, Desai SP. Morphological variation of human lung fissures and lobes: An anatomical cadaveric study in North Karnataka, India. *Indian j health sci* 2016;9:284-7.
- [10]. Gopalakrishna K, Deepalaxmi S, Somashekara S C, Rathna B S. A cadaveric study on morphological variations of fissures and lobes in the human lungs and its clinical significance. *J Exp Clin Anat* 2017;16:7-11.
- [11]. Shivaleela C, Lakshmi Prabha S, Afroze M K H. A study of anatomical variations in patterns of fissures and lobes in human lungs: a cadaveric study with clinical significance. *Int J Anat Res* 2018;6(1.1):4819-4823.
- [12]. Diso D, Anile M, Carillo C, et al. Correlation between collateral ventilation and interlobar lung fissures. *Respiration.* 2014;88(4):315–319
- [13]. Gompelmann D, Heussel CP, Eberhardt R, et al. Efficacy of bronchoscopic thermal vapor ablation and lobar fissure completeness in patients with heterogeneous emphysema. *Respiration* 2012;83:400–6.
- [14]. Taverne Y, Kleinrensink GJ , Rooij PD. Perioperative Identification of an Accessory Fissure of the Right Lung. *Case reports in pulmonology* 2015.
- [15]. Patterson, GA, Cooper JD, Deslauriers J, Lerut A, Luketich JD, Rice TW, Pearson FG. Pearson's Thoracic and Esophageal Surgery . 3rd Edition. Churchill Livingstone; 2008: 401-414.
- [16]. Cronin P, Gross BH, Kelly AM, Patel S, Kazerooni EA, Carlos RC .Normal and accessory fissures of the lung: evaluation with contiguous volumetric thin-section multidetector CT. *Eur J Radiol.*2010; 75:1–8.

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ABSTRACT

Background: Pulmonary fissures are invaginations of the visceral pleura that extend from the outer surface of the lung into its substance. The fissures are grouped into normal and accessory fissures. The oblique fissure and horizontal fissures are the normal pulmonary fissures which may be complete, incomplete or absent. Incomplete pulmonary fissures are considered to be markers of collateral ventilation. They play a significant role in determining clinical response following valve replacement surgery in emphysematous patients. The Accessory fissures occurring within an individual lobe may be confused with other lesions such as linear atelectasis, pleural scar. Knowledge of the variations in the pulmonary fissures is useful for clinical interpretation. It is in this regards that this study was undertaken to assess the morphology of pulmonary fissures.

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Conclusions: The present study shows that the horizontal fissure is more frequently incomplete or absent when compared to the oblique fissure in the right lung. Superior accessory fissure in the lower lobe of a right lung was observed in 1 (1.66%) specimen. Knowledge of the varying degrees of completeness of pulmonary fissures and accessory fissures is essential to avoid misinterpretation of radiological signs.

KEY WORDS: Pulmonary Fissure, Oblique Fissure, Horizontal Fissure, Incomplete Fissure, Superior Accessory Fissure.

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Table 3: Comparison of pulmonary fissural pattern in different studies.

	Varalakshmi et al, 2014 [7] (n=64)	Ambali et al, 2014 [8] (n=100)	Thapa et al, 2016 [9] (n=40)	Gopalakrishna et al, 2017 [10] (n=100)	Shivleela et al, 2017 [11] (n=84)	Present study n=60
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Fig. 1: Absent horizontal fissure in right lung.**Fig. 2:** A superior accessory fissure in the lower lobe of the right lung separating the upper part of the lobe from rest of the basal segments

DISCUSSION

The oblique fissure is also known as the Major fissure. The oblique fissures of each lung are indicated by a line joining the spine of the T3 vertebra, which is opposite the posterior end of the fifth rib, to the sixth rib in the midclavicular line. More simply, this is approximately the line of the fifth rib, or level with the vertebral border of the scapula when the arm is fully abducted above the head [2].

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The most common accessory fissures are the azygos, inferior, and superior accessory fissures and the left minor fissure [1]. The inferior accessory fissure separates the medial basal segment from the remainder of the lower lobe [1]. The cardiac lobe is the medial basal segment of the lower lobe, which is demarcated by the inferior accessory fissure [15].

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REFERENCES

- [1]. Muller NL, Silva C Isabela S. Imaging of the Chest. Volume 1. Saunders; 2008: 6-18.
- [2]. Sinnatamby CS. Last's Anatomy. Regional and Applied. 12th Edition. Elsevier.Churchill Livinstone; 2012: 214-218.
- [3]. Tarver RD. How common are incomplete pulmonary fissures, and what is their clinical significance? *Am J Roentgenol* 1995; 164(3):761.
- [4]. Godwin JD, Tarver RD. Accessory fissures of the lung. *AJR Am J Roentgenol* 1985; 144(1):39-47.
- [5]. Meenakshi S, Manjunath KY, Balasubramanyam V. Morphological variations of the lung fissures and lobes. *Indian J. Chest. Dis. Allied Sci.* 2004;46: 179-182.
- [6]. Raasch BN, Carsky EW, Lane EJ, O Callghan JP, Heitzman ER. Radiographic anatomy of the interlobar fissures: A study of 100 specimens. *AJR* 1982; 138 : 1043-49.
- [7]. Varalakshmi KL, Jyothi NN, Sangeetha M. Morphological variations of fissures of lung. *Indian J Appl Res* 2014;4:457 69.
- [8]. Ambali MP, Jadhav SD.; Doshi MR, Patil; Roy P, Desai RR. Variations of Lung Fissures: A Cadaveric Study. *Journal of Krishna Institute of Medical Sciences University.* 2014; 3(1):85-89
- [9]. Thapa P, Desai SP. Morphological variation of human lung fissures and lobes: An anatomical cadaveric study in North Karnataka, India. *Indian j health sci* 2016;9:284-7.
- [10]. Gopalakrishna K, Deepalaxmi S, Somashekara S C, Rathna B S. A cadaveric study on morphological variations of fissures and lobes in the human lungs and its clinical significance. *J Exp Clin Anat* 2017;16:7-11.
- [11]. Shivaleela C, Lakshmi Prabha S, Afroze M K H. A study of anatomical variations in patterns of fissures and lobes in human lungs: a cadaveric study with clinical significance. *Int J Anat Res* 2018;6(1.1):4819-4823.
- [12]. Diso D, Anile M, Carillo C, et al. Correlation between collateral ventilation and interlobar lung fissures. *Respiration*. 2014;88(4):315–319
- [13]. Gompelmann D, Heussel CP, Eberhardt R, et al. Efficacy of bronchoscopic thermal vapor ablation and lobar fissure completeness in patients with heterogeneous emphysema. *Respiration* 2012;83:400–6.
- [14]. Taverne Y, Kleinrensink GJ , Rooij PD. Perioperative Identification of an Accessory Fissure of the Right Lung. *Case reports in pulmonology* 2015.
- [15]. Patterson, GA, Cooper JD, Deslauriers J, Lerut A, Luketich JD, Rice TW, Pearson FG. Pearson's Thoracic and Esophageal Surgery . 3rd Edition. Churchill Livingstone; 2008: 401-414.
- [16]. Cronin P, Gross BH, Kelly AM, Patel S, Kazerooni EA, Carlos RC .Normal and accessory fissures of the lung: evaluation with contiguous volumetric thin-section multidetector CT. *Eur J Radiol*.2010; 75:1–8.

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A STUDY ON POSITION OF INFRAORBITAL FORAMEN

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ABSTRACT

Background: The infraorbital foramen is located on the maxillary bone about 1 cm inferior to the infraorbital margin. The infraorbital nerve and vessels are transmitted through this foramen. The infraorbital nerve, the continuation of the maxillary or second division of the trigeminal nerve, is solely a sensory nerve. It traverses the inferior orbital fissure into the inferior orbital canal and emerges onto the face at the infraorbital foramen. It divides into several branches that innervate the skin and the mucous membrane of the midface, such as the lower eyelid, cheek, lateral aspect of the nose, upper lip, and the labial gum.

Materials and Methods: Total 300 skulls were used for this study, the following measurements were recorded, mean distance between the infra orbital foramen and the infra orbital margin on right and left side and average of it. The mean distance between the infra orbital foramen and the piriform aperture on right and left side measured and average of it also recorded. The mean distance between infra orbital foramen and the anterior nasal spine on right and left side measured. The transverse and vertical diameter also measured.

Results: Total 300 skulls were used for this study, the results were the mean distance between the infra orbital foramen and the infra orbital margin was 8.48 ± 1.92 mm, on right side it was 8.72 ± 2.16 mm and 8.20 ± 1.92 mm on left. The mean distance between the infra orbital foramen and the piriform aperture was 19.35 ± 3.26 mm, on right side it was 19.10 ± 3.42 mm and 19.56 ± 3.26 mm on left. The mean distance between infra orbital foramen and the anterior nasal spine on right was 34.86 ± 6.73 mm and left was 36.12 ± 3.72 mm and total average was 35.51 ± 3.75 mm. The transverse diameter was 3.16 ± 0.96 mm and vertical diameter was 3.03 ± 0.72 mm.

Conclusion: The knowledge of infraorbital foramen may be helpful in blocking of nerve passing through it for surgical purpose.

KEY WORDS: Infraorbital foramen, Infraorbital nerve, Infraorbital vessels, Face.

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INTRODUCTION

The infraorbital foramen is located in the maxillary bone. It is the anterior opening of the infraorbital canal, which is the anterior continuation of the infraorbital groove, which course through the floor of the orbit. The canal may

reside entirely in the maxillary sinus, suspended from the sinus roof by a mesentery. The foramen's facial surface is superior to the canine fossa and inferior to the lower margin of the orbit. It transmits the infraorbital nerve, a branch of the maxillary division of the trigemi

nal nerve and infraorbital artery and vein. Within the infraorbital groove, the infraorbital nerve gives off sensory branches to the maxillary sinus and upper teeth, that are posterior superior alveolar nerve, middle superior alveolar nerve, anterior superior alveolar nerve.

The infraorbital foramen is an important landmark in facilitating anaesthetic and surgical interventions of the midface region. The infraorbital nerve block is widely used to accomplish regional anaesthesia during surgeries involving the midface region and paranasal sinuses. Traumatic or iatrogenic injury to the infraorbital neurovascular bundle may result in bleeding and hypoesthesia or paraesthesia or anaesthesia in the region of its supply [1-4].

The nerve block of infraorbital nerves can be used in following cases. The location of the infraorbital foramen determines the orientation of an acupuncture point used in trigeminal neuralgia treatment [5]. The position of the infraorbital foramen helps to locate the infraorbital plexus region which we believe a risk zone during plastic surgery [6]. The location of this foramen determines morphometric variations from reference points to decrease the risk of orbital surgery [7]. The morphometry of this foramen plays an important role during regional block anesthesia techniques of the infraorbital nerve [8, 9].

The precise location of the foramen facilitates risk free zygoma fracture surgery [10]. Hence, detailed knowledge of the precise anatomical location and the possible variations of the infraorbital foramen is fundamental to ensure safe and successful regional anaesthesia and to avoid the risk of damaging the neurovascular bundle during surgery in this region.

MATERIALS AND METHODS

300 dry adult human skulls constituted the material for the present study. The skulls belong to the Department of Anatomy, JJM Medical College, Davangere, Rajarajeswari Medical college, Bangalore and Gadag govt medical college, Gadag, Karnataka, India. Each was studied for the morphometric analysis of Infra orbital foramen position. Each skull examined properly and located infraorbital foramen, measurements were recorded with

Vernier callipers.

RESULTS

Total 300 skulls were used for this study, the results were the mean distance between the infra orbital foramen and the infra orbital margin was 8.48 ± 1.92 mm, on right side it was 8.72 ± 2.16 mm and 8.20 ± 1.92 mm on left. The mean distance between the infra orbital foramen and the piriform aperture was 19.35 ± 3.26 mm, on right side it was 19.10 ± 3.42 mm and 19.56 ± 3.26 mm on left. The mean distance between infra orbital foramen and the anterior nasal spine on right was 34.86 ± 6.73 mm and left was 36.12 ± 3.72 mm and total average was 35.51 ± 3.75 mm. The transverse diameter was 3.16 ± 0.96 mm and vertical diameter was 3.03 ± 0.72 mm (Table 1 & 2).

Table 1: The mean distances between Infra orbital foramen and various reference points.

Distances between	Right side	Left side	Total
IOF - IOM	8.72 ± 2.16 mm	8.20 ± 1.92 mm	8.48 ± 1.92 mm
IOF - PA	19.10 ± 3.42 mm	19.56 ± 3.26 mm	19.35 ± 3.26 mm
IOF - ANS	34.86 ± 6.73 mm	36.12 ± 3.72 mm	35.51 ± 3.75 mm

IOF – Infra orbital foramen, IOM – Infraorbital margin, ANS- Anterior nasal spine, PA- Piriform aperture.

Table 2: Transverse Diameter and Vertical diameter of Infra orbital foramen.

Measurement of IOF	
Transverse Diameter	3.16 ± 0.96 mm
Vertical diameter	3.03 ± 0.72 mm

CONCLUSION

The Infra orbital foramen is the way to the infraorbital nerve, vessels and the knowledge of its position is very useful to the professionals who manipulate the maxilar region like in acupuncture, zygoma's fracture surgery, practical of intra and extra oral anesthesia[10]. The dentist and surgeons of head and neck have to know the exactly position of Infra orbital foramen, because the anesthetic must be put on the foramen in order that it diffuses by the canal and causes the anterior superior alveolar nerve block and in consequence, the block of the branches that supply the central superior incisive teeth, lateral incisive and superior canine, ipsilateral to the blocked nerve[11].

Figun [12] point out that, the topography of

Infra orbital foramen presents unquestionable interesting on the anesthesia practice of alveolar anterior superior nerve and the infraorbital branch, because the foramen is an excellent reference point to intraoral functions and extra oral, 5 to 7mm inferior to the infra orbital margin, this is in correlation with our present study observation that is 8.48 ± 1.92 mm, some more previous studies were recorded same measurement which are having similar findings as our present study. Dubrul[13] reported about the variable distance between 6 to 8mm under the inferior margin of the orbit. Bergman et al[14] describe a bigger variation, between 3 to 7mm inferior to the infra orbital margin. Karakas et al[15] pointed that the measurement between the Infra orbital foramen and midpoint of the inferior orbital margin was taken as 7 mm. The present study was reported that mean distance between infraorbital foramen and anterior nasal spine was 35.51 ± 3.75 mm, this findings are in correlation with previous studies [16, 17]. In another study also reported slight higher results than present study in Indian population [1]. The mean distance of the infraorbital foramen from the piriform aperture was 19.35 ± 3.26 mm, which was close to some previous studies record. Rajani Singh[18] was reported 15.56 , Kazkayasi et al[19] reported 14.70 mm.

According to the literature there are some standards of location of the foramen on the surface, one of them is to check the line that joins the gingival margin, situated between the central and lateral incisive, medial to the fronto-zygomatic suture, a reference point easily recognized 4mm over a horizontal line that passes by the lateral angle of eyelid slit. Another classic conduct suggests situate the foramen on a vertical line that joins the supraorbital incisure to the mentonian foramen, 5 to 6mm under the orbital margin. Information on skull foramina size and symmetry is increasingly important because of the advancements in radiologic techniques such as magnetic resonance imaging and computed tomography. These methods are making difficult diagnoses of pathologic conditions of skull foramina possible[13, 20].

The importance of the incidence and lateralization of the Infra orbital foramen is also evident

in facial surgical procedures. The recognition of the presence of double or triple foramen is essential when the appropriate amount of anesthesia is applied, or it can be inappropriate. The study of the Infra orbital foramen is also basic to prevent the potential risk for iatrogenic injury during facial surgeries due to the presence of additional branches of the infra orbital nerve[19]. Previous studies show the relation between infra orbital foramen and the other anatomical structures, in studies with different purposes, what shows its importance as a repair point: distance between infra orbital foramen and an imaginary horizontal line in the piriform aperture base, inferior orbital fissure and the more inferior portion of the optical channel[21] medium facial line on an imaginary line that passes through the supraorbital incisure; eyes pupil and second premolars[22] medium sagittal plane and supraorbital incisures[23] and finally related to the piriform aperture[19]. The morphometric and morphological studies of foramen of skull and different bones of skull are more helpful in surgery practice and anthropometric studies[24, 25]. The present study results of infraorbital foramen morphometric measurements may be helpful in facial and dental surgery practice.

Conflicts of Interests: None

REFERENCES

- [1]. Deepthi Nanayakkara, Roshan Peiris, Navini Mannapperuma, Amal Vadysinghe. Morphometric Analysis of the Infraorbital Foramen: The Clinical Relevance. Anatomy Research International. Volume 2016, Article ID 7917343. <http://dx.doi.org/10.1155/2016/7917343>.
- [2]. Aziz S R, J. M. Marchena, and A. Puran. Anatomic characteristics of the infraorbital foramen: A Cadaver Study. Journal of Oral and Maxillofacial Surgery, 2000;58(9):992-996.
- [3]. Chandra R. K, Kennedy D. W. Surgical implications of an unusual anomaly of the infraorbital nerve. Ear, Nose and Throat Journal, vol.83,no.11,pp.766-767,2004.
- [4]. Shaik HS, Shepur MP, Desai SD, Thomas ST, Maavishettar GF, Haseena S. Study of mastoid canals and grooves in South Indian skulls. Indian J Med Healthc 2012;1:32-33.
- [5]. Esper RS, Yara J, Yamamura Y, Crimenti SV. Relações anatômicas do ponto de acupuntura E-2 (Sibai) localizado no forame infraorbital. Rev Paul Acupunct. 1998;4:19-21.

- [6]. Hwang K, Han JY, Battuvshin D, Kim DJ, Chung IH. Communication of infraorbital nerve and facial nerve: anatomic and histologic study. *J Craniofac Surg* 2004;15:88-91.
- [7]. Karakas P, Bozkir MG, Oguz O. Morphometric measurements from various reference points in the orbit of male Caucasians. *Surg Radiol Anat* 2003;24:358-62.
- [8]. Chung MS, Kim HJ, Kang HS, Chung IH. Locational relationship of the supraorbital notch or foramen and infraorbital and mental foramina in Koreans. *Acta Anat (Basel)* 1995;154:162-6.
- [9]. Radwan IA, Saito S, Goto F. High-concentration tetracaine for the management of trigeminal neuralgia: quantitative assessment of sensory function after peripheral nerve block. *Clin J Pain* 2001;17:323-6.
- [10]. Du Tolt DF, Nortjé C. The maxillae: integrated and applied anatomy relevant to dentistry. *SADJ* 2003;58:325-30.
- [11]. Zide B, and Swift R. How to block and tackle the face. *Plast. Reconstr. Surg.*, 1998;101:2018.
- [12]. Figun, ME, Garino R. Anatomia odontologica funcional E aplicada. Sao paulo, panamericana. 1994.
- [13]. Dubrul EL, Sicher and Dubrul oral anatomy. 8th ed. Ishiyaku euroamerica publishers. 1991.
- [14]. Bergman RA, Thompson SA, Afifi AK, Saadeh FA. Compendium of human anatomic variation: catalog, Atlas and world literature. Baltimore. Urban & Schwarzenberg. 1998.
- [15]. Karakas P, Bozkir M.G, Oguz O. Morphometric measurements from various reference points in the orbit of male caucasians. *Surg. Radiol. Anat.* 2002;24(6), 358-62.
- [16]. Zygocka. A, Podgorski, K. Jedrzejewski, M. Topol, and M. Polgaj. The location of the infraorbital foramen in human skulls, to be used as new anthropometric landmarks as a useful method for maxillo-facial surgery. *Folia Morphologica*. 2002;7(2):198-204.
- [17]. Singh, A., P. Agarwal, N. Singh, and S. Debberma. Accessory infraorbital foramen and Morphometric localization of infraorbital foramen. *National Journal of Integrated Research and Medicine*. 2015;6(5):28-33.
- [18]. Rajani Singh. Morphometric analysis of infraorbital foramen in Indian dry skulls. *Anat Cell Biol* 2011;44:79-83. doi: 10.5115/acb.2011.44.1.79.
- [19]. Kazkayasi M, Ergin A, Ersoy M et al. A Microscopic anatomy of the infra orbital canal, nerve, and foramen. *Otolaryngology - Head & neck surgery*. 2003;129(6):692-697.
- [20]. Berge JK, Bergman RA. Variations in size and in symmetry of foramina of the human skull. *Clinical anatomy*. 2001;14(6):406-413.
- [21]. Rontal E, Rontal M, Guilford F T. Surgical anatomy of the orbit. *Ann. Otol.* 1979;88:382-6.
- [22]. Molliex S, Navez M and Baylot D. Regional anaesthesia for outpatient nasal surgery. *British journal of anaesthesia*. 1996;76:(1) 151-153.
- [23]. Chung MS, Kim HJ, Kang HS, Chung IH. Locational relationship of the supraorbital notch or foramen and infraorbital and mental foramina in Koreans. *Acta anat.* 1995;154:162-6.
- [24]. Saheb HS, Mavishettar GF, Thomas ST, Prasanna LC, Muralidhar P. Occipitalization of Atlas: A case report. *J. Biomedsci and Res.* 2010;2:73-75.
- [25]. Hussain Saheb S, Mavishettar GF, Thomas ST, Prasanna LC. Incidence of metopic suture in adult south Indian skulls. *J Biomed Sci Res* 2010;2:223-6.

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Original Research Article

ESTIMATION OF THE CRANIAL CAPACITY IN DRY HUMAN SKULL BONES

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ABSTRACT

Introduction: Cranial capacity is a measure of the volume of the interior of the skull of those vertebrates who have both a skull and a brain. Cranial capacity is used as a rough indicator of the size of brain. Cranial capacities like several bodily dimensions are affected by environmental, ecological, biological, geographical, racial, gender and age factors.

Aim: The aim of the study is to measure and calculate cranial capacity by direct and calculated methods and to classify the skull under different subtypes.

Materials and Methods: The study will constitute 100 dried human skull bones belonging to both sexes in the Department of Anatomy, Rajarajeswari medical college, Bengaluru.

Results: The average cranial capacity by using direct method is $1275.33 \text{ cc} \pm 124.68 \text{ cc}$ in male skulls and $1213 \text{ cc} \pm 138.66 \text{ cc}$ in female skulls and by calculated method is $1344.10 \text{ cc} \pm 106.62 \text{ cc}$ in male skulls and $1276.26 \text{ cc} \pm 68.72 \text{ cc}$ in female skulls respectively.

Conclusion: The mean cranial capacities of male skulls were higher than that of female skulls that tends to agree with similar studies conducted earlier. Thus, the cranial capacity of the male skulls is 5-15% higher than the female skulls.

KEY WORDS: Cranial capacity, linear measurement, packing method, Lee-Pearson formula

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INTRODUCTION

Cranial capacity is a measure of the volume of the interior of the skull (also called the braincase or brainpan) of those vertebrates who have both a skull and a brain. Cranial volume is often used as a general estimate for the size of a vertebrate's brain. Cranial capacity is used as a rough indicator of the size of brain. Craniometric study is an important fraction of anthropometry that can be employed in the determination

of cranial study of an individual. Cranial capacities like several bodily dimensions are affected by environmental, ecological, biological, geographical, racial, gender and age factors. The cranial capacity has been used indirectly to reflect the volume of the brain and to predict the mental ability. It is also useful in the field of forensic anthropology and pediatrics as an indicator of skull development in both male and female individuals [1]. Skulls may be classified

according to their cranial capacities as Microcephalic: Cranial capacity < 1350 cc, Mesocephalic: Cranial capacity 1350 cc to 1450 cc Megacephalic: Cranial capacity > 1450 ccs [2]. This information is useful in correlating cranial capacity with other cranial measurements and in studies of primate phylogeny. Medically, an analysis of cranial capacity exposes another aspect of growth and development and permits critical evaluation of unusually large, small, or misshapen crania [3]. These skeletons are from living primates some are from the fossil records. For this reason physical anthropologists have become specialists in skeletal anatomy [4]. In Forensic science, anthropologists are often directly involved in the analysis of archeological and fossilized skeletal remains. Using skeletal remains, the anthropologists can also estimate a person's stature and general body proportion in life. In addition, skeletal remains help in the determination of a person's racial background [5].

AIM: The aim of the study is to measure and calculate cranial capacity by direct and calculated methods and to classify the skull under different subtypes.

MATERIALS AND METHODS

Source of Data: The study constituted 100 dried human skulls belonging to both sexes in the Department of Anatomy from the first year students (2013-15 batches), Raja Rajeshwari Medical college, Bengaluru. Approval from the institutional ethics committee was taken for the study. The sex of the skulls was determined by examining the superciliary arches, mastoid process, frontal and parietal eminence, muscular ridges. Materials used were spreading calipers, Measuring tape, Channa dal to fill into the skull, Two liters measuring cylinder to measure the quantity, Rubber ring as a bed to place the skull during the procedure, Cotton to plug the foramina.

METHODS OF COLLECTION OF DATA:

Linear Measurement: The cranial volume is calculated by using three principle dimensions of the cranium: 1. Maximum cranial length (L): One point at the glabella and another point at the inion are taken and the maximum cranial length is measured using spreading caliper.

2. Maximum cranial breadth (B): This is measured using spreading caliper, distance between two parietal eminences above the zygomatic arches (Biparietal diameter). 3. Basion-bregmatic height (H): One point is taken at the basion and another point on the bregma and the height is measured using measuring tape. Usually the measurement should be made at least 3 times and the average of the three is considered for calculations. Using the following formula derived by Lee- Pearson the cranial volume can be computed- Males: $524.6 + 0.000266 \times L \times B \times H$ & Females: $812 + 0.000156 \times L \times B \times H$.

Packing/Filling Method: This method is widely used for determining the cranial volume of the skull, where the interior of the skull is packed with the filling materials and then measured. Packing materials used in our study is channa dal. First all the foramina of the skull are plugged with cotton. Then the skull is placed over the rubber ring with frontal end at a lower level. After all the foramina were packed by cotton, a large funnel is placed into the foramen magnum. Now channa dal is poured into the skull with a forward tilt. Again skull is tilted to right and left to fill the dal upto foramen magnum, and pressed with thumb gently backward and downwards into occipital region, and then the space left is finally filled with dal upto the level of foramen magnum and smoothed off without pressure. The filled in channa dal into the skull were poured into the 2litres graduated measuring jar and the readings were taken. The process was repeated to cross check the accuracy of measurements.

Statistical Methods: Descriptive and inferential statistical analysis has been carried out in the present study. Analysis of variance (ANOVA) has been used to find the significance of study parameters between three or more groups of skulls and Student t test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale within each group. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. Pearson correlation between study variables is performed to find the degree of relationship [6, 7].

RESULTS

Table 1: Gender distribution of skulls studied.

Gender	No. of skulls	%
Male	60	60
Female	40	40
Total	100	100

Table 2: Length (mm) distribution of skulls studied.

Length (mm)	Gender		Total
	Male	Female	
<150	1(1.7%)	3(7.5%)	4(4%)
150-160	1(1.7%)	6(15%)	7(7%)
161-170	18(30%)	11(27.5%)	29(29%)
171-180	28(46.7%)	16(40%)	44(44%)
181-190	12(20%)	4(10%)	16(16%)
Total	60(100%)	40(100%)	100(100%)

Table 3: Breadth (mm) distribution of skulls studied.

Breadth (mm)	Gender		Total
	Male	Female	
<120	0(0%)	3(7.5%)	3(3%)
120-130	28(46.7%)	19(47.5%)	47(47%)
131-140	27(45%)	15(37.5%)	42(42%)
141-150	5(8.3%)	3(7.5%)	8(8%)
Total	60(100%)	40(100%)	100(100%)

Table 4: Height (mm) distribution of skulls studied.

Height (mm)	Gender		Total
	Male	Female	
<120	1(1.7%)	2(5%)	3(3%)
120-130	13(21.7%)	18(45%)	31(31%)
131-140	44(73.3%)	20(50%)	64(64%)
141-150	2(3.3%)	0(0%)	2(2%)
Total	60(100%)	40(100%)	100(100%)

Table 5: Comparison of Measurements in male and female skulls studied.

Measurements	Gender		Total	P value
	Male	Female		
Length (mm)	173.92±8.17	169.27±10.22	172.06±9.28	0.013*
Breadth (mm)	131.82±6.24	131.33±7.18	131.62±6.60	0.717
Height (mm)	133.48±4.99	130.96±5.41	132.47±5.28	0.019*

Table 6: Direct cranial volume (ml) distribution of skulls studied.

Direct cranial volume (ml)	Gender		Total
	Male	Female	
Microcephalic	38(63.3%)	37(92.5%)	75(75%)
Mesocephalic	19(31.7%)	2(5%)	21(21%)
Megacephalic	3(5%)	1(2.5%)	4(4%)
Total	60(100%)	40(100%)	100(100%)

Table 7: Calculated cranial volume (ml) distribution of skulls studied.

Calculated cranial volume (ml)	Gender		Total
	Male	Female	
Microcephalic	32(53.3%)	37(92.5%)	69(69%)
Mesocephalic	24(40%)	2(5%)	26(26%)
Megacephalic	4(6.7%)	1(2.5%)	5(5%)
Total	60(100%)	40(100%)	100(100%)

Table 8: Comparison of Direct cranial Volume and Calculated Cranial Volume in male and female skulls studied.

	Gender		Total	P value
	Male	Female		
Direct cranial volume (ml)	1275.33±124.68	1213.00±138.66	1250.40±133.34	0.021*
Calculated cranial volume (ml)	1344.10±106.62	1276.26±68.72	1316.96±98.74	0.001**

Table 9: Testing the significance of Volume (ml) by Direct and Calculated methods.

	Min-Max	Mean ± SD	Difference	t value	P value
Direct cranial volume (ml)	850.00-1600.00	1250.40±133.34	-	-	-
Calculated cranial volume (ml)	1134.13-1941.90	1316.96±98.74	66.561	6.425	<0.001*

Table 10: Correlations Direct cranial volume with length, breadth, height, Circumference.

Pearson Correlation	r value	P value
Direct cranial volume (ml) v/s Length (mm)	0.426	<0.001**
Direct cranial volume (ml) v/s Breadth (mm)	0.604	<0.001**
Direct cranial volume (ml) v/s Height (mm)	0.558	<0.001**
Direct cranial volume (ml) v/s Circumference (mm)	0.643	<0.001**
Direct Cranial Volume (ml) v/s calculated (mm)	0.638	<0.001**

DISCUSSION

In the present study following observations are done, 6 the mean cranial capacity by using: A) Direct measurement is 1275.33cc ± 124.68cc in male skulls and 1213cc ± 138.66cc in female skulls. B) Calculated method is 1344.10cc ± 106.62 cc in male skulls and 1276.26cc ± 68.72cc in female skulls. Based on overall mean cranial capacity of both sexes by direct method, the skulls could be classified as 63.3% of male and 92.5% of female skulls were microcephalic. However, 31.7% of male and 5% of female skulls were mesocephalic, while 5% of male and

2.5% of female skulls were megacephalic.

Thus, based on calculated method, the skulls could be classified as, 53.3% of male and 92.5% of female skulls were microcephalic, however, 40% of male and 5% of female skulls were mesocephalic and while 6.7% of male and 2.5% of female skulls were megacephalic. The skulls used in the present study has a rounded to long shape (dolicocephalic), with a narrow nasal aperture, moderately developed supraorbital ridging, prominent nasal spine, a steeple shaped nasal root, little prognathism and a narrow interorbital distance. The forehead is steep, the chin is prominent, the palate is long and narrow, the cheek bones are not overly prominent and there is a tendency to maxillary protrusion or mandibular retrusion which belongs to the Caucasoid racial group.

In 1995, study of Korean adult cranial capacity done by Young Hawy by Direct/ filling method cranial capacity of male and female 1407 ± 107 and 1317 ± 117 which is more than our study may be due to ethnic factor [8].

Manjunath in 2002, estimated cranial volume in 50 dissecting room cadavers (33 males; 17 females) using linear dimensions of the head (using Lee-Pearson's formula) measured with spreading caliper and Todd's head spanner. Following the removal of the calvaria the cranial volume was again estimated using spheroid formula after subtracting the linear dimensions from scalp/soft tissue thickness. The estimated mean cranial volume was as follows: by calculated method/ Lee Pearson's formula: Males: 1152.813 ± 279.16 cc; Females: 1117.82 ± 99.09 cc. By spheroid formula: Males-mean: 1169.68 ± 239.98 cc; Females-mean 1081 ± 111.6 cc and the length, breadth, height, circumference similar to our results [9].

In 2007, Acer Usanmaz estimated CC in 17-22 years old university students Turkey. They studied 226 male and 140 female health students and found that CC is 1411cc and 1306cc respectively. There was significant difference between genders. Their study showed CC is larger in males, results similar to our study [10]. In 2010 Gohiya et al, estimated CC in 20-25 years old population of Madhya Pradesh. They studied 200 males and females by using linear dimensions of head, mean CC in males and

females 1380cc and 1189cc respectively. This study has shown significance difference between male and female population, male being higher than in female, and this result almost similar to our study [11].

In 2011 M.B. Maina measured CC in 150 males and 150 females, aged 18-35 years using random stratified methods. Linear measurements of CL, CH, HC and width were undertaken and their CC significantly higher in male than in females. CL significantly higher in males than in females. The result obtained from this study confirms that CC higher in males than females. CC of males and females 1442cc and 1331cc respectively. Cranial length, height, circumference and width 145 and 141, 145 and 141, 564 and 570, 191 and 183 respectively for males and females, this is similar to our study [12].

Ilayperumal et al, in 2011 Sri Lankan, a total of 210 subjects with an age span of 20-23 years were included in the study. The cranial length, breadth and auricular head height of the subjects were recorded using a digital sliding caliper and Todd's head spanner capable of measuring to the nearest 0.01mm. The cranial capacity was calculated using external dimensions of the skulls (Lee & Pearson, 1901; Williams et al., 2000). The findings of the study indicated significant sexual differences in the mean cranial capacity (male: 1421.12 ± 171.69 cc, female: 1300.95 ± 158.18 cc) similar to our study [13].

Murali Lalwani has conducted study in 2012 about craniometric to study differentiate sex from intracranial volume of dry human skulls. The study was done on 100 male and 60 females. They used dry mustard seed of uniform size to fill the cranium. CC of female 1179 and male 1302 respectively, this is similar to our study [14].

Sadakat Ali, in 2004 conducted a study on adult north Indian human skulls. They studied 112 male and 88 female dry skulls. In their study they used filling and packing method to know the CC which is 1260 and 1164 respectively in male and female similar to our study [15]. Most of the anthropologists while studying crania of various races on the basis of morphological and metrical features have concluded that the population of a country is no more formed by one homogeneous element but instead is constituted by

Authors	Cranial capacity (male)	Cranial capacity (female)	Methods used
Young Hawi etal 1995- Korea	1470 +/- 107	1317 +/- 117	Filing method
Manjunath etal 2002 – india	1152 +/- 94	1188 +/- 1188	L-P formula
Usnawz etal 2007etal – turkey	1411 +/- 118	1306 +/- 162	Linear dimension
Gohiya etal (2010) India	1380 +/- 94	1188 +/- 75	Linear dimension
Maina etal, (2011)Nigeria	14234+/-137	1331 +/- 201	Linear dimension
Murali etal, (2012)India	1302 +/- 108	1179 +/- 97	Filing method
Nzotta etal, (2014) Nigeria	1636 +/- 109	1632+/- 149	L-P formula
Sadakat etal, (2014) India	1260 +/- 75	1164+/- 89	Filling & pack
Present study	1275+/- 124	1213 +/- 138	Filing method
Present study	1344 +/-106	1276 +/-68	L-P formula

heterogeneous elements (Shukla-1966). This explains how there can be a wide range of variation of cranial capacity within a population. The skulls used in the present study has a rounded to long shape (dolicocephalic), with a narrow nasal aperture, moderately developed supraorbital ridges, prominent nasal spine, a steeple shaped nasal root, little prognathism and a narrow interorbital distance. The forehead is steep, the chin is prominent, the palate is long and narrow, the cheek bones are not overly prominent and there is a tendency to maxillary protrusion or mandibular retrusion which belongs to the Caucasoid racial group.

CONCLUSION

There was a significant difference between genders of head length, head breadth and head height of male compared to female skulls. Thus, cranial capacity of the males is 5-15% higher than the female skulls. . Therefore, estimating cranial capacity of skull is an undisputable criterion for sex determination from skeletal remains and filling method is more accurate compared to calculated method to measure cranial capacity.

ABBREVIATIONS

CC- Cranial Capacity

CL- Cranial Length

CB- Cranial Breath

HC- Head circumference

Conflicts of Interests: None

REFERENCES

- Hwang Robert jurmain. Introduction to physical anthropology, 2013-14:292.
- A K Dutta. Essentials of Human Anatomy, head and neck, 5thEdn.:3.
- Smithsonian's. The Secret in the Cellar Webcomic, an educational resource from the Written in Bone exhibition, 2009–2011:33-37.
- Pal GP, Bhagwat SS, & Routal RV. A study of sutural bone in Gujarati (Indian) crania; 1986; 44(1):67-76.
- Krogman WM. The human skeleton in forensic medicine. 23rd Edn. 1973:112-121.
- Sunder Rao P S S, Richard J et al. An Introduction to Biostatistics. A manual for students in health sciences 4th Edn 2006:86-160.
- Suresh K.P. and Chandrasekhar S. Sample Size estimation and Power analysis for Clinical research studies. Journal Human Reproduction Science. 2012;5(1):7-13.
- Hwang Y, Lee KH. Study on the Korean Adult Cranial Capacity. Journal of Korean Medical Science, 1995;10(4):239-42.
- Manjunath KY. Estimation of cranial volume in dissecting room cadavers. Journal anatomical society of India. 2002b;51(2):168-72s.
- Acer N, Usanmaz M & Ertekin T. Estimation of cranial capacity in 17-26 year old university students. Int. J. Morph. 2007;25(1):99-102.
- Gohiya VK, Shrivastava S and Gohiya S. Estimation of Cranial Capacity in 20-25 Year Old Population of Madhya Pradesh, a State of India. Int. J. Morphl. 2010;28(4):1211-14.
- MB Maina, YC Shapu, SH Garba, MA Muhammad, AM Garba, AU Yaro, Et al. Assessments of Cranial Capacities in a North-Eastern Adult Nigerian Population. Journal of Applied Sciences. 2011;2662-65.
- Ilayperuma Et al. Cranial capacity in an adult Sri Lankan population: Sexual dimorphism and ethnic diversity. Int. J. Morphol. 2011;29(2):479-84.
- Murli Lalwani Et al. Sex identification from Cranial Capacity of Adult Human Skulls. J Indian Acad Forensic Med. April-June 2012;34(2):0971-0973.
- Sadakat Ali, AP Sinha, SL Jethani, RK Rohatgi, K Anamika. Study of Cranial Capacity of Adult North Indian Human Skulls & its Sexual Dimorphism. International Journal of Scientific case Study.2014; 1(5):29-31.



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MORPHOLOGICAL AND MORPHOMETRIC STUDY OF FORAMEN SPINOSUM

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ABSTRACT

Back ground: The foramen spinosum is one of important foramina located in the base of the skull on the greater wing of sphenoid bone situated posteriorlaterally to the foramen ovale, therefore it could be identified both from the exterior and interior of the skull base, externally the foramen spinosum pierces the spinous process of the sphenoid bone at its apex or medial aspect. Foramen spinosum transmits the passage of the middle meningeal artery, parietal trunk of the middle meningeal artery and posterior trunk of the middle meningeal vein to the middle cranial fossa.

Materials and Methods: Total 300 skull were used for this study. The shape of foramen spinosum and diameter of it recorded with vernier calipers.

Results: Foramen spinosum found as round shape in 58%, oval shape in 38% and irregular in 4%. The maximum diameter of foramen spinosum was 2.77+0.97mm and 2.03+0.56mm was minimum in females, in males maximum diameter was 2.95+0.56mm and 1.52+0.82mm as minimum. The knowledge of foramen spinosum is great helpful for neurosurgeons.

Conclusion: The round shape was found in more number of skulls and very few were irregular shape. The knowledge of foramen spinosum help to cranial surgeons as it is transmitting middle meningeal artery.

KEY WORLD: Foramen spinosum, Middle meningeal artery, dry skull, sphenoid bone.

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INTRODUCTION

The greater wing of the sphenoid bone is marked by numerous foramina which transmit vital neural and vascular structures[1]. These foramina are characteristically situated along the medial aspect of the floor of the middle cranial fossa. Many variants have been described in the anatomic and radiologic literature which is not only

important to understand the complex regional neurovascular anatomy but also to distinguish the normal from the potentially abnormal structures [2,3]. One such foramen is the foramen spinosum which is located in close proximity posterolateral to foramen ovale and transmits the middle meningeal vessels, the meningeal branch of mandibular nerve and the nervous

spinosus [1]. The transmission of these neurovascular structures allows for communication between the middle cranial and the infratemporal fossae[4,5].

It transmits middle meningeal artery, nervous spinosus and occasionally posterior trunk of middle meningeal sinus. Middle meningeal artery may arise from ophthalmic artery instead of maxillary artery and enter into cranial cavity through superior orbital fissure in which, FS may be absent. Early division of middle meningeal artery before passing through FS may be the cause of duplication of foramen spinosum[6,7,8]. Foramen spinosum has been described as an important landmark for microsurgical procedure involving middle cranial fossa particularly when using middle meningeal artery as a donor graft for either internal carotid artery or posterior cerebral artery bypass surgery [9,10].

Hence detailed anatomical knowledge including developmental aspect is really worthwhile as far as neurosurgery and radiology is concerned. As per development of sphenoid bone is concerned, it is derived from both intramembranous and intracartilaginous ossification centres. Out of eight post sphenoid ossification centres, first ossification centre appears for greater wing of sphenoid i.e. Alisphenoid at about 8 week of intrauterine life by membranous ossification. Foramen spinosum is visualized earliest by eight month after birth and gradually becomes prominent latest by seven year. In this regard, postnatal changes of Foramen spinosum have been described by Lang et al[11]. Thus, developmental background of sphenoid bone may explain various asymmetries in shape, size including different bony outgrowth affecting the margin this foramen. Available literatures reveal that foramen spinosum can exhibit a wide range of variations. This study was conduct to establish a source of reliable data and thus minimizing hazards of modern diagnostic and therapeutic procedures involving middle cranial fossa. Morphometric studies helps in clinical practices of related surgeries[12].

MATERIALS AND METHODS

300 skulls dry adult human skulls constituted the material for the present study. The skulls

were collected from the Department of Anatomy, JJM Medical College, Rajarajeswari medical College, Gadag govt medical college, Karnataka, India. Each was studied for the morphometric analysis of foramen spinosum and recorded. Maximum and minimum diameter was measured and recorded. The different shapes of foramen spinosum were also recorded and percentage of shapes were calculated. Measurements were expressed in mean \pm SD.

RESULTS

Total 300 skulls were used for this study. The results were foramen spinosum found as round shape in 58%, oval shape in 38% and irregular in 4%. The maximum diameter of foramen spinosum was 2.77+0.97mm and 2.03+0.56mm was minimum in females, in males maximum was 2.95+0.56mm and 1.52+0.82mm as minimum.

Table 1: Shapes of Foramen Spinosum.

Shape of foramen spinosum	Incidence
Round shape	58%
Oval shape	38%
Irregular shape	4%

Table 2: Sizes of Foramen Spinosum.

Sex	Maximum diameter	Minimum diameter
Female	2.77+0.97 mm	2.03+0.56 mm
Male	2.95+0.56 mm	1.52+0.82 mm

Fig. 1: Showing base of skull with foramen spinosum.



DISCUSSION

The Foramen Spinosum is one of the foramen that lies in the greater wing of Sphenoid, provides communication between middle cranial

fossa and infratemporal fossa. It lies postero-lateral to foramen ovale. It transmits middle meningeal artery, Nervus Spinosus and middle meningeal vein [13-15]. The Foramen spinosum contains a venous component, the middle meningeal vein which connects the cavernous sinus with the pterygoid venous plexus, this is an important factor for clinical evaluation of radiological images of the diseased region. In present study we have observed the foramen spinosum in 98.9% cases, this one in agreement with different authors who have been reported in their studies with the percentage of 99.6%[16], 99.2%[17], and 98.5%[11]. Lindblom found that absence of foramen spinosum in 0.4% cases the reason would be the middle meningeal artery arose from the ophthalmic artery, in rare cases early division of the middle meningeal artery into an anterior and posterior division may result in the duplication of the foramen spinosum [16], our present study also observed that 1.1% of skulls with absence of foramen spinosum. In Wood-Jones study found the foramen spinosum to be more or less incomplete in approximately 44% and in 16%, the foramen in the right side was unclosed 84% were open[18].

According to Lang et al. the foramen spinosum was about 2.25mm in the new born and 2.56mm length in adults, the width of the foramen spinosum range from 1.05 to about 2.1mm in adults [11], these findings are in agreement with our present study. The findings of Osunwoke EA et al study results were slightly differs from present study, the results of there study were the maximal length of foramen spinosum was 4.0mm and minimal length was 1.0mm, in majority cases the lengths of the foramen spinosum ranges between 2.0 to 2.5mm. The maximal width of foramen spinosum was 2.0mm and the minimal width was 1.0mm, some of the foramen spinosum were partially divided into two components by bony spurs [19].

The same investigator also studied about the shape of foramen spinosum, the results were oval, circular and triangular, but not mentioned the percentage, in our present study same shapes of foramen spinosum were observed. Yanagi observed that the earliest perfect ring shaped formation of the foramen spinosum was observed in the 8th month after birth and the

latest in 7 years after birth in a developmental study on the foramen rotundum, foramen ovale and foramen spinosum, the majority of the foramen in the skulls studies was round in shape [20]. The present study provides essential information about variations in morphology and morphometry of foramen spinosum. The variations are of clinical significance in fractures of base of skull and in diagnosing any aneurysms or vascular lesions in cranial cavity. This knowledge very important for neurosurgeons to identify and preserve the neurovascular structures while approaching middle cranial fossa.

Conflicts of Interests: None

REFERENCES

- [1]. Dogan, N. U., Fazhogullari, Z., Uysal, I. I., Seker, M. & Karabulut. A. K. Anatomical examination of the foramens of the middle cranial fossa. *Int. J. Morphol.*, 2014;32(1):43-8.
- [2]. Curtin, H. D., Williams, R. & Johnson, J. CT of perineural tumor extension: pterygopalatine fossa. *AJNR Am. J. Roentgenol.*, 1985;144(1):163-9.
- [3]. Pandolfo, I., Gaeta, M., Blandino, A. & Longo, M. The radiology of the pterygoid canal: normal and pathologic findings. *AJNR Am. J. Neuroradiol.*, 1987;8(3):479-83.
- [4]. Kwathai, L., Namonta, K., Rungruang, T., Chaisuksunt, V., Apinhasmit, W. & Chompoopong, S. Anatomic and morphometric consideration for external landmarks of foramen spinosum in thai dry skulls. *Siriraj Med. J.*, 2012;64(Suppl. 1):S26-9.
- [5]. Srimani, P., Mukherjee, P., Sarkar, M.; Roy, H., Sengupta, S. K., Sarkar, A. N. & Ray, K. Foramina in alisphenoid – An observational study on their osseous-morphology and morphometry. *Int. J. Anat. Radiol. Surg.*, 2014;3(1):1-6.
- [6]. Karan BK, Surekha DJ, Umarji BN, Patil RJ, Ambali MP. Foramen ovale and foramen spinosum: a morphometric study. *Anatomica Karnataka*. 2012;6(3):68-72.
- [7]. Rai AL, Gupta N, Rohatgi R. Anatomical variations of foramen spinosum. *Innovative Journal of Medical and Health Science*. 2012;2(5):86-8.
- [8]. Khan AA, Asari MA, Hassan A. Anatomic variants of foramen ovale and spinosum in human skulls. *Int J Morphol*. 2012;30(2):445-9.
- [9]. Krayenbuhl N, Isolan GR, Al-Mefty O. The foramen spinosum: a landmark in middle fossa surgery. *Neurosurg Rev*. 2008;31(4):397-401.
- [10]. Ustan ME, Buyukmumcu M, Ulku CH, Guney O, Salbacak A. Transzygomatic-subtemporal approach for middle meningeal artey-to-P2 segment of posterior cerebral artery bypass: an anatomical and technical study. *Skull Base*. 2006;16(1): 39-44.

- [11]. Lang J, Maier R, Scafhauser O. Postnatal enlargement of the foramina rotundum, ovale et spinosum and their topographical changes. *Anat Anaz*. 1984;156:351-87.
- [12]. Shaik HS, Shepur MP, Desai SD, Thomas ST, Maavishettar GF, Haseena S. Study of mastoid canals and grooves in South Indian skulls. *Indian J Med Healthc* 2012;1:32–33.
- [13]. Jeyanthi Krishnamurthy, Lalitha Chandra, Shubha Rajanna. Morphometric Study Of Foramen Spinosum In Humanskulls. *Int J Cur Res Rev*, July 2013;05(14):44-48.
- [14]. L. Lazarus, N. Naidoo, Satyapal, K. S. An Osteometric Evaluation of the Foramen Spinosum and Venosum. *Int. J. Morphol.* 2015;33(2):452-458.
- [15]. S.D Desai, Hussain S.S, Muralidhar S.P, Thomas S.T, Mavishettar G.F, Haseena.S. Morphometric analysis of Foramen Spinosum in South Indian skulls. *J.Pharm. Sci. & Res* 2012;4(12):2022-2024.
- [16]. Lindblom K. A roentgenographic study of the vascular channels of the skull, with special reference to intracranial tumors and arteriovenous aneurysms. *Acta Radiol Suppl.* 1936;30:1-146.
- [17]. Berlis A, Putz R, Schumacher M. Direct and CT measurements of canals and foramina of the skull base. *Br J Radiol.* 1992 Aug;65(776):653-61.
- [18]. Wood-Jones F. The non-metrical morphological characters of the skull as criteria for racial diagnosis. par 1: General discussion of the morphological characters employed in racial diagnosis. *J. Anat.* 1931;65:179-495.
- [19]. Osunwoke EA, Mbadugha CC, Orish CN, Oghenemawwe EL, Ukah CJ. A morphometric study of foramen ovale and foramen spinosum of the human sphenoid bone in the southern Nigerian population. *J Appl Biosci.* 2010 Feb;26:1631-5.
- [20]. Yanagi S. Developmental studies on the foramen rotundum, foramen ovale and foramen spinosum of the human sphenoid bone. *The Hokkaido Journal of Medical Science*. 1987;62(3):485–96.

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Original Research Article

Attitude of Medical Students in Davangere towards Older People and Willingness to Consider a Career in Geriatric Medicine

Santosh A¹, Aswin Kumar², BA Varadaraja Rao³

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Abstract

Background: In light of population ageing in India, the education of tomorrow's medical doctors must include geriatrics care. Training of future physicians in the care of elderly patients needs to evolve in accordance with the exponential increase of elderly patients. WHO strongly advocates awareness for training all future medical doctors in the care of older people **Objectives:** To measure the medical students attitude towards older people; To know their willingness to consider a career in Geriatric Medicine.(GRM). **Methods:** A cross sectional study was carried out in S S Institute of medical sciences and research centre for a period of 6 months. 552 medical students from first year to final year participated in the study. University of California, Los angeles UCLA Geriatrics Attitude scale was used to measure the attitude of medical students towards elderly and a question regarding their willingness to consider geriatric medicine as a carrier option was included. **Results:** The mean UCLA attitude score of the medical students is 3.43 ± 0.37 , which suggests that the students have a relatively positive attitude towards elderly (mean UCLA score above 3 is considered as relatively positive attitude). There is a weak correlation between mean attitude scores & willingness to consider geriatric medicine as a career. [R = 0.13, P= 0.002]. More than one third (41.7%) are willing to consider Geriatric Medicine as career. The mean attitude scores for males and females are 3.46 ± 0.41 and 3.60 ± 0.45 respectively, the difference is found to be statistically significant (P< 0.05). **Conclusion:** Though the students have positive attitude towards treating elderly, only few are willing to consider geriatric medicine as a career.

Key words: Medical students, Older people, Geriatric Medicine, Elderly

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Introduction

The percentage of elderly population is increasing in India due to an improvement in the child survival and increased life expectancy, which is a significant feature of demographic change in India. As on 2010 an estimated 8% population i.e 96 million people of the total population of India are senior citizens above age group of 60 years. Presently India has the second largest population of senior citizens in the

globe. According to UN by 2050 the population of 60 plus in India would likely go upto 20%.^[1] Coping with old age is becoming increasingly difficult. Sadly young people now see old people as a burden. The respect they once enjoyed in the joint family is slowing disappearing. The changed scenario has given rise to three major needs: Social, health and financial security in elderly.^[1] So, it is important to prepare health providers and societies

to meet the specific needs of older populations. This includes training for health professionals on old-age care; preventing and managing age-associated chronic diseases; designing sustainable policies on long-term and palliative care; and developing age-friendly services and settings.^[2]

WHO strongly advocates awareness for training all future medical doctors in the care of older persons. It also promotes the adoption of a life-course approach in the education and training of doctors. In light of population ageing, the education of tomorrow's medical doctors must include geriatrics care . In this regard WHO has developed a study on Teaching Geriatrics in Medical Education (TeGeMe) - a joint initiative of ALC (aging and life course) and the International Federation of Medical Students Associations (IFMSA) which focused on the integration of geriatric medicine within medical curriculums worldwide.^[3]

Future physicians need to be trained in the care of elderly patients in accordance with the increase of elderly patients, it is also important that all doctors should ideally improve their knowledge, attitudes and skills with regard to the management of elderly patients, as they will increasingly encounter elderly patients and therefore should be addressed to help & generate more "elderly-friendly" physicians.^[4] In this regard the study aimed to find out the attitude of medical students towards elderly and also their willingness to consider a career in Geriatric medicine.

Materials and methods:

Study design: Cross sectional study

Study area: S.S Institute of Medical Sciences & Research Centre

Study duration: six months from September 2012 to February 2013

Study subjects: All the medical students from 1st year to final year, who were present in the class during the study were included after obtaining written informed consent

Questionnaire: The University of California, Los Angeles (UCLA) Geriatrics Attitudes Scale has been validated for measuring attitudes towards older patients amongst primary care

residents in the United States and it has also been validated for use in medical students. The Geriatrics Attitude Scale consists of a mixture of 14 positively and negatively worded questions, answered on a 5-

point Likert scale ranging from "Strongly disagree (1 point)" to "Strongly agree (5 points)" and a rating of 3 points indicating a neutral response. Mean UCLA score above 3 is regarded as positive attitude. A fifteenth question was included at the end of the questionnaire which enquired about students' willingness to consider Geriatric Medicine (GRM) as a potential career choice. Scores were tabulated in accordance with Chua et al's original article, in which scores on negatively worded statements were reversed before being added to scores on positively worded statements to produce a total score.

Statistical Analysis: The reliability of the attitudes scale was measured by calculating the statistic, Cronbach coefficient alpha. Univariate linear regression analysis was performed to identify factors associated with attitude scores and willingness to consider GRM as a career. Student's unpaired *t*-test, ANOVA, Games Howell's post Hoc test was used to compare the mean scores. Pearson's correlation coefficient was used to assess the relation between mean UCLA scores and willingness to consider a career in Geriatric Medicine.

Results

The internal consistency of the modified UCLA geriatric attitude scales measured using the Cronbach coefficient alpha was 0.65.

Table 1: Distribution of Medical Students according to Age, Gender and Religion

Characteristics	Category	Frequency	Percentage
Age (in years)	17 – 20	322	58
	21 – 24	223	41
	25 - 27	7	1
Total		552	100
Gender	Male	245	44
	Female	307	56
Total		552	100
Religion	Hindu	512	93
	Muslim	28	5
	Christian	8	1.4
	Jain	4	0.6
Total		552	100
Year of Study	1 st year	140	25
	2 nd year	199	36
	3 rd year	100	18
	4 th year	113	21
Total		552	100

Majority of the students were in the age group of 17 – 20 years (58%). Females outnumbered males and accounted for 56% and 93% of the students belonged to Hindu religion.

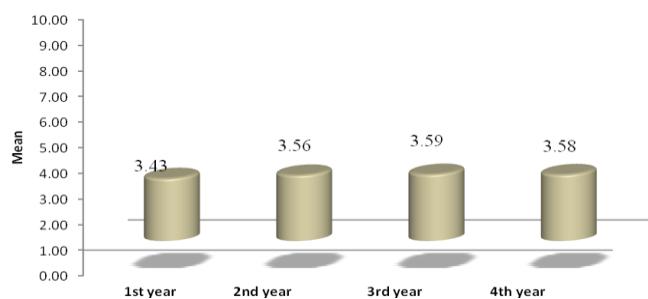
Strength of the students was more in 2nd year (36%) students followed by 1st year, final year and 3rd year accounting for 25%, 21% and 18% respectively.

Table 2: showing Mean UCLA Score of all the Medical Students

Mean		SD		95 % C.I
3.43		0.37		3.37-3.49
Males		Females		
Mean	SD	Mean	SD	P* Value, Sig
3.46	0.41	3.60	0.45	<0.001 HS

The mean UCLA attitude score of all the students was 3.43 ± 0.37 which suggests that the students had a relatively positive attitude. Overall mean UCLA attitude scores for males and females were 3.46 ± 0.41 & 3.60 ± 0.45 respectively, the difference was found to be statistically significant ($p < 0.001$)

Figure 1: Showing Mean UCLA Scores of students from First Year to Final Year



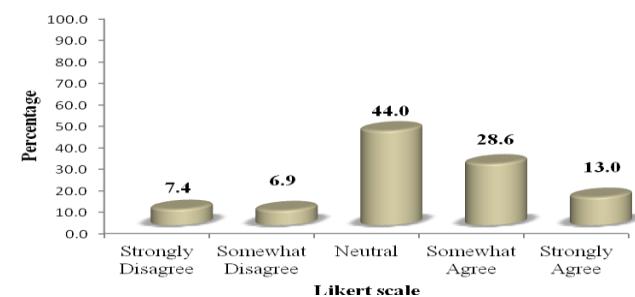
One way ANOVA test, $P= 0.009$

The difference in the mean attitude scores of students from 1st year to final year was found to statistically significant ($P= 0.009$)

According to Games Howell post hoc test, the significant pairs are I & II, I & III and I & IV which means there was a significant difference in the attitude towards elderly in 1 year students and second year students, 1st year students and 3rd year

students and also 1st year students and 4th year students (Figure 1)

Figure 2: Distribution of Students according to their willingness to consider GRM as a Potential Career Choice



A large proportion of students (44%) were undecided in considering a career in geriatrics and 41.6 % students reported they would consider a career in Geriatrics, and 14.3% of the students had already decided at this point that they would not consider geriatrics as a potential career choice.

Table 3: Mean scores of males & females in willingness to consider GRM as a Potential Career Choice

Options	Males		Females	
	Frequency	Percentag e	Frequenc y	Percentag e
Strongly disagree	24	9.8	17	5.5
Somewhat disagree	16	6.5	22	7.2
Neutral	112	45.7	131	42.7
somewhat agree	61	24.9	97	31.6
Strongly agree	32	13.1	40	13.0
Total	245	100	307	100
Mean career scores	3.25		3.39	
SD	1.08		0.99	

(P value = 0.10) Student's unpaired t Test

Regarding willingness of male and female students in considering geriatrics as a career, majority were neutral in their decision. The difference in the mean career scores of males (3.25 ± 1.08) and females (3.39 ± 0.99) was not statistically significant ($P = 0.10$).

3.39 ± 0.99) (P value = 0.10 NS) in considering geriatrics as a career was not statistically significant.

Table 4: Correlation of Mean attitude (UCLA) Score of 552 students & willingness to consider Geriatric Medicine as a career

I would like to consider a career in geriatric medicine	Number of students	Mean attitude (UCLA) Score	Standard deviation
Strongly disagree	72	3.38	0.43
Somewhat disagree	158	3.41	0.41
Neutral	243	3.56	0.41
Somewhat agree	38	3.55	0.49
Strongly agree	41	3.63	0.42

Correlation between overall mean UCLA Score & career scores ($r = 0.132$; $P = 0.002$) *Pearson's correlation coefficient

The student's willingness to consider GRM is correlated with the mean UCLA scores. There was a weak correlation between the mean attitude scores and taking geriatrics as a career scores ($r = 0.132$; $P = 0.002$) which means even though there was a positive attitude among students towards elderly they were not willing to consider geriatrics as a career.

Discussion

A study from Chua MPW et al. showed that the internal consistency of the modified UCLA geriatric attitudes scales measured using the Cronbach coefficient alpha was 0.73.^[5] The internal consistency of the modified UCLA geriatric attitude scales measured using the Cronbach coefficient alpha of our study was less compared to their study (0.65). In our study the mean UCLA score (3.43 ± 0.37) of medical students towards elderly is lower than the mean UCLA score (3.58 ± 0.41) found in the study done by Melvin PW Chua et al in Singapore^[5] and also lower than the study from

Hughes NJ et al which reported First-year medical students had a mean attitude score \pm standard deviation of 3.69 ± 0.39 .^[6] In our study, the difference in the mean UCLA attitude scores for males (3.46 ± 0.41) and females (3.60 ± 0.45) was found to be statistically significant ($p < 0.001$) but in the study done by Melvin PW Chua et al in Singapore there was no significant difference ($P = 0.332$) in mean UCLA scores between male and female students.^[5] Chua MPW et al. showed that the male and female students had significantly difference in mean career scores of 2.91 and 3.22, respectively ($P = 0.015$).^[5] but in our study there was no statistically significant difference in the mean career scores of males (3.25 ± 1.08) and females (3.39 ± 0.99) (P value = 0.10) in considering geriatrics as a career

In our study there was a weak correlation between the mean attitude scores and taking geriatrics as a career scores ($r = 0.132$; $P = 0.002$) which means even though there was a positive attitude among students towards elderly they were not willing to consider geriatrics as a career but Hughes NJ et al reported that in their study a more-positive attitude increased the likelihood of considering a career in GM ($P < .001$).^[6] In our study the difference in the mean attitude scores of students from 1st year to final year was found to statistically significant ($P = 0.009$) similarly a study by Hughes NJ et al showed Fourth-year students had better attitude scores than first-year students (3.86 ± 0.36 , $P = .002$).^[6]

Conclusion

From our study we conclude that the medical students have positive attitude towards the older people. Female students have more positive attitude than males and the difference is found be statistically significant. First year students show significant difference in the attitude when compared to their senior medical students. There was no significant difference among males and females in considering a career in Geriatric Medicine. Majority of the medical students even though have positive attitude, are not seeking a career in Geriatric Medicine.

Recommendation

Medical students should be emphasized on the changing demography of the country & requirements of the older people regarding health as well as social issues in the curriculum, which will

have an impact on medical students attitude towards older people.

References

1. *Support for our Elders “1298” Senior Citizens Referral Helpline Mumbai.silver innings Blog for senior citizens[serial online]. Available from: <http://silverinnings.blogspot.in/2011/05/support-for-our-elders-1298-senior.html> Last date of access 22 Dec 2012*
2. *10 facts on aging and Life course. <http://www.who.int/features/factfiles/ageing/en/index.html> [serial online]. Last date of access 20 Sep 2012.*
3. *Geriatrics and Medical Education. <http://www.who.int/ageing/projects/tegeme/en/>. [serial online].Last date of access 20 Sep 2012.*
4. *Aging. <http://www.who.int/topics/ageing/en/> [serial online] [cited 20 Sep 2012].*
5. *Chua MPW, Tan CH, Merchant R, Soiza RL. Attitudes of First year medical students in Singapore towards older people and willingness to consider a career in Geriatric Medicine. Ann Acad Med Singapore 2008;37:947-51*
6. *Hughes NJ et al. Medical Students Attitudes towards Older People and Willingness to Consider a Career in Geriatric Medicine. J Am Geriatr Soc 2008;56: 334-8.*



Original Research Article

Socio demographic and economic factors associated with people on Hemo-dialysis in a tertiary care hospital, Davangere: A cross sectional study

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Abstract

Back Ground: Dialysis is extremely stressful as it interferes with all spheres of daily activities of patient. This study has done to understand the socio demographic factors associated with patient on dialysis and its impact daily activities of patients. **Objectives:** 1. To determine the socio demographic and economic factors associated with people on haemo dialysis. 2. To determine the perceived effect of haemodialysis on people's day today activities **Methodology:** A cross sectional study involving 80 patients with chronic kidney diseases on haemodialysis was conducted for a period of 4 months (August and November 2011) in a tertiary care hospital. Pre-tested semi structure questionnaire was used for the study; data was collected by interview method. **Results:** 45% of the people didn't go for renal transplant due to lack of financial support. More than 50% of the subjects were generating money for dialysis from their occupation. Most of the subjects responded that to some extent their day today activities were affected by dialysis. **Conclusion:** Majority of the subjects had completed upto 2 years duration of hemodialysis and twice weekly dialysis. Majority of the people had to spend rupees 10000 – 20000 per month for their survival. Majority didn't opt for renal transplantation due to lack of money.

Key words: Hemo dialysis, Chronic Kidney Disease, illness intrusion, social factors

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Introduction:

Chronic kidney disease (CKD) is a worldwide public health problem. The population of India exceeds one billion and is projected to become the major reservoir of chronic diseases like diabetes and hypertension. Since 25–40% of these subjects may develop CKD, the end stage renal disease burden

will rise and health care system would need to take care of them.^[1]"There is an estimated 1.5 lakh new dialysis patients in India annually, of which 1.35 lakh die without treatment due to financial constraints.^[2] According to the first annual report published by the CKD registry of India involving 13,151 patients, diabetes and hypertension were

major causes of CKD in India accounting for 28.5% and 16.2% respectively.^[1]

A number of stress factors operate in patients on maintenance hemodialysis. These include: social, financial and marital problems, dependency on the machine, limited activities and treatment related problems.^[3] Most people pay for their own medical treatment in India, kidney related or otherwise. Only people working for the government or large corporations have their medical expenses covered. While this is all right for minor problems that are transient, it can be a lifelong nightmare for chronic conditions^[4]. In India the incidence of CKD is increasing day by day and the option for the treatment is dialysis or transplantation. In the present scenario, due to the cost of treatment normal people can afford only hemodialysis rather than transplantation. Since the cost of hemodialysis differs across the country, research is needed to evaluate its exact cost.^[5] The substantial monetary burdens and everyday inconveniences for CKD patients on hemodialysis have become two of the most important health care related concerns which prompted us to take up the present study.^[6]

Objectives: To determine the socio demographic and economic factors associated with people on haemo-dialysis. To determine the perceived effect of haemo-dialysis on people's day to day activities.

Methodology:

A cross sectional study was conducted on patients on maintenance hemodialysis in S S Institute of Medical Sciences & Research Centre, a tertiary care hospital in Davangere, Karnataka for a period of four months.

About 80 patients of Chronic Kidney Disease on Hemodialysis were taken up for the study after obtaining the informed consent. We included patients who were willing to participate, stable & who had completed at least two months of Hemodialysis. The subjects were interviewed using pre tested & semi structured interview schedule covering demographics, the expenditure for dialysis & social activities affected due to dialysis.

The subjects were asked to rate their perceived illness intrusion regarding work, hobbies, social activities and relationship with friends on a 4 point scale ranging from 1(not applicable), 2(not at all), 3(to some extent), 4(to great extent). As most of the patients were accompanied by a relative, they were also involved in the study during the interview.

Data was entered and analyzed using statistical package SPSS Version 17. Results were tabulated in percentages and proportions.

Results :

Table 1: Socio – demographic details of the subjects on Hemodialysis

Demographic factors	Category	Frequency	%
Age (Years)	<40	14	18
	40-60	49	61
	>60	17	21
	Total	80	100
Gender	Male	63	79
	Female	17	21
	total	80	100
Religion	Hindu	70	88
	Muslim	7	9
	Christian	2	3
	Jain	1	1
	Total	80	100
Education	Upto SSLC	45	56
	PUC	23	29
	Graduate	8	10
	PG	4	5
	Total	80	100
marital status	unmarried	7	9
	married	69	86
	widow/widower	4	5
	Total	80	100
place	urban	50	63
	rural	30	38
	Total	80	100
Family	Nuclear	47	59
	Extended/Joint	19	24
	3 Generation	14	18
	Total	80	100

Among the 80 subjects, majority of the study subjects were in the age group of 40 – 60 years accounting for 61% and 79% of the subjects were males. Hindus accounted for 88% and 56% of the subjects education status was within 10th Standard. Majority were married accounting for 86%. Most of the subjects came for Dialysis from urban area (63%). Majority were belonging to nuclear family (59%)

Table 2: Distribution of subjects according to the duration, Frequency and cost spent on hemodialysis

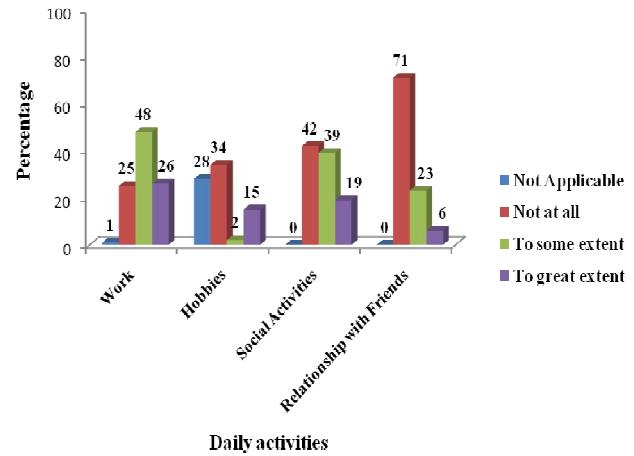
Variable	Category	Frequency (Percentage)
Duration of Dialysis	< 2 years	44 (55)
	2 – 5 years	30 (38)
	5 years	6 (7)
Total		80 (100)
Frequency of Dialysis	Once weekly	19(24)
	Twice weekly	53(66)
	Thrice weekly	8 (10)
Total		80 (100)
Average amount spent for dialysis by study subjects	< 10000	21(26)
	10000 – 20000	53(66)
	>20000	6(8)
Total		80 (100)

Majority of the study subjects were undergoing dialysis from past 2 years accounting for 44(55%) and 30(38%) between 2 years – 5 years. Majority 53(66%) were undergoing dialysis twice weekly. 53 (66%) subjects spent around 10,000 – 20,000 rupees per month for their dialysis.

Table 3: Distribution of subjects according to certain variables on hemodialysis

Variable	Category	Frequency(Percentages)
Reason for not choosing renal transplantation	Lack of money	37(46 %)
	Lack of donors	18(23 %)
	Fear	17(21 %)
	Age factor	8(10 %)
Total		80 (100)
Money for Dialysis is generated from	Occupation	43 (54 %)
	Sale of property / Debt	21(26 %)
	Reimbursement	11(14 %)
	Charity	5(06 %)
Total		80(100)
Relatives attitude towards patient	Responsibility	71(89 %)
	Physical burden	2(02 %)
	Financial burden	7(09 %)
Total		80 (100)

Figure 1: Perceived illness intrusion in various domains among the subjects



The subjects were asked the reason for not opting renal transplantation, Majority of them 37 (46%) told lack of money being the reason and 18 (23%) told lack of donors. majority of the subjects

generated money for Dialysis from their occupation, 21 (26%) generated by selling their property or by debt. the relatives were asked about their attitude towards the patient, 71% felt it is their responsibility to take care and 7 (9%) of them felt is as financial burden.

In our study 74% reported illness intrusion in the area of work of which 48% had felt the intrusion to some extent and 26% felt the intrusion to a great extent. With respect to hobbies, 28% reported that they didn't have any hobbies. Majority (71%) of the subjects reported that the relationship with family and friends was not affected. Regarding social activities, 42% reported that dialysis didn't interfere with their social life and 39% felt that dialysis interfered to some extent and 9% felt the interference to great extent.

Discussion:

The subjects with CKD require lifelong treatment by undergoing dialysis twice or thrice weekly, which will have a negative impact on their daily routine from all aspects, social, Psychological, economic and also the relationships.

As the duration of dialysis increases, the quality of life of the people on dialysis deteriorates.^[7]

In our study majority (79%) of the subjects were males, similar result was seen from a study by Bhatti AN et al. where 77% of the subjects were males. Reason for the male predominance may be the treatment seeking behaviour of the society where the people avoid treating females, further the treatment is costly and lifelong.^[7]

In our study 63% of the subjects were from urban area. Similar result was found in a study from Bapat U et al. where 86% were from urban area.^[3] The reason for this may be because of the availability of the dialysis centres is limited in India with majority being in the private sector and located in urban areas which the subjects from rural area cannot utilise the facility because of the cost as well as the distance to travel.

In our study majority of the subjects (55%) were undergoing dialysis between 2 – 24 months,

similarly in a study from Bapat U et al. majority (80%) of the subjects had completed 2 – 30 months^[3] which shows that the chances of survival of the subjects on maintenancehemodialysis is less for longer duration.

In our study majority (66%) were undergoing dialysis twice weekly whereas in the study from Bapat U et al. majority (56%) were undergoing dialysis thrice weekly.^[3]

In our study 74% reported illness intrusion in the area of work. Similar results were found from a study by Bapat U et al. where 70% subjects reported intrusion of illness in the area of work. With respect to hobbies, in our study 28% reported that they didn't have any hobbies whereas a found from a study by Bapat U et al. reported Majority (50%) of the subjects didn't have any hobbies as well. Majority (71%) of the subjects reported that the relationship with family and friends was not affected. Similar results were found from a study by Bapat U et al. where Majority (79%) reported that illness didn't interfere in relationship with family and friends. Regarding social activities, 58% reported that dialysis did interfere with their social life whereas in a study from Bapat et al. Social life was not affected in 50% of the subjects.^[3]

Conclusion:

Majority of the subjects had completed upto 2 years duration of hemodialysis and twice weekly dialysis. Majority of the people had to spend rupees 10000 – 20000 per month for their survival. Majority didn't opt for renal transplantation due to lack of money.

Regarding perceived illness intrusion in their daily life, in the area of work majority reported illness intrusion. Majority of the subjects reported that their hobbies was not affected due to hemodialysis. Majority of the subjects reported that illness had not interfered in their relationship with friends. Majority reported that illness had affected their social activities.

Recommendations:

Nephrology units should be started in each government district or at least at the regional level, which makes it possible for the people from rural area to utilize the facilities from cost point of view

as well as the distance. Educating and counseling the subjects on Hemodialysis to socialize and engaging themselves in light physical and spiritual activities with an active life style is important. As there are less studies in this regard, more studies need to be carried out towards social and economic aspects of the people on hemodialysis.

Conflict of Interest: None

Source of funding: Nil

References:

1. Murugesan Ram Prabhar, VenkatramanChandrasekaran, PeriasamySoundararajan. Epidemic of Chronic Kidney Disease in India -What Can Be Done. Saudi J kidney dis and transpl 2008; 19 (5): 847 – 853.
2. Dialysis at Rs 400 to be reality Available from: URL <http://timesofindia.indiatimes.com/city/bengaluru/Dialysis-at-Rs-400-to-be-reality/articleshow/7279869.cms> [last accessed on 08.10.2016]
3. Bapat U, KedlayaPG ,Gokulnath. Perceived illness intrusion among patients on hemodialysis. Saudi J kidney dis and transpl 2009; 20(3): 386-391.
4. Dialysis in India - costs, the biggest problem. Available from: URL <http://www.kamaldshah.com/2009/01/dialysis-in-india-costs-biggest-problem.html>. [Last accessed on 08.10.2016]
5. Suja A, Anju R, Anju V, Neethu J, Peeyush P, Saraswathy R. Economic evaluation of end stage renal disease patients undergoing hemodialysis. J Pharm BioallSci 2012;4:107-11
6. Mucsi I. Health-Related Quality of Life in Chronic Kidney Disease patients. Primary psychiatry 2008;15(1): 46-51. Available from: URL: <http://primarypsychiatry.com/health-related-quality-of-life-in-chronic-kidney-disease-patients/> [Last accessed on 8.10.2016]
7. Bhatti AN, Awan S, Anwar A. Socio-economic impact of hemodialysis on patients undergoing dialysis at DHQ Hospital, Sargodha. Professional Med J Aug 2012;19 (4): 573-580.



Original Research Article

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Geriatric health: assessment of nutritional status and functional ability of elderly living in rural area of Bangalore, Karnataka, India

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ABSTRACT

Background: In India, geriatric age group (aged 60 years and above) constitutes 8.6% of the total population as per 2011 census. Under nutrition among elderly is leading to frailty, functional dependence and premature death. The functional status of the elderly is reflected by their ability to perform daily activities which refers to the basic tasks of everyday life. Present study looks into their nutritional status and functional ability. The objectives were to assess the nutritional status of the elderly using mini nutritional assessment (MNA) scale, to describe the functional ability of geriatric people using Katz scale and to assess the vision, hearing and mobility of the elderly.

Methods: The study was a community based cross sectional study carried out in KakaRamanahalli, rural field practice area of RajaRajeswari Medical College Hospital, Bangalore for a period of 3 months. By the end of the study, we were able to reach a sample of 91 elderly.

Results: Majority of the elderly were either at risk of malnutrition or malnourished. There was significant association between age of the elderly and their nutritional status. About 25% of the elderly were having decreased ability in performing activities of daily living. More than 30% were having hearing impairment. Mobility and vision was affected in about 25% of the elderly.

Conclusions: From our study, we conclude that majority of the elderly were either at risk or were malnourished. There was a statistically significant association between age of the study subjects and their nutritional status.

Keywords: Functional ability of elderly, Geriatrics, Malnutrition among elderly

INTRODUCTION

Health and Functional ability is greatly influenced by nutrition.¹ In India, geriatric age group (aged 60 years and above) constitutes 8.6% of the total population as per 2011 census.² Undernutrition is harmful leading to frailty, physical dependence and premature death apart from impairment of the immune system, increased risk of infection and poor wound-healing.

The energy requirement declines with age due to reduction in the body mass, body metabolism and physical activity. Yet older people are at higher risk of under nutrition due to several reasons, namely:

Food is less enjoyable due to changes in taste and smell sensation; lack of teeth, gum problems and ill-fitting dentures make eating painful; reduced appetite due to lack of exercise, loneliness, depression, chronic

debilitating disease, confusion, forgetfulness and side effects of drugs, alcohol and smoking.³

The mini nutritional assessment (MNA) scale is to diagnose the risk of malnutrition in elderly individuals. This provides a simple and quick evaluation of the nutritional state of elderly people in the community.² It is simple and non-invasive, which facilitates its use in the community. It detects subjects at risk of malnutrition before significant changes occur in weights. Malnutrition in elderly patients is common because daily food consumption decreases with old age. Furthermore, the consumed food is low in calories, contributing to nutritional deficiencies and malnutrition.⁴ The functional status of the elderly is reflected by their ability to perform daily activities which refers to the basic tasks of everyday life. The most often used measure of functional ability is the Katz Activities of Daily Living Scale. In this scale, the set of tasks assessed are bathing, dressing, transferring, using the toilet, continence, and eating. A theoretical basis for selecting these functions is that they represent milestones in the sociobiological development of self-care independence in children.⁵ When people are unable to perform these activities, they need help in order to cope, either from other human beings or mechanical devices or both.

In this view, this present study was undertaken to assess the nutritional status and functional ability of elderly living in rural India.

Objectives

- To assess the nutritional status of the elderly using Mini Nutritional Assessment (MNA) scale.
- To describe the functional ability of geriatric people using Katz scale.
- To assess the vision, hearing and mobility of the elderly.

METHODS

Study design: It is a Community based cross sectional study.

Study period: Three months from May 2016 to July 2016.

Study area: KakaRamana Halli, Rural Field Practice Area of RajaRajeswari Medical College and Hospital, Bangalore.

Study population: All the elderly aged 60 years and above residing in KakaRamana Halli.

Sample size: With this by the end of study we were able to reach a study population of 91 elderly.

Study tools: Predesigned and pretested questionnaire and nutritional status were assessed using MNA scale, an

instrument designed by Nestle Nutrition Institute specifically for elderly people.⁶

Inclusion criteria

Individuals aged 60 years & above residing in KakaRamana Halli were included in the study.

Exclusion criteria

Individuals who didn't give consent were excluded from the study.

Individuals who were not able to comprehend the study questionnaire due to terminal illness or dementia were excluded from the study.

Methodology : A community based cross sectional study was conducted among elderly living in KakaRamana Halli, rural field practice area of RRMCH, Bangalore. There are about 140 households in the village. All the elderly aged 60 years and above in the village were interviewed and examined. House to house visit was done, all the elderly living in the house were included in the study, if the elderly was not there in the house or if the house was locked, visit was given on the next day.

Data collection

After explaining the purpose of the study to the participants a written/ informed consent was obtained. A predesigned semi structured questionnaire was used to collect information. Nutritional status was assessed using Mini Nutritional Assessment scale. The objective of this scale is to provide a simple and quick evaluation of the nutritional status of elderly people. It is a simple and non-invasive instrument which facilitates its use in community.

Measure of functional ability was done by the Katz Activities of Daily Living Scale. In this scale, the set of tasks assessed were bathing, dressing, transferring, using the toilet, continence, and eating.^{7,8}

Eye examination was done by 'finger counting' method, hearing assessment was done by 'whisper test', mobility by 'get up and go' test.

Definitions and procedures

- **Visual impairment:** Individuals who were unable to count fingers at a distance of 3 meter were considered as visually impaired.⁹
- The **Whisper test** is performed with the investigator standing at a fixed distance behind the person's ear and whispering a short set of random words. The patient should not be able to see the examiner's lip movements and the opposite ear should be occluded. The patient is then asked to repeat the words depending upon which the person was categorized as

having normal hearing or having hearing impairment.¹⁰

- **Get up and go test:** Residents were asked to rise from an armless chair without using the support of hands, stand still momentarily, walk to a wall 10 feet away, turn around without touching the wall, walk back to the chair, turn around & sit down. Undue slowness, hesitancy, abnormal movements, staggering, and stumbling are considered abnormal and indicate that the patient is at risk of falling.¹⁰

Statistical data analysis

The data was compiled in MS Excel Sheet and analyzed by using SPSS (Statistical Package for Social Sciences) version 16.0. Descriptive statistics and Chi square test was used during analysis. Statistical significance of 0.05 was considered.

RESULTS

Our Study comprised of 91 geriatric participants. The mean age of the study subjects was 67.69 ± 8.76 years with minimum and maximum ages being 60 and 98 years. Majority, 61 (67%) belonged to the age group 60-69 years, 19 (20.9%) belonged to the category to 70-79 years and 11 (12.1%) were aged 80 years and above. With respect to gender, 42 (46.2%) were males and 49 (53.8%) were females (Table 1).

Table 1: Age wise and gender wise distribution of the study participants.

Characteristic	Category	Frequency	Percent
Age in years	60 -69	61	67.0
	70 - 79	19	20.9
	80 and above	11	12.1
	Total	91	100.0
Gender	Male	42	46.2
	Female	49	53.8
	Total	91	100.0

Majority of the participants, 51 (56%) out of 91 were at risk of malnutrition and 28 (30.8%) were found to be malnourished. About 12 (13.2%) participants were normal (Figure 1).

Of the 91 elderly assessed, 22 of them (24.2%) had decreased activities of daily living and around 69 (75.8%) of them were found to be capable of coping with their ADL (Figure 2).

It is seen that, among the study subjects in the age group of 60 to 69 years, 62% participants were at risk of malnourishment and 20% were malnourished. Among the participants aged 70 – 79 years 58% were at risk and 42% were malnourished. Majority of the participants aged 80

years and above were malnourished accounting for 72% and 23% were at risk of malnourishment. A statistically significant association was found between age and Nutritional status of the participants ($p = 0.007$) (Table 2).

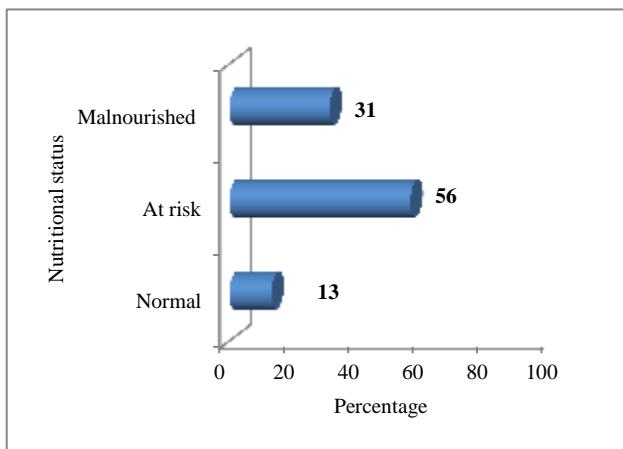


Figure 1: Distribution of study subjects according to their nutritional status.

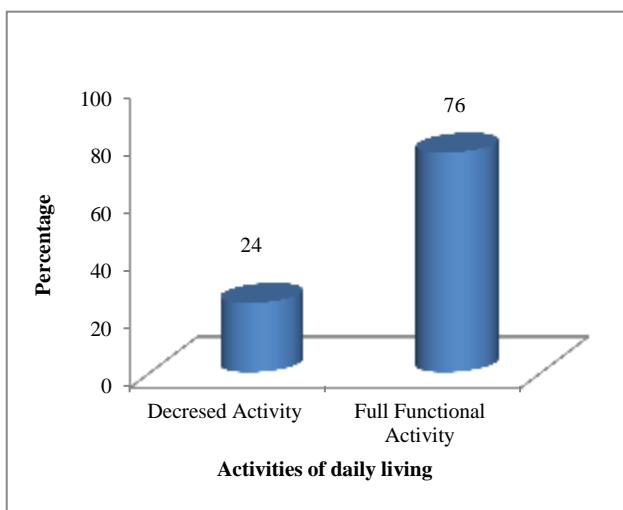


Figure 2: Distribution of subjects according to their ability to perform activities of daily living.

Out of 91 participants, 26 (62%) of the males and 25 (51%) females are at risk of malnutrition. 12 (28%) males and 16 (33%) females were found as malnourished, while, 4 (10%) males and 8 (16%) females were normally nourished. There was no statistically significant association between gender and nutritional status ($p = 0.505$) (Table 3).

Visual impairment was found in 26 (28.5%) of the study participants. 35 (38.5%) of the elderly were unable to hear whispers and 24 (26.4%) participants were unable to get up without support and walk with steadiness and failed the get up and go test (Table 4).

Table 2: Association between age and nutritional status of the study participants.

Age in years	Nutritional status			Total	P value
	Normal	At risk	Malnourished		
60 -69	11 (18)	38 (62)	12 (20)	61	
70 - 79	1 (5)	10 (58)	8 (42)	19	
80 and above	0	3 (23)	8 (72)	11	0.007*
Total	12	51	28	91	

*Fischer Exact Test.

Table 3: Showing association between gender and nutritional status of the study participants.

Gender	Nutritional status			Total	P value
	Normal	At risk	Malnourished		
Male	4 (10)	26 (62)	12 (28)	42	
Female	8 (16)	25 (51)	16 (33)	49	0.505
Total	12	51	28	91	

*Fischer exact test.

Table 4: Distribution of the study subjects with respect to their impairment in the functioning status.

Functional status assessment	Frequency	Percentage
Vision	26	28.5
Hearing	35	38.5
Mobility	24	26.4

DISCUSSION

Nutrition is an important factor contributing to health and functional ability.

Malnourished elderly are more likely to require health and social services, need more hospitalization, and demand extra challenges from caregiver. So, early detection and prompt interventions are essential for prevention of malnutrition in this group.⁴ In our study, majority of the participants, 56% were at risk of malnutrition and 30.8% were found to be malnourished. Only around 13.2% participants were found to be well nourished. In a study carried out by Shivaj M et al. in Bikaner, Rajasthan, showed that approximately 11.6% elderly were malnourished while 46% were at risk of malnutrition and 42.4% were well nourished and in another study done by Vedantam A et al in rural south India, in which the MNA scale classified 14% as malnourished and 49% at risk of malnourishment.¹¹ In a study done by Baweja S et al from Western Rajasthan, 7.1% elderly were malnourished while 50.3% were at risk of malnutrition and only 42.6% were well nourished.¹² All these studies including our study show that larger proportion of the elderly people are at risk of malnourishment.

In our study, out of 91 participants, 62% of the males and 51% females are at risk of malnutrition. Also 28% males

and 33% females were found to malnourished, while, 4 (10%) males and 8 (16%) females were normally nourished. In a study done by Kansal D et al among rural population of Belagavi it was found that 43.7% males and 43.3% females were at risk of malnutrition. 25.4% males and 21% females were suffering from malnutrition and 31% males and 35.3% females were well nourished. In this study the association of gender and nutritional status of elderly was not found to be statistically significant ($p = 0.735$). Similar result was found in our study, that is, no statistically significant association between Gender and Nutritional status ($P = 0.505$).⁴ Study done by Shivraj et al also showed that risk of malnutrition and malnutrition was more common in female 48.64%, 15.13% than male 44.44%, 9.52% respectively.¹

Impaired mobility is a health concern for the elderly people, as it is a risk factor for fall and it may cause psychological problem of fear of falling, loss of confidence in being able to move around safely which restricts activity. This restriction limits the social activity leading to social isolation of the person. In our study, 26.4% participants were having impaired mobility whereas in a study conducted by Sharma et al in Chandigarh reported that locomotive disorders were found in 38.2% of the elderly population.¹³

Vision impairment is associated with a decreased ability to perform activities of daily living. It also leads to increased incidence of fall, social isolation and also dependency. Hearing impairment can interfere with socialization, as making an effort to listen becomes too embarrassing with eventual avoidance of participation in talking and hearing.³

In our study, visual impairment was found in 28.5% of the study participants and 38.5% of the elderly were having hearing impairment. The findings of our study are

comparable to a study done by Majra JP et al, in old age homes of Southern India, in which visual impairment was found in about 28% of the residents and hearing deficit was found in about 42% of the residents.¹⁴

Although persons of all ages may have problems performing the ADLs, prevalence rates are much higher for the elder population than for the non-elder population. In our study 24.2% had decreased activities of daily living whereas in a study done by Tiwari S et al in rural population of Varanasi by using Katz ADL scale, about 7.2% of the elderly population had decreased activity.⁸

CONCLUSION

From our study, we conclude that Majority of the elderly were either at risk or were malnourished. There was significant association between age of the study subjects and their nutritional status.

About 25% of the elderly were having decreased ability in performing activities of daily living. More than 30% were having hearing impairment. Mobility and vision was affected in about 25% of the elderly. Around 24% of the study subjects had decreased activities of daily living.

Recommendations

Subjects with visual impairment, hearing impairment, reduced mobility were referred to respective departments of RRMCC Hospital for further examination and treatment. Advice on the diet and education on the nutritional values of various food stuff was given to the participants.

As the elderly population is on the rise it's important to address their health and social problems and contribute in improving their quality of life.

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REFERENCES

1. Shivraj M, Singh VB, Meena BL, Kusum S, Neelam M, Dayal S, et al. Study of Nutritional Status In Elderly In Indian Population. *Int J current research.* 2014;6(11):10253-7.
2. Lahiri S, Biswas A, Santra S, Lahiri SK. Assessment of nutritional status among elderly population in a rural area of West Bengal, India. *Int J Med Sci Public Health.* 2015;4:569-572.
3. Dey AB. Introduction; Hand Book on Health Care of Elderly. A Manual for Trainers of Physicians in Primary and Secondary Health Care Facilities, 1st ed., WHO, Ministry of Health and Family Welfare, AIIMS, p 11-16.
4. Kansal D, Baliga SS, Kruthika K, Mallapur MD. Nutritional assessment among elderly population of rural Belagavi: a cross-sectional study. *Int J Med Sci Public Health.* 2016;5DOI: 10.5455/ijmsph.2016.15122015298.
5. Wiener JM, Hanley RJ, Clark R, Van Nostrand JF. Measuring the activities of daily living: Comparisons across national surveys; 1990 [cited 2013 Oct 18]. Available from: <http://aspe.hhs.gov/daltcp/reports/meacmpes.pdf>.
6. Kaiser MJ, Bauer JM, Ramsch C, et al. Validation of the Mini Nutritional Assessment Short-Form (MNA®-SF): A practical tool for identification of nutritional status. *J Nutr Health Aging.* 2009;13:782-8.
7. Shelkey M, Wallace M. Katz Index of Independence in Activities of Daily Living (ADL). Available from http://consultgerirn.org/uploads/File/trythis/try_this_2.pdf
8. Tiwari S, Sinha AK, Patwardhan K, Gehlot S, Gambhir IS, Mohapatra SC. Prevalence of health problems among elderly: A study in a rural population of Varanasi. *Indian J Prev Soc Med.* 2010;41(3 & 4):226-30.
9. Park K: Textbook of Preventive and Social Medicine. Banarasidas Bhanot Publication, 22th edition, 2012, p549.
10. All India Institute of Medical Sciences. Evaluation of health status and health needs of old age home residents and establishment of minimum standards of health services in long stay institutions in India, 2006-07. New Delhi: All India Institute of Medical Sciences; 2007 : 46-57.
11. Vedantam A, Subramanian V, Rao NV, John KR. Malnutrition in free-living elderly in rural south India: prevalence and risk factors. *Public Health Nutr.* 2010;13(9):1328-32.
12. Baweja S, Agarwal H, Mathur A, Haldiya KR, Mathur A. Assessment of Nutritional Status and Related Risk Factors in Community Dwelling Elderly Rajasthan. *J Ind Acad Geriatr.* 2008;4:5-13.
13. Sharma S, Thakur M, Kaur S. Health Problems and Treatment Seeking Behaviour among Elderly. *HelpAge. India-Research & Development J.* 2012;18(2):21-7.
14. Majra JP, Gur A. Medico social profile of the inmates of the old age homes in southern India. *Middle East J Age Aging.* 2010;7(3):2.

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Original Research Article

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Awareness of cervical cancer and its risk factors among female students of a pre university college in Bangalore, Karnataka, India

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ABSTRACT

Background: Cervical cancer is a serious public health problem. It is the commonest cancer among women in rural India, and India has the largest burden of cervical cancer patients in the world. Primary intervention focusing on creating awareness in the community will make a difference in present situation of cervical cancer in the country. Objective of the study was to assess the awareness of cervical cancer and its risk factors, Pap smear testing and HPV vaccine among female students of a pre university College.

Methods: A cross sectional study was conducted among female students of a pre University College, near to Raja Rajeshwari Medical College and Hospital. The study was carried out for duration of two months, May and June 2016. A pre tested, semi-structured questionnaire was designed to evaluate their basic awareness on cervical cancer. After the data collection Health education on cervical cancer was given to the students.

Results: Out of 98 students who participated in this study 53 (54%) students were 1st year and 45 (46%) were 2nd year students. Awareness about role of hereditary factor as a risk of cervical cancer was present in 19% of the students and 36% of the students reported that having multiple sexual partners is a risk factor for cervix cancer. 45% were not aware of the fact that poor personal hygiene could also be a risk factor. 66% were not aware about HPV vaccine. There was no statistically significant association between place of residence and awareness level and there was a statistically significant difference in the awareness level and the year of study ($p<0.003$).

Conclusions: There was statistically significant difference in the awareness level between 2nd year and 1 year student. Almost all students haven't heard about Pap smear test. Majority of the students weren't aware about HPV Vaccine.

Keywords: Cervical cancer, Female students, HPV Vaccine

INTRODUCTION

Breast cancer and cervical cancer are the two most common cancers in women. There has been a drastic rise in number of cases since the past two decades. Among the two, cervical cancer is the commonest cancer among women living in rural India and India has the largest burden of cervical cancer patients in the world. One out of every five women in the world suffering this disease belongs to India. Genital infection with human papilloma

virus is a necessary factor for causation of cervical cancer.¹ Also there are many associated risk factors like bad local hygiene, too many children, not enough spacing between children, low nutrition levels and early marriage multiple sexual partners, smoking, early pregnancy all contribute to the risk factors for this kind of cancer.^{2,3}

If family history is positive, then the risk is all the higher. Although it is one of the most common cancers that affect women, cervical cancer is preventable.⁴

There are various factors which can be modified to prevent cervical cancer. It can be completely cured if detected at the earliest stage. All it needs is a little care and lots of awareness. Primary intervention focusing on creating awareness in the community will make a difference in present situation of cervical cancer in the country. Therefore spreading awareness and enhancing the knowledge regarding cervical cancer is absolutely necessary. Hence an effort has been done to assess the awareness of cervical cancer among female college students.

Objective of the study was to assess the awareness of cervical cancer and its risk factors, pap smear testing and HPV vaccine among female students of a pre – university college.

METHODS

It was a cross sectional study for two months conducted at Government Pre University College in Bidadi, Bangalore, Karnataka, India. All the female students of the pre university college were considered for the study. Pretested, semi-structured Questionnaire was used as study tool.

Sample size

As per records maintained in the administrative office of the pre university college, there are totally around 110 female students including PUC 1st Year and 2nd Year. Hence complete enumeration of the female students will be done for the study. Considering the absentees on the day of the study, 98 was the sample of the study.

Inclusion criteria

All the female students present on the day of study and willing to participate in the study.

Exclusion criteria

Those not willing to give consent

Method of data collection

A cross sectional study will be conducted among female students of a pre University College, near to Raja Rajeshwari Medical College and Hospital, Bangalore, Karnataka, India. All the students present on the day of the study and gave consent will be included in the study. A pre tested, semi-structured questionnaire was designed to evaluate their basic awareness on cervical cancer. The questionnaire, in its first part included information on age, study stream, place of permanent resident, type of family.

Remaining part of the questionnaire contained questions regarding awareness of cervix cancer and its risk factors, pap smear test and human papilloma virus vaccine. There

were 14 questions, administered to assess the awareness of cervical cancer. Of which if the respondent scored < 50 %, the student was considered to have below average awareness level and those who scored > 50% was considered to have above average awareness level regarding cervical cancer. After the data collection health education on cervical cancer was given to the students.

Statistical analysis

The data was collected and compiled in MS Excel sheet and analyzed by using SPSS (Statistical Package for Social sciences) version 20.0. Descriptive statistics has been presented and Chi square test was the test of significance used during analysis.

RESULTS

With respect to the socio – demographic factors, majority (59%) were at the age of 16 years. PUC 1st year students formed that major group of the study accounting for 54%. Majority (53%) of the students were from Arts Stream. Students from rural area accounted for 54%. Students from Nuclear family accounted for 88%.

Table 1: Socio demographic profile of the students.

Characteristics	Category	Frequency	Percent
Age (in years)	15	5	5
	16	58	59
	17	30	31
	18	5	5
	Total	98	100.0
Year of study	PUC 1st year	53	54.1
	PUC 2nd Year	45	45.9
	Total	98	100.0
Study stream	Arts	52	53.1
	Commerce	32	32.7
	Science	14	14.3
	Total	98	100.0
Place of residence	Urban	45	45.9
	Rural	53	54.1
	Total	98	100.0
Type of family	Nuclear Family	86	87.8
	Joint Family	12	12.2
	Total	98	100.0

In present study Majority (96%) were not aware of the causative agent and 71% of the students were not aware of the age of occurrence of cervical cancer. Majority of the students knew that early marriage (59%), Sexual activity at an early age (49%), smoking (66%) as a risk factor for Cervical cancer. Majority of the students didn't know the following factors as a risk for cervical cancer:

Low consumption of fruit/vegetables (44%), Use of intra-uterine device (93%), Hereditary factor (62%), Having sex with multiple partners (57%), Poor personal hygiene

related to cervical cancer (45%), Use of birth control pills for longer duration (49%) and Having multiple pregnancies as a risk factor (58%).

Table 2: Distribution of students with respect to awareness regarding risk factors of cervical cancer.

Knowledge	Answer	Frequency	Percent
Causitive Agent	correct	4	4.1
	Wrong	94	95.9
	Total	98	100.0
Age of occurrence	30 – 50 years	22	23
	Above 50 years	6	6
	Don't know	70	71
Marriage at an early age is a risk factor for cervical cancer	Total	98	100
	Yes	58	59
	No	2	2
Sexually active at early age can cause cervical cancer	Don't Know	38	39
	Total	98	100
	Yes	49	50
Smoking as a risk factor for cervical cancer	No	-	-
	Don't know	49	50
	Total	98	100
Low consumption of fruit/vegetable can cause cervical cancer	Yes	18	18
	No	37	38
	Don't know	43	44
Use of intra-uterine device is a risk factor for cervical cancer	Total	98	100
	Yes	3	3
	No	4	4
Hereditary factor	Don't know	91	93
	Total	98	100
	Yes	19	19
Having sex with multiple partners	No	19	19
	Don't know	60	62
	Total	98	100
Poor personal hygiene related to cervical cancer	Yes	35	36
	No	7	7
	Don't know	56	57
Use of birth control pills for longer duration	Total	98	100
	Yes	44	45
	No	6	6
Having multiple pregnancies	Don't know	48	49
	Total	98	100
	Yes	9	9
	No	32	33
	Don't know	57	58
	Total	98	100

Table 3: Distribution of students according to awareness regarding Pap smear test for cervical cancer.

Knowledge	Response	Frequency	Percentage
Heard of Pap smear test	Yes	1	1
	No	97	99
	Total	98	100

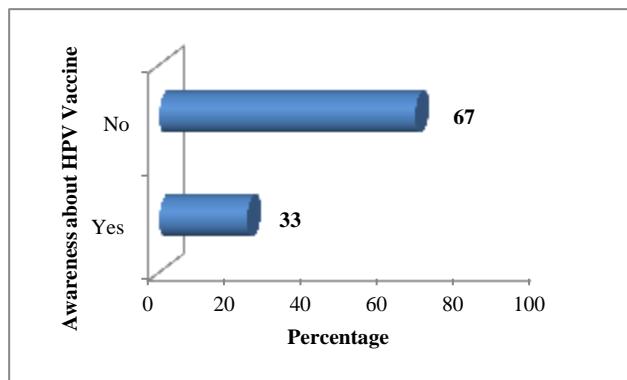


Figure 1: Distribution of study subjects according to their awareness about HPV Vaccine.

Out of 98 students, 67% were not aware about HPV vaccine. (Figure 1) Almost all students haven't heard about Pap smear test (Table 3). According to place of residence 79% of the students from rural area and 80% of the students from urban area were having below average awareness level regarding cervical cancer. There was no statistically significant association between place of residence and awareness level which suggests that rural as well as urban females do not differ significantly in the knowledge regarding cervical cancer. (Table 4) About 33% of the 2nd year students and 9% of the first year students had above average awareness level. The difference was found to be statistically significant ($p<0.003$) (Table 5).

Table 4: Association between place of residence of the students and their awareness level.

Place of Residence	Awareness Level		Total	P value
	< 50%	> 50%		
Urban	36 (80%)	9 (20%)	45	0.926
Rural	42 (79%)	11 (21%)	53	
Total	78	20	98	

Table 5: Association between the year of study of the students and their awareness level.

Year of study	Awareness Level		Total	P value
	< 50%	> 50%		
PUC 1	48 (90%)	5 (10%)	53	0.003
PUC 2	30 (67%)	15 (33%)	45	
Total	78	20	98	

DISCUSSION

Awareness is the key to prevent cervical cancer. But today in India, cervical cancer is the most common kind of cancer due to lack of knowledge, lack of access to the resources and an 'it-cannot-happen-to-me' attitude. 'It's tragic that cervical cancer mostly hits the young population and the most important thing to understand is that it is completely preventable and, therefore awareness needs to be given at the earliest to the young population. In our study 23% knew usual age of occurrence whereas in a study by Saha A et al. it was about 43%.⁵ Sexual activity at an early age was recognised as a risk factor by 50% of the students and in a study conducted by Joy T et

al. awareness in relation to sexually active at early age can cause cervix cancer was 26.1% (Indian), 38.8% (Nepal) and 27.7% (Srilanka), in which it was found that Indians were less aware.⁶

Smoking as a risk factor was recognised by 66% of the students whereas in a study by Saha A et al. it was about 29% and in a study by Joy T et al. it was found to be 31.8%.^{5,6} About 18% of the students reported low consumption of fruits and vegetables can be a risk factor for cervical cancer similar result was found in a study by Saha A et al. 12% recognised it as risk factor.⁵ Knowledge about multiple sex partners as a risk factor was found in 7% of the students and it was only 3% in a

study by Saha A et al whereas in a study by Teresa Joy et al awareness in relation with multiple sex partners can cause cervix cancer was 39.8% (Indian), 51.3% (Nepali) and 43.85 (Srilankan) showed that it was the Indians with least awareness.^{5,6} Hereditary factor as a risk factor for cervical cancer was reported by 19% of the students in present study whereas in a study by Joy T. et al it was only 5.1%.⁶ Poor personal hygiene was recognised as risk factor by 39% of the students whereas in a study by Saha A et al.⁵ 14% of the students identified poor personal hygiene as a risk factor

In present study only 1% of the students have heard of Pap smear test and in a study by Saha A et al. where only 11% had heard about Pap smear test.⁵ The results of our study and that from other studies too suggest that the awareness about cervical cancer among the college students appears to be at a lower level. In present study, awareness about use of birth control pills can't prevent HPV infection was present in 45% of the students and in a study by Teresa Joy et al it was about 28%.⁶ In present study 33% of the students had heard about HPV Vaccine. According to another cross sectional study conducted in Brazil, only 37% of the students reported that they "had ever heard about HPV".⁷

Limitations

The study was carried out in only one women's college in the city; hence caution needs to be applied before generalizing the results to entire population.

CONCLUSION

The students were not aware about most of the risk factors for cervical cancer. Almost all students haven't heard about Pap smear test. Majority of the students weren't aware about HPV Vaccine. There was statistically significant difference in the awareness level between 2nd year and 1 year student.

Recommendations

Health education programs in colleges and in community will help in creating awareness about cervical cancer and its risk factors. Female students at college are also can serve as most important source of information in educating and bringing awareness about cervical cancer in the community.

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REFERENCES

1. Walboomers JMM, Jacobs MV, Manos MM, Bosh FX, Kummer JA, Shah KV, et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. *J Pathol.* 1999;189:12-9.
2. Adam E, Kaufman RH, Adler-Storthz K, Melnick JL, Dreesman GR. A prospective study of association of herpes simplex virus and human papillomavirus infection with cervical neoplasia in women exposed to diethylstilbestrol in utero. *Int J Cancer.* 1985;35(1):19-26.
3. Castellsagué X, Díaz M, Vaccarella S, de Sanjosé S, Muñoz N, Herrero R, et al. Intrauterine device use, cervical infection with human papillomavirus, and risk of cervical cancer: a pooled analysis of 26 epidemiological studies. *Lancet Oncol.* 2011;12(11):1023-31.
4. Centers for Disease Control and Prevention (CDC). FDA licensure of bivalent human papillomavirus vaccine (HPV2, Cervarix) for use in females and updated HPV vaccination recommendations from the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rep.* 2010;59(20):626-9.
5. Saha A, Chaudhury AG, Bhowmik P, Chatterjee R. Awareness of cervical cancer among female students of premier colleges in Kolkata, India. *Asian Pacific Journal of Cancer Prevention.* 2010;11:1085.
6. Joy T, Sathian B, Bhattacharai C, Chacko J. Awareness of Cervix cancer risk factors in educated youth: A cross-sectional, questionnaire based survey in India, Nepal and Sri Lanka. *Asi Pac J Can Prev.* 2011;12:1707.
7. Rama CH, Villla LL, Pagliusi S, Andreoli MA, Costa MC. Awareness and knowledge of HPV, cervical cancer, and vaccines in young women after first delivery in São Paulo, Brazil - a cross-sectional study. *BMC Women's Health.* 2010;10:35.

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Original Research Article

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A study to determine the hidden part of the iceberg of diabetes, using Indian diabetes risk score as a screening tool in rural population of Bangalore, Karnataka, India

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ABSTRACT

Background: Diabetes as a non-communicable disease is a significant public health problem and the prevalence rate is increasing globally and reaching epidemic proportions. This highlights the need to employ screening programs for early identification of people at the risk of diabetes.

Methods: A community based cross-sectional study was conducted in three pre-selected villages in and around Kakaramanahalli, rural field practice area of Rajarajeswari Medical College. The screening tool used to assess the risk status was Indian diabetes risk score (IDRS). Body mass index (BMI) was calculated and random blood sugar (RBS) level was also estimated.

Results: A total of 101 subjects formed the study population. On evaluating the risk status of study subjects using IDRS, 25.7% had high risk score. With increase in BMI there was increase in the risk status for diabetes. Among the subjects, 5(5%) were found to have an RBS value more than the cut off (i.e. >200 mg/dl).

Conclusions: To conclude, in our study 1/4th of the study population were in high risk group. A statistically significant association was seen between the age of the study subjects and the IDRS risk status ($p = 0.001$). There was no statistically significant association between BMI categorization and the IDRS risk status ($p = 0.483$).

Keywords: BMI, Diabetes, IDRS, RBS

INTRODUCTION

Diabetes as a non-communicable disease is a significant public health problem and the prevalence rate is increasing globally and reaching epidemic proportions.¹ It is a leading cause of premature morbidity and mortality and is posing a serious challenge to Indian society and economy.

India is predominantly an agricultural nation with 72.2% of the population living in rural areas. The rural population in India is undergoing drastic lifestyle transition due to socio-economic growth. A study done

by Indian Council of Medical Research (ICMR) in the 1970s reported a diabetes prevalence of 1% in rural areas which has increased to 4 -10 % in 2000.² Thus, it is seen that even in rural India, prevalence rates of diabetes is rising rapidly.

The Indian population is known to have an increased susceptibility to develop diabetes mellitus. The ethnicity, presumable genetic vulnerability of Asians, manifests into diabetes when subjected to unfavourable lifestyles.³ In addition to this the changing epidemiological trends, economic boom, reduced physical activity, changing

dietary patterns and varied environmental factors also contribute to the increasing risk.⁴

This highlights the need to employ screening programs for early identification of people at the risk of diabetes and also those in the pre-diabetic stage, where simple lifestyle interventions can help prevent or delay the onset of the disease.

Hence, this study was undertaken to access the risk of developing type-2 diabetes and also to detect the undiagnosed cases of diabetes among rural population.

Aims and objectives

- To determine people at risk of developing diabetes using the Indian Diabetes Risk Score (IDRS).
- To calculate the Body Mass Index and measure the Random Blood Sugar levels (RBS) of all the study subjects and classify it according to their risk status.

METHODS

Study design: Community based cross sectional study

Study area: Three pre-selected villages in and around Kakaramanahalli, rural field practice area of RajaRajeswari Medical College.

Study duration: Two months between May and June 2016

Data collection: Using pre designed, semi structured questionnaire based on the Indian Diabetic Risk Score (IDRS)

Sampling method: Convenience sampling

Inclusion criteria: All individuals aged 20 years and above and not known to be diabetics were included in the study after obtaining their consent.

Exclusion criteria: Those individuals who were not willing to participate in the study.

A community based cross-sectional study was conducted in three pre-selected villages in and around Kakaramanahalli, rural field practice area of Department of Community Medicine, Rajarajeswari Medical College. In the three pre-selected villages a house to house survey was conducted. The subjects present in the house at the time of visit were included and were informed about the purpose of the study and a written consent was obtained from all the subjects. At the end of the study we were able to reach 101 individuals

The Indian Diabetes Risk Score was used as the study tool and the general socio demographic profile was also collected along with the score. The components of Indian Diabetic risk score include age, waist circumference,

physical activity and family history of diabetes. Minimum Score is 0 and Maximum is 100. Interpretation: score <30- low risk, score 30-50- medium risk, score >60- high risk.⁵

Height and weight measurements were taken and BMI was calculated. The BMI cut off values for Asian Indians as recommended by the WHO was used in the present study. A desirable BMI according to the WHO recommended cut-offs for Asians is considered to be between 18.5 and 22.9 kg/m². A BMI of 23–24.9 kg/m² is defined as “overweight” and ≥25 kg/m² as “obese”. Random Blood Glucose (RBS) was also estimated using a glucometer.⁶

Statistical analysis

Data collected was entered into Microsoft excel sheet and analyzed using SPSS (Statistical package for social sciences) version 16.0. Results were expressed in terms of frequency and percentage. Test of significance was done using chi square. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 101 subjects formed the study population. The mean age was 52.13±16 years. Minimum and maximum ages were 23 and 90 years respectively. Majority of the study participants were in the age category of 50 years and above. Among study subjects, 33 (32.7%) were males and 68 (67.3%) were females. More than half of the study subjects (52.5%) were illiterates. Greater proportion of the study subjects were Agriculturists. Majority of the respondents were living in joint family (Table 1).

On evaluating the risk status of study subjects for Type 2 Diabetes Mellitus using IDRS, 26 (25.7%) out of the 101 subjects showed low risk score, 49 (48.5%) moderate risk and rest 26 (25.7%) high risk score (Figure 1).

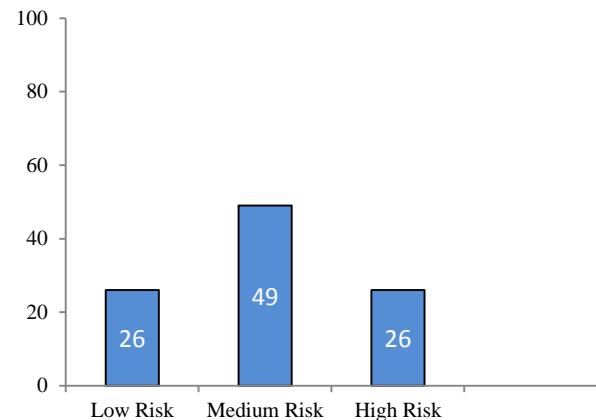


Figure 1: Distribution of the study population according to IDRS risk status.

Table 1: Socio-demographic characters of the study subjects.

Characteristics	Category	Frequency	Percentage
Gender	Male	33	32.7
	Female	68	67.3
Age	< 35 years	19	18.8
	35-49 years	29	28.7
	>50 years	53	52.5
Occupation	Professional	5	5.0
	Business	1	1.0
	Agriculture	54	53.5
	House wife	27	26.7
	Unemployed	7	6.9
	Unskilled	6	5.9
	Skilled	1	1.0
Educational status	Illiterate	53	52.5
	Primary school	3	3.0
	Higher primary school	10	9.9
	High school	26	25.6
	PUC	5	5.0
	PG and above	4	4.0
Type of family	Nuclear	40	39.6
	Joint	60	59.4
	3 Generation	1	1
Total		101	100

A total of 26 individuals belonged to the high risk group, 4% of them were found to be <35years of age, 15% of them were in the age group of 35-49 years and 81% of them were aged >50years. Thus, it is noted that with increasing age group of the study population the percentage of the individuals belonging to the high risk group also increased. A statistically significant association was seen between the age of the study subjects and the IDRS risk status ($p = 0.001$)(Table 3).

It was observed that among males and females, who were in high risk Group, 38% of them were males and 62% were females. There was no statistically significant association seen between the gender of the study subjects and the IDRS risk status ($p = 0.625$) (Table 4).

Table 2: Distribution of study subjects according to IDRS system.

Particulars	Score	Frequency (%)
Age (years)		
<35	0	14 (13.9)
35-49	20	36 (35.6)
≥50	30	51 (50.5)
Abdominal obesity		
Waist <80cm (Females); <90cm (Males)	0	47 (46.5)
Waist 80-89cm(Females); 90-99cm (Males)	10	33 (32.7)
Waist >90cm (Females); >100cm (Males)	20	21 (20.8)
Physical activity		
Exercise (regular)+strenuous work	0	68 (67.3)
Exercise (regular) or strenuous work	20	23 (22.8)
No exercise and sedentary work	30	10 (9.9)
Family history		
No family history	0	92 (91.1)
Either parents	10	9 (8.9)
Both parents	20	0 (0)

When the BMI score was assigned according to IDRS risk status, it was found that 51 (50.5%) of subjects had a BMI ≥ 23 , among whom, 16 (31.37%) were under high risk category (IDRS). There was no statistically significant association between BMI Categorization and the IDRS risk Status ($p = 0.483$) (Table 5).

RBS was measured for all the study subjects irrespective of their risk Status. The mean RBS value of the study subjects was 128 ± 36 . Among the subjects, 5(5%) were found to have an RBS value more than the cut off (i.e. >200 mg/dl), of which 2 subjects belonged to high risk group and 2 belonged to medium risk group. These subjects were advised for further investigations to confirm the Diabetes status by Fasting and post prandial blood glucose estimation (Table 6).

Table 3: Distribution of study subjects according to age category and IDRS risk status.

Age categorisation	IDRS Category			Total	P value
	Low risk frequency (%)	Medium risk frequency (%)	High risk frequency (%)		
< 35 years	11 (42)	7 (14)	1 (4)	19	
35 - 49 years	12 (46)	13 (27)	4 (15)	29	0.001
> 50 years	3 (12)	29 (59)	21(81)	53	
Total	26	49	26	101	

Table 4: Distribution of study subjects according to the gender and IDRS risk status.

Gender	IDRS category			Total	P Value
	Low risk frequency (%)	Medium risk frequency (%)	High risk frequency (%)		
Male	9 (35)	14 (29)	10 (38)	33	0.625
Female	17 (65)	35 (71)	16 (62)	68	
Total	26	49	26 (100)	101	

Table 5: Distribution of study subjects according to BMI category and IDRS risk status.

BMI categorization	IDRS category		Total	P value
	Low/medium risk	High risk		
<18.5 (Under nutrition)	11 (85)	2 (15.3)	13 (12.9)	
18.5 -22.9 (normal)	29 (78)	8 (22)	37(36.6)	
23 and above (overweight and obese)	35 (69)	16 (31)	51(50.5)	0.483
Total	75	26	101	

Table 6: Distribution of study subjects according to their risk Status and RBS value.

IDRS risk status	RBS Value(mg/dl)		Total
	<200	>200	
Low risk	25	1	26
Medium risk	47	2	49
High risk	24	2	26
Total	96	5	101

DISCUSSION

In this study, we used the Indian Diabetes Risk Score to identify the risk status of undiagnosed diabetics in a rural population. Although various risk factor scoring systems (Ramachandran) were developed previously, IDRS developed by Mohan *et al* is considered to be one of the strongest predictors of incident diabetes in India.^{7,8} IDRS uses two non-modifiable risk factors (age and family history of diabetes) and two modifiable risk factors (waist circumference and physical activity) giving a clear message that if the modifiable risk factors are altered the risk score can be considerably reduced.⁹

The biochemical tests most commonly used to screen diabetes are Fasting blood glucose estimation, 2 hour post prandial blood glucose estimation and oral glucose tolerance test. These tests are labor intensive and expensive to do on a large scale in a community setting. Thus, estimation of Random capillary blood glucose level is the most convenient method as this has the advantage that it can be done at any time of the day and does not need venipuncture.

The current study identified 25.7% of the subjects to be in the high risk category according to IDRS. In a study by Mohan *et al.* reported that 43% of their study subjects

were in high risk group.⁵ In a similar study conducted by Gupta *et al*, they found 31% of their study population to have a high risk score.² Reason for this difference could be the varied life styles of the study subjects, as our study was conducted in a rural area where as the other studies were done in an urban setting.

In our study it is noted that with higher the age group of the study population, the percentage of the individuals belonging to the high risk group also increased which is similar to the findings obtained by Patil RS *et al.*¹⁰ Several other studies have recorded similar findings.¹¹⁻¹³

In this study 91% of the study subjects did not have any family history of diabetes. In another study conducted by Patil RS *et al* 89% of the individuals did not have any family history of diabetes.¹⁰ Gupta SK *et al* in their study observed that 68.5% of the respondents had no family history of diabetes.² This difference could be due to previous lack of awareness about the disease and lack of screening tests at the community level to detect the cases of diabetes.

Of the 26 subjects who belonged to high risk group according to IDRS, 7% had RBS value >200mg/dl. These findings are concurrent with the results obtained in a study done by Chythra *et al*, in which 6% of the subjects in high risk group had RBS value of >200mg/dl and belonged to the high risk group.³

CONCLUSION

In conclusion, it is seen that 1/4th of the subjects in our study belonged to the high risk category. A statistically significant association was seen between the age of the study subjects and the IDRS risk status ($p=0.001$). There was no statistically significant association seen between the gender of the study subjects and the IDRS risk status ($p=0.625$). There was no statistically significant

association between BMI Categorization and the IDRS risk Status ($p = 0.483$). Among the subjects, 5 (5%) were found to have an RBS value more than the cut off (i.e. >200 mg/dl). Hence, our study shows that IDRS is a simple, quick and cost effective screening tool for early identification of people at the risk of developing diabetes. Use of IDRS has made mass screening for diabetes more practically feasible.

Recommendations

All the subjects with RBS value more than the cut-off were asked to undergo further confirmatory testing, and those who belonging to IDRS moderate and high risk category were advised to implement lifestyle modifications and dietary changes.

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REFERENCES

1. Nandeshwar S, Jamra V, Pal DK. Indian Diabetes Risk Score for screening of undiagnosed diabetic subjects of Bhopal city. National J Community Med. 2010;1(2):176-7.
2. Gupta SK, Singh Z, Purty AJ, Vishwanathan M. Diabetes prevalence and its risk factors in urban Pondicherry. Int J Diabetes Dev Ctries. 2009; 29(4):166-9.
3. Rao CR, Kulkarni MM, Narayanan SS, Kamath VG, Kamath A, Ballala K, Sujatha K. Utility of Indian Diabetic Risk Score (IDRS) in a Rural Area of Coastal Karnataka, India". Journal Evolution Medical and Dental Sciences. 2014;3(13):3272-7.
4. Gupta M, Singh R, Lehl SS. Diabetes in India: a long way to go. Int J Sci Rep. 2015;1(1):1-2.
5. Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A Simplified Indian Diabetes Risk Score for Screening for Undiagnosed Diabetic Subjects. JAPI. 2005;53:759-63.
6. Humayun A, Shah AS, Sultana R. Relation of hypertension with body mass index and age in male and female population of Peshawar, Pakistan. J Ayub Med Coll Abbottabad. 2009;21(3):63.
7. Ramachandran A, Snehalatha C, Vijay V, Wareham NJ and Colagiuri S. Derivation and validation of diabetes risk score for urban Asian. Diabetes Res and Clinical Practice. 2005;70:63-70.
8. Stanley JML, Elantamilan D, Mohanasundaram K, Kumaravel TS. Evaluation of Indian diabetic risk score for screening undiagnosed diabetes subjects in the community. Indian J Sci Technol. 2012;5(6).
9. Abhishek A, Srivastava JP, Gupta P, Sachan B, Prakash D, Zaidi ZH. Indian diabetes risk score (IDRS), a strong predictor of diabetes mellitus: A cross sectional study among urban and rural population of Lucknow. Int J Applied Res. 2015;1(7):135-8.
10. Patil RS, Gothankar JS. Assessment of risk of type 2 diabetes using the India Diabetes Risk Score in an urban slum of Pune, Maharashtra, India: a cross-sectional study. WHO South-East Asia J Public Health. 2016;5(1):53-61.
11. Mohan V, Shanthirani CS, Deepa R. Glucose intolerance (diabetes and IGT) in a selected South Indian population with special reference to family history, obesity and lifestyle factors – the Chennai Urban Population Study (CUPS 14). J Assoc Physicians India. 2003;51:771-7.
12. Singh RB, Bajaj S, Niaz MA, Rastogi SS, Moshiri M. Prevalence of type 2 diabetes mellitus and risk of hypertension and coronary artery disease in rural and urban population with low rates of obesity. Int J Cardiol. 1998;66(1):65-72.
13. Menon VU, Kumar KV, Gilchrist A, Sugathan TN, Sundaram KR, Nair V, et al. Prevalence of known and undetected diabetes and associated risk factors in central Kerala – ADEPS. Diabetes Res Clin Pract. 2006;74(3):289-94.

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Research Article

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Bringing elder abuse out of the shadows: a study from the old age homes of Davangere district, Karnataka, India

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ABSTRACT

Background: Elder abuse is a violation of human rights. Elder abuse has disturbing consequences for older persons such as poor quality of life, psychological distress, and loss of property and security. It is also associated with increased mortality and morbidity. Objective of the study was to identify the magnitude and the pattern of elder abuse experienced by the elderly, which made them to join old age home.

Methods: The study was a cross sectional study carried out in the old age homes of Davangere district, Karnataka, India for a period of 1 year with the sample of about 105 elderly residing in old age homes.

Results: Out of 105 elderly, majority were in the age group of 60 – 69 (48%). Females (65%) outnumbered the males (35%). Majority of the residents were from rural background (71%). The magnitude of elder abuse in our study was found to be 35.2%. Regarding the type of elder abuse, majority of the residents experienced verbal abuse (70%) followed by physical abuse (13%). Daughter-in-law was involved in majority of the cases of elder abuse i.e., (45.9%), followed by their son (24.3%).

Conclusions: The magnitude of elder abuse is on the higher side in our study, which made them to join old age home. This finding, questions the general perception in India whether the families are the safest place for the elderly to live.

Keywords: Elder abuse, Old age homes, Geriatrics

INTRODUCTION

Ageing of population is a major emerging demographic issue and is an inevitable consequence of the demographic transition experienced by most countries.¹ In 2001, geriatric population was 77 million and it is estimated that in India total number of elderly will rise to 150 million by 2025.² With more elderly people living longer, the households are getting smaller and congested, causing stress in joint and extended families and issues of elder security and well-being are becoming a matter of

concern. There is a need to take care of the situation of elderly in terms of social and mental well-being, economic and social security and elder abuse.¹

Elder abuse

Is defined as “elder abuse is a single, or repeated act, or lack of appropriate action, occurring within any relationship where there is an expectation of trust which causes harm or distress to an older person”. It is important to note that elder abuse in this definition

excludes random acts of violence or criminal behaviour against older people". Elder abuse constitutes of different forms of abuse like neglect, disrespect, verbal abuse, physical abuse, financial abuse, psychological and emotional abuse or even sexual abuse.³

There is growing realization among older persons that they are more often than not being perceived by their children as a burden. The vulnerability and dependence in old age exposes them to elder abuse. This problem of elder abuse silently affects the older person's life, health, dignity, safety, emotional feelings and also violates the human rights of older person.⁴

The older generation that had once been dependent on their children for old age care is now increasingly looking towards old age homes and long-term institutional facilities. There are legal safeguards to older persons in India, one of which is maintenance and welfare of parents and senior citizens Act 2007, in a national survey only 11% knew about it.¹

The Objective of the study was to identify the magnitude and the pattern of elder abuse experienced by the elderly, that made them to join old age home.

METHODS

It is a cross sectional study conducted between January 2012 - December 2012 for 1 year. Davangere district has 6 talukas, with 7 old age homes (OAH) in its jurisdiction. Data was collected from all the residents of the 7 old age homes of Davangere district, Karnataka, India. With this

by the end of study we were able to reach a sample of 105 elderly.

Inclusion criteria

All the residents aged 60 years and above in the old age homes.

Exclusion criteria

Individuals who refused to give consent.

Statistical analysis

Data was entered and analyzed using statistical package SPSS Version 17. Results were tabulated in percentages and proportions. Chi square test was applied to test the significance.

A semi structured and pre tested questionnaire was used to interview the residents after modifying to local language. Contents of the questionnaire were explained to the residents and to the head/manager (concerned person) and they were ensured that a total confidentiality will be maintained. The questionnaire included information regarding socio-demographic factors and their social problems. Regarding social problems, the main focus was to obtain the reason for the elderly to join the old age home. The individuals who have experienced elder abuse and ended up in OAH were further interviewed regarding the type of elder abuse and the person involved in the abuse. The below table shows the definitions of various forms of abuse considered in our study.

Table 1: Definitions of type of abuse.³

Type of abuse	Characteristics	Examples
Physical abuse	The infliction of pain or injury	Slapping, hitting, kicking, force feeding, restraint striking the objects
Psychological/ emotional abuse	The infliction of mental anguish	Verbal aggression or threat, threats of institutionalization, social isolation, humiliating statements
Financial/ material abuse	The illegal or improper exploitation and/or use of funds or resources	Theft of cheques or money, coercion to deprive the older person of his or her assets such as forcible transfer of property
Sexual abuse	Non – consensual contact of any kind with an older person	Suggestive talk, forced sexual activity, touching, fondling with a non-consenting competent or incompetent person
Neglect	Intentional or unintentional refusal or failure of designated caregiver to meet needs required for older person's well being	Failure to provide adequate food clothing shelter, medical care, hygiene or social stimulation.

RESULTS

Out of 105 residents, majority were in the age group of 60 – 69 (young old) accounting for 48%. Females

outnumbered the males, 68 (65%) were females and 37 (35%) were males. 64 (61%) of the residents were either widow or widower and 14 (13%) remained unmarried. 101 (96%) residents belonged to Hindu Religion. 48

residents (46%) were illiterates & 30 residents (29%) stopped schooling once they reached primary schooling (Table 2).

Table 2: Socio – demographic profile of the residents.*

Variable	Category	Frequency	Percentage
Age(years)	60-69 (young old)	50	48
	70- 79 (Old old)	36	34
	80 & above (Oldest old)	19	18
Total		105	100
Gender	Male	37	35
	Female	68	65
Total		105	100
Marital status	Married	24	23
	Widowed	64	61
	Separated	3	3
	Unmarried	14	13
Total		105	100
Religion	Hindu	101	96
	Muslim	3	3
	Jain	1	1
Total		105	100
Education	Not literate	48	46
	Primary	30	29
	Higher primary	9	8
	High school	10	9
	Below graduate	3	3
	Graduate & above	5	5
Total		105	100

*To be read column wise

Major portion of the residents were engaged in unskilled work in their past as their mode of earning (38%). Social security benefits in the form of old age pension/widow pension were available to about 43% of the residents. 71% of the residents were from rural background (Table 3).

Elder abuse, the major reason for the elderly to join old age home

In our study reason given by majority of the residents to join OAH was abuse accounting for 37 (35.2%), and 28 residents (26.7%) joined old age home as they didn't wanted to be burden on their family members. About 20 residents (19%) had joined because there was nobody to take care of them and 11 residents (10.4%) joined to be cared in a better way. Other reasons given by residents were for companionship 4 (3.8%), due to ill health/

disability 3 (2.9%), to live with self - respect 2 (1.9%) and one individual was forced by relatives to join OAH.

Table 3: Socio demographic profile of the elderly.*

Variable	Category	Frequency	Percentage
Last occupation	Professional	8	8
	Business	5	5
	Skilled	1	1
	Semi – skilled	14	13
	Unskilled	40	38
	Housewife	23	22
	Unemployed	14	13
Total		105	100
Source of income	Gainfully employed	2	2
	Money sent from family	22	21
	Old age pension/widow pension	45	43
	Property	7	6
	No income	29	28
Total		105	100
Place most stayed	Urban	30	29
	Rural	75	71
Total		105	100
Duration of stay	< 1 Years	33	32
	1-3 years	35	33
	4-6 years	25	24
	7 years & above	12	11
Total		105	100

*To be read column wise

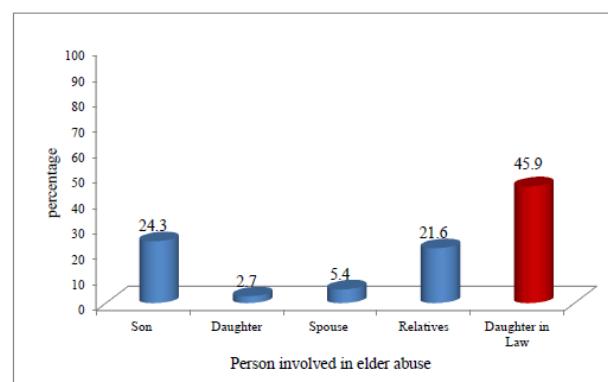


Figure 1: Reason for joining old age home.

Person involved in elder abuse

Daughter in law of the residents was the major person involved in the elder abuse accounting for 45.9% and son was involved in the abuse among 24.3% elderly. Abuse from relatives accounted for 21.6%. Spouse and daughter were reported in about 5.4% and 2.7% cases respectively (Figure 2).

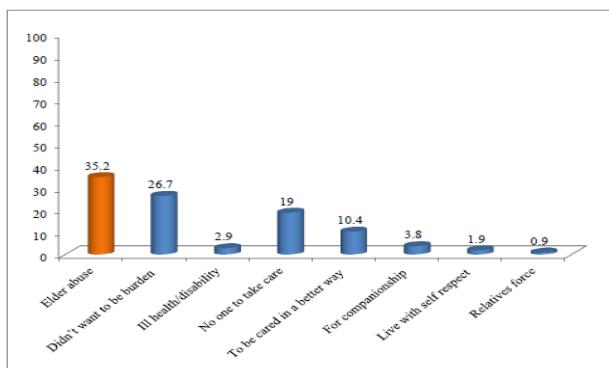


Figure 2: Percentage distribution of the abusers involved in elder abuse.

Type of abuse

Regarding the type of elder abuse, majority of the residents experienced psychological/emotional abuse (70%) followed by Physical abuse (13%). About 11% felt they were being neglected by their family members. In

6% of the residents, it was the financial abuse that made them to join OAH (Figure 3).

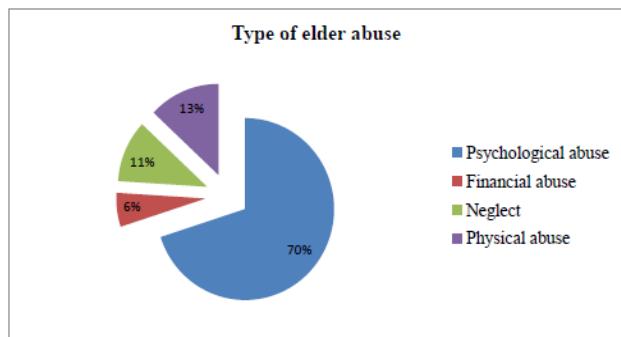


Figure 3: Type of abuse the residents experienced.

Major person involved in the psychological abuse of the elderly was daughter in law accounting for 14 (54%). Elderly felt neglected the most from the relatives 3 (75%). Son was the major person involved in the physical form of abuse 3 (60%) (Table 4).

Table 4: Relationship of type of abuse and the person involved in elder abuse.*

Type of elder abuse	Person involved in elder abuse					Total frequency (%)
	Son frequency (%)	Daughter frequency (%)	Spouse frequency (%)	Relative's frequency (%)	Daughter in-law frequency (%)	
Psychological abuse	6 (23)	1 (4)	1 (4)	4 (15)	14 (54)	26 (100)
Financial abuse	0	0	1 (50)	1 (50)	0	2 (100)
Neglect	0	0	0	3 (75)	1 (25)	4 (100)
Physical abuse	3 (60)	0	0	0	2 (40)	5 (100)
Total	9 (24.3)	1 (2.7)	2 (5.4)	8 (21.6)	17 (45.9)	37 (100)

*To be read row wise.

Table 5: Association between socio - demographic factors and elder abuse.*

Parameters	Elder abuse present Frequency (%)	Elder abuse absent frequency (%)	Total frequency (%)	Chi square	P value
Age (in years)					
60 -69	17 (34)	33 (66)	50 (100)		
70 - 79	12 (33.3)	24 (66.7)	36 (100)	0.48	0.798
80 & above	8 (42)	11 (58)	19 (100)		
Sex					
Male	12 (32)	25 (68)	37 (100)	0.19	0.676
Female	25 (37)	43 (63)	68 (100)		
Marital status					
Married	7 (29)	17 (71)	24 (100)	2.33	0.506
Widows /widowers	27 (42)	37 (58)	64 (100)	(Yates)	(Yates)
Unmarried	0	3	3 (100)		
Separated/ divorced	3 (21)	11 (69)	14 (100)		
Place of residence					
Urban	12 (40)	18 (60)	30 (100)	0.41	0.518
Rural	25 (33.3)	50 (66.7)	75 (100)		

*To be read row wise.

Abuse was found more evident among elderly aged 80 years and above and females experienced more abuse than their counter part. Elderly from urban area had experienced more abuse. Abuse was found to be high among widow/ widowers. There was no significant association between abuse and any of these socio demographic factors (Table 5).

DISCUSSION

In our study reason given by majority of the elderly to join OAH was abuse similar finding was noted from a study in old age homes of Kerala where the residents reported “family problems” which is categorised as quarrels with their sons, daughters, relatives, son in law and daughter in law, as the main reason to join OAH accounting for to 41%.⁵ Whereas in a study from old age homes of Chennai, about 11.4% of elders stated that their family members mistreated them.⁶ and a national survey findings say, more than one fifth of the elderly, 23% reportedly experienced abuse nationally.¹ Even though there is variation in the findings, in the recent years elder abuse is very much prevalent in the community which is forming a major reason for elderly to leave home.

In our study daughter in law was the major person involved in the elder abuse followed by the son, this finding is similar to a National survey report on elder abuse in India (2013), nationally the daughter-in-law has been reported as a primary perpetrator of abuse (39%) followed closely by the son (38%).¹ Whereas a study from Kerala, showed majority of the abuse was from son (62.4%), followed by daughter in law (59.2%).⁷ Son as a primary perpetrator (39% was found in another study carried out in Tirunelveli district, Tamil Nadu followed by daughter in 15% of the residents and daughter in law accounted in (7.3%) residents.⁴ Majority of the residents in our study are females and adjustment problem they have faced with their daughter in law might have led them to OAH.

Residents in our study experienced psychological/emotional abuse as a major form of abuse and in a study from old age homes of Tirunelveli district, Tamil Nadu mixed abuse (47%) was the major reason for elderly to join OAH followed by emotional abuse (16.3%), financial abuse (14.3%), neglect (8.3%) & sexual abuse (2.3%).⁴ A study from Kerala reported Nearly half (49%) experienced some form of abuse from their family, among them most common forms stated by the residents were verbal abuse (39%) and neglect (39%) followed by physical abuse (13%) and financial abuse (10%).⁷ This shows the changing value towards the old people among the younger generation.

Limitations of the study

Our study assessed the magnitude and pattern of elder abuse and was not intended to find out the impact of elder abuse. Hence we recommend that further studies looking

at impact of elder abuse on health and well-being of the elderly can be taken up.

CONCLUSION

Majority of the residents in our study was formed by females. Illiteracy was found on the higher side and majority of the elderly were from rural background. Elderly are becoming victims of elder abuse, with this regard from our study we conclude that elder abuse formed the major reason for the elderly to join the old age home. Main form of abuse experienced is verbal abuse. In most of the cases, daughter in law was the primary perpetrator.

Recommendations

Elder abuse is widespread and unreported. Hence efforts should be made from the government to sensitize the public regarding the problems of old age and importance of family to act as a unit to tackle the problems of old age. Younger generation should be sensitized and motivated that it's their responsibility to respect, honour and protect the elderly people. Legal awareness about the rights of the older persons such as “maintainence and welfare of parents and senior citizens act 2007” should be created. More research should be encouraged in the field of geriatrics and elder abuse, so that the elder population, who are regarded as precious assets, will have a better quality of life.

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REFERENCES

1. HelpAge India, Fighting Isolation Poverty and Neglect. Elder abuse in India (2013). Available from: URL:[http://www.helpageindia.org/pdf/Elder Abuse in India \(2013\) – a Helpage India study.pdf](http://www.helpageindia.org/pdf/Elder Abuse in India (2013) – a Helpage India study.pdf)
2. Dawale AK, Mudey A, Lanjewar A, Wagh VV. Study of morbidity pattern in inmates of old age homes in Urban area of central India. J Indian Acad Geriatr. 2010;6(1):23-7.
3. Perel-Levin S. Disscussing screening for elder abuse at primary Health care level. World Health Organization, Aging and Life Course 2008.
4. Rufus D, Shekar B. A Study on Victims of Elder Abuse: A Case Study of Residents of Old age Homes in Tirunelveli District. Helpage India-

- Research & Development Journal. 2011;17(3):29 - 39
5. Sreevals, Nair PS. Elderly and old age homes in kerala. Available from: URL:<http://www.helpageindia.org/helpageprd/download.php?fp=aW1hZ2VzL3B1Ymxpc2hpbmcf=&f=MTMwNzAwOTk0My5wZGY>.
6. Rani AM, Palani G, Sathiyasekaran BWC. Social problems of elders in old age homes in Chennai. J Indian Acad Geriatr. 2012;8(3):101-7.
7. Sebastian D, Sekhar TV. Extent and Nature of Elder Abuse in Indian Families: A Study in Kerala. HelpAge India-Research & Development Journal. 2011;17(3):20-8.

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Primary immunization coverage among children using lot quality assurance sampling technique in rural field practice area of a Medical College and Hospital, Bengaluru, Karnataka, India

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ABSTRACT

Background: In India, immunization has been a central goal of the health-care system from the 1970's, but universality is yet to be achieved. **Objectives:** The objective of the study was to assess the primary immunization status of children aged 12–23 months using lot quality assurance sampling (LQAS) technique in three primary health center (PHC) areas and estimate the dropout rates. **Materials and Methods:** A community-based cross-sectional study was carried out in three PHC areas of a Medical College Hospital, Bengaluru. LQAS technique was applied in 10 lots and 190 children aged 12–23 months were included. Lots are judged as acceptable or unacceptable based on the decision value, and dropout rates are estimated. **Results:** By 1 year of age, 92.6% of children were fully immunized, 7.4% were partially immunized, and no child was found to be unimmunized. One lot was found to be low performing. Dropout rate was 0.5%, 2.1%, and 3.2% between DPT1-DPT2, DPT2-DPT3, and DPT3-Measles, respectively. **Conclusion:** LQAS technique could be used to identify areas needing resource assignment to improve immunization coverage.

KEY WORDS: Children; Karnataka; Lot Quality Assurance Sampling; Primary Immunization Coverage

INTRODUCTION

Immunization is a cost-effective preventive public health intervention, averting an estimated 2–3 million deaths every year.^[1] An estimated 19.5 million infants worldwide are still missing out on basic vaccines.^[2] In Karnataka, there has been a decline in full vaccination coverage between National Family Health Survey (NFHS)-2 (60%) and NFHS-3 (55%)^[3] and was 62.6% during NFHS-4.^[4] Lot quality assurance sampling (LQAS) has found application

in the field of health, particularly valuable for measuring immunization coverage as it helps to identify areas with low immunization coverage where improvement in vaccine delivery need to be made.^[5,6] In spite of it being more than 30 years after the launch of Universal Immunization Programme, universality of immunization services is yet to be achieved. Hence, the present study was carried out with an objective to assess the primary immunization status of children aged 12–23 months using LQAS technique in three primary health center (PHC) areas and to estimate the dropout rates.

MATERIALS AND METHODS

A community-based cross-sectional descriptive study was conducted in three PHC areas, catering to a total population of 52,499, attached to the Department of Community Medicine of a Medical College and Hospital, Bengaluru,

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during September–October 2014. The procedures followed were in accordance with the ethical standards as laid by the ICMR-Ethical Guidelines for Biomedical Research on Human Participants.

Inclusion Criteria

Children aged 12–23 months with either mother or reliable respondent available to provide key information and who are permanent residents of the study area and consenting to participate in the study.

Sampling Technique

Lot Quality Assurance Sampling Technique.

Planning the Study as per the WHO guidelines^[7]

1. Level of the accuracy of $\pm 8\%$ and 95% confidence level is considered for the study.
2. Estimation of total sample size: The sample size for $\pm 8\%$ accuracy and 95% confidence is determined as 150 by considering the declarations by the WHO.
3. Estimation of target population from which sample will be selected: Children 12–23 months age make up approximately 3% of population (percent that WHO recommends using when actual rates are not available). The total population of the study area is 52499 and the proportion of children aged 12–23 months is 3%, then $52499 \times 0.03 = 1575$.
4. Calculate the sampling fraction to decide whether to reduce the total sample size: A sampling fraction shows what proportion of a total population will be included in a study. Sampling fraction = Total sample size/Target population = $150/1575 \times 100 = 9.5\%$.
5. The number of lots to be studied: For this study, each subcenter is considered as a LOT as it is served by different junior health assistant female/male. Thus, each LOT is considered to contain homogenous sampling units. There are 10 subcenters in the three PHC's.
6. Calculation of minimum sample size for each lot: Minimum sample size = Total sample size/Number of lots = $150/10 = 15$. It is the same for all LOTS. This can be increased but not decreased. Thus, it is increased to 19 per Lot, as according to Valadez *et al.*,^[8] the sample size of 19 per lot has α and β error <10%. Thus, total sample size is increased to 190.
7. Setting of low and high threshold levels and decision value: Decision value is the cutoff for the performance of an indicator. It is the highest number of children who are not fully immunized in a lot. Considering 85% as acceptable (high threshold) and 65% as unacceptable (low threshold) coverage level, decision value is determined as three based on WHO declaration.^[7] This means a minimum of 16 fully immunized or 3 partial/non-immunized children is acceptable in a lot.

8. Select sampling point areas: It is done using the estimated list of households in each lot as shown in Table 1. 19 numbers are selected randomly from 1 to 817 using the random number table. The villages in which the 19 numbers are located (indicated by*) will be those from which children aged 12–23 months will be selected in the lot.

Selection of Household

Locations of 19 interviews for each lot are identified using a random process. To select the household, from the center of the village, the street, side of street and first household is selected randomly. If there is no eligible child in that house, then the door closer to the first household is chosen as the second house and so on until a household containing a child in the age group of 12–23 months is found. If there is more than one child per village, then the above steps are repeated to select the next household with an eligible child.

Method of Data Collection

If any house visited had more than one child aged 12–23 months, then numbers were designated to the children and one child was selected randomly. Mother/guardian of the child was interviewed using a pre-tested, semi-structured questionnaire to collect information on sociodemographic components. Data on immunization status was collected by checking the immunization card of the child or information from the mother or a reliable respondent in the family stating that the child has been immunized was considered. Further, the presence of scar of BCG vaccine was checked.

The following definitions were considered for immunization status:^[9]

Fully immunized

Child who had received one dose BCG, three doses of oral polio vaccine (OPV), DPT, and Hep B, and one dose of Measles before 1 year of age.

Table 1: Selection of sampling point areas in Lot 1

Villages in lot 1	Estimated number of households	Cumulative number of households	Interview locations
Village 1	84	84	**
Village 2	102	186	***
Village 3	78	264	*
Village 4	111	375	***
Village 5	90	465	**
Village 6	182	647	****
Village 7	170	817	****

Partially immunized

Child who had received one or more vaccines but not all the above-mentioned vaccines.

Non-immunized

Child who had not received any of the above-mentioned vaccines.

Children who were not fully immunized were linked to the health worker of concerned PHC for further follow-up.

Ethical Consideration

Approval was obtained from the Institutional Ethics Committee of Rajarajeswari Medical College and Hospital, Bengaluru, before the commencement of the study.

Statistics

Data were compiled into Microsoft excel worksheet and analyzed using SPSSv.20. Data are presented as frequency and percentages. Lots are judged as acceptable or unacceptable based on the decision value. Estimate of overall coverage and confidence interval (CI) for the target population in the study area is calculated.^[7] The dropout rate is calculated using the formula: $(HCAD-LCAD) \times 100/HCAD$, where HCAD is highest covered antigen dose, and LCAD is lowest covered antigen dose.^[9]

RESULTS

Of the 190 children, 101 (53.2%) were males, 185 (97.4%) were Hindu by religion, 131 (68.9%) belonged to the joint family, and 78 (41.1%) belonged to lower middle class according to modified BG Prasad classification. Majority,

176 (92.6%) of children were fully immunized by 1 year of age, and 14 (7.4%) children were partially immunized. In this study, no children were found to be unimmunized. Immunization card was unavailable during the survey for 43 (22.6%), of which 29 (67.4%) had misplaced the card, 8(18.6%) had left the card their mother's place, and 6 (14%) had lost it. Majority 181 (95.3%) of the children were vaccinated in the government sector.

Of the 10 lots studied, nine lots were high performing, and only lot three were considered to be low performing as it had 4 partially immunized children. After giving weights to each lot, the estimated immunization coverage and CI in children aged 12–23 months were found to be $93\% \pm 3.8\%$ [Table 2]. Thus, the true coverage in the study area ranges from 89.2% to 96.8%.

As shown in Table 3, 5.8% of children have not received the measles vaccine, 2.6% had not received third dose DPT, HepB, and OPV. BCG scar had developed in 177(93.2%) of children.

As shown in Figure 1, the lowest dropout rate was of 0.5%, between first dose of OPV, DPT, and HepB and second dose OPV, DPT, and HepB, with increasing dropout rates among the next doses. Between HCAD and LCAD, i.e., between BCG and Measles dropout rate was found to be 4.75%. Dropout rate <10% indicates good utilization rates.^[10] Dropout children need to be identified and mobilized for the next vaccination session so that they do not become partially immunized.

DISCUSSION

Lot quality technique is used to monitor the quality of immunization services.^[7] Overall, immunization coverage estimate for the target population was 93% with one lot

Table 2: Overall performance of each lot estimated overall coverage for the total target population (LOT sample size=19, Decision value=3)

Lot No.	Lot population	Weight (Wt)	Number immunized	Partially immunized	Overall performance	Proportion immunized (p) [†]	Estimated coverage [‡]
1	3749	0.07	19	0	High	1.00	0.070
2	5428	0.11	18	1	High	0.95	0.104
3	1698	0.03	15	4	Low	0.79	0.023
4	4039	0.08	17	2	High	0.89	0.071
5	3626	0.07	18	1	High	0.95	0.066
6	3736	0.07	19	0	High	1.00	0.070
7	3786	0.07	17	2	High	0.89	0.062
8	9092	0.17	18	1	High	0.95	0.161
9	8468	0.16	18	1	High	0.95	0.152
10	8877	0.17	17	2	High	0.89	0.151
Total	52499	1.00	-	-	-	-	0.93

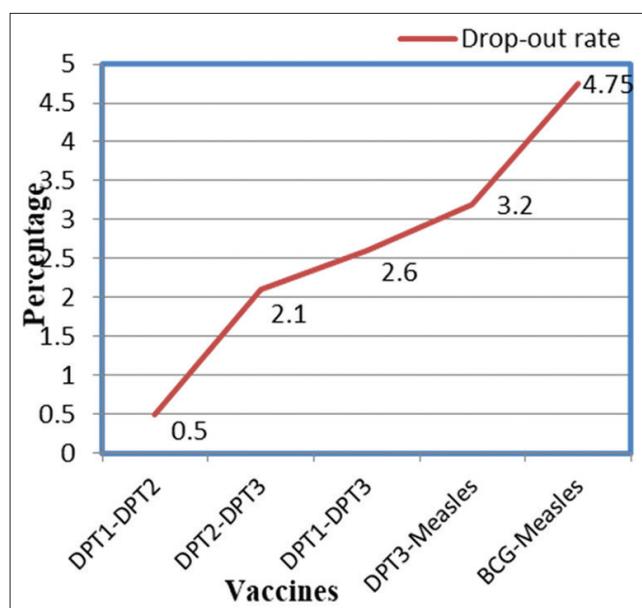
*Weight (wt) = (Lot population)/(Total target population of all lots), [†]Proportion immunized (p) = (Number immunized)/Lot sample size (n),

[‡]Estimated coverage=Weight×Proportion immunized, Confidence Interval (CI) = $[1.96 \times \sqrt{\sum (wt^2 \times pq)/n}] \times 100$, where q=1 - p

Table 3: Distribution of children according to vaccines received and missed

Vaccine	Vaccine received	Vaccine not received
BCG	188 (98.9)	2 (1.1)
OPV1/DPT1/Hep B1	190 (100)	0 (0.0)
OPV2/DPT2/Hep B2	189 (99.5)	1 (0.5)
OPV3/DPT3/Hep B3	185 (97.4)	5 (2.6)
Measles	179 (94.2)	11 (5.8)

Figures in parenthesis indicate percentages. OPV: Oral polio vaccine

**Figure 1:** Dropout rates of children between each dose of vaccine

identified as low performing. It was good to know that there were no unimmunized children in the study area. In the present study, one of the 10 lots studied had immunization coverage below the acceptable levels. The present study had least dropout rate of 0.5% between DPT1 and DPT2. Between consecutive doses, dropout rate was high between DPT3 and measles (3.2%) which could be because of the gap of 6 months or more between the doses. Our country being in the phase of measles elimination, necessary measures need to be taken to address the dropout at all stages, by giving reminder for the mothers so that vaccination is not missed for children, use of tracking tools such as tracking bag, mother and child registers at PHC's, also facilitate timely tracking of dropouts and thus improving the coverage rates.

As per DLHS-4 for Karnataka,^[11] 77.6% children aged 12–23 months were fully vaccinated, 1.4% not received any vaccination, BCG, three doses of DPT and polio vaccine and measles vaccine was received by 97.2%, 88.2%, 89.6%, and 89.6% children, respectively. As per DLHS-4, in Bengaluru 90.6% children were fully vaccinated, 98.1%, 94.3%, 96.2%, and 96.2% had received BCG, three doses of DPT and polio

vaccine and measles vaccine, respectively.^[12] Compared to DLHS-4 report, the coverage estimates obtained in the present study are higher for all vaccines (>95%) except for measles vaccine which was 94.2% and no children were found unimmunized. In a study by Lahiri *et al.*,^[13] the number of valid doses in percentages was BCG - 96.14%, DPT1 - 83.64%, DPT2 - 79.48%, DPT3 - 77.47%, OPV1 - 83.64%, OPV2 - 80.25%, OPV3 - 78.09%, Hep B1 - 65.74%, Hep B2 - 56.64%, Hep B3 - 45.99%, and Measles - 73.3%. In a similar study using LQAS technique by Pradeep *et al.*^[5] the overall immunization coverage was 84.21%, and all the sub centers had high performance for immunization. Similar coverage estimates as our study was seen in study by Datta *et al.*,^[14] where 90.9% children were fully immunized, 0.3% were non-immunized, and coverage for individual vaccines was 99.7% for BCG, coverage for Measles and hepatitis B vaccine was 95.45% and for DPT and OPV was 97.3%. In the study by Sivasankaran *et al.*,^[15] 97.7% of children were vaccinated against measles, and two health sub-centers were low performing. In the study by Bhuiya *et al.*,^[16] the number of inadequately performing areas was one area each for DPT and BCG, five areas for measles. Dropouts are those children who started vaccination but did not complete the schedule. It reflects the poor perception of parents/caregivers' about the benefits of vaccination or the immunization service delivery system, or both, combined with other barriers that force them to place immunization on a low priority. Since December 2014, Mission Indradhanush has made tremendous efforts to bridge the gap in immunization.^[10] In a study in the rural area, the dropout rate between BCG and DPT3 was 2.1%, 3.9% between BCG-Measles and DPT3-Measles dropout rate was 1.8%. In comparison to the present study, higher dropout rates were found in coverage evaluation survey with a dropout rate of 5% between DPT1 and DPT2; 9% between DPT2 and DPT3; 13% between DPT1 and DPT3; 15% between BCG and Measles, 18% between BCG and DPT3; and 10% between DPT1 and Measles.^[17] The difference in dropout rates is mainly because of the improved vaccination coverage noted with years which also indicated better utilization of immunization services in the community.

Strengths of the Study

LQAS technique used helps make judgments about individual lots surveyed, and findings can be used immediately by local managers and health. As every child is selected at random, a child who could be residing on the outskirts of the village will also have equal chances of being selected, unlike in other survey methods. Only a small sample is needed to classify a supervisory area as not having reached the average coverage.^[7] The study follows STROBE guidelines

Limitation

The results of the study cannot be generalized beyond the study area. LQAS technique is time-consuming as almost

every village in the lot needs to be visited to obtain a representative sample.

CONCLUSION

Present study area showed good immunization coverage rates with only one lot considered as low performing and dropout rate in the study was high between DPT3 and measles. LQAS technique can be used in rural areas so as to identify sub-areas with poor coverage, to better assign resources to improve the coverage.

REFERENCES

1. UNICEF. Child Health: Current status + Progress. Millions of Children are Still not Reached by Potentially Life-Saving Vaccines; 2018. Available from: <http://www.data.unicef.org/topic/child-health/immunization>. [Last cited on 2018 May14].
2. World Health Organization. Immunization Coverage Factsheets; 2018. Available from: <http://www.who.int/en/news-room/fact-sheets/detail/immunization-coverage>. [Last cited on 2018 May10].
3. International Institute for Population Sciences (IIPS). National Family Health Survey (NFHS-3) 2005-06. India: Karnataka. Mumbai: IIPS. Available from: http://www.nfhsindia.org/NFHS-3%20Data/Karnataka_report.pdf91. [Last cited on 2014 Mar10].
4. International Institute for Population Sciences (IIPS). National Family Health Survey (NFHS-4) 2015-16. State fact sheet, Karnataka, India. Mumbai: IIPS. Available from: http://rchiips.org/NFHS/pdf/NFHS4/KA_FactSheet.pdf. [Last cited on 2018 May10].
5. Pradeep BS, Gangaboraiah, Usha S. Evaluation of Immunization Coverage by Lot Quality Assurance Sampling in a Primary Health Center Area. The Internet Journal of Public Health; 2011. Available from: <https://www.ispub.com/IJPH/1/1/4543>. [Last cited on 2012 Oct 15].
6. Alkoy S, Ulugtekin N, Dogru AO. Monitoring vaccination coverage in Istanbul using the lot quality assurance sampling and geographic information system. J Int Med Res 2007;35:242-52.
7. World Health Organization. Global Programme for Vaccines and Immunization vaccine research and Development. Monitoring immunization services using the Lot Quality Technique. Geneva: WHO; 1996. Available from: http://www.whqlibdoc.who.int/hq/1996/WHO_VRD_TRAM_96.01.pdf93. [Last cited on 2013 Oct 31].
8. Valadez JJ, Weiss W, Leburg C, Davis R. Assessing Community Health Programs. A Trainer's guide. Using LQAS for Baseline Surveys and Regular Monitoring. TALC, UK; 2003.
9. Ministry of Health and Family Welfare, Government of India. Immunization Handbook for Medical Officers. India: Ministry of Health and Family Welfare; 2009.
10. Ministry of Health and Family Welfare, Government of India. Immunization Handbook for Medical Officers. India: Ministry of Health and Family Welfare; 2017.
11. International Institute for Population Sciences (IIPS). District Level Household and Facility Survey (DLHS-4), 2012-13. State fact sheet, Karnataka, India. Mumbai: IIPS. Available from: <http://www.rchiips.org/pdf/dlhs4/report/KA.pdf>. [Last cited on 2017 Jun 1].
12. International Institute for Population Sciences (IIPS). District Level Household and Facility Survey (DLHS-4), 2012-13. District fact sheet, Bangalore, India. Mumbai: IIPS. Available from: <https://www.nrhm-mis.nic.in/DLHS4//Karnataka/District%20Factsheets/Bangalore.pdf>. [Last cited on 2017 Jun 1]
13. Lahiri SK, Ghosh R, Jana PK, Bhattacharya S, Mitra K, Chatterjee A. Evaluation of immunisation coverage of children by lot quality technique in a block of West Bengal. Indian J Prev Soc Med 2010;41:138-42.
14. Datta A, Mog C, Das S, Datta S. A cross-sectional study to assess the immunization coverage and vaccine dropout rates among 12 to 23 months old children in a rural area of Tripura. Int J Med Sci Public Health 2017;6:394-7
15. Sivasankaran S, Manickam P, Ramakrishnan R, Huttin Y, Gupte MD, Centers for Disease Control and Prevention (CDC). et al. Estimation of measles vaccination coverage using the lot quality assurance sampling (LQAS) method-tamilnadu, India, 2002-2003. MMWR Suppl 2006;55:16-9.
16. Bhuiya A, Hanifi SM, Roy N, Streatfield PK. Performance of the lot quality assurance sampling method compared to surveillance for identifying inadequately-performing areas in Matlab, Bangladesh. J Health Popul Nutr 2007;25:37-46.
17. United Nations Children's Fund. Coverage Evaluation Survey. All India Report. UNICEF House. New Delhi: Ministry of Health and Family Welfare, Government of India; 2009.

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Risk factors for preterm birth: a community based longitudinal study in rural Mysuru, Karnataka, India

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ABSTRACT

Background: Preterm birth is defined as birth of the baby before 37th completed week counting from first day of the last menstrual period. Preterm infants constitute two-third of low birth weight babies. Estimated 15 million babies are born too early every year. Almost 1 million children die each year due to complications of preterm birth.

Methods: A Community based longitudinal study was conducted for the period of one year (March 2015- February 2016). All the antenatal mothers who completed 24 weeks of gestation, who were available for follow-up till 1 week after the delivery were included in the study. Registration of the mothers was done for the period of 6 months, follow up was done till their 1st week of the delivery. During the first visit, a pretested semi structured proforma was administered which includes details regarding socio demographic background, major risk factors etc. Mothers were examined and information pertaining to basic investigations was collected. Mothers were followed up till the delivery and details regarding delivery and birth weight were collected. Minimum of 3 visits were made before declaring lost follow up. Data collected was entered in MS office excel sheet and analyzed using Statistical Package for Social Sciences(SPSS) software version 22.0.

Results: Out of 257 registered mothers, 246 mothers had live birth. 11 mothers lost to follow-up. Total numbers of preterm birth out of 246 deliveries were 5 (2%) 95% CI (0.22-3.78%). Gestational diabetes mellitus, Education of the mother and type of the family was found to be statistically significant ($p<0.05$) under univariate analysis. Whereas multivariate regression showed that age of the father was the independent predictor of Preterm birth and higher the age of father risk of having preterm baby was 7.57 times higher.

Conclusions: Though presence of 'high risk' factors are attributed to the adverse pregnancy outcomes like preterm birth, socio demographic characteristics of the antenatal mother and her family play a vital role.

Keywords: Longitudinal study, Multivariate regression, Pretested semi-structured questionnaire

INTRODUCTION

In any community mothers and children constitute a priority group. They comprise approximately 71.14% of the population of the developing countries.¹ Mothers and children not only constitute a large group but they are

also a "vulnerable" or special risk group. The central purpose of antenatal care is to identify" high risk cases" and provide skilled care. Preterm birth is defined as birth of the baby before 37th completed week counting from first day of the last menstrual period. Preterm infants constitutes two-third of low birth weight babies.²

Causal factors linked to preterm birth include medical conditions of the mother or fetus, genetic influences, environmental exposure, infertility treatments, behavioural and socioeconomic factors and iatrogenic prematurity.³

Estimated 15 million babies are born too early every year. That is more than 1 in 10 babies. Almost 1 million children die each year due to complications of preterm birth.² Many preterm babies land up in complications like Asphyxia, Hypothermia, Hypoglycemia, Infections, Jaundice, Dehydration, Anaemia, Fetal shock, Heart failure, Sudden infant death syndrome and so on.³

Many survivors face a lifetime of disability, including learning disabilities and visual and hearing problems.² The morbidity associated with preterm birth often extends to later life, resulting in enormous physical, psychological and economic costs.⁴ Hence strict vigilance of the high risk pregnancies and intensive care of the preterm babies help to achieve better MCH indicators.

Hence the present study intended

- To estimate the proportion of preterm birth in our field practice area.
- To determine the factors affecting the Preterm birth.
- To evaluate the association between Risk factors and Preterm birth.

METHODS

A Community based longitudinal study was conducted for the period of 1 year (March 2015- February 2016). All the antenatal mothers who completed 24 weeks of gestation, seeking health care services from Hadinaru and Suttur PHC's of Mysuru, Karnataka, India and who were available for follow-up till 1 week after the delivery were included in the study.

Antenatal mothers were excluded based on their unwillingness to participate in the study. Institutional Ethics Committee clearance was obtained before the start of the study.

List of all the pregnant women who were beneficiaries of both the PHC's of our field practice area were collected and expectant mothers who meets the eligibility criteria were contacted and registered for the study at their residence. Registration of the mothers was done for the period of 6 months, follow up was done till their 1st week of the delivery. Total of 257 mothers were registered during the period of 6 months.

During the first visit, after taking informed consent a pretested semi structured proforma was administered this includes details regarding socio demographic background, major risk factors of the present pregnancy, past obstetric history, delivery details of the present pregnancy. Ultrasonography reports along with their 1st

day of last menstrual period were used to calculate the expected date of delivery. Mothers were examined for pallor, edema, height, weight and blood pressure, fundal height. Respiratory and cardiovascular system examination was done as a routine and to determine any abnormality. Information pertaining to basic investigations was collected.

Mothers were followed up till the delivery with the help of Anganawadi and ASHA workers. During subsequent visits, development of any symptom, risk factor was noted.

Investigation reports were reviewed and BP, weight, fundal height was recorded. Mothers were contacted within the 1 week of their expected date of delivery and details regarding birth weight, date of delivery, place of delivery, mode of delivery were collected.

Minimum of 3 visits were made before declaring lost follow up. Data collected was entered in MS office excel sheet and analyzed using Statistical Package for Social Sciences(SPSS) software version 22.0.

RESULTS

Out of 257 registered mothers, 246 mothers had live birth. 11 mothers lost to follow-up. Total numbers of preterm birth out of 246 deliveries were 5 (2%) 95% CI (0.22-3.78%). Preterm birth was found in 8.4% of the graduate mothers, 2% of the mothers who studied up to diploma/intermediate, 0.7% of the mothers who studied up to high school and 10% of the mothers who studied up to middle school.

And the difference was found to be statistically significant ($p<0.05$). As many as 5.2% of the Preterm deliveries seen in Three generation family. And no preterm deliveries seen in nuclear and joint family. This difference was found to be statistically significant ($p<0.05$).

The association between the preterm birth and factors such as age of the mother, age of the father, education of the father found to be statistically insignificant (Table 1).

Relationship between preterm birth and Gestational diabetes mellitus found to be statistically significant at 95% CI. And the factors like Anemia, Previous still births, Intra uterine deaths, previous caesarean delivery did not attain statistical significance at 95% CI (Table 2).

The variables with p value <0.25 during uni-variate analysis were included for multi-variate logistic regression analysis.

It was observed that in multi-variate analysis of predictors of preterm birth revealed that age of the father was statistically significant with OR: 7.57, 95% CI: 1.47-38.99%, $p=0.01$. So we can conclude that age of the

father was the independent predictor of preterm birth and higher the age of father, risk of having preterm baby is

7.57 times higher (Table 3).

Table 1: Association between socio demographic characteristics and preterm delivery (N=246).

	Preterm delivery		χ^2/p
	Yes n (%)	No n (%)	
Age of the mother			
<19 years	0	33 (100)	
20-24 years	3 (2)	149 (98)	$\chi^2=3.74 / p=0.71$
25-29 years	2 (4)	49 (96)	
30-34 years	0	9 (100)	
>35 years	0	1 (100)	
Age of the father			
20-24 years	0	13 (100)	
25-29 years	0	109 (100)	
30-34 years	2 (2.90)	67 (97.10)	$\chi^2=5.76 / p=0.07$
>35 years	3 (5.5)	52 (94.5)	
Education of the mother graduate			
Graduate	1 (8.4)	11 (91.6)	
Intermediate/diploma	1 (2)	51 (98)	
High school	1 (0.7)	145 (99.3)	$\chi^2=9.88 / p=0.05^*$
Middle school	2 (10)	18 (90)	
Primary school	0	3 (100)	
Not literate	0	13 (100)	
Education of the father			
Graduate	0	19 (100)	
Intermediate/diploma	2 (5.66)	34 (94.44)	
High school	1 (1)	106 (99)	$\chi^2=7.10 / p=0.24$
Middle school	2 (5.89)	32 (94.11)	
Primary school	0	11 (100)	
Not literate	0	39 (100)	
Type of family			
Nuclear	0	57 (100%)	$\chi^2=5.95 / p=0.027 *$
Joint	0	92 (100%)	
Three generation	5 (5.2%)	92 (94.8%)	

*= p value< 0.05, statistically significant.

Table 2: Relationship between high risk factors and preterm delivery (N=246).

High risk factors	Level	Preterm delivery		Total n (%)	OR (95%CI)
		Present n (%)	Absent n (%)		
Elderly primi	< 30yrs	5 (2.1%)	238 (97.9%)	243 (100%)	
	>30yrs	0	3 (100%)	3 (100%)	*
Short statured primi	<140cms	0	5 (100%)	5 (100%)	
	>140cms	5 (2.1%)	236 (97.9%)	241 (100%)	*
Pre-eclampsia & Eclampsia	Yes	0	7 (100%)	7 (100%)	
	No	5 (2.1%)	234 (97.9%)	239 (100%)	*
Anaemia	Yes	2 (1.65%)	131 (98.4%)	133 (100%)	0.56(0.09-3.41)
	No	3 (1.8%)	110 (98.2%)	112 (100%)	
Gestational Diabetes Mellitus	Yes	1 (16.7%)	5 (83.3%)	6 (100%)	11.8(1.11-125.41)**
	No	4 (1.7%)	236 (98.3%)	240 (100%)	
Twins and Hydramnios	Yes	0	2 (100%)	2 (100%)	
	No	5 (2.1%)	239 (97.9%)	244 (100%)	*
Previous still births, Intra uterine death, Previous caesarean section	Yes	2 (7.5%)	25 (92.5%)	27 (100%)	5.76 (0.91-36.14)
	No	3 (1.6%)	216 (98.6%)	219 (100%)	
Grand multipara	Yes	0	11 (100%)	11 (100%)	
	No	5 (2.2%)	230 (97.8%)	235 (100%)	*

* odds ratio could not be calculated as the frequency of the variables were found to be less; **p value - <0.05. Statistically Significant.

Table 3: Uni variate and multiple logistic regression analysis of predictors of preterm among study participants (n=246).

Variable	Univariate analysis		Multivariate analysis			
	OR (95% CI)	Chi-square value	p value	OR (95% CI)	p value	
Education of mother	*	9.88	0.05	0.76 (0.18-3.12)	0.70	
Education of father	*	7.10	0.24	0.63 (0.22-1.17)	0.38	
Type of family	*	5.95	0.02	*	0.99	
Previous still births, Intrauterine death, Previous caesarean section	5.76 (0.91-36.1)	4.40	0.09	0.41 (0.03-5.64)	0.50	
Age of the father	*	6.02	0.07	7.57 (1.47-38.99)	0.01**	
Gestational diabetes mellitus	11.8 (1.11-125.41)	6.61	0.04	0.11 (0.03-4.57)	0.24	

* odds ratio could not be calculated as the frequency of the variables were found to be less; **p<0.01- highly significant

DISCUSSION

Out of 246 antenatal mothers who had given live births, 5 (2%) mothers had preterm delivery. According to Branum et al, primiparae aged 40 years and older had a reduced risk of very preterm birth compared with women of 25-29 years (OR 0.74 [95% CI=0.66, 0.84]). Among multiparae, women 40 years and older had the same risk of very preterm birth compared with women of 25-29 years (OR 1.00 [95% CI=0.90, 1.12]). The effect of maternal age on very preterm birth depends on parity and education.⁶

These findings are consistent with the findings of the present study. Another study conducted by Medhi R et al showed that adolescent mothers had a higher incidence of preterm deliveries (OR: 1.655, 95% CI p=0.03).⁷ These findings did not match the findings of the present study. More preterm birth in the older age of the parents is because of the higher birth order. However this study was conducted in the hospital settings and findings cannot be compared with the present study.

Hospital based cross-sectional study conducted in Northern India by Saini et al showed that type of family affects the pregnancy outcome. They found that, this association between type of family and low birth weight was statistically significant. (OR-2.8, 95% CI 1.8-3.8, p-0.03).⁸ Nuclear family has positive impact by having good socio economic status and more leisure. Joint family provides good antenatal mother care and support. So we can see more adverse outcomes in three generation family. According to the study conducted by Etuk et al to determine the factors influencing the incidence of preterm birth in Calabar, Nigeria. It was observed that, Previous pre-term delivery, Multiple pregnancies, Antenatal complications were significantly associated with Pre-term birth. Similar to our study, Anemia, Pre-eclampsia, Premature rupture of membranes, Previous spontaneous abortion were not significantly associated with pre-term birth.⁹

However association of preterm birth with Gestational diabetes mellitus could be because of the early opting of

the elective caesarean section by the health care provider. The present study showed that that age of the father was the independent predictor of Preterm birth and higher the age of father risk of having preterm baby is 7.57 times higher. This results are consistent with the study conducted by Alio et al in which highest rates of stillbirths and preterm births are observed in infants whose fathers had advanced paternal age, suggesting that in utero development and survival are influenced by both maternal and paternal age.¹⁰ However it is advised to conduct similar studies in the Indian setup to determine the effects of paternal factors on pregnancy outcome.

CONCLUSION

Though presence of 'high risk' factors are attributed to the adverse pregnancy outcomes like preterm birth, socio demographic characteristics of the antenatal mother and her family play a vital role. Gestational diabetes mellitus, Education of the mother and type of the family found to have association with the preterm birth and Age of the father was found to be the independent predictor of preterm birth. Hence the antenatal mothers should be strictly monitored in this regard.

Recommendations

Effective monitoring of the antenatal mothers for presence of high risk factors and reporting if, any adverse outcome occurs. Education regarding age of marriage for both men and women should be given. Overall improvement in the educational status of the population which play a vital role in utilization of health services.

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REFERENCES

- Park K. Parks textbook of preventive and social medicine. 22nd ed. Jabalpur, India. M/s Banarsidas Bhanot. 2013.

2. WHO. Preterm birth. <http://www.who.int/mediacentre/factsheets/fs363/en/>.
3. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. Lancet. 2008;371:75-84.
4. Dutta DC. Textbook of Obstetrics. 8th ed. New Central Book Agency Ltd. Kolkata.2011.
5. Beck S, Wojdyla D, Say L, Betran AP, Merialdi M, Requejo JH, et al. The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity. Bulletin of the World Health Organization. 2010;88:31-8.
6. Branum AM, Schoendorf KC. The influence of maternal age on very preterm birth of twins: Differential effects by parity. Paediatric and Perinatal Epidemiology. 2005;19(5):399-404.
7. Medhi R, Das B, Das A, Ahmed M, Bawri S, Rai S. Adverse obstetrical and perinatal outcome in adolescent mothers associated with first birth: a hospital-based case-control study in a tertiary care hospital in North-East India. Adolescent Health, Medicine and Therapeutics. 2016;7:37-42.
8. Saini S, Singh J, Ahluwalia SK, Mittal A, Singh MM, Qadri S. A cross-sectional study of Association of Maternal Sociodemographic Factors and Low Birth Weight in Tertiary care centre in Northern India. Ind J Mat Chi Health. 2012;14(1):1-9.
9. Etuk SJ, Etuk IS, Oyo-Ita AE. Factors Influencing The Incidence Of Pre-term Births In Calabar, Nigeria. Nigerian J Physio Sci. 2005;20(1-2):63-8.
10. Alio AP, Salihu HM, McIntosh C, August EM, Weldelesasse H, Sanchez E, et al. The effect of paternal age on fetal birth outcomes. Am J Mens Health. 2012;6(5):427-35.

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Research Article

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Knowledge and attitude on HIV/AIDS among adolescent school children in urban mysuru: a cross sectional study

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ABSTRACT

Background: Adolescence is a stage of physiological, mental and social transformation which poses a threat for risky health behaviours. Inadequate knowledge, taboos regarding sex education, indulgence in risky behaviour lends the adolescents susceptible to AIDS (Acquired Immuno Deficiency Syndrome). Hence, this study was undertaken with the objective to assess the knowledge and attitude towards HIV/AIDS among Adolescent school children in urban Mysore and to describe the factors influencing the same.

Methods: This cross sectional study was conducted among schools and pre-university colleges. A simple random sampling technique was used to select the schools and pre-university college and two classes from each school were selected randomly and all adolescents in the class on the day of the study were included. Information regarding their socio-demographic characteristics, knowledge and attitude regarding HIV/AIDS were obtained using a self-administered, pre-tested, semi-structured questionnaire. The children who were mentally disabled were excluded.

Results: Among the 374 adolescents who participated, textbooks 275(73.5%) were the most common sources of information about HIV/AIDS. Knowledge about modes of transmission was higher than about prevention and control and a majority had a positive attitude towards relative, friend, a fellow student and teacher whereas, around 50 % had a negative attitude towards a shopkeeper or Housekeeper affected with HIV (Human Immuno Deficiency Virus).

Conclusions: Optimal utilization of mass media to deliver key messages and reinforcement using curriculum content would improve the knowledge about HIV and to bring down the discrimination of people living with HIV among adolescents. Life skill education with HIV awareness should be implemented in schools.

Keywords: Knowledge, Attitude, HIV/AIDS, Adolescents

INTRODUCTION

Adolescence is one of the most rapid phases of development, constitute 10-19 years of age¹ and contribute to 19.6 % of the Indian population.² It is one of the most crucial stages in the life of an individual, metamorphosing from being a child into becoming responsible adults. It establishes a strong foundation for adulthood, which propels one to move in the right direction with a right influence and a lack thereof resulting in disastrous consequences, generating an

economically productive but a morally precarious population. Adolescence, a stage of physiological, mental and social transformation which accompanies inquisitiveness, impulsiveness and experimentation, makes them prone for risky health behaviours. These behaviours make them vulnerable to diseases especially sexually transmitted diseases such as AIDS.

AIDS caused by HIV stands as a threat to entire mankind stigmatizing those affected and petrifies the rest and has rightly been called a social disease. Although, a vast

amount of accessible information is available about the disease and a significant progress made in the past two decades on prevention, control and cure, the extent of utilization still remains a challenge to be explored. A report released by UNICEF and UNAIDS revealed, the number of adolescents aged 10-19 officially estimated to be living with HIV in Asia and the Pacific has increased over the past decade, reaching 220,000 in 2014. Despite the reduction in AIDS-related deaths among adults, those 10-19 year olds in the region increased by 110 per cent between 2005 and 2014, which is alarming.³

Inadequate knowledge of development, lack of correct health information, the taboos associated with sex education at homes and schools, indulgence in risky behaviours and a lack of access to adequate reproductive health services further lends the adolescents susceptible to AIDS. Once the epidemic sets out in this age group, it is tougher to trace and treat. AIDS largely relies on prevention and the right information at the right time is essential to bring out behavioural change when the population is most receptive. An adequate knowledge is imperative to prevent the increasing burden. Hence, the present study was undertaken to assess the knowledge about HIV and attitude towards people living with HIV among the study population.

Objectives of the study are to assess the knowledge and attitude towards HIV/AIDS among adolescents in Mysuru city and to describe the factors influencing the knowledge and attitude among the adolescents.

METHODS

This cross sectional study was conducted between October and December 2013, in 19 High schools and Pre-University Colleges coming under JSS Mahavidyapeetha. The students belonging to classes 9, 10 and 11(13-17 years of age) in the selected institutions were the study participants. The sample size was calculated using the formula $n = za^2pq / l^2$, taking p as 60%, from the findings of a previous study,⁴ an absolute allowable error of 5 % was taken at 95% confidence interval and the level of significance kept at less than 0.05 and a sample size of 368 was obtained, rounded to 375 and finally a total 374 students participated in the study.

Permission was obtained from the concerned head of the institution before commencing the study. The schools and PU College were selected by simple random sampling technique. Two classes from each school were selected randomly and all the adolescents in the class on the day of the study were included after explaining the purpose of the study. Informed consent/assent was taken from those who were willing to take part in the study and confidentiality was maintained. Information regarding their socio-demographic characteristics, knowledge and attitude regarding HIV/AIDS were obtained using a self-administered, pre-tested, semi-structured questionnaire containing questions and given 15 minutes time to

complete the questionnaire and collected at the end of the given time. The children who were mentally disabled were excluded. Ethical clearance was obtained from Institutional Ethical Committee, JSS Medical College, Mysore.

The data was analysed using SPSS version 22.0 and descriptive statistics represented as frequencies and proportions and Chi-square test was used to test the significance at 95% confidence interval and p value of less than 0.05 was considered to be statistically significant.

RESULTS

Table 1: Socio - demographic characteristics of the study subjects.

Variable	Frequency	Proportion
Age in years		
<16	184	49.2
16-18	190	50.8
Sex		
Male	96	25.7
Female	278	74.3
Religion		
Hindu	347	92.8
Muslim	07	1.9
Christian	15	4.0
Jains	05	1.3
Locality of residence		
Urban	258	69.0
Rural	116	31.0
Parent's literacy status (atleast one)*		
Uneducated	38	10.2
Educated	336	89.8

*Literacy status of atleast one of the parent.

The study included 374 adolescents among whom 25.7% were male and 74.3% female as seen in Table 1.

Table 1, summarizes that adolescents were fairly equal in number in the age categories, less than 16 years, i.e. 184 (49.2) and 16 to 18 years, i.e. 190 (50.8). The number of female children, i.e. 278 (74.3) outnumbered the males, i.e. 96 (25.7) in the study population. Most of them, 347 (92.8) were hindu by religion and residing at an urban locality, 258 (69.0) and the rest were students whose parents were in rural areas, but are currently residing at a relative's house or hostel for education purpose.

Table 2, shows the knowledge about the modes of transmission of HIV. It shows that a high proportion of children had adequate knowledge about the correct modes of transmission in all domains. However, 196 (52.4%) have responded that HIV is transmitted by mosquitoes.

Table 3, summarizes that less than 60% responded correctly with regard to vaccine against HIV, alcohol and risky behaviours increases risk of HIV, cure for HIV and about laws for discrimination against people living with HIV.

Table 2: Knowledge on modes of transmission of HIV.

Knowledge of transmission by/ through/ from	Frequency	Percentage
Misconceptions		
Shaking hands	24	6.4
Sharing plates	86	23.0
Sharing clothes	50	13.4
Sharing the same toilet	108	29.9
Through mosquito bite	196	52.4
Breath	98	26.2
Kissing	139	38.2
Modes of transmission		
Blood transfusion	334	89.3
Sharing a needle or a syringe	358	95.7
Mother to child	331	88.5
Sexual intercourse	335	89.6
Breast milk	311	83.2

Table 3: Knowledge of prevention and control of HIV.

Knowledge on prevention and control regarding	Frequency	Percentage
Absence of a vaccine against HIV	159	42.5
Prevention by blood testing	319	85.3
Alcohol and other drugs increases risky behavior associated with HIV	218	58.3
Prevention by remaining faithful to a single partner	286	76.5
Prevention by condom usage during sexual contact	310	82.9
Awareness about a separate testing facility	256	68.4
Awareness of treatment for HIV	270	72.2
Absence of cure for HIV	205	54.8
Discrimination against people living with HIV punishable by law	193	51.6

Table 4 shows, factors such as age and literacy status of atleast one of the parents is statistically significant.

Table 5 shows, all other factors except sex of the participant were statistically not significant.

The median scores for knowledge and attitude regarding HIV/AIDS was calculated, based on which the knowledge domain was divided into two categories.

Those with a median score less than 16 were considered to have a poor knowledge and those with scores above 16 were considered good knowledge. Similarly, attitude was also divided into two categories and those with a median score less than 9 were considered as positive attitude and more than 9 as negative attitude.

Table 4: Association of socio-demographic characteristics with knowledge of HIV/AIDS.

Factors	Category	Knowledge		p value
		Poor	Good	
Age in years	Less than 16	100(57.5)	84(42.0)	0.003
	16-18	74(42.5)	116(58.0)	
Sex	Male	38(21.8)	58(29.0)	0.114
	Female	136(78.2)	142(71.0)	
Religion	Hindu	158(90.8)	189(94.5)	0.168
	Others	16(9.2)	11(5.5)	
Locality	Rural	48(27.6)	68(34.0)	0.181
	Urban	126(72.4)	132(66.0)	
Literacy status	Illiterate	11(6.3)	27(13.5)	0.022
	Literate	163(93.7)	173(86.5)	

Table 5: Association of socio-demographic characteristics with attitude towards HIV/AIDS.

Factors	Category	Attitude		p value
		Positive	Negative	
Age in years	Less than 16	129(50.0)	55(47.4)	0.644
	16-18	129(50.0)	61(52.6)	
Sex	Male	54(20.9)	42(36.2)	0.002
	Female	204(79.1)	74(63.8)	
Religion	Hindu	238(92.2)	109(94.0)	0.553
	Others	20(7.8)	7(6.0)	
Locality	Rural	81(31.4)	35(30.2)	0.813
	Urban	177(68.6)	81(69.8)	
Parents education	Illiterate	22(8.5)	16(13.8)	0.119
	Literate	236(91.5)	100(86.2)	

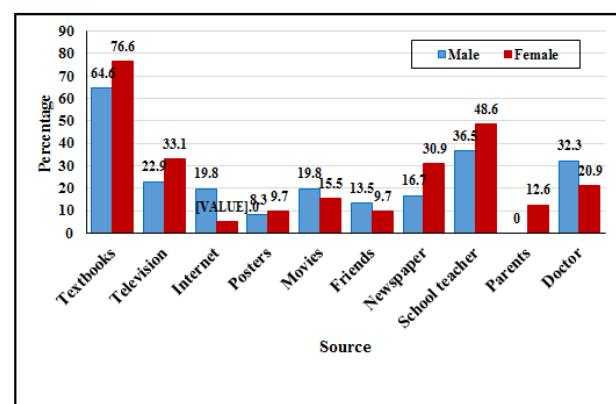


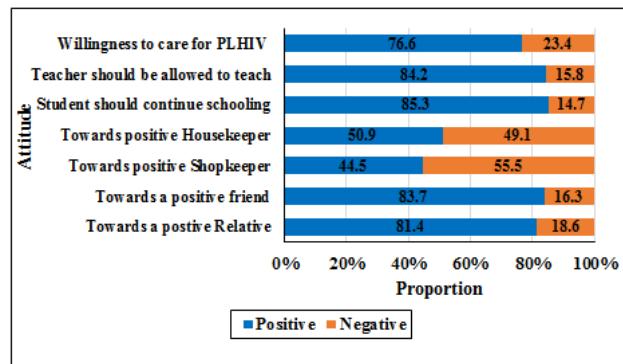
Figure 1: Distribution of study participants according to the source of information.

Table 6: Association of knowledge characteristics with attitude among the study participants.

Knowledge	Attitude		P value
	Positive	Negative	
Poor	105(40.7)	69(59.5)	
Good	153(59.3)	47(40.5)	0.001
Total	258	116	

*Numbers in parenthesis indicate percentages.

Table 7 shows, the knowledge of the adolescent children with attitude was found statistically significant.

**Figure 2: Distribution of adolescents based on attitude towards PLHIV.**

DISCUSSION

The present study was undertaken to explore the levels of knowledge about HIV/AIDS and attitude towards PLHIV among the vulnerable adolescent population.

It was observed that textbooks 275 (73.5%) were the most common sources of knowledge, followed by information gathered from school teacher 170 (45.4) and television 114 (30.5). This can be attributed to mandatory inclusion in curriculum for improving grades and an active participation of teachers in imparting such valuable knowledge. Similar findings were reported by Spiwe et al⁵ for the knowledge of HIV/ AIDS attributed to the life orientation curriculum in Africa. In contrast a studies by Pankaj Kumar et al⁶ and Yazdi et al⁷ independently revealed that television was the most common source of information while teachers contributed for a smaller proportion in the first study, teachers (66%) were pointed out as the next best source of information in Iran. However, parents contributed only to a very meagre amount due to stigma in adults and a sense of discomfort among adolescents to discuss about sexually transmitted diseases which are considered a taboo in our social context.

The present study revealed that a high proportion of children had a knowledge about the correct modes of transmission of HIV, such as by blood transfusion (89.3%), sharing needles (95.7%), sexual transmission (89.6%) and mother to child transmission (88.5%) which

can be attributed to the curricular inclusion of information on AIDS in the textbooks. This was in contrast to the observations made by P Lal et al⁸ and Chatterjee et al⁹ which showed a poor knowledge of transmission. The difference may be due to the different periods of study. A low proportion of misconceptions about transmission of HIV through sharing toilets, sharing plates, etc was observed, however, more than a half of them had misconceived that HIV is transmitted by mosquitoes (53.4%) which was similar to the findings of Prathiba Gupta et al.¹⁰

Knowledge on prevention and control of HIV revealed that less than 60% responded correctly with regard to absence of an available vaccine against HIV, alcohol and risky behaviours increases risk of HIV, presence of a cure for HIV and about implementation of laws for discrimination against people living with HIV in this study, which were similar to the findings of Pankaj Kumar et al⁵ and Jaiswal et al¹¹ which shows that correct knowledge regarding availability of vaccine for prevention of pretest were 28 (27.45%) and 46.2% respectively. The misconceptions are caused due to a gap in knowledge. Overall, the findings are similar to a study done in Laos which states that though knowledge of transmission is good, misconceptions still persist.¹² This reveals that knowledge about modes of transmission was higher than about prevention and control, which are more openly discussed through influencers and mass media than regarding the latter.

In the attitude domain, a mixed response was observed with majority having a positive attitude towards relative, friend, a fellow student and teacher whereas, around 50 % had a negative attitude towards a shopkeeper or Housekeeper affected with HIV. Similar findings were observed in studies done at Laos, Ghana, Turkey and China.¹³⁻¹⁵ This might be owing to the closeness of relationship with the affected individual, which compels them to look beyond discrimination. Majority of them were willing to care for PLHIV but showed a hostile attitude towards a shopkeeper or a housekeeper for fear of contracting the disease. Measures to address stigma have to be kept in mind during successful planning and implementation of strategies. In a study done in Kolkata, 45.8% of girls and 38.8% of boys were willing to care for PLHIV⁶ in contrast to our findings.

The limitations are although adolescents also include ages from 10 to 12, they could not be included in the study due to cultural barriers. The out of school adolescents could not be addressed due to time and resource constraints.

CONCLUSION

To conclude, optimal utilization of mass media to deliver key messages and reinforcement using curriculum content would improve the knowledge about HIV and to bring down the discrimination of PLHIV. It is imperative

to facilitate a one to one interaction with parents and teachers taking an active role with their adolescents to promote risk free healthy behaviour. Life skill education with HIV awareness should be implemented in schools and adolescents queries should be addressed as required. The adolescents had a positive attitude towards friends and relatives affected with HIV whereas majority had a negative attitude towards shop-keeper and housekeeper affected with HIV which require targeted interventions.

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REFERENCES

1. Maternal, newborn, child and adolescent health fact sheet. Geneva: World Health Organization; 2016. Available at: http://www.who.int/maternal_child_adolescent/topics/adolescence/development/en/ (Accessed on 2nd March 2016).
2. C Chandramouli, Registrar General & Census Commissioner, India. Adolescents and youth in india highlights from Census 2011. Available at: http://www.censusindia.gov.in/2011-documents/PPT_World_Population/Adolescents_and_Youth_in_India_Highlights_from_Census_2011.pptx (Accessed on 2nd March 2015).
3. Adolescents under the radar in the asia-pacific aids response. Unicef East Asia and Pacific Regional Office. December 2015.
4. Yadav SB, Makwana NR, Vadera BN, Dhaduk KM, Gandha KM. Awareness of HIV/AIDS among rural youth in India: a community based cross-sectional study. *J Infect Dev Ctries.* 2011;5(10):711-6.
5. Madiba S, Mokgatle MM. HIV and AIDS related knowledge and attitudes towards learners infected with HIV: survey among high school learners in Gauteng and North West provinces in South Africa. Peerj preprints. 2014;2:e693v1. Available at <https://doi.org/10.7287/peerj.preprints.693v1>. Accessed on 03.03.2016 at 7am.
6. Kumar P, Pore P, Patil U. Hiv/Aids related kap among high-school students of municipal corporation school in pune - an interventional study. *NJCM.* 2012;3(1):74-9.
7. Yazdi CA, Aschbacher K, Arvantaj A, Naser HM, Abdollahi E, Asadi A et al. Knowledge, attitudes and sources of information regarding HIV/AIDS in Iranian adolescents. *AIDS Care.* 2006;18(8):1004-10.
8. Lal P, Nath A, Badhan S, Ingle GK. A study of awareness about HIV/AIDS among senior secondary school children of delhi. *Indian J Community Med.* 2008;33(3):190-2.
9. Chatterjee C, Baur B, Ram R, Dhar G, Sandhukhan S, Dan A. A study on awareness of AIDS among school students and teachers of higher secondary schools in north Calcutta. *Indian J Public Health.* 2001;45(1):27-30.
10. Gupta P, Anjum F, Bhardwaj P, Srivastav JP, Zaidi ZH. Knowledge about HIV/AIDS among secondary school students. *Najms.* 2013;5(2):119-23.
11. Jaiswal S, Magar BS, Thakali K, Pradhan A, Gurubacharya DL. HIV/AIDS and STI related knowledge, attitude and practice among high school students in kathmandu valley. *Kathmandu Univ Med J.* 2005;3(1):69-75.
12. Thanavanh B, Rashid HO, Kasuya H, Sakamoto J. Knowledge, attitudes and practices regarding HIV/AIDS among male high school students in lao people's democratic republic. *J Int AIDS Soc.* 2013; 16(1):17387.
13. Sallar AM. Correlates of misperceptions in HIV knowledge and attitude towards people living with HIV/AIDS (PLHIV) among in-school and out-of-school adolescents in Ghana. *Afr Health Sci.* 2009;9:82-91.
14. Koksal S, Namal N, Vehid S, Yurtsever E. Knowledge and attitude towards HIV/AIDS among Turkish students. *Infect Dis J Pakistan.* 2005;14:118-23.
15. Tan X, Pan J, Zhou D, Wang C, Xie C. HIV/AIDS knowledge, attitudes and behaviours assessment of Chinese students: a questionnaire study. *Int J Environ Res Public Health.* 2007;4:248-53.

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Please provide table no. 7. As per above mentioned line regarding table 7. In results section.

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Correlation between Risk Factors and Prevalence of Root Caries among Elderly Individuals Attending Dental College

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Abstract

Introduction: Root caries is one of the most common and significant dental health problem among older adults today. Over the years, root caries has been the major reason for tooth loss in older adults, and has negative impact on oral health related quality of life in elderly individuals. *Aim:* The study was done to assess the prevalence and risk factors associated with root caries among elderly individuals attending I.T.S Dental College Greater Noida. *Materials & Methods:* A total sample of 380 individuals aged from 65-74 years old who attended the dental college of Greater Noida were included in the study. A face-to-face interview using a prevalidated structured questionnaire was conducted to collect the information of the subjects including their demographic characteristics were recorded. The prevalence of root surface caries was evaluated using the Katz Index. Chi square test and Logistic regression analysis was used for statistical analysis. *Results:* The prevalence of root caries in our study population was found to be 45.7%. Risk factors included smoking, dryness of mouth, tobacco chewing were significantly associated with root caries. *Conclusion:* The study concluded that root caries prevalence was high in the elderly individuals. Factors including demographic variables e.g age, gender and deleterious habits including smoking, tobacco chewing and alcohol consumption had a definite impact on the prevalence of root caries.

Keywords: Prevalence; Root Caries; Risk Factor; Root Caries Index; Elderly Individuals.

Introduction

In the coming next four decades, United Nations Population Division estimates the elderly individuals

in Indian population will rise dramatically from 8 to 19 %. By the mid of 21st century, population of elderly individuals who aged beyond 60 years is more than population of United States in 2012. This profound shift among the elderly individuals in Indian population brings variety of challenges [1]. In the last two years, root caries is common clinical problem faced by the elderly individuals [2]. A number of studies done in the worldwide reportedly found the high prevalence of root caries in elderly individuals.

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³⁻⁶. A number of Risk factors including socio-demographic factors, xerostomia has been noted which can compromise the older's adult health.⁷ Many dental practitioners face a challenge to provide good oral health care to older's patients. Tooth loss is chief oral health related variable which has negative impact among elderly individuals and it is a major reason for tooth loss in them [8].

Hazen et al defined the root caries as a soft, progressive, destructive lesion which is either totally confined to the root surface or involving undermining of enamel at the cemento-enamel junction but clinically indicating the lesion initiated on the root surface [9]. In recent years, increasing in oral health awareness and recent advances in treatment modalities which helps the patients to retain their natural teeth in old age. As age progresses, they are more susceptible to periodontal problems like gingival recession which even made them more vulnerable to root caries [10].

Few studies have been done in Indian population regarding the prevalence of root caries. However, none of the studies have mentioned the association of risk factors with root caries. Thus it is necessary to have the study based on the risk factors which affecting the prevalence of root caries. The present study was done to assess the prevalence and risk factors associated with root caries among elderly individuals attending I.T.S Dental College Greater Noida. The study also examined the association of risk factors with the root caries.

Materials and Methods

A descriptive type of epidemiological study was carried out among the patients who aged 65-74 years attending O.P.D of I.T.S Dental College & Hospital Greater Noida, India.

Pilot Study

Sample size was determined by conducting a pilot study among 50 elderly individuals attending outpatient department of Public Health Dentistry. Prevalence rate obtained by doing pilot study was 41.9% and sample size was estimated by the formula : $4pq/L^2$, hence the sample (n) calculated from the pilot study was 380.

Ethical Clearance

The ethical clearance letter was obtained from Institutional Review Committee of Dental college.

Consent Form

A signed consent form was obtained from the patients or their guardian prior to the study, a consent form was available in Hindi & English for the better understanding of the study. A study procedures were fully explained by the examiner to the patients or guardian.

Inclusion Criteria

Patients who aged from 65-74 years were included in the study, Patients who agreed & completed the questionnaire were included in the study.

Exclusion Criteria

Incomplete questionnaires during collecting the data, Patients who were not willing to participate in the study and not giving consent for the same purpose. The third permanent molars are excluded from the present study.

Questionnaire

An open ended questionnaire was used for collecting the demographic characteristics of patients including name, age & gender of the patient and behavioural characteristics of patients including number of dental visits of patients, brushing techniques, sugar consumption. The patients were also being asked about their habits of smoking & alcohol.

Clinical Examination

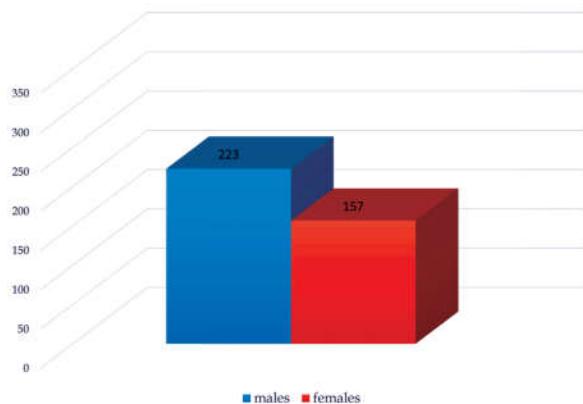
The examination of root caries on patients done by using mouth mirror and exploratory probe on dental chair by a single examiner. The reliability of the index was tested and calculated by obtaining kappa value which was 0.89. Assessment of root caries done by using root caries index (Katz Index) [11].

Statistical Analysis

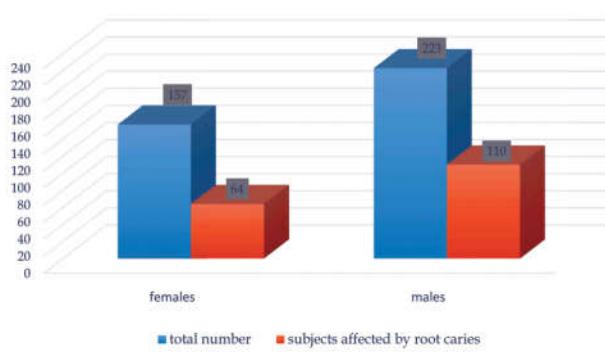
Collection of data was done in Microsoft excel software. Chi square test was used for the association of the variables. Logistic regression was used for the correction of the variables. The level of significance was set at 0.05 and SPSS 21.0 version was used for statistical analysis.

Results

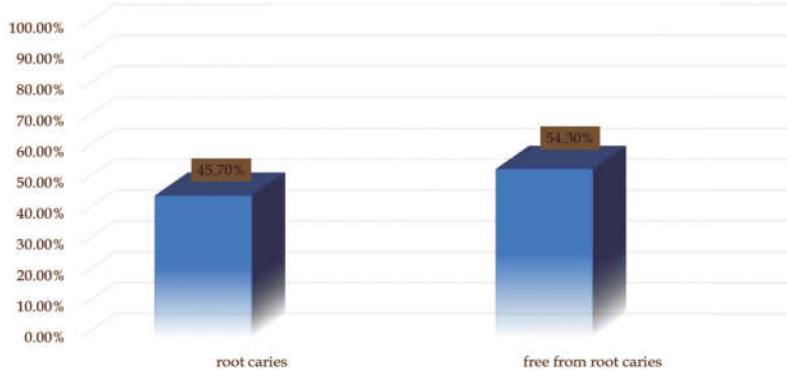
A total of 380 elderly patients (223-females, 157-males) with age range from 65 to 74 years were



Graph 1: Gender wise distribution of elderly patients in the study population



Graph 2: Gender wise distribution of root caries in the study population



Graph 3: Prevalence of root caries in the study population

Table 1: Association of root caries with various factors in elderly population

Independent variables		N	Root caries present	Percentage of respondents with RCI
Age	65-74 years	380	174	45.7%
Gender	Males	157	78	49.6%
	Females	223	96	43%
Smoking	No	167	107	64.0%
	Yes	213	43	20.1%
Alcohol	No	162	48	29.6%
	Yes	218	81	37.1%
Frequency of tooth brushing	Twice a day	82	26	31.8%
	Once a day	156	53	33.9%
	Less than once a day	142	68	47.8%
Dental Visits	Yes	213	84	39.4%
	No	163	48	29.4%
Frequency of sugary consumption	High	154	52	33.7%
	Low	226	80	35.3 %
Tobacco chewing	Yes	135	89	65.9%
	No	245	90	36.7%
Dryness of Mouth	Yes	134	91	67.9%
	No	246	114	46.1%

Table 2: Logistic regression analysis results for root caries among elderly individuals

Independent variables	OR	p value
Age	3.67	<0.001
Gender	1.13	<0.001
		0.001

Smoking	Yes	2.24	<0.001
	No		0.001
Dryness of Mouth	Yes	3.84	<0.001
	No		0.001
Smoking And Tobacco chewing (Males)	Yes	3.19	<0.001
	No		0.001
Tobacco chewing	Yes	4.73	<0.001
	No		0.001
Dental Visits	Yes	0.67	0.001
	No		<0.001

examined to assess the prevalence of root caries as being mentioned in Graph .1

The prevalence of root caries among the examined elderly population was 45.7% (174 patients), out of which 64 (40.7%) were females and 110 (49.3%) were males which was mentioned in Graph II.

It was found that 380 patients were examined out of them 174 patients were affected root caries, hence the study found the prevalence of root caries among 65-74 years old in the outpatient department was 45.7% (mean 1.1) which is mentioned in Graph 3.

Table 1 represents the association between various factors with the root caries in elderly population using Chi-square tests. Our results found prevalence of root caries were significantly associated with age, gender, smoking, alcohol consumption, tooth brushing frequency, dental visit frequency, tobacco chewing and dryness of mouth.

Table 2 represents the logistic regression analysis for root caries among elderly individuals. It was found that age, females, perceived dryness of mouth, smoking, smoking and tobacco chewing among males and tobacco chewing were significantly associated with the prevalence of root caries. ($p<0.05$). The result of multiple logistic regressions shows significantly high prevalence of root caries in the age group of 65-74 years (OR-3.67). Elderly individuals having dryness of mouth, the patients with deleterious habits of smoking, tobacco chewing and among those who had habit of tobacco chewing as well as smoking had a high prevalence of root caries.

Discussion

Though edentulousness is a common problem found in older population, elderly individuals who share their own problems too in the form of root caries which causes lack of functioning activity in the their other remaining teeth.

In our study, the prevalence of root caries in elderly individuals was found to be 45.7%, the findings of this study was closely correspond to the studies done

in Japan (39%) [12], China (41%)[13], As Indian population a study done by Bharateesh et al [14] who also reportedly found similar results in prevalence which was 41.9%. In contrast to our finding, a studies done by Kularatne [15], Watanabe [16] found a much higher prevalence of root caries in elderly individuals in Srilanka and Brazil respectively. This finding was similarly found by Joshi [17], Mamai [18] who found the prevalence of root caries in the similar age group around 52% and 40% respectively in New England and Greece respectively.

In our study 62.8% of the elderly individuals had habit of smoking and there was a significant association of root caries occurrence with smoking. This finding is similarly found in the studies done by Mu [13], Bharateesh [14], Kularatne [15]. A longitudinal study done by Solveig et al [19] in 10 years found the significant association in incidence of root caries with daily number of cigarettes.

Our study found the high prevalence of root caries among smokers and tobacco chewers. This finding was similar found in studies conducted by Tomar [20] who found tobacco acts as carcinogenic agent and he also found that tobacco chewing may be a risk factor for root caries.

Our study found the non significant association between frequency of sugary consumption and root caries. However, our analysis were contradicted with the findings done by Rugg Gunn AJ [21], Moynihan [22] who found statistically significant association with the dietary habits and prevalence of root caries.

Limitations

Though the study cannot be generalized in the whole population, as the sample size of our study was small, further studies with higher samples size and variables are required.

Conclusion

It was concluded that the high prevalence of root

caries seen in elderly individuals in the study population. Therefore studies regarding root caries should be conducted more in the Indian population. Factors including demographic variables e.g: age, gender and deleterious habits including smoking, tobacco chewing and alcohol consumption had a definite impact on the prevalence of root caries.

References

1. Rajan SI, Sarma PS, Mishra US. Demography of Indian Ageing, 2001-2051. *J Aging Soc Policy.* 2003; 15 (2-3): 11-30.
2. Population Reference Bureau [Internet]. India's Aging Population. Issue 25, March 2012. Available from: <http://www.prb.org/Publications/Reports/2012/india-older-population.aspx> (last accessed on 22nd October 2015).
3. Burke F.M., Allen P.E.: In teeth for life for Older Adults. Quintessence Publishing Co. Ltd. 2002; 47-59.
4. Galan D., Lynch E.: Epidemiology of root caries. *Gerodontology.* 1993; 10: 59-71.
5. Kirkegaard E. et al.: Oral health status, dental treatment need and dental care habits in a representative sample of the adult Danish population. Thesis. Royal Dental College, Aarhus, 1985.
6. Splieth Ch et al.: Prevalence and distribution of root caries in Pomerania, North-East Germany. *Caries res.* 2004; 38: 333-340.
7. Shah N, Sundaram KR. Impact of socio-demographic variables, oral hygienepractices, oral habits and diet on dental caries experience of Indian elderly: acommunity-based study. *Gerodontology.* 2004; 21(1): 43-50.
8. Shah N, Sundaram KR. Impact of socio-demographic variables, oral hygienepractices, oral habits and diet on dental caries experience of Indian elderly: acommunity-based study. *Gerodontology.* 2004; 21(1): 43-50.
9. Sivapathasundaram B, Raghu AR. Dental Caries. In: Rajendran R, Sivapathasundaram B. (eds.) Shafers Text Book of Oral Pathology. 5th ed. New Delhi, India. Elsevier. 2006; 5: 568-658.
10. Randa E Shaker. Diagnosis, prevention and treatment of root caries. *Saudi Dental Journal.* 2004; 16(2): 84-86.
11. Katz RV. Assessing root caries in populations: the evolution of the root caries index. *J Public Health Dent.* 1980; 40(1): 7-16.
12. Imazato S, Ikebe K, Nokubi T, Ebisu S, Walls AW. Prevalence of root caries in aselected population of older adults in Japan. *J Oral Rehabil.* 2006; 33(2): 137-43.
13. Du M, Jiang H, Tai B, Zhou Y, Wu B, Bian Z. Root caries patterns and risk factors of middle-aged and elderly people in China. *Community Dent Oral Epidemiol.* 2009; 37(3): 260-66.
14. Bharateesh J, Kokila G. Association of Root Caries with Oral Habits in Older Individuals Attending a Rural Health Centre of a Dental Hospital in India. *Journal of Clinical and Diagnostic Research.* 2014; 8(11): 80-82.
15. Kularatne S, Ekanayake L. Root surface caries in older individuals from Sri Lanka. *Caries Res.* 2007; 41(4): 252-56.
16. Watanabe MG. Root caries prevalence in a group of Brazilian adult dentalpatients. *Braz Dent J.* 2003; 14(3): 153-56.
17. Joshi A, Douglass CW, Jette A, Feldman H. The distribution of root caries incommunity-dwelling elders in New England. *Public Health Dent.* 1994; 54(1): 15-23.
18. Mamai-Homata E, Topitsoglou V, Oulis C, Margaritis V, Polychronopoulou A. Riskindicators of coronal and root caries in Greek middle aged adults and seniorcitizens. *BMC Public Health.* 2012; 12: 484.
19. Solveig Fure. Ten years cross sectional and incidence study of coronal and rootcaries and some related factors in elderly Swedish individuals. *Gerdontology.* 2004; 21(3): 130-40.
20. Tomar SL, Winn DM. Chewing tobacco use and dental caries among US men. *JAm Dent Assoc.* 1999; 130(11): 1601-10.
21. Rugg-Gunn AJ, Hackett AF, Appleton DR, Jenkins GN, Eastoe JE. Relationship between dietary habits andcaries increment assessed over two years in 405 English school-children. *Arch Oral Biol.* 1984; 29: 983-92.
22. Moynihan PJ. The relationship between diet, nutrition and dental health: an overview and update for the 90s. *Nutr Res Rev.* 1995; 8: 193-224.

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When to Ring the Bell??!!: Perception on Warning Signals of Cancer in a Rural Community, Mysuru

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Abstract

Background: Cancer is the third leading cause of mortality in developing countries. Awareness of public about warning signs of cancer in relation to early detection and prevention has been surveyed in a few countries only, and results showed poor knowledge among them. The present study was aimed at investigating the awareness level about warning signs of cancer and its determinants in rural population of Mysuru District. **Materials and Methods:** This cross-sectional survey was conducted in two selected villages which come under rural field practice area of JSS Medical College, Mysore in the month of July-September 2014. 200 people aged 18 years and above were included in the study. **Results:** The study showed that, out of 200 people interviewed, the awareness regarding persistent Change in bowel and bladder habits was 77(38.5%), Non healing Wound 70(35%), Bleeding from natural orifices 75(37.5%), Lump in breast 92(46.0%), Difficulty in swallowing 69(34.5%), Difficulty in opening mouth 70(35.0%), Change in Size or shape of wart 62(31.0%), Hoarseness of voice 76(38.0%), Unexplained Weight loss 86(43.0%). It showed that, 06(3%) were having persistent change in Bowel and bladder habits, 02(1%) were having Non Healing wound, 3(1.5%) were having Bleeding from natural orifices, 02(1.0%) were having lump in breast, 5(2.5%) were having unexplained weight loss **Conclusion:** The awareness related to warning signals of cancer was very low among study participants. Therefore, educational and intervention programmes, with special attention placed on particular at-risk populations, to increase awareness about the disease leading to its early diagnosis is needed.

Keywords: Awareness; Cancer; Warning Signs; Mysore.

Introduction

Cancer is the third leading cause of death in developing countries. India is experiencing a rapid health transition with a rising burden of Non

Communicable Diseases (NCDs) [1]. Overall, NCDs are emerging as the leading cause of deaths in India accounting for over 42% of all deaths (Registrar General of India) [2]. The incidence of cancer in the next decade will rise due to an increase in the number of the elderly people of the country [3].

The importance of cultural influences on recognition of symptoms and help-seeking behaviours was highlighted in a review of ethnic and cultural differences in models of and attitudes

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towards cancer across ethnic groups (Dein, 2004).

Based on the cancer registry data, it is estimated that there will be about 800,000 new cancers cases in India every year [4]. At any given point there is likely to be thrice this load, i.e. about 24,00,000 cases.

According to the National Commission on Macroeconomics & Health (NCMH) Report (2005), the Crude Incidence Rate (CIR) for Cervix cancer, Breast cancer and Oral cancer is 21.3, 17.1 and 11.8 (among both men and women) per 100,000 population respectively [5].

Awareness of public about warning signals of cancer in relation to early detection and prevention has been surveyed in a few countries only, and results showed poor knowledge among them. Stimulated by the neglect of research in assessing awareness regarding cancer, attitudes towards it and help seeking for cancer symptoms in ethnic minorities, the present study was carried out.

Materials and Methodology

This cross-sectional survey was conducted in two selected villages which come under rural field practice area of JSS Medical College, Mysore in the month of July-September 2014. 200 people aged 18 years and above were included in the study.

Two Villages were selected by simple random sampling in rural Mysore. Complete enumeration of all the individuals aged above 18 years was done. Those who were available for interview for awareness of cancer at home at the time of visit and consenting to participate in the study were included. Data was collected by House to House survey using Pretested Semi structured questionnaire to assess the awareness regarding cancer and presence of signs of cancer by interview technique. This was followed by health

education session using flipcharts. Study participants having signs of cancer were referred to JSS Hospital, Mysore.

Statistical Analysis

The data was entered in excel sheet and analysis using SPSS ver 16.0 software. Descriptive statistics like mean, median, frequencies were calculated. Each sign was assigned score 1 and the overall scores were calculated for each individual. And the overall scores were divided into three grades i.e., low (0-3, medium 3.1-6, High >6).

Results

Among 200 adults included in the study, mean age of the study participants was 35 ± 0.8 years. 52% of them were males and 48% were females.

Among the study participants, 77(38.5%) were aware of persistent change in bowel and bladder habits, non-healing wound 70(35%), bleeding from natural orifices 75(37.5%), lump in breast 92(46.0%), difficulty in swallowing 69(34.5%), difficulty in opening mouth 70(35.0%), change in Size or shape of wart 62(31.0%), hoarseness of voice 76(38.0%), unexplained weight loss 86(43.0%) Table 1.

The study showed that, 6(3.0%) were having persistent change in bowel and bladder habits, 2(1%) were having non healing wound, 3(1.5%) were having bleeding from natural orifices, 2(1.0%) were having lump in breast, 5(2.5%) were having unexplained weight loss at the time of the survey Table 2.

It was observed that, the awareness regarding cancer awareness signs was low among 74% high among 28% of the study participants. Table 3.

Table 1: Showing distribution of study participants according to awareness of cancer signals

Warning signal	Frequency(%)
Bowel and bladder habits	77(38.5)
Non healing Wound	70(35)
Bleeding from natural orifices	75(37.5)
Lump breast	92(46.0)
Difficulty swallowing	69(34.5)
Difficulty in opening mouth	70(35.0)
Size or shape of wart	62(31.0)
Hoarseness of voice	76(38.0)
Weight loss	86(43.0)

Table 2: Showing distribution of study participants according to presence of cancer warning signals

Warning signal	Frequency(%)
Bowel and bladder habits	6(3)

Wound	2(1)
Bleeding	3(1.5)
Lump breast	2(1.0)
Difficulty swallowing	0
Opening mouth	0
Size or shape of wart	1(0.5)
Hoarseness of voice	3(1.5)
Weight loss	5(2.5)

Table 3: Distribution of study participants according to awareness scores.

Awareness Levels	Frequency(Percentage)
low	128(64.0)
medium	15(7.5)
high	57(28.5)
Total	200

Discussion

The study has identified low levels of awareness of cancer warning signs. The results revealed that, in general, the level of knowledge about warning signs of cancer among the studied subjects was low.

Our findings are consistent with those of a few studies in developing countries [7,8]. However, the level of awareness in a developed country is slightly higher [9,10].

Such a difference, in general, can be attributed to the social inequalities and absence of community based / patient education between developed and developing countries.

Mehta S, Rajaram S, in their cross sectional study on Awareness about Human Papilloma Virus and its vaccine among medical students [11] clearly states awareness and attitude of medical college students towards HPV and its vaccine. The medical students did not know the incidence of cervical cancer in India, but they could relate its association with cervical cancer. The lack of knowledge among medical students is only tip of the iceberg. The misconceptions in the lay public would be even more and this could prove detrimental to the health of the society.

Such a difference, in general, can be attributed to the social inequalities between developed and developing countries.

Breast cancer is the most common diagnosed malignancy in women worldwide (22%) and in India (18.5%) it ranks second to cervical cancer. The burden of breast cancer is increasing in both developed and developing countries [12]. Present study estimates awareness of presence of lump is a warning sign is present in 46% of the participants. Considering breast cancer as one of the leading cause of death in India, awareness towards the same should be created.

Conclusion

This study may be considered as a maiden attempt in the development of an educational intervention program. Such educational and intervention programmes should be culture-sensitive and accessible to all individuals, with special attention placed on reaching the populations of the highest risk to increase awareness about the disease leading to its earliest diagnosis.

As a National Cancer Prevention strategy, public education combined with the use of cancer-screening technology, focused on high-risk populations, can be a cost-effective approach.

References

1. World Health Organization. Cancer control: knowledge into action: WHO guide for effective programmes. Module 2. Geneva: World Health Organization, 2007:iii. (www.who.int/cancer/modules/Prevention%20Module.pdf, 2007, accessed on July 2010).
2. Park K. Epidemiology of chronic non communicable diseases and conditions. 21st edition, M/s Banarsidas Bhanot publishers.
3. Sadjadi A, Nouraei M, Mohagheghi MA, Mousavi-Jarrahi A, Malekezadeh R, Parkin DM. Cancer occurrence in Iran in 2002: an international perspective. Asian Pac J Cancer Prev. 2005; 6: 359-63.
4. Breslow RA, Sorkin JD, Frey CM, Kessler LG. Americans' knowledge of cancer risk and survival. Prev Med. 1997; 26: 170-7.
5. Operational guidelines for national programme for prevention and control of cancer, diabetes, cardiovascular diseases & stroke (NPCDCS), Directorate General of Health Services, Ministry of Health & Family welfare, Government Of India. Available from <http://health.bih.nic.in/Docs/Guidelines-NPCDCS.pdf>.

6. Boffetta P, Brennan P, Saracci P. Neoplasms. Oxford Textbook of Public Health. 4th Edition, Oxford University Press.
7. Ali NS, Khalil HZ. Cancer prevention and early detection among Egyptians. *Cancer Nurs.* 1996; 19: 104-11.
8. SanTurgay A, Sari D, Turkistanli EC. Knowledge, attitudes, risk factors, and early detection of cancer relevant to the schoolteachers in Izmir, Turkey. *Prev Med.* 2005; 40: 636-41.
9. Bostick RM, Sprafka JM, Virnig BA, Potter JD. Knowledge, attitudes and personal practices regarding prevention and early detection of cancer. *Prev Med* 1993; 22: 65-85.
10. Brunswick N, Wardle J, Jarvis MJ. Public awareness of warning signs for cancer in Britain. *Cancer Causes Control.* 2001; 12: 33-7.
11. Mehta S, Rajaram S, Goel G, Goel N. Awareness about Human Papilloma Virus and its vaccine among medical students. *Indian J Community Med.* 2013; 38: 92-4.
12. Kamath R, Mahajan KS, Ashok L, Sanal T S. A study on risk factors of breast cancer among patients attending the tertiary care hospital, in Udupi district. *Indian J Community Med.* 2013; 38: 95-9.

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Factors Influencing Immediate Career Plans Among Dental Students, India

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Abstract

Aim: To study the importance of various factors on career decision making among dental students, India. *Material and Methods:* A self administered close ended questionnaire study was conducted among 113 students from one dental teaching institute of India. The survey was based on a collection of responses to a 17-item questionnaire, in the month of August, 2014. Final year students and interns were participant of the study. Data was analyzed using SPSS (social package of statistical software) Chicago, USA, version 18.0 software. Chi-square test and multivariate logistic regression analysis were used to analyze variables. *Results:* A total of 109 participants were included in the final study with response rate of 96.5%. There were 59.6% Females and 40.4% males. Among personal motivation factors, "Earning of money" was having highest odds of 1.523. For all the specialties, prosthodontics (2.95) and orthodontics (1.83) were having higher odds compared to others. In private practice, factors like "Marital status", "Influence of spouse", "Education debt taken" are affected more in deciding career plans. *Conclusion:* Various factors are important in career decision for dental students in India like Anticipated Educational debt, influence of spouse and other family member. Debt repayment facility should be revised for the students interested to continue post graduate studies so that they are not forced to leave studies and earn for debt repayment.

Keywords: Career; Dental Students; Interns; Private Practice.

Introduction

The healthcare professionals are important elements of society and a vital resource including dentistry [1]. The choice of a dental career is motivated

by the financial and social status of this profession, but some of the dental students are initially motivated for prestige, status , variety of work, and to apply their theoretical knowledge into practice, not only this but also motivations regarding helping people and to improve their own appearance as ideal for others. Most of the students after choosing dentistry as a career also expect a secure and bright professional future which provides motivation for students during the course of their dental education [2]. In society; dentist has an important role as licensed

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health care workers. Socialization of dentists begins with admission to dental college and continues through the entire period of their study [3,4,5]. Career choice is a critical decision that has a direct impact on a future life style. It is of utmost importance to understand the priorities and their sociodemographic backups of the students to choose dentistry as a profession because of monetary factors which influence an individual's level of commitment towards the profession. The extent to which societal changes influence the choice of dentistry is of ultimate interest [6].

The majority of Indian dentists are engaged in dental private practice. In the present scenario, new graduates enter mostly into private practice just after their graduation. As the proportion of general dentists has increased, the proportion entering academics and research has declined so as the proportion of specialists has decreased. Since 1966, all dental colleges in India were either run by govt. or aided by govt., in the same year the first dental college in private sector was established. Now the dental manpower has greatly increased in private and public sector [7]. most of the students opt career choice according to the advice given by their parents, spouse, influence of family dentist, family member in dentistry, educational debt etc. To keep these points in view the present study was designed to assess the importance of various factors on career decision making among final years and interns of Vyas dental college and hospital, Jodhpur, Rajasthan, India.

Material and Methods

A self administered close ended questionnaire study was conducted among 113 students from Vyas Dental College and hospital at Jodhpur, which is affiliated to the Rajasthan University of Health Science (RUHS). Ethical clearance was taken from "Ethical Committee for Research" from Vyas Dental College and Hospital. The survey was based on a collection of responses to a 17-item questionnaire, in the month of August, 2014. Final year students and interns were invited to complete the questionnaire in their classrooms after lectures rather than outside the class. 109, dental students who were willing to participate were given the questionnaire. The participants were asked to fill the questionnaire of their own. The examiner was available throughout the filling of the questionnaire to explain the question to the participants. The response rate of the study was 96.5%.

A pilot study was also carried out on 30 subjects

(final year students and interns of Vyas dental college and hospital) before starting the main study to check the feasibility of the study and the aim of the study was clearly explained to all the subjects and written informed consent was obtained.

Exclusion Criteria

- The study subject who were not willing to participate.
- The study subject who were absent at the time of the study.

The data was collected by the close ended questionnaire. The original questionnaire was prepared by referring the studies of Nashleanas et al, Omolola O. Orenuga et al. and Jennifer E Gallagher et al.[6,8,9] few questions were added according to Indian scenario. It included demographic data and questions on anticipated educational debt, plan immediately after graduation, family members in dentistry, influence of spouse, family other than spouse and family dentist.

Data was analyzed using SPSS (social package of statistical software) Chicago, USA, version 18.0 software. Chi-square test and multivariate logistic regression analysis were used to analyze variables.

Results

Table 1 shows 59.6 % of the study subjects were females and 40.4% were males. Among those only 11.9% were married.

Table 2 shows most of the dental students consider dentistry as a career choice followed by medicine irrespective of gender, marital status and location. No statistical significant relationship was found between gender, marital status, location and career choice.

Table 3 shows that among personal motivation earning of money was 1.523 times affected the career plans in males compared to females. Based on level of confidence, there is no effect on career planning, as compared to other branches 2.95 times males are opting for Prosthodontics branch compared to females. Statistically significant relationship was found in both males and females regarding factors affecting career plans.

Table 4 shows that other factors are not playing major role as compared to Influence of other family members on post graduation plans (p value = 0.000).

Table 5 shows that in private practice marital

status, influence of spouse, education debt. Taken are affected more in deciding career plans where as In Military Educational debt, influence of spouse are the important factors Among specialty, males are 1.57 times more affecting the individual

career plans compared to females and statistically significant results were found among study subject who opted for other dental occupation are educational debt. Taken and influence of family dentist.

Table 1: Distribution of study subjects according to their gender and marital status

Variable	No. of Study Subjects (n)	Percentage (%)
Gender		
Male	44	40.4%
Female	65	59.6%
Marital Status		
Married	13	11.9%
Unmarried	96	88.1%

n- Number of patients in a particular category

Table 2: Relationship between gender, marital status, location and career choice.

Variable	Dentistry	Career Choice Medicine	Career Choice Pharmacy	Others	Chi-Square value	p-value	Significance
Gender							
Male	24(22%)	14(12.8%)	1(0.9%)	5(4.6%)	0.261	0.967	NS
Female	33(30.3%)	21(19.3%)	2(1.8%)	9(8.3%)			
Marital Status							
Married	7(6.4%)	5(4.6%)	1(0.9%)	0(0%)	3.397	0.334	NS
Unmarried	50(45.9%)	30(27.5%)	2(1.8%)	14(12.8%)			
Location							
Campus	20(18.3%)	8(7.3%)	1(0.9%)	2(1.8%)	9.672	0.139	NS
Off Campus	37(33.9%)	27(34.8%)	2(1.8%)	12(11%)			

(p ≤ 0.05 – Significant, CI = 95 %)

Table 3: Multivariate logistic regression analysis showing factors affecting career plans

Variables	Odd's Ratio	p-Value
Personal Motivation		
Forced to join	1	
Want to serve community	0.811 (0.11,1.71)	
To earn money	0.128 (0.29,4.38)	0.763
Interest in dental field	0.015 (0.24,4.25)	
Career Options		
Both	1	
Boys	5.07 (17.7,1.38)	0.001
Girls	8.56 (15.96,3.20)	
Level of Confidence		
Not confident	1	
Confident	0.217 (0.58,6.84)	0.277
Very confident	0.217 (0.492,11.91)	
Specialty inspires the most		
Oral Pathology	1	
Oral Medicine & Radiology	0.658 (0.04,9.4)	
Pedodontics	0.099 (0.006,1.7)	
Orthodontics	1.83 (0.204,16.5)	
Conservative Dentistry & Endodontics	0.748 (0.08,6.3)	0.630
Prosthodontics	2.95 (0.23,37.8)	
Periodontics	0.565 (0.05,5.7)	
Oral & Maxillofacial Surgery	0.349 (0.03,3.09)	
Public Health Dentistry	0.493 (0.04,4.9)	

(p ≤ 0.05 – Significant, CI = 95 %)

Table 4: Multivariate logistic regression analysis showing factors affecting post graduation plans

Variables	ODD's Ratio	p-Value
Reason Behind Choosing The Particular Specialty		
Global Opportunities	1	
Interest	1.73 (0.18,16.7)	
Financial stability	10.09 (0.84,12.6)	0.068
Career development	4.06 (0.38,42.7)	

Social status	4.12 (0.3,56.2)	
Influence of other family members	5.035 (1.11,2.29)	0.001
Family member as a dentist	1.19 (0.37,3.73)	0.766
Influence of Family Dentist	1.38 (0.56,3.39)	0.476
Education Debt Taken		
More than 620000	1	
No debt	0.744 (0.03,18.5)	
155000-310000	0.415 (0.01,13.05)	0.617
310000-465000	0.431 (0.01,13.9)	
465000-620000	2.88 (0.05,16.2)	
Suggest to pursue career in dentistry		
No	1	
Yes	0.617 (0.03,10.3)	0.853

(p≤0.05 – Significant, CI = 95 %)

Table 5: Multivariate logistic regression analysis showing factors affecting individual career Plans

Variables	ODD's Ratio	p-Value
Private Practice		
Gender(Male/Female)	0.294 (0.21,8.2)	0.751
Marital status(Married/Single or divorce)	1.31 (0.07,12.6)	0.505
Influence of spouse(Yes/No)	1.34 (0.39,48.9)	0.890
Influence of other family members(Yes/No)	0.95 (3.25,45.9)	0.920
Family member as a dentist(Yes/No)	0.13 (0.10,12.1)	0.926
Influence of Family Dentist(Yes/No)	0.90 (0.02,5.64)	0.502
Education Debt Taken(No debt/ Debt)	1.35 (3.04,21.9)	0.769
Military		
Gender(Male/Female)	0.36 (0.16,11.8)	0.758
Marital status(Married/Single or divorce)	0.26 (0.01,13.4)	0.911
Influence of spouse(Yes/No)	2.22 (1.02,8.39)	0.850
Influence of other family members(Yes/No)	0.48 (1.1,2.37)	0.967
Family member as a dentist(Yes/No)	1.03 (0.01,7.8)	0.512
Influence of Family Dentist(Yes/No)	0.68 (0.02,12.3)	0.675
Education Debt Taken(No debt/ Debt)	5.4 (9.09,21.9)	0.326
Speciality		
Gender(Male/Female)	1.57 (0.03,1.33)	0.098
Marital status(Married/Single or divorce)	0.95 (0.04,14.2)	0.640
Influence of spouse(Yes/No)	0.50 (2.4,11.3)	0.961
Influence of other family members(Yes/No)	0.99 (8.2,16.4)	0.922
Family member as a dentist(Yes/No)	0.31 (0.06,8.9)	0.807
Influence of Family Dentist(Yes/No)	0.68 (0.15,25.4)	0.601
Education Debt Taken(No debt/ Debt)	0.33 (7.35,69.9)	0.943
Other Dental Occupation		
Gender(Male/Female)	0.32 (0.09,20.9)	0.814
Marital status(Married/Single or divorce)	1.39 (0.01,10.7)	0.594
Influence of spouse(Yes/No)	1.35 (3.42,4.42)	0.934
Influence of other family members(Yes/No)	2.50 (6.64,9.98)	0.878
Family member as a dentist(Yes/No)	2.6 (0.002,3.5)	0.188
Influence of Family Dentist(Yes/No)	3.48 (0.89,11.8)	0.051
Education Debt Taken(No debt/ Debt)	18.5 (0.02,69.4)	0.012

(p d" 0.05 – Significant, CI = 95 %)

(Constant: gender-female, marital status-single or divorced, Educational Debt- no debt, others-No)

Discussion

Most of the studies are conducted on final year students but present study is conducted on both final years and interns, the proportion of female candidate (59.6%; n=65) was more than that of Males (40.4%;n=44) because now a day's more number of females are taking admission in dentistry in India as compared to males, However contradictory findings

was found in a study conducted in USA by Benjamin M N et al (2014), in which males 139(55.2%) were taking more admission in dentistry as compared to females 113 (44.8%) [8].

Omolola o orenuga et al (2006) [6] and Gobichetti PJA et al (2013) [10] found that medicine was generally the preferred first choice followed by dentistry and the most common reason for the dental students to choose the dentistry as a career due to self

interest followed by, did not get admission in medicine. However these findings differ in our study, it was found that dentistry was a first choice of most of the dental students followed by medicine irrespective of gender and marital status. The most common reasons for the student to choose medicine as career choice are their desire to enter prestigious profession.

Our study also found that to earn money, is the most prominent motivational factors in choosing dentistry as a career but in study conducted by Ganesh R et al (2013) [7] in which interest in dental field was the main reason to choose dentistry as a profession. Similar finding was also noted in study by Joanne N W et al (2006) [11] and in another study conducted by C Naidu, where financial gains was the main reason to choose healthcare as a profession [12].

Study by Gobichetti PJA et al (2013) [10] found that students wants to do a master degree in oral surgery because of passionate towards the specialization and in another Study by Hazim HR (2013) [1] orthodontics was the most favored option followed by oral maxillofacial surgery. These two specialties were more opted by dental students in specialization and both were associated with higher income. But in our present study students were more interested in prosthodontics branch followed by orthodontics. According to the students these two branches enhance their status as well as financial gain which attract them towards these branches.

Influence of spouse's occupation and influence of a family dentist have more significant impact on the post graduation career plans, found in study conducted by Benjamin M N et al (2014) [8] where as in another study by Hazim H R (2013) [1] contradictory results were found. In comparison to our study, influence of other family members had great impact on post graduation plans (p value ≤ 0.001)

The logistic regression model demonstrated that influence of spouse, educational debt, taken were important factors for career plans who want to enter military and private practice. Statistically significant results were found among study subject who opted for other dental occupation with educational debt taken and influence of family dentist. Similar findings were noted in the study conducted by Benjamin M N et al (2014) [8] along with certain factors associated such as plans to join private practice just after the graduation, gender and influence of their family dentist. No statistically significant difference was found between marital status, family member as dentist and their future career plans.

Limitation of the Study

This study is conducted only in one institution

which may limit generalizability. A follow-up research is required among these new dentists over several years of graduation which could lead to a better understanding of how different factor can influences their immediate career plans.

Conclusion

Various factors are important in career decision for dental students in India like Anticipated Educational debt, influence of spouse and other family member. Debt repayment facility should be revised for the students interested to continue post graduate studies so that they are not forced to leave studies and earn for debt repayment.

References

1. Hazim H Rashid, Swapnil G Ghotane, Salem H Abufanas, Jennifer E Gallagher. short and long term career plans of final year dental students in the United Arab Emirates. BMC oral health. 2013; 13: 39.
2. Maryam Baharvand, Elnaz Jaldi Moghaddam, Hamidreza Pouretemad, Kaveh Alavi. Attitudes of Iranian Dental Students toward Their Future Careers: An Exploratory Study. J Dent Educ. 2011; 75: 1489-1495.
3. Vigild M, Schwarz E. Characteristics and study motivations of Danish dental students in a longitudinal perspective. Eur J Dent Educ. 2001; 5: 127-33.
4. Eli I, Judes H, Allerhand-Alexander Y. Dentists and dentistry: attitudes towards the chosen profession. Hum Relations. 1989; 41: 929-37.
5. Weaver RG, Haden NK, Valachovic RW. U.S. Dental school applicants and enrollees: a ten-year perspective. J Dent Educ. 2000; 64: 867-70.
6. Omolola O. Orenuga, Oluranti O. da Costa. Characteristics and Study Motivation of Clinical Dental Students in Nigerian Universities. J Dent Educ. 2006; 70: 996-1103.
7. Ganesh R, Sajida Sultana.N, Talat Naz. Crossroads of dental education: perception among the interns of the dental schools in Tamil Nadu, India. EJOD. 2013; 3: 434-440.
8. Benjamin M Nashleanas, Susan C McKernan, Raymond A Kuthy, Fang Qian. Career influences among final year dental students who plan to enter private practice. BMC Oral Health. 2014; 14: 18-25.
9. Jennifer E Gallagher, Resmi Patel, Nora Donaldson, Nairn HF Wilson. The emerging dental workforce: why dentistry? A quantitative study of final year

- dental students' views on their professional career. *BMC Oral Health.* 2007; 7: 7.
10. Gobichetti Palayam Jagatheeswaran AnbuSelvan, Subramaniam Gokulnathan, Vilvanathan Prabu Rajan, Gangadharan, RajaRaman, Singaravelu Suresh Kumar, Arthie Thagavelu. A study among dental students regarding the factors influenced dental students to choose dentistry as career. *J Pharm Bioallied Sci.* 2013 Jun; 5(Suppl 1): S36-S38.
 11. Joanne N. Walton, Ian R. Matthew, Cheryl Dumaresq. The Burden of Debt for Canadian Dental Students: Part 4. The Influence of Debt on Program and Career Decisions. *J Can Dent Assoc.* 2006; 72: 913-913d.
 12. C Naidu, J Irlam, P N Diab. Career and practice intentions of health science students at three South African health science faculties. *AJHPE.* 2013; 5: 68-71.
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Dietary Consumption of Calories Predicting the Nutritional Status of Preconception Women in a District of North Karnataka-A Community Based Study

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Abstract

The term 'preconception period' includes both the period before conception and the inter-conception period. Many women in low- and middle-income countries do not have adequate access to the prenatal care they need. Reproductive-aged women are at risk of iron deficiency because of blood loss from menstruation, poor diet, and frequent pregnancies. It affects children in a family and also brings down house hold economic status. In India, because of low socio economic status and consumption of less caloric food affects the health and nutritional status of woman is adversely affected. So, this study was done to know the nutritional status of preconception women and calories consumption in a district of Karnataka. A total of 770 preconception women were enrolled across the district. Women were identified by simple random method. In the present study, majority of them, (36.6%) were normal below body mass index (BMI), 45.5% had normal BMI and 17.9% of them were overweight. Significant association between BMI and calories intake was found ($p=0.038$).

Keywords: Preconception; Reproductive Age; Body Mass Index.

Introduction

As per WHO, the term 'preconception period' includes both the period before conception and the inter-conception period. Preconception women also termed as pre-pregnant women. Even where strong public health programmes across the life-course are in place, they do not guarantee that women enter pregnancy in good health. The reality is that many women in low- and middle-income countries do not have adequate access to the prenatal care they need.

Preconception care can make a useful contribution to reducing maternal and childhood morbidity and mortality, and also to improve maternal and child health in both high- and low-income countries [1].

In India, women of the child-bearing age (15 to 49 years) constitute 22.2 percent of the total population. Mother and children not only constitute large group, but also a vulnerable or special-risk group. Malnutrition is like an iceberg; most people in the developing countries live under the burden of malnutrition. The adverse effects of malnutrition have been well documented, which include maternal depletion, low birth weight, anaemia, toxæmias of pregnancy and postpartum hemorrhage [2].

Reproductive-aged women are at risk of iron deficiency because of blood loss from menstruation, poor diet, and frequent pregnancies [3]. They are more

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prone for nutritional anaemia. Poor health of women has implications on self as well as on their families. It affects children in a family and also brings down household economic status. Because of prevailing culture and traditional practices in India, the health and nutritional status of woman is adversely affected [4].

This study contributes information on body mass index and calorie consumption in preconception women.

Methodology

This cross-sectional study was conducted between January to December 2014. A total of 770 preconception women were enrolled belonging to 18 villages of 10 primary health centres across the Belagavi district in Karnataka state. Women were identified by simple random method with the help of ANMs and ASHAs. Women of nulliparous and Para 1-3 who were non-pregnant and non-lactating (NPNL) were enrolled in the study. Women with NPNL who were having Hb% less than 7gm/dl and adopted permanent and temporary method of sterilization were excluded.

The present study was approved by J N Medical College, Belagavi Institutional Ethics Committee on Human Subjects Research. Informed written consent was obtained from each study participant. Socio-demographic data was collected by interview and anthropometric measurements were carried out in primary health centres. The anthropometric measurements taken were women's height and weight. The WHO recommended appropriate Body Mass Index (BMI) for Asian population and their cut-off values were used for classification [3].

Data was analysed by SPSS version 21.0 and chi-square test of significance was applied for establishing the association between two variables.

Results

In the present study, the mean age was 22.5 ($SD \pm 3.19$) years and the median age was 22 years. As many as 638 (82.9%) participants of the study were housewives and 331 (43.0%) educated up to high school. Amongst the total women, 338 (43.9%) were having 1 child, 141 (18.3%) 2 children and 33 (4.3%) had 3 or more children. About 258(33.5%) women were nulliparous. Majority, 499 (64.8 %) belonged to class V followed by 185 (24.0%) to class IV, 58 (7.5%) to class III, 22 (2.9%) to class II and only 6 (0.8%) belonged to class I socio-economic status according to modified BG Prasad classification (Table-1).

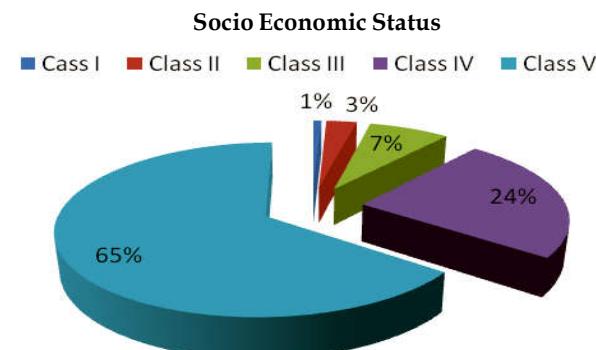
One third of the study participants, 282 (36.6%) were below BMI(18.5) , 350 (45.5%) were having normal BMI(18.5-22.9) and 138 (17.9%) of them were overweight(≥ 23). Women having BMI category of underweight 3(23.1%) consumed energy <50% of RDA, 70(48.9%) consumed 50-70% of RDA, 29(20.3%) consumed 70-90% of RDA and only 11(7.7%) were consuming >90% of RDA. This association between BMI and energy consumption of preconception women was statistically significant ($p=0.038$) (Table-2).

Among participants of class I of SES, 2(33.3%) women belonged to normal, mild and moderate category of anaemia equally. But women belonged to class V, 215(43.2%) had moderate anaemia, 195(39.0%) had mild anaemia and 89(17.8%) had normal haemoglobin. This association between SES and Haemoglobin was statistically significant ($p=0.041$) (Table. 3).

Table 1: Demographic characteristics (n=770)

Demographic Characteristics of Study Participants	Number	Percentage
Age :		
15 - 19 Years	129	16.8
20- 24 Years	441	57.2
25-29 Years	181	23.5
30- 34 Years	19	2.5
Education :		
Illiterate	51	6.6
Primary	228	29.6
Secondary	331	43.0
PUC	123	16.0
Graduate And Post Graduate	37	4.8
Socio Economic Status :		
Class I	6	0.8
Class II	22	2.9
Class III	58	7.5
Class IV	185	24.0
Class V	499	64.8
Body Mass Index (BMI):		

<18.5	282	36.6
18.5 – 22.9	350	45.5
≥23	138	17.9
Parity :		
Nulliparous	258	33.5
1 Child	338	43.9
2 Children	141	18.3
3+Children	33	4.3



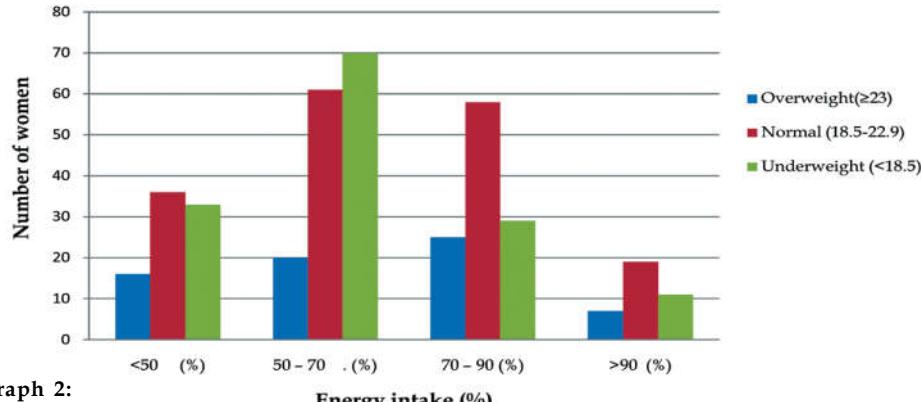
Graph 1:

Table 2: Association between body mass index (BMI) and energy intake

Body Mass Index (BMI)	Energy %				Total
	<50 No. (%)	50 – 70 No. (%)	70 – 90 No. (%)	>90 No. (%)	
Overweight(≥23)	16(23.5)	20(29.4)	25(36.8)	7(10.3)	68
Normal (18.5-22.9)	36(20.7)	61(35.1)	58(33.3)	19(10.9)	174
Underweight (<18.5)	33(23.1)	70(48.9)	29(20.3)	11(7.7)	143
Total	85	151	112	37	385

$\chi^2 = 13.331$, DF = 6 , p = 0.038

Association between Body Mass Index(BMI) and Energy intake



Graph 2:

Table 3: Association between socio economic status (SES) and hemoglobin:

Socio economic status (SES) (Rs.)	Hemoglobin level			Total
	Normal No. (%)	Mild Anemia No. (%)	Moderate Anemia No. (%)	
Class I ? 5571)	2(33.3)	2(33.3)	2(33.3)	6
Class II (2786-5570)	9(40.0)	7(31.8)	6(27.2)	22
Class III (1671-2785)	15(25.8)	26(44.8)	17(29.4)	58
Class IV (836 -1670)	50(27.0)	64(34.6)	71(38.4)	185
Class V (?836)	89(17.8)	195(39.0)	215(43.2)	499
Total	165	294	311	770

$\chi^2 = 16.064$, DF = 8 , p = 0.041

Discussion

In reproductive age group socio-economic status and BMI of women are utmost important as they are future mothers. But haemoglobin level of women in this study was very poor and it may lead to many complications in the health of the women.

Similar study was conducted in Bangladesh by Hague et al [5]. It showed that, the mean age of woman was 28 years($SD \pm 8.1$). A study by Potadar et al. in Mumbai [6] comprised 69.7% Hindus and 25.6% Muslims. Similarly, a study conducted at mumbai [6], 81.4% of the women completed secondary school education. A study in Mumbai [6] showed that, 31% women were nulliparous, 43.7% had 1 child and 25.0% were with more than 1 child. A study done in Kerala [7] showed that 31.3% preconception women were undernourished ($BMI < 18.5$). Another study in Dhaka [5] showed that, 25.6% preconception women were undernourished and 28.7% had normal BMI.

In the present study, a majority (64.8%) of the participants belonged to Class V socio-economic status and 24.0% to class IV of socio-economic status. A study done in rural areas of Belgaum [8] showed that, 62.5% participants belonged to Class V and 23% to class IV of socio-economic status. Similar observations were found in both the studies.

In the present study, 40.4% of preconception women had moderate anaemia and 38.2% were suffering from mild anaemia. A study done in Madhya Pradesh [9], Chambal division showed that 48.0% women had moderate anaemia and 42.1% had mild anaemia. As per NNMB 2006 [10], India contributes 51% of anaemia in 15-49 reproductive age group women. A study done in Iran [11] revealed that, mild anaemia was present in 11.5% women, moderate anaemia in 2.3% and no one had severe anaemia. In preconception women, this large gap could be due to low socio-economic status and less nutritious diet pattern in rural area. In our study, lower socio-economic status and taking low calorie diet were predisposing factors for low BMI. Various other studies also proved the same relation.

Conclusions

The current study revealed that preconception women staying in rural areas had low socio-economic status and less calorie consumption as per RDA. So, women were having high prevalence of anaemia and low BMI. Low BMI in women pronounced that their socio-economic status was also low. The key

intervention would be suggestion of good nutrition and health education regarding importance of good health during preconception period.

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References

- WHO-meeting to develop a global consensus on preconception care to reduce maternal and childhood mortality and morbidity. 2012: 6-7.
- Park K. Text book of Preventive and Social Medicine. Jabalpur. M/S Banarsidas Bhanot Publishers India: 22nd edition. 2013; 480-482.
- American College of Obstetricians and Gynecologists. ACOG practice bulletin no. 95: Anemia in pregnancy. *Obstetric Gynecology*. 2008; 112: 201-7.
- Mallikarjun RK, Balakrishnan N, Aralappa, Laxmaiah A, Brahmam NV. "Diet and Nutrition status of women in India" *J Hum Ecol*. 29(3): 2010; 165-170.
- Haque MJ, Rashid M. "Nutritional status of Women at Reproductive Age with some of their socio demographic characteristics of a slum in Dhaka". *Dinapur Med Col J*. 2008; 3(1): 116-119.
- Potadar R et.al. Improving women's diet quality preconceptually and during gestation: effects on birth and prevalence of low birth weight-a randomized controlled efficacy trial in India (Mumbai Maternal Nutrition Project) Mumbai Maternal Nutrition Project *AJCN (American journal of clinical nutrition)*. 2014; 100: 1257-68.
- Ramesh P. Malnutrition among Women in Kerala: An Analysis of Trends, Differentials and Determinants: National Family Health Survey (NFHS-2), 1998-99: Data files of Kerala.
- Sulakshana SB, Naik VA, Mallapur MD. Nutritional status of Adolescent girls residing in rural area: A community based cross sectional study. *Journal of scientific society*. 2014; 41(1): 210-212.
- Ghosh S. et al. Dimensions of nutritional vulnerability: Assessment of women and children

- in Sahariya tribal community of Madhya Pradesh in India. Indian J Public Health. 2015; 57(4): 117-221.
10. National Nutritional Monitoring Bureau (NNMB): Diet and Nutritional status of rural population, prevalence of Hypertension & Diabetes among adults and infants & young child feeding practices-Report of the 3rd report survey. 2012; 26: 23-211.
11. Majid SA, Fatourechi, Lesanpezeski M, Ahmadnezhad E. Prevalence of Anemia and Correlated Factors in the Reproductive Age Women in Rural Areas of, Tabas, Iran. Journal of Family and Reproductive Health Sept. 2013; (7): 139.

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Epidemiological Study of Health Profile of Adolescent Schoolgirls Residing in Social Welfare Hostel in Rural Area of Kuppam

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Abstract

Introduction: The importance of the health of adolescents has started to receive increasing recognition particularly in developing countries where four out of five of the world's young people live and where more than half the population is under the age of 25. **Aims and Objectives:** The study was done with the objectives of assessing the the health status profiles of adolescent girls residing in welfare hostel in Kuppam town of Andhra Pradesh. **Materials and Methods:** study was conducted among adolescent school girls who were residing in the social and tribal welfare hostel in Kuppam Mandal of Chittoor Disrtict. Andhra Pradesh. **Results:** A total of 218 Adolescent school girls were studied. Our study found out there was high prevalence of undernurtrition (68.8%) which was significantly associated with the younger age. There was also higher prevalence of morbidity conditions like reproductive (26.1%), skin (25.5%) and dental problems (19.3%). Emphasizing regular school health programmes for health education, early detection and proper treatment will curtail the burden of malnutrition among this population.

Keywords: Adolescence; Health; Morbidity; School; Undernutrition.

Introduction

The importance of the health of adolescents has started to receive increasing recognition particularly in developing countries where four out of five of the world's young people live and where more than half the population is under the age of 25 [1]. More than half the world's adolescents live in either the South Asia or the East Asia and Pacific region, each of which contains roughly 330 million adolescents. In India, they constitute around 23 percent of the total

population. The period is characterized by a combination of physical changes (puberty), behavior changes and shifts in social grouping. This is also the period of preparation for undertaking greater responsibilities including healthy responsible parenthood. Nutritional and health needs of adolescent are also more because of more requirements for growth spurt and increase in physical activity [2].

Inadequate iron storage during adolescence and before conception is a major cause of iron deficiency anemia during pregnancy, which aggravates the risk of death due to anemia during pregnancy.

Establishment of social welfare hostels is an important measure for the educational advancement of adolescent girls belonging to weaker sections of the society. The health care of this group of

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adolescents is of utmost importance as many of them already being suffering from malnutrition, infectious diseases, anemia, and helminthiasis etc. They may be at further risk of deterioration of health if inadequate food menu is followed in these social welfare hostels. Hence with this background the study was undertaken to assess the health status profiles of adolescent girls residing in welfare hostel in Kuppam town of Andhra Pradesh.

Materials and Methods

This cross sectional study was conducted among adolescent school girls aged 10-19 years who were residing in the social and tribal welfare hostel in the Paramasamudram village of Kuppam Mandal of Chittoor District. Andhra Pradesh, from April to September 2015. A total of 218 adolescent girls were residing in the hostel studying in various classes from 5th to intermediate and were included in the study after obtaining permission from principal of the school. Pre-tested semi structured proforma was used for data collection and it included detailed physical clinical examination of the children present in hostel and the identified health problems were referred to the urban health training center for further management.

WHO Body Mass Index (BMI) classification [3] was used for nutritional status classification after taking anthropometric measurements like height and weight. Hemoglobin estimation was done by Drapkin's method as it is a single step procedure using single reagent and errors due to subjective visual matching can be avoided as spectrophotometer is used and hence the reading would be precise and reliable [4]. The WHO guidelines [5] were used for classification of anemia. The collected data was analyzed by using proportions, percentages and chi-square test. The results were discussed by comparing with other similar studies collected as review of literature and the detailed report was prepared.

Results

Of the 218 adolescent girls studied, majority of them were Hindu (84.9%) by religion and followed by Muslims (15.1%). 39% of study subjects were having three or more siblings, followed by 33.9% had two siblings. Majority of the parents were literates. One third of the mothers were illiterate, whereas 26.2% of fathers were illiterate. Majority of the fathers (94.5%)

and almost half of the mothers (53.2%) were working to earn the livelihood (Table 1).

Table 2 shows the various morbidity conditions among the study participants. Majority of them had history of reproductive tract infections (26.1%), followed by skin (21.6%), and dental problems (18.4%). 11% of the subjects were having clinical anemia and other disorders like Vit-B complex deficiency, URTI, ENT problems etc were present in less than 8% of the subjects. Estimation of Hemoglobin levels by Drapkin's method (Table 3) revealed that almost half of them were anemic. Among them, the percentages of mild, moderate, and severe anemia was 19.7%, 23.4%, and 4.6% respectively.

Table 4 depicts that majority of them were classified with severe under nutrition (35.7%), subjects with Mild and Moderate under nutrition were 19.3% and 13.8% respectively. 6.9% were Overweight and none were obese. The proportion of under nutrition was high among younger adolescents of 10-14 yrs age group (80.1%), and it was statistically significant (Table 5).

Table 1: Distribution of socio-demographic variables of study subjects

Variables	No.	Percentage (%)
Religion		
Hindu	185	84.9%
Muslim	33	15.1%
Siblings		
Nil	7	3.2%
One	52	23.9%
Two	74	33.9%
Three or more	85	39%
Father's Education		
Secondary and above	137	62.8%
Primary	24	11%
Illiterate	57	26.2%
Mother's Education		
Secondary and above	124	56.9%
Primary	21	9.6%
Illiterate	73	33.5%
Father's occupation		
Working	206	94.5%
Unemployed	12	5.5%
Mother's occupation		
Working	116	53.2%
Housewife	102	46.8%
Total	218	100

Table 2: Details of morbidity profile of study subjects (n=218).

Indicators	No.	Percentage (%)
Dental problems	42	19.30%
Vit B complex deficiency	18	8.30%
Thyroid enlargement	9	4.10%
Skin problem	49	22.50%
ENT problem	11	5.00%

Clinical anaemia	26	11.90%
Passing worms in stools	4	1.80%
Pediculosis	5	2.30%
URTI	13	5.96%
h/o RTI	58	26.60%

Table 3: Distribution of adolescent girls according to hemoglobin estimation

Hemoglobin level	No.	Percentage (%)
Normal	114	52.3%
Mild anaemia	43	19.7%
Moderate anaemia	51	23.4%
Severe anaemia	10	4.6%
Total	218	100

Table 4: BMI classification of study population as per WHO Classification according to BMI

BMI	No.	Percentage (%)
Severe undernutrition (<16)	78	35.7%
Moderate undernutrition (16-16.9)	30	13.8%
Mild undernutrition (17-18.49)	42	19.3%
Normal(18.5-22.9)	53	24.3%
Overweight (23-27.5)	15	6.9%
Obese >27.5	0	0
Total	218	100

Table 5: Association of nutritional status with age (n=203*)

Age group (in years)	BMI Undernourished	Total	
		Normal	
10-14	109(80.1%)	27(19.9%)	136
15-19	41(61.2%)	26(38.8%)	67
Total	150(73.9%)	53(26.1%)	203

(*Overweight& Obese were excluded.X2= 8.36& p value = < 0.004)

Discussion

Adolescence is a phase separate from both early childhood and adulthood. It is a transitional period that requires special attention and protection. In our study, 68.8% of adolescent girls were under nourished. Similar findings were reported by Goyle A [6], Shivararamakrishna et al [7], and Joshi SM [8], where the prevalence of under nutrition was 72%, 73.5%, and 69% respectively. This can be attributed to the poor socio economic status as majority of the girls were from rural areas.

High prevalence of under nutrition was seen (80.1%) in the younger age group, i.e., 10-14 yrs as the nutritional requirements in the early adolescent period is high, which is similar to findings by National Nutrition Monitoring Bureau [9] (78%) and by Joshi SM [8].

Our study also found that majority of the girls were

suffering from various morbidity conditions such as skin (21.6%), and dental problems (18.4%). Similar findings with respect to skin problems were reported by Gupta KB [10] (23.2%), and Srinivasan K [11] (25.7%). Chabria P [12] reported the prevalence of dental caries as 16.1% which was similar to our study findings. 26.1% of adolescent girls were having history of reproductive tract infections either in the form of dysmenorrheal, vaginal discharge and burning micturition which was comparable to findings by Wasnik V³(16.7%). Poor personnel hygiene, overcrowding and lack of knowledge regarding the common infections might be the important contributing factors. Our study noted that 47.7% were anaemic which was lower than the estimates by Seshadri [13] S (60%) and by Padmaja P [14] (68%). This was probably due to different methods applied for haemoglobin estimation.

Conclusion

Focusing on health needs of vulnerable section of population such as adolescent girls from under privileged section of the community, who are residing in social welfare hostels, will give inputs in understanding the factors influencing under nutrition among them. Our study found that there was a significant association between under nutrition and early years of adolescent period. High burden of morbidity conditions were also reported. Measures like conducting school health programmes in the form of regular periodic medical examination and providing treatment will bring down issues pertaining to the morbidity conditions among this group of population. Emphasis should be given to training of school health personnel in early identification of the problems and assisting in referral services, as it forms the crucial component of these school health programmes.

References

1. Park K. Textbook of Preventive And Social Medicine. 22nd ed.Jabalpur: Banarsidas Bhanot; 2013. Chapter 10, Preventive Medicine in Obstetrics,Paediatrics and Geriatrics; p.548-549.
2. Kishore J.National Health Programs of India.11th ed.New Delhi:Century: 2014.Chapter 8,Reproductive And Child Health Program-II; p.202-203.
3. Wasnik V, Rao BS, Rao D. A Study of the Health Status of Early adolescent Girls Residing in Social Welfare Hostels in Vizianagaram district of Andhra

- Pradesh State, India. *Intl J Col Res Int Med & Pub Health.* 2012; 4(1):72-83.
4. Wasnik M, Tirpude R, Wasnik N, Agrawal VP. Validation of different tests for haemoglobin estimation. *Intl J Bio Adv Res.* 2014; 5(1): 29-30.
 5. WHO Monograph: Preventing and controlling iron deficiency anemia through primary health care. De Meyer 1989.
 6. Goyle A. Nutritional status of girls studying in a government school in Jaipur city as determined by anthropometry. *Anthropologist.* 2009; 11: p225-227.
 7. H.R. Shivaramakrishna, A.V. Deepa and M. Sarithareddy. Nutritional Status of Adolescent Girls in Rural Area of Kolar District -A Cross-Sectional Study. *Al Ameen J Med Sci.* 2011; 4(3): 243-246.
 8. Joshi SM, Likha S, Agarwal S S, Mishra M K, Shukla U. Nutritional Status of Adolescent Girls in Rural area of Bhopal District. *Natl J Com Med.* 2014; 5(2): 191-194.
 9. National Nutrition Monitoring Bureau. Diet and nutritional status of rural population, Hyderabad: National institute of Nutrition, Indian Council of Medical Research; 2002. p91.
 10. Gupta KB, Walia BN. A longitudinal study of morbidity in children in a rural area of Punjab. *Indian J Pediatr.* 1980 Jul-Aug; 47(387): 297-301.
 11. Srinivasan K, Prabhu GR. Study of Morbidity Status of Children in Social Welfare Hostels in Tirupati Town. *Indian J Com Med.* 2006 Jul-Sep; 31(3): 170-172.
 12. Chabba P, Garg S, Sharma N, Bansal RD. Health and Nutritional status of boys aged 6-12 years in a children's observation home. *Indian J Public Health.* 1996 Oct-Dec; 40(4): 126-9.
 13. Seshadri S. Weekly implementation of iron in Rural adolescent girls In: Malnutrition in South Asia-A regional profile, 1996, ROSA publications, S, 79. 9. Taneja MK, Sandel J, Shukla PL. Health status of urban school children in Western Uttar Pradesh. *Indian J Pediatr.* 1978; 45: 359-363.
 14. Padmaja P A, Lakshmi AV and Mahatab S B. Riboflavin and Haemoglobin status of Urban school boys: relationship with income, diet and anthropometry. *Indian J Pediatr.* 1987 Jul-Aug; 54(4): 29-33.

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A Study of Screening of Cervical Cancer at the Community Level

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Abstract

Context: Cervical cancer till date is the commonest cancer of women of reproductive age group. It is a disease with long latent period and progresses in stages as: inflammation → mild → moderate → severe dysplasia → carcinoma in situ → invasive cancer. Prevention of carcinoma cervix can easily be done by regular screening of women of reproductive age group. In the days when diagnostic and curative endoscopic procedures have conquered the field of gynaecology, PAP SMEAR test is still an effective method for screening of cervical cancer at the community level. **Aims:** To find out the prevalence of cervical cancer in urban slum population of Turbhe, Navi Mumbai. **Settings and Design:** An OPD based cross sectional study, conducted at Urban Health Centre, Turbhe, Navi Mumbai. **Methods and Material:** Participants for the study were -married, parous women, more than 30 yrs of age, who attended the OPD. An informed consent was taken and a pre -tested questionnaire was filled up. Vaginal smear was taken with the help of Cusco's Speculum and cotton swab stick. Slides were sent for histopathological examination. **Statistical Analysis Used:** SPSS version 20. **Results:** 1.9% of participants had cervical dysplasia, 95.1% had inflammatory smear and 2.9% of participants had normal smear. **Conclusions:** PAP smear is a simple procedure which can even be carried out in minimum time and requirements. By this procedure cervical dysplasia can easily be detected and treated, and thereby burden of cancer cervix can easily be reduced. It is observed that creating awareness activities in a small setup at community level, increases the voluntary participation by the women. The study also deals with various risk factors for cervical cancer.

Keywords: Community Awareness; Cusco's Speculum; Dysplasia; Carcinoma in Situ.

Introduction

Cervical cancer is the fifth most common cancer, second most common cancer in the women

worldwide, third most common cancer in India, and commonest cancer amongst women in India. Cancer cervix does not arise de novo. It follows a sequence of epithelial cell abnormalities at the transitional zone of cervix. Epithelial abnormalities progress in stages as follows: atypical squamous cells → atypical squamous cells of undermined significance → low grade squamous cell intraepithelial lesion → mild dysplasia (CERVICAL INTRAEPITHELIAL

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NEOPLASIA) CIN-I → high grade squamous intraepithelial lesion'! moderate and severe dysplasia, (CARCINOMA IN SITU) CIS/CIN-II & III → squamous cell carcinoma. Infection with Human Papilloma Virus (HPV) in association with the risk factors is responsible for carcinoma cervix. It takes 10-12 years for CIN -III to progress to invasive cancer. Early stages can easily be detected by regular screening of women by PAP test at the community level and thereby reducing morbidity and mortality from the disease.

Aims

To find out the prevalence of cervical cancer in an urban slum area of Turbhe, Navi Mumbai.

Objectives

- To find out the prevalence of cervical cancer in Turbhe community .
- To Determine The Various Risk Factors For Cervical Cancer

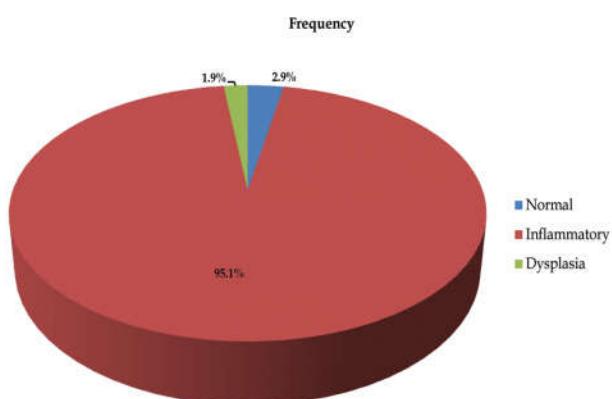
Study design and Methods

It was a cross sectional study conducted at Turbhe OPD. PAP smear screening of 103 parous, married women, more than 30 years of age, was conducted. Informed consent was taken and a pre-tested questionnaire was filled up before conducting the test. Pap smear was taken using Cusco's speculum and cotton swab stick by aseptic technique. Smears were fixed by ethyl alcohol and sent for cytological examination.

Study Period

From January 2013- to July 2015

Results

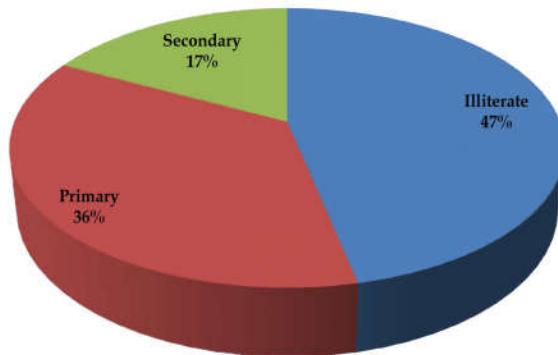


Graph 1: PAP Smear findings of participants

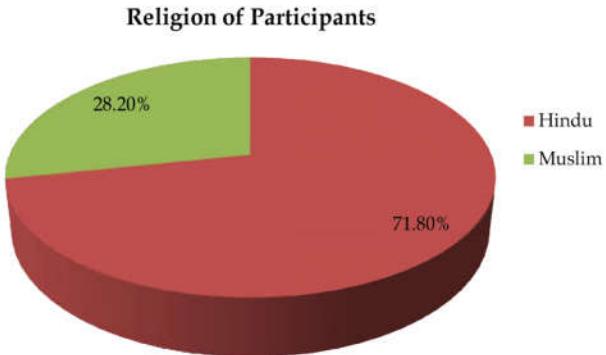
Table 1: Age group of participants

Age group	No. of Patients	Percentage
30 - 34	42	40.8
35 - 39	27	26.2
40 - 44	13	12.6
45 - 49	13	12.6
50 - 54	6	5.8
55 - 59	0	0.0
60+	2	1.9
Total	103	100.0

Education of Participants



Graph 2:



Graph 3

Table 3: Association between age at marriage of participants and their cytological findings

Age at marriage	Normal	Inflammatory	Dysplasia	Total(%)
<18	3	62	1	66(64%)
18-21	0	35	1	36(34.8%)
22+	0	1	0	1(0.9%)
Total	3	98	2	103

Chi square=1.922, P-value=0.750 Statistically not significant

Table 4: Association between parity of participants and cytological findings

Parity	Normal	Inflammatory	Dysplasia	Total (%)
1	0	1	0	1 (0.9%)
2	0	13	1	14 (13.6%)
3	1	27	0	28 (27.18%)
4+	2	57	1	60 (58.25%)
Total	3	98	2	103 (100%)

Chi square =3.067 P-value=0.800

Statistically not significant

Table 5: Association between age at first pregnancy of participants and cytological findings

Age	Normal	Inflammatory	Dysplasia	Total (%)
<18	2	11	0	13 (12.6%)
18-21	1	67	2	70 (67.9%)
22-25	0	17	0	17 (16.5%)
>25	0	3	0	3 (2.9%)
Total	3	98	2	103

Chi square =9.201 and P- value=0.163 Statistically not significant

Table 6: Association between presentation of participants at the time of screening and their cytological findings

Presentation	Normal	Inflammatory	Dysplasia	Total (%)
Symptomatic	1	79	2	82(79.6%)
Asymptomatic	2	19	0	21(20.3%)
Total	3	98	2	103

Chi square=4.531 P- value=0.104 Statistically not significant

Discussion

Though HPV is the causative agent for carcinoma cervix, only 1% of women infected with HPV develop the disease. It is the association of other risk factors with HPV infection that leads to development of Ca Cervix. It is a malignancy with long latent period. Disease progresses in stages from atypical squamous cell→squamous cell carcinoma. It takes about 10-12 years fo CIN-III to progress to invasive cancer. Early stages of intraepithelial changes can easily be detected by PAP smear and thereby Ca Cervix can be prevented.

Studies conducted by Jissa V Thulaseedharan et al revealed education is the fundamental factor among the sociodemographic determinant of cervical cancer. In our study 46.6% of the participants were illiterate which proves our community to be at high risk for Ca Cervix.

Early age at marriage is also a proven risk factor for carcinoma cervix. Studies conducted by Thakur et al revealed the same. In our study 64% of participants were married <18yrs of age which puts them at risk.

Multiparity is another risk factor for Ca Cervix. Studies conducted by M.Hinkula et al confirmed the same. 58.2% of our study population had parity >4.

Studies conducted by Jan Yasmeen et al , Satya B. Paul et al & Roopali Fotra et al revealed incidence of Ca Cervix is less in muslim women than in hindu women. It may be due to circumcision done in muslim males. Though not statistically significant,our study revealed dysplasia in 1.9% of participants all of them were hindus. 71.8% of our study population were hindus which again puts them at high risk.

In studies conducted by Manjit Singh Bal et al, symptomatic patients with complaints like vaginal discharge, post-coital bleeding, inter-menstrual

bleeding, dyspareunia & pain lower abdomen, epithelial abnormalities were found in 5% smears. In our study 1.9% of participants had dysplasia & 95.1% had inflammatory smear. Discrepancy with our study may be because we had both symptomatic and asymptomatic subjects. Another factor may be for use of cotton-swab sticks for taking the smears where epithelial cells get entangled thereby reducing sensitivity of the test.

88.23% of our total asymptomatic participants were having inflammatory lesion. Studies showed that Ca Cervix with symptoms had 5-yr survival rate 10% whereas early detection had survival rate 90%. This proves PAP screening was highly indicated for our study population.

Awareness about carcinoma cervix and specific knowledge on screening of Ca Cervix are critical elements in determining whether a women will volunteer for PAP test. Studies conducted by Robin Marie Beining et al revealed 69.6% of women were not aware of cervical cancer and 16.4% were aware. In our study 2% of women knew about Ca Cervix and none of them knew about the risk factors of Ca Cervix. During the study period we observed more women volunteered for PAP screening towards the end of our study period than before. Studies have shown less knowledge about screening significantly predicted underutilization of PAP test facility.

In our study association of multiple sexual partners with Ca Cervix could not be elicited. At the community level it was not possible to elicit information on the number of sexual partners as it is a sensitive and personal issue.

A sample size was small in this centre based study, so the results obtained were not statistically significant. It is proposed to conduct large sample sized study in the community.

References

1. A population based study on the risk of cervical cancer and cervical intraepithelial neoplasm among grand multipara women in Finland- M Hinkula, E Pukkda , P Kyynohea, P Leukkahea, P Koskela, J Pavoner, M Lehtiner- British Journal of Cancer, 2004, Mar. 8; 90(5): 1025-29.
 2. Community based screening of cervical cancer in a low prevalence area of India-a cross sectional study ,Jae Lasmear, MariyabAmin Qureshi, Nazmi Arshad Manzoor,Wali Asiya, Sheikh Zahoor Ahmed- Asian Pacific J. Cancer Prevalence. 2010; vol.11.
 3. Cervical cancer screening - current knowledge and practices women in a rural population of kerela, India - Aswathy S, Mariya Amin Qureshi, Betrsa Kewrian Leelanaik- Department of cOMmunity Medicine,Amrita institute of medical sciences, amrita vishwa vidyapeeth, kochin, India- Indian J . Medical Research. August 2012; 136: 205-210.
 4. Manjit Singh Bal, Rishu Goyal, Anil Kumar Suri, Manjit Kawmohan. Detection of abnormal cervical cytology in papanicolar smear, Journal of Cytology.
 5. Sociodemographic and reproductive risk factors for cervical cancer – a large prospective cohort study from rural India -Thalaseedharan JissaV, Malila, Nea, Hakama, Hatti, Sankarnarayan Rangaswami- Asian Pacific Journal of Cancer Prevention. 2012; 13(6): 2991-95.
 6. Screening for cervical cancer – an exploratory study of urban women in Tamil Nadu, India- Robin Marie Beining, an abstract may 2012.
 7. Socio-demographic risk factors for cervical cancer in Jammu region of J&K state of India- Roopali Fotra, Shashi Gupta, Shubhash Gupta- Indian JourNAL OF Scientific Research. 2014; 9(11): 105-110.
 8. Studies on epidemiology of cervical cancer in Southern Assam - Sathya B Paul, Basant K Tiwary, Arun Paul Choudhary- Assam University Journal of Science & Technology, Biological and Environmental Sciences. 2011; 7(1): 36-42.
 9. Thakur A, Gupta B, Gupta A, Chauhan R, - risk factors for cancer cervix among rural women of a hilly state- a case control study- Indian Journal of Public Health-2015.
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Management of Non-Communicable Diseases Using Hand held Mobile Phone

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Abstract

Mobile is poised to play a significant role in healthcare...

In contrast to healthcare access, mobile access is becoming almost ubiquitous worldwide. Almost all developed markets already have mobile penetration greater than 100%. Mobile penetrations in Africa, Asia-Pacific and Latin America are also expected to increase to 82%, 98% and 119% respectively in 2014. Also, the increasing penetration of smartphones as well as the 3G and 4G networks will provide a significant boost to the use of the mobile platform for providing healthcare services.

Thus, the feasibility of mobile devices supporting healthcare is greater than ever before. Mobile health - the use of mobile communication and devices for providing healthcare services or achieving health outcomes - stands at a significant inflection point.

In India we have 900 million mobile phone users. Almost every family has one mobile set and hence tremendous potential to reach out in the remote area. The people are fairly well conversant with the use of mobile phone for call and messaging. The smart phone too is becoming popular. The IT enabled health related Mother and Child tracking system (MCTS) is one such example. The government is keen to expand these initiatives into other areas of health care delivery.

With the phenomenal growth of mobile network and mobile users the opportunities for its application in engaging the families in managing Non- Communicable diseases is immense.

Keywords: Smart Phone; Health Kiosk; Diabetes Patient; Axillary Nurse; Specialist Doctor.

Introduction

We are witness to bounty (1,2) in food/milk/meat/fish/vegetables/ fruits all because of high technology. Similarly countries are preparing deficit budget, print paper money and promote welfare economics. Then there are human rights advocates championing equity. Perhaps these changes have touched most of

the countries. There are some rich people so also poor people-unequal distribution of money, materials and means. For this inequality of distribution whom are we to blame? Blame the government/blame the policy/ blame the procedure/culture? In any case demographical/epidemiological transitions are occurring, epidemics of infectious diseases are thing of the past, people are living longer, manual work is more and more replaced by machines, markets are filled with ready to eat energy rich food, people eat, not because they are hungry but due to aroma of food and its vicarious taste resultant is NCDs(3)(Non Communicable Diseases). The revenue generated by sale of tobacco/ alcohol can sustain the government.

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Beside the robust media advertisement drives people to insatiable desires compounding the situation.

The current situation of wide spread T2D (Type 2 diabetes) 70 million people, COPD (Chronic respiratory obstructive disease) (22 millions), cardiovascular diseases (30 millions), stroke, cancers, substance abuse (270 millions), depression, aberrant sexual behavior...etc., account for 53% deaths and 44% DALYs lost. Unlike the infectious diseases, NCDs can't be managed by vaccines, slow in their onset, need visit to doctors, medications, out of pocket expenditure, no credible health insurance make the scenario a complex condition to handle. Our health care system has shown no matching transition to respond to rising NCDs besides providing just acute emergency care. The referral system is rudimentary with heterogeneous providers, wide variations in availability, quality and accessibility .There is no system in place to emphasize prevention, risk factor reduction, early detection and evidence based approach in management of NCDs. The patients do visit the health care providers, the records are disjointed, fragmentary and lack credibility.

ICT (Information Communication Technology)

Have a look at the -Banks -money transactions from any bank to any other bank with in a fraction of a second. Travel agency- you can buy travel tickets from any place to any other place. If you have GPS system positioned in your vehicle think of the ease and comfort in the travel. This technology is widely used in agriculture/Poultry/Farm/Dairy industry. Perhaps you have heard of "Integrated cattle health monitoring system using wearable sensors" [4].

Hence we are championing "*Digitalization of community data and creation of Data base*". Information and Communication Technology has made it possible to analyze the data, understand the health needs of the community, *engage the community through periodical text messages/SMS*, so that one can:-

Focus on an individual, build on his/her sensibility to identify early symptoms of the ill health, adopt self-care as near to his house as possible with available community resources.

Stakeholders

- General Physician Doctor at Primary Health Centre at Village Level. Specialized Doctors (Endocrinologists/Diabetologists/MD) at Community Health Centre (Town Level) and at District Government Hospital (City Level). Public

Healthcare Worker (Primary/Community) at Village level, Type-2 Diabetic Patient, Pre-diabetic Patient, Family of Type-2 Diabetic patient, Rural populace which is susceptible to Type-2 Diabetes

Surroundings (To Describe the Surroundings Premise for this Project we have Considered a not so Prosperous and not So Down Trodden Village Scenario)

- Most houses made of bricks and baked tiles. Few houses made of mud bricks and thatched roofs. Various economical background families. Majority belong to low income group. Few belong to middle income group. Very few belong to rich class. Major occupation is small time farming and daily laborers. Few villagers are small store owners of items like grocery, vegetables & fruits, tea stall, snacks stall, small restaurant, phone booth. etc. Most common family size is 6 members (adult couple, grandparents, 2 children). Families with 10 members and 3 members are on the extreme of the scale. There is a social order based on caste system with Scheduled Tribes and Scheduled Castes (ST & SC) being at the bottom of the caste ladder. Other Backward Castes (OBC) come above them. The Brahmins occupy the top spot in the caste hierarchy. There are many temples and shrines in the village. Many are dedicated to the local protecting God and few to the commonly worshipped Gods like Shiva, Vishnu, Durga. etc., There is one mosque in the village. The population of the village is 3000. Many families in the village possess a TV set and a cable connection.
- Most of the families have one mobile phone per household (basic handset). Few families have multiple mobile phones per household and very few even have smart-phones. Families with girl child are tensed about saving money for the daughter's marriage and finding the right match. The concept of saving money for health-care is mostly absent. There is no presence of any health insurance.

The only available facility for health-care at village level is the Primary Healthcare Centre (PHC) located a few kilometers from the village (which serves 3 villages). A General Physician is supposed to be available at the PHC all the time. But, sometimes a pharmacist or healthcare worker diagnose and provide basic medication to the patients. Few basic tests are done at the PHC. There is no blood sugar or any other diabetes related test done at the PHC. A part from basic medication and vaccines, specialized medicines for Tuberculosis and Malaria are available

at the PHC. But no medication for type-2 diabetes patients is available at the PHC (NO metformin, NO insulin vials), even if available always run short of stock.

Figures and Facts

Prevalence of Diabetes in the World

The world prevalence of diabetes among adults (aged 20-79 years) is 6.4%, affecting 285 million adults, in 2010, and will increase to 7.7%, and 439 million adults by 2030.

Between 2010 and 2030, there will be a 69% increase in numbers of adults with diabetes in developing countries and a 20% increase in developed countries.

Indian Scenario

According to the International Diabetes Federation, 61.3 million people in India had diabetes in 2011. That figure is projected to rise to 101.2 million by 2030. IDF data reveal that India has more diabetes than the

United States. In fact, India is ranked second in the world in diabetes prevalence, just behind China.

The sanofi-aventis India SITE study (Screening India's Twin Epidemic), rolled out during 2009/2010, was a cross-sectional epidemiological study of 16,000 patients from 800 centers in Maharashtra, New Delhi, Tamil Nadu, Andhra Pradesh, West Bengal, Karnataka, Gujarat, and Madhya Pradesh. About 60 percent of the surveyed population suffered from diabetes, hypertension, or both, and 70 percent of the patients had uncontrolled diabetes.

Currently there are 23,109 Primary Health Centres (PHC) in India. (Source: Data.Gov.in Site)

Compliance or adherence problems are common in diabetes management. Many factors are potentially related to these problems, including demographic, psychological, social, health care provider and medical system, and disease-and treatment-related factors. The findings from the recently published Cross-National Diabetes Attitudes, Wishes, and Needs (DAWN) Study showed the following:

Patients	type 1 diabetes	type 2 diabetes
patient-reported adherence rates for medication	83%	78%,
SMBG adherence was	70%	64%,
appointment keeping adherence	71%	72%,
The adherence rates observed for diet	39%	37%,
exercise they were	37%	35%,

Providers reported significantly better adherence for type 1 than for type 2 diabetic patients across most regimen domains.

Review of Existing Solutions to Solve this Problem

- Video Conferencing Facility at Belgaum, Karnataka - One of the Primary Healthcare Centre (PHC) at Belgaum in Karnataka, India has one primary Doctor there to treat patients. This is supported by a video conferencing facility to help the patients. The video conferencing facility is situated around 10 km away from the PHC in a medical college and has surgeons and specialized Doctors to provide additional assistance through video conferencing to the PHC. (Source: Discussion with Dr Mohan, a team member, who is involved with the initiative)
- The health care providers - Government/Non Government/others are there but access is a problem and costly. Recently a mhealth solution in the form of "Arogyavani" has been started in Karnataka, India, by the Government. Anyone can dial toll free number 104 and get access to talk to doctors, who listen to them, counsel them and suggest remedy 24*7*365. A similar service for Emergency care, toll free number 108 has been working successfully for last few years. <http://kshsrc.org/arogyavani/>
- Dimagi (<http://www.dimagi.com/>) They deliver open and innovative technology to help underserved communities everywhere in the world. They have taken major initiatives in India in the mhealth space. Some mhealth initiatives by Dimagi:
- CommCare (<http://www.commcarehq.org/home/>) is a turnkey solution for community health and extension workers that provides case management, data collection, and data management. It provides job aid for community health workers (CHWs). It is a free and open-source software application with mobile and cloud infrastructure. It acts as a tool for supervision and evidence-based change. It provides way to capture data in an electronic repository that otherwise sits in thousands of

- paper notebooks.
- CommConnect is a solution for building SMS applications allowing for two-way messaging, conditional reminders, surveys and broadcast messages. It can be used on its own, or integrated into a CommCare application. It is a turnkey platform for building messaging applications (SMS and IVR). It allows the user to send conditional reminders and two-way surveys to clients. It also allows users to send broadcast communication or do large scale surveys. It integrates with information collected using CommCare.
 - CommTrack is a tool for mobile logistics and supply chain management. It supports mobile workers for better stock tracking, requisition planning, and delivery acknowledgement using either SMS or a CommCare application. Through the use of mobile technology, CommTrack supports health workers and other mobile agents who manage commodities in low-resource settings. It has been proven at scale, through real-world deployments, to provide reliable, real-time, and actionable information to improve the performance of new and existing supply chains. CommTrack is integrated seamlessly with Dimagi's suite of industry-leading tools for empowering the mobile workforce.
 - Teledoc Program in India TeleDoc uses leading-edge communications technology to bring high-quality healthcare and health related information directly to rural villages. Local healthcare personnel can enter disease symptoms and patient information into the database over the widely-available GPRS network. Doctors retrieve that information at an IT-enabled central clinic, where they input diagnoses, prescriptions and treatment for retrieval by the local personal. TeleDoc is a low-cost, highly effective and broadly applicable networking solution. TeleDoc uses Java-enabled mobile phones to connect village-based healthcare workers with doctors in urban areas for remote diagnosis and treatment. <http://www.wsis-award.org/winner/teledoc-59620100625>, <http://healthmarketinnovations.org/program/teledoc>
 - Digital Inclusion Kit in health and Higher Education (DIKHAE) Researchers at the University of Buenos Aires are developing a system that collects data from portable medical diagnostic equipment and transmits it wirelessly to a database that is instantly available to medical specialists in other locations. this technology can help bring preventive healthcare to many people who currently have little or no access to it, thereby allowing them to address risk factors before they develop an acute condition. The main goal of the project is to provide a fast way of communications between physicians and patients in underserved zones, both rural and urban, using mobile technology. <http://research.microsoft.com/en-us/collaboration/papers/buenosaires.pdf>
 - Integrated Healthcare Information Services through Mobile telephony in Botswana University of Botswana researchers are developing an Internet based healthcare information service that can process text message queries from cell phone users and deliver relevant information about how to self-manage chronic health conditions such as HIV/AIDS. The service will also allow health workers to look up patient records and monitor follow-up care between treatment and lower healthcare costs. <http://research.microsoft.com/en-us/collaboration/papers/botswana.pdf>, <http://healthmarketinnovations.org/program/integrated-healthcare-information-service-through-mobile-telephony-ihism>
 - BlaBla Doctor, Blabla Doctor is a health based social networking site that helps people suffering from a variety of health conditions, including Breast Cancer, to globally connect, help and share information with others in similar situations, by focusing on bridging the gap of patient-to-patient communication, and patient-to-practitioner, with all the social networking features and functionality expected in today's society. With BlablaDoctor community support; real people in similar situations come together, to circumvent negative feelings like disconnection and loneliness, and focus on improving self-esteem, understanding, communication, relationships, and peer support. <http://www.blabladocor.com/>
 - Robust and Low-Cost Networking for Rural Kiosks, The KioskNet project is designing an innovative and low-cost computer kiosk system for developing countries that is reliable, easy to deploy and operate, and equipped with advanced security protections. The system will allow kiosks to exchange large amounts of data with the Internet without the need for dial-up, cable or satellite connections. <http://research.microsoft.com/en-us/collaboration/papers/waterloo.pdf>
 - Portable Diagnostic Device, This low-cost portable diagnostic system will monitor vital health parameters, record them in a database and send the data directly to a remote doctor's mobile

phone. the system will collect ECG and pulse-oximetry data, with additional parameters such as diabetes monitoring to be added in future versions. <http://research.microsoft.com/en-us/collaboration/papers/hyderabad.pdf>

- Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WelTel Kenya1), Mobile (cell) phone communication has been suggested as a method to improve delivery of health services. However, data on the effects of mobile health technology on patient outcomes in resource-limited settings are limited. We aimed to assess whether mobile phone communication between health-care workers and patients starting antiretroviral therapy in Kenya improved drug adherence and suppression of plasma HIV-1 RNA load. Patients who received SMS support had significantly improved ART adherence and rates of viral suppression compared with the control individuals. Mobile phones might be effective tools to improve patient outcome in resource-limited settings. [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(10\)61997-6/abstract](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)61997-6/abstract).
- Mobile Health: The potential of mobile telephony to bring health care to the majority. <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=1861959>
- SMS for Life: Tanzania Pilot Project, With around 11 million malaria cases annually it is vital that we have enough stocks of effective malaria treatments in all our health facilities, at all times, especially at the district level. It's simple. If there are no malaria treatments, someone will die. It is very likely to be a child. Reducing the frequency of local health facilities running out of ACT stocks (stock-outs) saves lives. The SMS for Life pilot project, designed to address this challenge, has been tried and tested in three districts of the country and, based on the results presented in this report, has showed remarkable success in keeping health facilities in those districts almost fully supplied with malaria treatments. The benefits for our health systems are potentially far reaching. Not only do we have the makings of a national stock management approach that can improve the availability of, and access to, lifesaving malaria drugs across the country, but we also have the possibility to apply this stock management approach to other essential health commodities. <http://www.rollbackmalaria.org/docs/SMSdetailReport.pdf>
- MiDoctor (MyDoctor) automatically monitors

individuals with chronic diseases and promotes self-care by providing a timely diagnosis, automated calls, and continual reminders via text messaging (SMS). This system ensures the continuity of care and reduces the morbidity and costs associated with care. <http://ehs.cl/en/solutions/continuous-monitoring/>

Materials and Method

Populations across the world are at the risk of lifestyle diseases- Diabetes, Cancer, Hypertension, Heart attack..etc People have access to Mobile phone...if they are able to seek help...anytime.....can the Doctor located remotely respond?Yes, it is Possible :First: Create a database of all the users. and give user id. Second: People contact through Mobile set regarding health problem. Third: Interphase with Doctors. Fourth: Suggested intervention Fifth: May use diagnostic devices- ECG/ Blood sugar/ O2/X-Ray/ CT. In this effort the Community, Community Health Workers, Doctors, communicate through mobile for their health care needs.

We have thought of Spice M9000 Mobile (mobile handset with projector) useful and affordable for our purpose. It can be bit a more comprehensive unit: Mobile handset with Diagnostic mode which is wirelessly connected with diagnostic devices like ECG/ X-Ray/ CT/ Glucometer/ Oximeter, so that patient symptoms plus comprehensive diagnosis can be made by Doctors and useful interventions provided.

Discussion

The PHC has a General Physician Doctor, Primary/Community Healthcare Workers and ASHA workers who work to provide basic medical care to the village population. Villagers come to the PHC for medical treatment. Healthcare Workers visit villagers homes to collect basic health and medical data. There is a tie up with a Medical University which is 10 km from the PHC. The Medical University currently supports a video conferencing facility between the patients at the PHC and the Specialized Doctors at the Medical University Hospital.

The solution proposes having a full- fledged 'Health Kiosk' at the PHC. The health kiosk will act as a focal point of the service model. Along with the existing video conferencing facility the proposed health kiosk will have many more features to provide

a comprehensive care. We plan to sync wireless/remote diagnostic devices with the health kiosk.

The healthcare workers will be provided with a smartphone with a projector.

Most of the villagers already have a basic mobile handset, one basic mobile handset per family.

There are Specialized Doctors available at the Medical University Hospital situated at 10 km from the PHC.

Service Model

Details

Health Kiosk Features

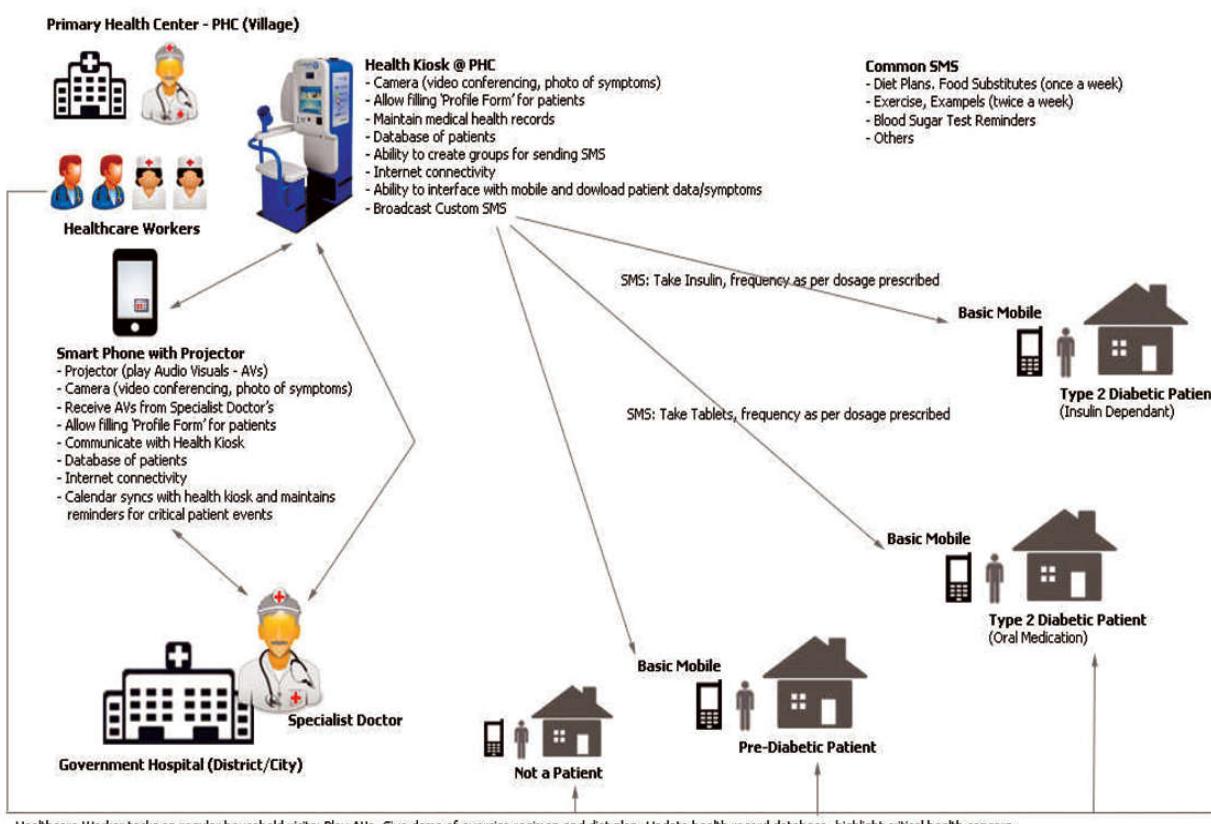
Patient friendly, ability to do demonstration for nutrition and health education, Facility to do Blood Sugar Test Ability to sync data with remote/wireless diagnostic devices, Video conferencing facility, Capture symptoms as photographs, Maintain medical health records (also known as personal health records), Maintain database of patients, Ability to create groups from patient records and send custom SMS, Internet connectivity, Ability to sync patient data with Mobile phone and remote diagnostic devices.

Smart Phone with Projector Features

Projector with ability to project Audio Visuals (AVs), Camera for video conferencing, taking photo of symptoms, Ability to fill in profile form for patients, Ability to update medical health records, Ability to receive AVs from Specialized Doctor at University Medical Hospital, Internet connectivity, Ability to sync patient data with the Health Kiosk at the PHC, Phone Calendar syncs with health kiosk and maintains reminders for critical patient events.

Broadcast SMS Details

Common SMS to be sent to all types of diabetes patients: Diet Plans, Food Substitutes, Exercises, Blood Sugar Test Reminders, Tip of the day for healthy living with diabetes, others, Customized SMS to be sent to various groups of diabetic patients (insulin dependant, oral medication, dependant, pre-diabetic) like reminders for medication adherence. Frequency of SMS is dependant on the criticality and occurrence of the events. If unusually large number is detected for certain disease, for example communicable disease like malaria and dengue, we will leverage this setup to send a general precaution and awareness SMS to all the people in the village.





Details of the Role of Healthcare Worker

Collect demographic data, family history, contact information and feed it in the smart phone, Reinforce health messages during regular visits, Health promotion by nutrition advice, Promote early detection in obese/ patient relatives/hypertension patients, Facilitate the usage of health kiosk at the PHC, Project AVs in the villagers homes during regular visits, Act on the calendar reminders on critical patient events. For example: If a patient has an average blood sugar level of 350 (considered very high) and based on this a calendar reminder is pops up in the phone of the health care worker that it is time for the regular blood sugar test for this patient, then the healthcare worker should call the patient's mobile number and remind to come for blood sugar test and in event that patient doesn't turn up, go to their house and do the blood sugar test there.

Details of the Role of Specialized Doctor at University Medical Hospital

Protocols/ Procedures for Detection/ Diagnosis/ Treatment of Diabetes, Referral advice during complication, Inpatient care, Surgery, Expert advice during Video Conferencing, Create and send AVs to the healthcare workers smartphones regularly, Help identify trends/ patterns through patients medical health records and help Doctor at PHC.

Details of the Role of Doctor at Primary Health Centre

Case detection - early detection, suspect diabetes in relation to obesity/ unusual weight gain during pregnancy/ excessive hunger, thirst, loss of weight/ hypertension/ patient relative Diagnosis, treatment regimen, guidelines, Consult Specialized Doctor during complications through video conferencing, Facilitate the usage of the health kiosk, Help form the customized SMS which needs to be sent to various patient groups.

Conclusion

The mobile technology has expanded considerably and people are equally familiar with its use. The commercial sectors like railways, banks, business enterprises have already applied this technology. Even in health care attempts are being made, example (*MCTS*) to track pregnant women in our country. Our frontline health care workers are smart and any attempt made to strengthen their hands can certainly increase the outreach of quality health care especially for Non Communicable diseases.

Limitations

The information Technology is a very complex science. We can get the software necessary for our use but works out costly and takes some time to develop. There are existing softwares readily available and are affordable. However we should be able to bear with risks if any while we use this newer technology. Hence many policy and decision makers prefer to wait and watch for some time till the situation reaches a tipping point. Perhaps the doctors of present generation are fully conversant with computer use while the older age are not so familiar and it is these older age group who decide policy matters!!! Hence projects may get stuck up.

Recommendation

Given the present scenario and the need of the community for smart health care facility we strongly recommend the use of Mobile technology in Health Care. It is safe, secure and smart for contemporary use.

Disclaimer

The authors have their individual significant, contribution in the article; have no conflicts, no competition or contradictory interests. Dr. Sunkad initiated the study, Ms. Shilpa collected the details of families in communities and Dr. Javali did the critical review. All the authors read and approved the final manuscript.

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References

1. PerPinstrup-Andersen Peter B., R..HazellThe impact of the green revolution and prospects for the futureFood Reviews International. 1985; 1(1): 1-25.
2. John Beddington Food security: contributions from science to a new and Published 24 November 2009.DOI: 10.1098/rstb.2009.0201.
3. Kalpa Sharma.Burden of non communicable diseases in India: Setting priority for actionREVIEW ARTICLEInt J Med Sci Public Health. 2013; 2(1): 7-11doi: 10.5455/ijmsph.2013.2.7-11.
4. AnselemeiB.Lukonge 1, Dr. ShubiKaijage 2, Ramadhani S. Sinde 3. Review of cattle monitoring system using wireless network International Journal Of Engineering And Computer Science ISSN:2319-7242. May 2014; 3(5): 5819-5822.

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Wandering Pace Maker in Dengue Fever

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Abstract

Dengue is one of the most important emerging viral diseases globally. The majority of infections follow a relatively benign disease course. However, a small proportion of patients develop severe clinical manifestations, including bleeding, organ impairment, and endothelial dysfunction, eventually cardiovascular collapse. Evidence is increasing that dengue can also cause myocardial impairment, arrhythmias and, occasionally, fulminant myocarditis. We report a case of a young male patient who presented as a prototype case of dengue myocarditis, except for an extremely rare occurrence of a wandering pacemaker which was detected on a routine ECG. This case emphasizes the importance to keep a trained & vigilant eye, even in the face of what appears routine.

Keywords: Wandering Pace Maker; Dengue; Dengue Haemorrhagic Fever; Dengue Shock Syndrome.

Introduction

Dengue, an arboviral disease caused by a flavivirus is transmitted by the *Aëdesaegypti* mosquito [1]. Dengue virus has four antigenically distinct serotypes (DEN 1, DEN 2, DEN 3, and DEN 4). Dengue may remain asymptomatic or manifest as undifferentiated fever (or viral syndromes), dengue fever, dengue shock syndrome (DSS), or dengue hemorrhagic fever (DHF).

An increasing number of cases of dengue are being reported with atypical presentations as frequent epidemics are occurring. As awareness of this disease is increasing, rare manifestations are also being reported.

Case Report

A 24 year-old previously healthy male presented to the Emergency Department with the history of fever with chills, diffuse abdominal pain since 5 days and of haematuria since 1 day. He had a axillary temperature of 100 F, blood pressure of 86/60 mmHg,

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respiratory rate of 20/min and Pulse rate of 46/min. Central nervous system, Respiratory and Cardiovascular system examination was normal. Abdominal examination revealed diffuse tenderness. There was mild free fluid in the abdominal cavity. Laboratory investigation like hemogram revealed anHemoglobin of 12 gm%, TLC 8400/mm³ and platelet count 9,000/mm³. His urea was 30mg/dL and creatinine of 1.03 mg/dL, serum Sodium was 138mmol/L, and liver function tests were normal. In

view of recent outbreak of dengue and leptospirosis in our area, serology for dengue, leptospira and malaria was sent. His Dengue serology for IgM and IgG turned out to be positive but serology for leptospira and malaria were negative. Ultrasound of the abdomen revealed minimal pleural effusion and minimal ascites and distended gall bladder. ECG was taken it showed wandering pacemaker. Echocardiography was done it showed no regional wall motion abnormality with normal ventricular function.

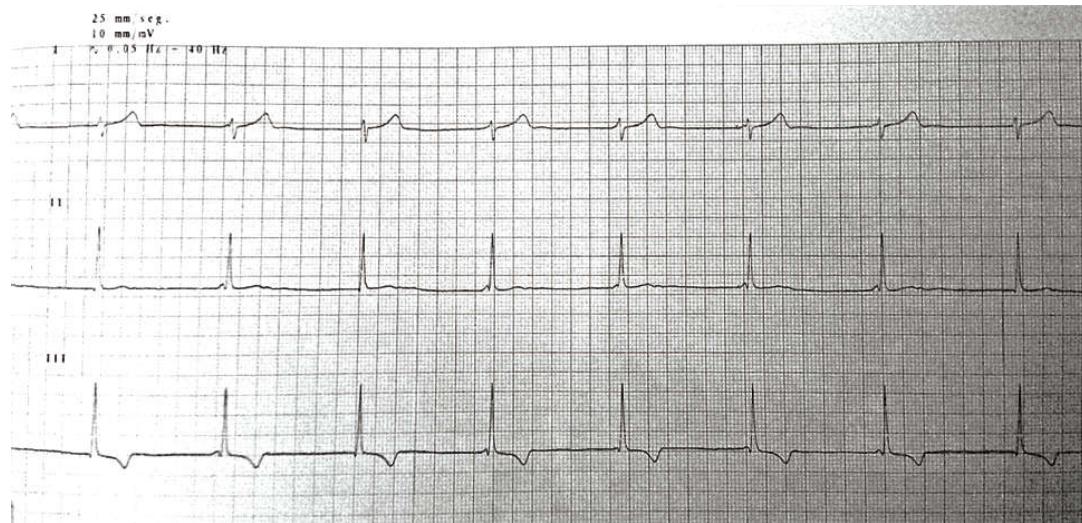


Fig. 1: ECG showing wandering pace maker with changing P wave morphology

The patient was fluid resuscitated and shifted to intensive care unit where he was symptomatically managed with IV fluids, antiemetics, platelet transfusion and close monitoring. There were no bleeding episodes, he maintained good urine output during the hospital stay. In view of significant thrombocytopenia, he received total of 6 units of platelet rich plasma (PRP). His general condition gradually improved with improvement of platelet count. ECG was repeated daily, on the 4th day ECG was reverted to normal sinus rhythm with heart rate of 70 and blood pressure of 120/70 mm of Hg. Patient got discharged after one week of admission.

Discussion

Dengue infections are caused by a flavivirus which has four serotypes (DEN 1-4). It is the commonest arbovirus and a common cause of haemorrhagic fever in the world.

The clinical presentation of the disease ranges from simple undifferentiated viral fever to Dengue Haemorrhagic fever and Dengue Shock Syndrome.

The clinical manifestations of cardiac complications in dengue illness vary considerably. At one end of the clinical spectrum, patients are asymptomatic or have mild cardiac symptoms despite relative bradycardia, transient atrioventricular block, and/or ventricular arrhythmia [2,3,4]. At the other severe end, patients may experience acute pulmonary edema and/or cardiogenic shock due to severe myocardial cell damage with left ventricular failure.

A wandering atrial pacemaker, (WAP), is an atrial arrhythmia that occurs when the natural cardiac pacemaker site shifts between the sinoatrial node (SA node), the atria, and/or the atrioventricular node (AV node). This shifting of the pacemaker from the SA node to adjacent tissues is identifiable on ECG Lead II by morphological changes in the P-wave; sinus beats have smooth upright P waves, while atrial beats have flattened, notched, or diphasic P-waves. It is often seen in the very young, very old, in athletes and rarely causes symptoms or requires treatment. Wandering pacemaker is usually caused by varying vagal tone. With increased vagal tone the SA Node slows, allowing a pacemaker in the atria or AV Nodal area, which may briefly become slightly

faster. After vagal tone decreases, the SA Node assumes its natural pace.

Wandering atrial pacemaker in dengue fever not clearly understood. Dengue fever may result either from direct DEN invasion of the cardiac muscles or a cytokine-mediated immunological response, or both. The upsurge in serum tumor necrosis factor-a, interleukins 6, 13 and 18, and cytotoxic factors in patients with dengue illness lead to increased vascular permeability and shock leading to increased vagal tone leading to shifting of the pacemaker from the SA node to adjacent tissues [5,6].

Here we report a rare case of wandering pace maker in as a rare confounding association in dengue infection mimicking dengue shock syndrome (DSS).

Conclusion

Our case report shows that cardiac complications are not uncommon in dengue illness. Although it was a self-limiting presentation in our patient, we report a rare case of wandering pace maker as an extremely rare confounding association in dengue infection.

References

1. Gibbons RV, Vaughn DW. Dengue: an escalating problem. *BMJ*. 2002; 324: 1563-6.
2. Ravindral S, Kanagasingham A, Neomali A, Amerasena, Udittha B, DeshuVS. Asymptomatic myocardial involvement in acute dengue virus infection in a cohort of adult Sri Lankans admitted to a tertiary referral centre. *Br J Cardiol*. 2007; 14: 171-3.
3. Kularatne SA, Pathirage MM, Kumarasiri PV, Gunasena S, Mahindawarne SI. Cardiac complications of a dengue fever outbreak in Sri Lanka, 2005. *Trans R Soc Trop Med Hyg*. 2007; 101: 804-8.
4. Wali JP, Biswas A, Chandra S, Malhotra A, Aggarwal P, Handa R, et al. Cardiac involvement in dengue haemorrhagic fever. *Int J Cardiol*. 1998; 64: 31-6.
5. Hoher D, Poli L, Roblin B, Gestas P, Chungue E, Granic G, et al. Serum levels of tumor necrosis factor-alpha (TNF-alpha), interleukin-6 (IL-6), and interleukin-1 beta (IL-1 beta) in dengue-infected patients. *Am J Trop Med Hyg*. 1993; 48: 324-31.
6. Hoher D, Delannoy AS, Benyoucef S, De Groote D, Wattre' P. High levels of sTNFR p75 and TNF alpha in dengue-infected patients. *Microbiol Immunol*. 1996; 40: 569-73.

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Exercise Therapy in Prevention and Treatment of Postmenopausal Osteoporosis: An Update

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Abstract

This short communication was aimed to enumerate the evidence for exercise therapy in preventing and treating postmenopausal osteoporosis from a preliminary search of PubMed. There were two systematic reviews, seven clinical trials and one narrative review emphasizing the role of exercise training in prevention and treatment of women with postmenopausal osteoporosis. There is moderate evidence for efficacy of weight-bearing and aerobic exercises for improving muscular strength, coordination, and balance and decreasing risk for falling and subsequent fractures in women with postmenopausal osteoporosis.

Keywords: Preventive Rehabilitation; Preventive Exercises; Bone Mineral Density; Osteoporosis.

This short communication was aimed to enumerate the evidence for exercise therapy in preventing and treating postmenopausal osteoporosis from a preliminary search of PubMed.

Systematic Reviews

The first Cochrane systematic review by Bonaiutiet al [1] reviewed 18 randomized controlled trials with a mean methodological quality score of 2.53, which reported efficacy of aerobics, weight bearing and resistance exercises for improving spine BMD, with walking improving spine and hip BMD whereas aerobic exercise improved wrist BMD.

The second Cochrane systematic review was an

update of the earlier review, performed by Howe et al [2] which identified 27 new RCTs with 4320 participants; and found that the most effective type of exercise intervention on bone mineral density (BMD) for the neck of femur appears to be non-weight bearing high force exercise such as progressive resistance strength training for the lower limbs; and the most effective intervention for BMD at the spine was combination exercise programmes. Exercise was concluded to have the potential to be a safe and effective way to avert bone loss in postmenopausal women.

Clinical Trials

Prince et al [3] studied the effects of three approaches (41 received exercises; 39 received exercises plus dietary calcium supplementation; and, 40 received exercises plus continuous replacement of estrogen and progesterone hormone-replacement therapy) in the prevention of osteoporosis in 120 postmenopausal women with low bone density.

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Whilst the control and exercise alone groups had bone loss, the exercise-calcium group had lower bone loss, and exercise-estrogen group had higher bone density in forearm compared to the other groups. Their findings suggested that bone loss can be slowed or prevented by exercise plus calcium supplementation or estrogen-progesterone replacement, the former was also associated with more side effects.

Kemmleret al [4] studied the effect of a 2-year vigorous, combined high-impact, strength, and endurance training program on bone mineral density (BMD) determined by dual-energy x-ray absorptiometry (DXA), quantitative computed tomography (QCT), and ultrasound in 90 early postmenopausal women with osteopenia who were given 14 months of exercise training, with 2 joint sessions and 2 additional home training sessions. The exercise group had improvements in lumbar spine BMD, maximum isometric strength (grip strength, trunk flexors and extensors, hip flexors, leg adductors and abductors, arm flexors and extensors), and VO_{2max}, than the control group.

Kemmleret al [5] determined the effects of intense exercise on physical fitness, bone mineral density (BMD), back pain, and blood lipids in 50 early postmenopausal women who exercised over 26 months (exercise group [EG]), and 33 women who served as a non-training control group (CG). Physical fitness (isometric strength: trunk extensors, trunk flexors and maxi, max oxygen consumption); BMD (lumbar spine, QCT L1-L3 trabecular region of interest, QCT L1-L3 cortical region of interest, and total hip); serum levels (total cholesterol, and triglycerides); and pain indexes at the spine improved in EG at 26 months follow-up.

Mayoux-Benhamouet al [6] conducted a 18-month prospective study to assess the long-term compliance and its determinants for an osteoporosis prevention exercise program in 135 postmenopausal women who participated in an educational session added to usual medical care. 17.8% practised exercises at a rate greater than 50% of prescribed dosage. Lack of motivation was the main reason for withdrawal from program. The predictor variables for compliance were contraindication for hormone replacement therapy, and general physical function scores from an SF-36 questionnaire, and osteoporosis risk, defined as a femoral T-score < or = -2.5, predicted compliance.

Kemmleret al [7] determined the impact of multipurpose exercise training on bone, body composition, blood lipids, physical fitness, and menopausal symptoms in 48 early postmenopausal women with osteopenia. After 38 months, significant

differences between EG and CG were observed for the BMD at the lumbar spine and the femoral neck, body composition (waist circumference, waist-to-hip ratio), blood lipids (total cholesterol, triglycerides), and menopausal symptoms (insomnia, migraines, mood changes). Maximal isometric strength and one repetition maximum and VO_{2max} increased significantly in the EG.

Teixeira et al [8] studied the effect of 18-week progressive muscular strength and proprioception training program on the muscle strength of the quadriceps, balance, quality of life, and prevention of falls in 100 postmenopausal women with osteoporosis who were randomized into two groups: the intervention group comprised of 50 patients who underwent a 18-week of progressive load training for the quadriceps muscle (50% up to 80% of 1-RM-one maximum repetition) and proprioception training associated to a drug treatment of osteoporosis and the control group that included 50 patients who only underwent a drug treatment of osteoporosis. The exercise program improved the SF-36 in the eight subscales, Timed Up & Go Test, 1-RM test, Berg Balance Scale, and also a decrease in the number of falls in the intervention group compared to control group.

Kemmleret al [9] studied supervised long-term exercise (EG) training on "overall" fracture incidence and bone mineral density (BMD) in 65 postmenopausal osteopenic women.

Exercisers performed in two group sessions/week and two home training sessions/week, and both groups received Calcium and vitamin D supplementation. Not only does exercises reduce fracture incidence, but also increased the lumbar spine BMD and femoral neck BMD compared to control group.

Narrative Review

Weight-bearing exercises provide osteogenic stimulus as a lifestyle factor that prevents bone loss, and the beneficial effects of weight training are increased muscular strength, coordination, and balance which could decrease risk for falling and subsequent fractures [10].

There were two systematic reviews, seven clinical trials and one narrative review emphasizing the role of exercise training in prevention and treatment of women with postmenopausal osteoporosis. There is moderate evidence for efficacy of weight-bearing and aerobic exercises for improving muscular strength, coordination, and balance and decreasing risk for falling and subsequent fractures in women with postmenopausal osteoporosis.

References

1. Bonaiuti D, Shea B, Iovine R, Negrini S, Robinson V, Kemper HC, et al. Exercise for preventing and treating osteoporosis in postmenopausal women. *Cochrane Database Syst Rev.* 2002; (3): CD000333.
2. Howe TE, Shea B, Dawson LJ, Downie F, Murray A, Ross C, et al. Exercise for preventing and treating osteoporosis in postmenopausal women. *Cochrane Database Syst Rev.* 2011; (7): CD000333.
3. Prince RL, Smith M, Dick IM, Price RI, Webb PG, Henderson NK, et al. Prevention of postmenopausal osteoporosis. A comparative study of exercise, calcium supplementation, and hormone-replacement therapy. *N Engl J Med.* 1991; 325(17): 1189-95.
4. Kemmler W, Engelke K, Weineck J, Hensen J, Kalender WA. The Erlangen Fitness Osteoporosis Prevention Study: a controlled exercise trial in early postmenopausal women with low bone density—first-year results. *Arch Phys Med Rehabil.* 2003; 84(5): 673-82.
5. Kemmler W, Lauber D, Weineck J, Hensen J, Kalender W, Engelke K. Benefits of 2 years of intense exercise on bone density, physical fitness, and blood lipids in early postmenopausal osteopenic women: results of the Erlangen Fitness Osteoporosis Prevention Study (EFOPS). *Osteoporos Int.* 2004; 16(10): 1084-91.
6. Mayoux-Benhamou MA, Roux C, Perraud A, Fermanian J, Rahali-Kachlouf H, et al. Predictors of compliance with a home-based exercise program added to usual medical care in preventing postmenopausal osteoporosis: an 18-month prospective study. *Osteoporos Int.* 2005; 16(3): 325-31.
7. Kemmler W, von Stengel S, Weineck J, Lauber D, Kalender W, Engelke K. Exercise effects on menopausal risk factors of early postmenopausal women: 3-yr Erlangen fitness osteoporosis prevention study results. *Med Sci Sports Exerc.* 2005; 37(2): 194-203.
8. Teixeira LE, Silva KN, Imoto AM, Teixeira TJ, Kayo AH, Montenegro-Rodrigues R, et al. Progressive load training for the quadriceps muscle associated with proprioception exercises for the prevention of falls in postmenopausal women with osteoporosis: a randomized controlled trial. *Osteoporos Int.* 2010; 21(4): 589-96.
9. Kemmler W, von Stengel S, Bebenek M, Engelke K, Hentschke C, Kalender WA. Exercise and fractures in postmenopausal women: 12-year results of the Erlangen Fitness and Osteoporosis Prevention Study (EFOPS). *Osteoporos Int.* 2012; 23(4): 1267-76.
10. Bemben DA. Exercise interventions for osteoporosis prevention in postmenopausal women. *J Okla State Med Assoc.* 1999; 92(2): 66-70.

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Preventive Role of Exercise Therapy in Osteoarthritis or Degenerative Joint Disease: A Viewpoint

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Abstract

Preventable or modifiable risk factors for osteoarthritis (OA) or degenerative joint disease (DJD) include obesity, occupational factors, sports participation, muscle weakness, nutritional factors and hormonal influence. The objective of this short communication paper was to explain the evidence-informed role of exercises in prevention of OA from studies in PubMed. Evidence suggested that regular exercise and physical activity (PA), particularly strengthening and aerobic activity, reduce pain and improve function, and health status among patients with knee and hip OA, the reasons for which are not only associated with slowing structural disease progression but also with functional and quality of life improvements. More longitudinal cohort studies are warranted in this population.

Keywords: Osteoarthritis (OA); Degenerative Joint Disease (DJD); Preventive Rehabilitation; Musculoskeletal Prevention.

Preventable or modifiable risk factors for osteoarthritis (OA) or degenerative joint disease (DJD) include obesity, occupational factors, sports participation, muscle weakness, nutritional factors and hormonal influence, which can be improved with a wide variety of rehabilitative interventions: joint specific exercises, physical fitness, physical modalities, education and self-management [1,2].

Secondary prevention of OA must address the skeletal malalignments such as coxavara, femoral retroversion, genu varum, tibia varum and pescavus; and leg length discrepancy such as structural/functional shortening [3]. Current state of science in prevention and management of OA emphasized the

role of multidisciplinary contribution from nursing, epidemiology, rheumatology, public policy, geriatrics, pharmacotherapy, physical therapy, and complementary modalities [4,5].

Thus it is a top priority to assimilate evidence on preventive and self-management strategies for OA [6]. The objective of this short communication paper was to explain the evidence-informed role of exercises in prevention of OA from studies in PubMed. Muscle weakness is common both as an etiological factor and as a clinical consequence of OA, secondary to common myoarticular innervation leading to arthrogenic inhibition and loss of motor control/stability which could be effectively tackled by land-based aerobic and strengthening exercises on pain relief and joint function [7].

Muscle activity influences knee-joint loading, and people with OA knee demonstrated muscle function deficits and muscle dysfunction was postulated in development and progression of knee osteoarthritis.

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Exercise prescription in OA should thus consider muscle rehabilitation as one of its primary goals of treatment [8].

Exercise was a valuable therapeutic adjunct to strategies aimed at alleviating the risks and symptoms of two ageing-related concomitant disease conditions—osteoporosis and osteoarthritis. Exercise had its potential impact on the disease processes themselves, and exercise improves general health and well-being, enhances quality of life, and preserves physical independence [9].

Penninx et al [10] examined the preventive role of exercise program on ADL and disability in OA in their 2-center, randomized, single-blind, controlled trial which was conducted in 250 participants who were assigned to an aerobic exercise program, a resistance exercise program, or an attention control group. The cumulative incidence of ADL disability was found to be lower in the exercise groups than in the attention control group, and both exercise programs prevented ADL disability; and the lowest ADL disability risks were found for participants with the highest compliance. Regular physical activity (PA), particularly strengthening and aerobic activity, can reduce pain and improve function, performance measures and health status among patients with knee and hip OA, the reasons for which are associated with slowing structural disease progression [11]. Sports and participation in sport-related activity was recommended for OA provided avoidance of high-impact sports is essential to prevent intra-articular trauma; and to undertake caution if they have abnormal joint anatomy or alignment, joint instability, underlying muscle weakness or imbalance, or if they are overweight [12].

Jordan et al [13] provided recommendations for design and execution of clinical trials on prevention or risk reduction in OA as follows: “disease definitions and their precise and sensitive measurement, identification of high-risk populations, the nature of the intervention (pharmaceutical, nutraceutical, behavioral) and its potential pleiotropic impacts on other organ systems are critical to consider. Because prevention trials may be prolonged, close attention to concomitant life changes and comorbidities, adherence and participant retention in the trial is of primary importance, as is recognition of the potential for “preventive misconception” and “behavioral disinhibition” to affect the ability of the trial to show an effect of the intervention under study.”

Evidence suggested that regular exercise and physical activity (PA), particularly strengthening and aerobic activity, reduce pain and improve function, and health status among patients with knee and hip OA, the

reasons for which are not only associated with slowing structural disease progression but also with functional and quality of life improvements. More longitudinal cohort studies are warranted in this population.

References

1. Bijlsma JW, Knahr K. Strategies for the prevention and management of osteoarthritis of the hip and knee. *Best Pract Res Clin Rheumatol*. 2007; 21(1): 59-76.
2. Dieppe P. Strategies for the prevention of osteoarthritis. *Int J Tissue React*. 1993; 15(3): 93-7.
3. Neogi T, Zhang Y. Osteoarthritis prevention. *Curr Opin Rheumatol*. 2011; 23(2): 185-91.
4. Robbins L, Kulesa MG. The state of the science in the prevention and management of osteoarthritis. *Am J Nurs*. 2012; 112(3 Suppl 1): S3-S11.
5. Robbins L, Kulesa MG. The state of the science in the prevention and management of osteoarthritis. *Am J Nurs*. 2012; 112(3): 25-33.
6. Jaramillo A, Welch VA, Ueffing E, Gruen RL, Bragge P, Lyddiatt A, et al. Prevention and self-management interventions are top priorities for osteoarthritis systematic reviews. *J Clin Epidemiol*. 2013; 66(5): 503-510.e4.
7. Valderrabano V, Steiger C. Treatment and Prevention of Osteoarthritis through Exercise and Sports. *J Aging Res*. 2010; 2011: 374653.
8. Bennell KL, Hunt MA, Wrigley TV, Lim BW, Hinman RS. Muscle and exercise in the prevention and management of knee osteoarthritis: an internal medicine specialist's guide. *Med Clin North Am*. 2009; 93(1): 161-77.
9. Sharkey NA, Williams NI, Guerin JB. The role of exercise in the prevention and treatment of osteoporosis and osteoarthritis. *Nurs Clin North Am*. 2000; 35(1): 209-21.
10. Penninx BW, Messier SP, Rejeski WJ, Williamson JD, DiBari M, Cavazzini C, et al. Physical exercise and the prevention of disability in activities of daily living in older persons with osteoarthritis. *Arch Intern Med*. 2001; 161(19): 2309-16.
11. Semanik PA, Chang RW, Dunlop DD. Aerobic activity in prevention and symptom control of osteoarthritis. *PMR*. 2012; 4(5 Suppl): S37-44.
12. Saxon L, Finch C, Bass S. Sports participation, sports injuries and osteoarthritis: implications for prevention. *Sports Med*. 1999; 28(2): 123-35.
13. Jordan JM, Sowers MF, Messier SP, Bradley J, Arangio G, Katz JN, et al. Methodologic issues in clinical trials for prevention or risk reduction in osteoarthritis. *Osteoarthritis Cartilage*. 2011; 19(5): 500-8.

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[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. *J Oral Pathol Med* 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. *Acta Odontol Scand* 2003; 61: 347-55.

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[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. *Dermatology* 1997; 195 Suppl 2: 3-9.

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[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. *J Periodontol* 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. *Dent Mater* 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM,

editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p.7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online – Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ%20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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Prevention of Child Sexual Abuse: The Need of the Hour

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Everyday we read about child sexual abuse. Sexual violence is a gross violation of children's rights that occurs worldwide across all social, economic and age groups, in homes, schools, institutions, and on the streets [1]. In 2002, WHO estimated that globally at least 150 million girls and 73 million boys under 18 years had experienced forced sexual intercourse or other forms of sexual violence involving physical contact [2].

In a national study on CSA in India, it was found that very few cases are ever reported. 72% of the victims did not report the matter to anyone. Only 3% of them or their families told the police. In most cases the perpetrator was known to the child. 31% of sexual assaults were committed by the victim's uncle or neighbour. 53% said that they had been subjected to one or more forms of sexual abuse. Over 20 % said they were subjected to severe forms of abuse, defined in the report as "sexual assault, making the child fondle private parts, making the child exhibit private body parts and being photographed in the nude [3].

Virani (2000) states, that WHO says that 1 girl out of 4 and 1 boy out of 7 are victims of CSA. According to WHO one of ten Indian children is the victim of sexual abuse [5]. The true magnitude of CSA is unknown due to differing legal definitions of abuse and underreporting. It is estimated that less than 50% of all sexual assaults on children are reported to the police [5].

CSA is the physical or mental violation of a child with sexual intent, usually by an older person who is in a position of trust and/or power, vis-a-vis the child. Rape is an extreme form of CSA. Different forms of CSA include-

1. Touch with a sexual intent
2. Pornography
3. Exhibitionism.
4. Masturbation
5. Oral sex
6. Homosexual and Heterosexual activity.

A pilot project was launched in Dharavi Municipal School, Marathi medium for std. 7th with necessary permission from the education officer and the school principal. Preliminary preparation consisted of meetings with school principal, teachers, parents and appropriate authority to obtain their consent. A team of doctors, nurse and social workers conducted participatory sessions for 4 months, separately for boys and girls.

The first session consisted of establishing rapport with the students through an ice breaker game.

Second session consisted of body mapping. Students were asked to identify organs, their location and functions using a cloth model. The gaps in knowledge were identified and discussed.

Third session: Concept of good touch and bad touch was introduced. Bad touch is a touch which you are not comfortable with, for example- touching the breast and/ or private parts. Good touch is, for example a mother's or father's touch.

The students learnt the following messages:

1. Difference between good and bad touch.
2. Nobody has right to touch your body without your permission.
3. Inform the mother if the incident happens at home and the teacher if it happens in school.
4. Students accepted that anyone can be a child abuser.
5. They recognised that it was the perpetrator and

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not the victim who was at fault.

6. They understood the right to say "No" to unwanted touch.

During discussion incidences were revealed of child abuse by people whom they trusted. Girls were observed to have gained confidence. They even rebuked their own classmates for unnecessary touching.

It is necessary to identify the victim as there is always a culture of secrecy and silence over such issues.

The Likely Symptoms are:

1. Depression
2. Not mixing up with others, remains isolated, remains withdrawn.
3. Bedwetting.
4. Avoiding specific persons.
5. Unable to concentrate.
6. Throat, anal and vaginal irritation and burning.
7. Bleeding from vagina/urethra and anus
8. Burning during micturition etc.

All such cases need to be dealt very sensitively to help the victim open up.

CSA has become rampant, yet our society remains silent. Our silence will make the perpetrator strong. Shed your silence. Come forward and speak up. Let us, as parents, teachers and responsible citizens; empower our children with the concept of good touch and bad touch. Proper coordination is necessary between government, NGO's, medical fraternity, legal and police departments, and civic society, for prevention of CSA.

The need of the hour is laws, policies and programmes with a strong political will for effective interventions to help children in having an innocent and playful childhood.

References

1. UNICEF.http://www.unicef.org/protection/57929_58006.html?p=printme)
 2. WHO, 2004.
 3. Ministry of Women and Child Development, Government of India, "National Study on Child Abuse: India 2007," 2007, <http://wcd.nic.in/childabuse.pdf> (accessed April 16, 2012), p. i.
 4. ViraniPinki. Bitter Chocolate: Child Sexual Abuse in India. New Delhi: Penguin Books. 2000.
 5. Floric, MaryLee and Matthew Broyles. Sexual Abuse. New York, NY: The Rosen Publishing Group, Inc. 2000.
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Prevalence of Low Birth Weight Children in Rural Area of Jaipur District of Rajasthan

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Abstract

Background: Low birth weight is a major public health problem in many developed and developing countries. In India 28% children born are estimated to be low birth weight as compared to only 4% in some developed countries. **Aims and Objectives:** To find the prevalence of LBW in the rural area and various factors affecting occurrence of LBW. **Material and Methods:** Present study was conducted in PHC Achrol, District Jaipur (Rajasthan), which is situated on the National highway 11 C. Record of 395 females was analyzed who were delivered in PHC Achrol, from 1st April 2015 to 31st March 2016. **Observations and Discussions:** In the present study, the prevalence of LBW was found to be 33.92%. Among the LBW babies, 39.55% were male children and 60.44% were the female children. Among the born babies in LBW, 66.41% were Hindu by religion and 33.58% were Muslim by religion. Among the ANC care utilizing mothers, the prevalence of LBW was found in 15.38% children, while among those who were not utilizing ANC care, LBW children were 54.54%. Among the smokers mothers, the prevalence of LBW children were 63.21%, while among Non-smoker mothers, the prevalence of LBW was only 25.64%. Among the pre term born babies, prevalence of LBW was 88%. On the other hand, among the full term born babies, the prevalence of LBW was 30.27%. In mothers of less than 20 years of age, the prevalence of LBW was 83.33%, in mothers with age of 20-30 years group- the prevalence of LBW babies was 27.61%. In the above 30 years of age group, prevalence of LBW babies was 66.66% in the present study. As regard to parity, prime mothers were having LBW prevalence i.e. 13.15%. In the second para mothers, prevalence of LBW was 21.12% and at the same time, third and above para were having prevalence of LBW, 55.94%. Among the mothers with Hb level below 9 gm %, prevalence of LBW was 57.89%. Among mothers with 9-11 gm %, prevalence of LBW was 26.12% and mothers having Hb level more than 11 gm % were having 27.27% prevalence of LBW. **Conclusion:** Prevalence of LBW is pretty high in developing Asian countries like India, where illiteracy, ignorance and poverty is rampant. Among the various factors affecting prevalence important once are religion, high parity, poor nutrition of mother, anemia of mother, age of mother at the time of delivery, smoking, term of delivery, utilization of ANC care services etc.

Keywords: Low Birth Weight; Preterm; Parity; Anemia.

Introduction

Low birth weight is a major public health problem in many developed and developing countries. In India

28% children born are estimated to be low birth weight as compared to only 4% in some developed countries [1]. In India majority of LBW babies are due to foetal growth retardation, which in turn mostly due to maternal malnutrition and anaemia. Other causes usually attributed to it are mother's hard physical labor, infections, very young age, high parity, smoking, close birth intervals etc.

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LBW is closely associated with fetal and Perinatal

mortality and Morbidity, inhibited growth and cognitive development, and chronic diseases later in life. At the population level, the proportion of babies with LBW is an indicator of a multifaceted public-health problem that includes long term maternal malnutrition, ill health, hard work and poor health care in pregnancy. On an individual basis, LBW is an important predictor of newborn health and survival and is associated with higher risk of infant and childhood mortality [2].

As per UNICEF Data [3] in 2013-an estimated 16% of all babies born globally that year- had LBW. Chan. Y, et al [4] revealed incidence of LBW in mainland China was 6.1%. In study of, Asphyxia of new born in east, central South Africa by Kinoti, SN [5]. Came out with overall incidence of LBW 13.9%. In a study by Karim E. [6] in Dhaka, Bangladesh, found about 21 % of incidence of LBW. Determinants of LBW: a community based prospective cohort study by Hirve SS, et al [7], found the cumulative incidence of LBW 29%, in 45 villages in Pune district. Incidence of LBW babies is on rise in India as reported by Kanti Jones [8] in India Health News. Stating that nearly 20% of all babies born in India have birth weight of less than 2.5 kg.

Aims and Objectives

To find the prevalence of LBW in the rural area

Observations

Table 1: Distribution of children according to birth weight

Total No Children No.	(%)	Weight below 2.5 kg m No.	(%)	Weight above 2.5 kg m. No.	(%)
395	100	134	33.92	261	66.07

Table 2: Distribution of socio-demographic variables

Variables.	Characteristics.	Normal birth weight. No	(%)	Low birth weight. No.	(%)	p- Value.
Gender	Male(206)	153	38.73	53	13.41	< 0.001.
	Females.(189)	108	27.34	81	20.50	
Age group.	Less than 20yrs (30)	5	1.26	25	6.32	<0.001
	20 to 30yrs (344)	249	63.03	95	24.05	
	Above 30yrs (21)	7	1.77	14	3.54	
Religion	Hindu (316)	227	57.46	89	22.53	<0.001
	Muslim (79)	34	8.60	45	11.39	
Smoking	Smoker (87)	32	8.10	55	13.92	<0.001
	Non-Smoker (308)	229	57.97	79	20	

Table 3: Distribution of mothers according to utilization of anc care

	Normal Weight. No.	(%)	Low Birth Weight. No.	(%)
ANC Care Utilizing.(208)	176	44.55	32	.8.10
ANC Care Not Utilizing.(187)	85	.21.15	102	25.82

$$\chi^2 = 67.4 \quad df= 1 \quad pd \leq 0.001$$

and various factors affecting occurrence of LBW.

Material and Methods

Present study was conducted in PHC Achrol, District Jaipur (Rajasthan), which is situated on the National highway 11 C. Record of 395 females was analyzed who were delivered in PHC Achrol, from 1st April 2015 to 31st March 2016. Area is mainly inhabited by low caste and low socio-economic class, mostly unskilled labor. Consent from hospital ethical clearance was obtained to undergo present study. Non-probability (Purposive) sampling technique was used for this study. Results were subjected to statistical assessment to reach to conclusion.

Study Design

Cross-sectional retrospective study.

Criteria for Inclusion

All delivered females from 1st April 2015 to 31st March 2016.were included in present study.

Criteria for Exclusion

Referred cases who were serious, not manageable at PHC Achrol or required caesarian section were not included in present study.

Table 4: Distribution of mothers according to term of delivery

	Normal weight Children No.	Normal weight Children (%)	Low Birth Weight. No.	Low Birth Weight. (%)
Preterm.(< 37 weeks) (25)	3	.075	22.	5.56
Full term. (370) (>37 weeks)	258	.65.31	112	28.35
Total. (395)	261.	66.07	134	.33.92

$\chi^2 = 34.8$ df=1 pd≤0.001

Table 5: Distribution of mothers accoding to parity

Parity	Normal Weight Children. No.	Normal Weight Children. (%)	Low Birth Weight. No.	Low Birth Weight. (%)
Prime. (38)	33	.8.35	5	.1.26
Second Para.(172)	142.	35.94	30	7.59
Third Para & above (185).	86	.21.77	99.	25.06.

$\chi^2 = 59.8$ df=2 pd≤0.001

Table 6: Distribution of mothers according to HB level

HB Level. (%)	No.	Normal Weight Children. No.	Normal Weight Children. (%)	Low Birth Weight. No.	Low Birth Weight. (%)
Below 9 gm	95	40	10.12	55	13.92
9. to 11 gm	245	181	45.82	64	16.20
Above 11 gm	55	40	10.12	15	3.79

$\chi^2 = 32.1$ df=2 pd≤0.001

Discussion

Birth weight of a live born infant of less than 2500 gm, regardless of gestational age is LBW. In the present study as shown in Table 1. Prevalence of LBW came out to be 33.92%. Prevalence of LBW varies from country to country, some developed one are having 4% while some Asian countries are with up to 35% prevalence. As per Unicef Data: Monitoring the situation of children and women current status updated April 16, Incidence of LBW is monitored through both health system surveillance and household surveys, in 2013-an estimated 16% of all babies born globally that year- had LBW. An epidemiological survey in LBW infants in China and analysis of full term LBW infants by Chan. Y, et al revealed incidence of LBW in mainland China was 6.1%. In study of, Asphyxia of new born in east, central South Africa by Kinoti, SN, came out with overall incidence of LBW 13.9%. In a study by Karim E. et al, in Dhaka, Bangladesh, while studying association between birth weight, socio-demographic variables etc found about 21% of incidence of LBW. A study by the Agency for Healthcare Research and Quality (AHRQ) found that 3.8 million births that occurred in the United States in 2011, approximately 6.1% were diagnosed with LBW. Approximately 1.3% were VLBW (<than 1500gms) [9]. Determinants of LBW: a community based prospective cohort study by Hirve SS, et al, found the cumulative incidence of LBW 29%,

in 45 villages in Pune district. Incidence of LBW babies is on rise in India as reported by Karty Jones in India Health News. Stating that nearly 20% of all babies born in India have birth weight of less than 2.5 kg. High prevalence of LBW could be explained in this particular area because of malnourished state mothers, anaemia and poor socio-economic profile of mothers.

As shown in Table 2, among the male born 38.73% were of normal weight and 13.41% LBW, at the same time among the female born children 27.34% children were normal weight and 20.50% LBW. Similar were the observations of Bharti P et al [10] in their study, Prevalence and causes of LBW in India. In a prospective study on some factors which influence the delivery of LBW babies in a developing country by Lawoyin. TO [11], found that mean birth weight of males, 3205g +/- 469 g, significantly higher than of females of 2991 g +/- 451 g.

As depicted in table among born babies, Hindu born children were 57.46% normal weight and 22.52% LBW. On the other hand among the Muslim born children 8.60% were normal weight and 11.39% were LBW. This religious difference of prevalence could be because of low literacy, poverty, multiple pregnancies and ignorance of nutrition principles among the low socio-economic class of Hindus..Table also depicts out of all mothers, 8.10% were normal weight and 13.92% children LBW among the smoker group of mothers. On the other hand 57.97% were normal birth

weight and 20% children L BW among the non smoker mothers. While active maternal tobacco smoking has well established adverse perinatal outcomes such as LBW, that mothers who smokes during pregnancy are twice as likely to give birth to LBW infants. Review on the effect of passive maternal smoking , also called environmental tobacco exposure (ETS), demonstrate that increased risks of infants with LBW were more likely to be expected in ETS exposed mothers [13]. A majority of pregnant women in developing countries, where rate of LBW is high, are heavily exposed to indoor air pollution , increased relative risk translates into substantial population attributable risk of 21% ofLBW [14]. Table 2 also shows 1.26% were normal weight and 6.32% LBW in less than 20 yrs age group of mothers. Similarly 63.03% were normal weight and 24.05% LBW. In the 20 to 30 yrs age group of mothers. At the same time in the above 30 yrs age group 1.77% were normal weight and 3.54% LBW children. Karim E, et al in their study of association between birth weight etc also observed that LBW was more common in younger (<20yrs) and older (>30yrs). Hirve SS,et al, also observed that the unadjusted relative risks for LBW were significantly higher for maternal age less than 20 yrs. Similar were the observation of Lawoyin TO, et al, in A prospective study on some factors which influence the delivery of LBW babies in a developing country.

Table 3 shows that among the ANC Care utilizing mothers 44.55 % had normal weight babies and only 8.10% had LBW babies whereas among ANC Care not utilizing mothers 21.51% were normal weight babies and 25.82% were having LBW babies. We can say in other words booked and not booked cases makes the difference. Main attention has been given in recent years to ways and means of preventing LBW through good prenatal care and intervention programmes, like ICDS, JSSY etc, rather than 'treatment' of LBW babies born later. Mavalankar DV et al [12] in their study of Risk factors for preterm and term LBW in Ahmedabad showed that low maternal weight, poor obstetric history, lack of antenatal care, clinical anaemia and hypertension were significant independent risk factors for both term and preterm LBW.

As shown in Table 4 full term children were 65.31% normal weight and only 28.35% were LBW delivered. On the other hand among the Preterm babies 0.75 % were normal weight and 5.56.% were LBW delivered babies. In a prospective study by, Lawoyin TO, 80% of LBW were full term (37-41 wks gestation) at delivery, while 20% were pre-term(<37 wks). These pre-term LBW babies weigh less than the 10th percentile for the gestational age, and are clearly the

result of retarded intrauterine foetal growth.

Table 5 shows distribution of mothers according to parity. 8.35% normal weight children and 1.26% from LBW. were from prime group. 35.94% normal weight children and 7.59% LBW among second para In the third para and above group 21.77% were normal birth weight and 25.06% were LBW. Chances of LBW babies increases with increasing parity, similar were the findings of Hirve SS. et al, Bharati P. et al, and Mavalankar DV. et al.

Chakraborty. P. et al [15] in their study on Maternal autonomy and LBW in India, indicated importance of empowering women in India to combat the high incidence of LBW , because in India male dominating society male decides number of children , sex of children and gape between two children.

Table 6 shows 10.12% normal birth weight and 13.92% LBW in group of mothers with Hb level below 9gm %. Among the group of mothers with 9 to 11 gm% Hb, 45.82% were normal birth weight and 16.20% were LBW. At the same time 10.12% were normal birth weight and 3.79% LBW in the mothers group with Hb above 11gm% , indicating that anaemia increases the incidence of LBW babies. According to Sumithra Muthayya, nearly half the pregnant women still suffer from varying degree of anemia. According to Hirve SS. et al, in their study stated that Socio-economic status, non-pregnant weight, maternal height, and severe anemia in pregnancy had substantial attributable risk percent for LBW (41.4%, 22.9%, 29.5% and 34.5%, respectively)

Mavalankar DV et al, in their study stated that clinical anaemia and hypertension were significant independent risk factors for both term and preterm LBW.

Conclusion

Prevalence of LBW is pretty high in developing Asian countries like India, where illiteracy, ignorance and poverty is rampant. Among the various factors affecting prevalence important once are religion, high parity, poor nutrition of mother, anemia of mother, age of mother at the time of delivery, smoking, term of delivery, utilization of ANC care services etc.

LBW is one of the most serious challenges of MCH care of both developed and developing countries. Its public health significance may be ascribed to numerous factors-- its high incidence, its association with mental retardation and a high risk of prenatal and infant mortality and morbidity (half of all

perinatal and one-third of all infant deaths are due to LBW.), human wastage and suffering, the very high cost of special care and intensive care units and its association with socio-economic underdevelopment.

Incidence of LBW can be reduced if pregnant women 'at risk' are identified at ANC CLINICS and steps are taken to reduce the risk. Increasing food intake, supplementary feeding, distribution of Iron and folic acid tablet, fortification and enrichment of foods, control of infections and early detection and treatment of medical disorders. Making programs like ICDS, JSSY etc more lucrative and popular, will take care of problem. Proper socio-economic and environmental reforms are long term desired goals to get rid of LBW problem in future.

References

1. UNICEF. State of World's Children. 2009.
2. Stevens- Simon C, Orleans M. "Low - birth weight prevention programs; the enigma of failure". Birth. 1999 Sep; 26(3): 184-91. Doi; 10.1046/j.1523-536x.1999.00184x.
3. Unicef Data; Monitoring the situation of children and women current status updated april 16, incidence of LBW is monitored through both health system surveillance and household surveys.
4. Chan Y, LiG, Ryan Y, Zou L, Wanq. X, Zhand. W. "An epidemiological survey in LBW infants in China and analysis of fullterm LBW infants." BMC, Pregnancy Child birth. 2013 Dec. 26; 13: 242. Dot 10 1086/1471-2393-13-242.
5. Kinoti SN, " Asphyxia of new born in east, central south Africa." East. Afr. Med. J. 1993. Jul; 70(7): 422-33.
6. Karim E, Mascie- Taylor CG. "The association between birth weight, socio - demographic variables and maternal anthropometry in an urban sample from Dhaka, Bangladesh." Ann. Hum. Biol. 1997 Sept-Oct; 24(5): 387-401.
7. Hirve SS, Ganatra BR. "Determinants of low birth weight; a community based prospective cohort study." Indian Paed. 1994 Oct; 31 (10): 1221-5.
8. Kanty Jones on Dec 23, 2010, India Health News.
9. Kowlessar. N. M, Jiang H. J, and Steiner C. Hospital Stays for Newborns, 2011. HCUP Statistical Brief #163, Oct. 2013, Agency for Health care Research and Quality, Rockville, MD.
10. Bharati P, Pal. M, Bandyopadhyay M, Bhakta A, Chakraborty S. " Prevalence and causes of low birth weight in India." Malays J . Nutr. 2011 Dec; 17(3): 301-13.
11. Lawoyin. TO, Oyediram AB. " A prospective study on some factors which influence the delivery of low birth weight babies in a developing country." Afr. J. Med. Sci. 1992 Oct; 21(1): 33-9.
12. Mavalankar DV, Gray RH, Trivedi CR. " Risk factors for preterm and term low birth weight in Ahmedabad, India. " Ind. J. Epidemiol. 1992 April; 21(2): 263-72.
13. Knopik VS, " Maternal smoking during pregnancy and child outcomes ; real or spurious effect ?" Dev. Neuropsychol. 2009; 34(1): 1-36.
14. Pope DP, Mishra V, Thompson L, et al. "Risk of low birth weight and still birth associated with indoor air pollution from solid fuel use in developing counties." Epidemiol. Rev. 2010 Apr; 32 (1): 70-81.
15. Chakraborty P, Anderson Ak. " Maternal autonomy and low birth weight in India." J. Womens Health (Larchnt). 2011 Sep; 20(9): 1373-83. Doi; 10.1089/jour.2010, 2428. Epub. 2011 Jul 18.

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Compare the Effectiveness of Pilates and Conventional Balance Training in Young Old Geriatric Population

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Abstract

Background and objective: Frequent falls among elderly is one of the most commonly identified problems. Balance, poor gait, lower limb muscle weakness, slowed reaction time have been identified as independent risk factors for falls in elderly. Exercise programs targeted to improve these deficits might result in decrease of falls and related injuries. Present study was undertaken to study the effectiveness of pilates and conventional balance training in young old geriatric. **Method:** Institutional ethical clearance was obtained. 40 young old geriatric subjects with age group between 65 -74years were included in the study after the fulfilment of inclusion and exclusion criteria. Informed consent was obtained from all the subjects. The subjects were then randomly divided into two groups by envelope method, Group A received pilates and Group B received conventional balance training. Treatment was carried out for 30 minutes for three sessions per week for five weeks. Subjects were assessed for balance and mobility using Tinneti performance oriented mobility assessment (POMA) and timed up and go test (TUG) before starting the treatment and after four weeks. **Results:** The results showed that both the conventional balance training and Pilates showed statistically significant ($p<0.001$) improvement in balance in young old geriatrics. **Conclusion:** The present study concluded that both Pilates program and conventional balance training equally improved the balance in elderly subjects so that both the therapies can be incorporated in the balance training.

Keywords: Balance; Geriatric; TUG; POMA; Pilates.

Introduction

“Balance is the ability to maintain the body’s centre of mass over its base of support.” It is achieved and maintained by a complex set of sensorimotor control systems that include sensory input from vision (sight), vestibular system (motion, equilibrium, spatial orientation) and the proprioception (touch); integration of that sensory input and motor output to the eye and body muscles. Injury, illness, or the aging process can affect one or more of these components [1].

Balance problems like postural instability and falls are common among the elderly and this is reverberated

by the fact that over five million subject’s visits as out patients per year and an estimated 28% and 35% of individuals over 65 years fall yearly and 1/5th of them required medical attention. The number of fallers increases to over 40% for those 75 and older. A history of falling is also a strong predictor of morbidity among the elderly [1].

Balance disorders in the geriatric population are often due to multifactorial causes. Weakness in the core stabilizing muscles, altered muscle activation pattern, loss of proprioception, and an inability to control normal postural sway can all result in decreased balance in the elderly.

A decrease in physiological reserves as we age, limits the ability to react quickly to perturbations. Studies have shown that elderly subjects who fall, demonstrate impaired functioning in sensory-motor factors accountable for balance or postural stability. Inactive lifestyle and physiological changes related to aging, featured by senile sarcopenia and

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progressive decline in muscle strength, joint range of motion, sensory system and reaction time lead to reduced physical performance and increased risk of fall [2]. Any of the above components are affected in balance in geriatric or it can be a combination. While there is not a solitary solution to postural control problems, there is evidence that the most effective treatment strategies for balance disorders consist of a multimodality approach including a re-evaluation of medications, manual therapy, exercise, and behavioural modification programs. There are many physical therapy interventions given for the treatment of such cases such as; conventional balance training program, Pilates, Tai chi, resistance training programme and many more [3].

Pilates, is a physical fitness system developed in the early 20th century by German-born Joseph Pilates. Pilates has become a popular exercise intervention that combines strength, endurance, flexibility and coordination training and, with the projected benefits of improved muscular control of the deeper abdominal muscles i.e. transverses abdominis, lumbar multifidus, respiratory and pelvic diaphragm, it may provide an effective method of improving postural stability. Pilates intervention has been shown to be useful in improving postural stability in neurologically intact elderly people [4].

Conventional balance training which include training the strength and endurance, maximizing flexibility and postural control have been proved to be effective in improving functional ability in addition to reducing risk of falls in elderly individuals [5].

The paucity of a study on the comparative analysis of Pilate Training Vs Conventional Balance Training in improving balance in the elderly was the driving force behind this particular study. Hence the need was there to study Pilates Training in great detail and a comparative study against Conventional Balance Training methods was required to explore more benefits in the understanding of new and innovative ways to improve balance in the elderly.

Materials and Methods

Ethical approval for this study was obtained from the institutional ethical committee. Using convenience sampling participants were recruited from the tertiary care hospital Belagavi, Karnataka. The inclusion criteria were as follows; Elderly Individuals in the age group of 65- 74 years, able to walk at least for 30 feet with or without an assisting device and not participating in any sports or physical therapy

session. Acute medical problems such as fever, bronchitis etc, history of fracture, ligament injury etc, history of any neurological condition and vestibular disorder were excluded. The written consent was obtained from all the subjects who fulfilled inclusion and exclusion criteria after explaining the purpose of the study. The subjects were randomly allocated into two groups by envelope method, Group A received pilates and Group B received conventional balance training.

Outcome Measures

Tinetti Performance Oriented Mobility Assessment (POMA) is a task- oriented test that measures an older adult's gait and balance abilities by an ordinal scale of 0 (most impairment) to 2 (independence). The assessment takes 10 - 15 minutes to complete. It is composed of a 9-item gait portion (POMA-G) and 7-item balance portion (POMA-B) [6]. Excellent test retest reliability for POMA balance and POMA gait (ICC= 0.72-0.86) was reported in elderly subjects [7].

Timed Up and GO Test (TUG) is designed to measure gait performance and balance; it was originally developed as clinical measure of balance in elderly patients. The intra-rater reliability is excellent (Pearson's r = 0.979) and inter-rater reliability is excellent (Pearson's r = 0.973) [8].

Intervention

Group A (Pilates Training)

Group A participants were given the pilates training which included Hundred, Shoulder bridge, Single leg circles, Alternate toe tap, Leg pull front, Spine twist, Ball leg lift, Standing side splits: Performed in standing on one leg with the other leg placed on exercise ball & performing side splits by rolling the ball away and close to the stance leg, Ball wall squat, Tandem walking and heel to toe walking in a straight line.

Group B (Conventional Balance Training)

Group B participants were given conventional balance training. The exercises included Flexibility of muscles such as calf, hamstring, quadriceps, hip flexors & hip adductors (15 sec hold and 5 repetition) strength exercises such as curl ups, spinal extensors hip abductors (side hip extensors, hamstring and quadriceps all movements are given for 10 repetitions. Postural control included stepping in all direction, reaching to limits of stability in different position (kneeling, half kneeling, standing: on hard surface

and foam surface), step up and down, tandem standing and walking, single limb standing (eyes open and closed). Walking for 12 minutes at self-selected comfortable pace on a level surface to improve endurance.

Both the Groups received the intervention for thirty minutes per session for three sessions per week for

five weeks. The subjects were assessed with POMA and TUG before starting the intervention and after five weeks.

Results

Statistical analysis for the present study was done

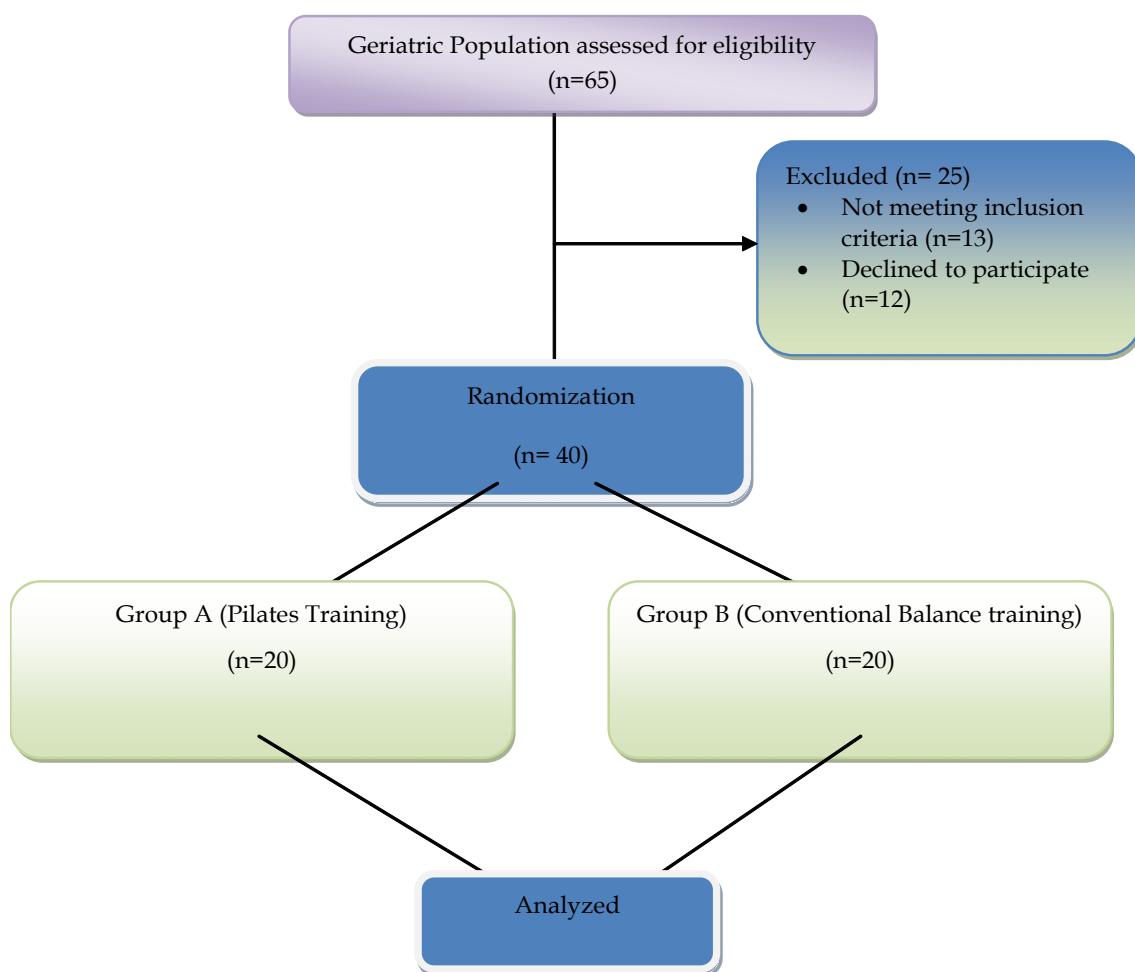


Fig. 1: Flow Chart of the study

manually as well as using statistical package of social sciences (SPSS) version 21 so as to verify the results obtained. For this purpose data was entered into the Microsoft Excel Sheet, tabulated and subjected to statistical analysis. Mean, standard deviation, and test of significance that is paired and unpaired t Test, were used. Subjects demographic data i.e. age, sex, BMI, height, weight distribution were analyzed using t-test. Comparison of the pre intervention and post intervention outcome measures such as POMA and TUG within the group and between the groups was done by using Paired t-test.

Participant Characteristic

In the present study there were 20 participants in Group A which included 7 males and 13 females and mean age of the participants was 68.70 ± 2.64 years and there were 20 participants in Group B which included 9 males and 11 females and mean age of the participants was 69.05 ± 3.10 years. The difference in mean age of Group A and Group B was statistically not significant ($p = 0.7029$).

The mean Body weight of the participants in Group A was 64.55 ± 7.04 kgs and mean height was 169.34 ± 8.44 cms and Group B mean weight was 66.35 ± 6.73 kgs and mean height was 171.5 ± 7.87 cms.

The difference in mean weight ($p= 0.4136$) and difference in mean height of participants ($p= 0.4886$) in Group A and Group B was not statistically significant. The mean BMI of the participants in Group A was 22.57 ± 2.58 and Group B was 22.81 ± 2.39 . The difference in mean BMI between participants of Group A and Group B was statistically not significant ($p= 0.7656$). On comparing the age, body weight, and BMI between Group A and Group B by paired t-test,

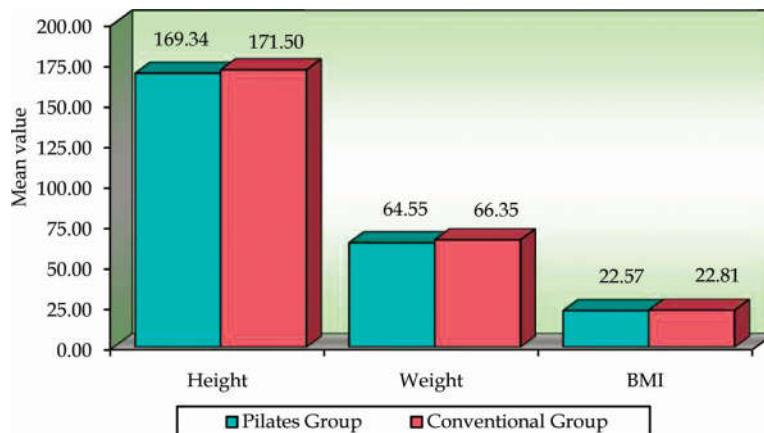


Fig. 2: Demographic characteristics

Table 1: Comparison of the pre and post treatment variables within the two Groups

GROUPS	POMA				TUG			
	Pre test	Post test	difference	p-value	Pre test	Post test	difference	p-value
Group A	19.46 ± 2.53	3.32 ± 1.49	3.00	0.0001*	49.44 ± 14.31	25.94 ± 9.64	23.50	0.0001*
Group B	6.19 ± 1.85	4.14 ± 1.40	2.06	0.0001*	52.16 ± 5.03	36.84 ± 6.51	15.32	0.0001*

Table 2: Comparison of the pre and post treatment variables between the two Groups

Variables	TUG				POMA		
	Group A	Group B	p-value	Group A	Group B	Group B	p-value
Pre test	19.07 ± 2.53	19.46 ± 3.03	0.6614	21.65 ± 2.70	20.85 ± 2.39	20.85 ± 2.39	0.3274
Post test	18.68 ± 2.44	18.15 ± 2.94	0.5383	24.30 ± 2.18	23.20 ± 2.14	23.20 ± 2.14	0.1157
Difference	0.92 ± 0.51	0.78 ± 0.60	0.4319	2.65 ± 1.35	2.35 ± 2.18	2.35 ± 2.18	0.6041

and POMA in both the groups ($p< 0.001$) (Table 1).

Between the groups analysis showed no statistically significant difference (Table 2).

Discussion

In our study the female participants were slightly more which is in accordance to the studies that have mentioned that falls by elderly women occur more often than by elderly men [9].

showed no significance difference at 5% level of significance which suggests that demographically the participants in each group was homogeneity to each other (Figure 2).

Outcome Measure

A comparison of pre- and post- treatment revealed a statistically significant difference in the score of TUG

The overall finding shows that Pilates intervention as well as Conventional Balance Training program leads to significant improvement in functional balance, however participation in PI lead clinically greater improvements compared to CBT.

There are scarce studies on Pilates with old people to improve stability therefore the results of the present study are difficult to compare with others. A similar chain of exercises called "calisthenics body balance training" was used with elderly subjects for five months [10], resulting in significant improvements in static balance and gait pattern. Other authors

studied the effects of an eight-week exercise program that was inspired by the Pilates Method in subjects of the same age group and obtained good results for static but not for dynamic balance [11]. In a study done on the effect of a 10 week pilates programme on the elderly had shown improvement with the body balance in these subjects [12]. When submitting healthy mid-aged adults to a Pilates program for 12 weeks, no improvements were detected with regard to body balance [13], which may be explained by the fact that these subjects do not yet have balance deficits and therefore did not further benefit from the Pilates program. On the other hand, that finding, together with those of the present study, clearly demonstrates that Pilate's exercises are very useful to improve body balance at the age group between 65 to 74 years. When considering the mechanisms resulting in the improvement of body balance after Pilates exercise, strengthening of the trunk and pelvic muscles in the sense of the "powerhouse" is certainly an important measure to stabilize posture and gait pattern, with the concomitant effect on maintaining equilibrium [12]. Only looking at muscle strengthening, however, appears an oversimplified mechanistic approach, as the functioning of other systems might also be positively influenced by the Pilates exercises.

In conventional balance training the improvement in proprioception and strength of the muscles around the joints of lower limbs must have further enhanced the improvement in balance and reduction in falls. Since impairments of proprioception have been described for the elderly [14, 15], and are held at least in part responsible for the increased risk of falls, exercises in the conventional balance training aimed at stimulating the kinaesthetic sense in these subjects.

One factor that might have contributed to more clinical improvement in the Pilates group was the pattern of exercise. The exercises include maintaining a stable posture while concentrating in the rhythm of respiration thereby providing a multi task intervention with increased awareness of kinaesthesia, proprioception and movement co-ordination. Both the groups shown significant improvement in balance, it can be contributed to the idea of both working on the postural stability by activating the core muscles.

Limitation

A long term follow up could not be assessed in this study.

Conclusion

The present study concluded that both Pilates

program and Conventional balance training equally improved the balance in elderly subjects so that both the therapies can be incorporated in the balance training.

Future Scope

A further comparison on long term and short term follow can be done.

References

1. Salzman B. Gait and balance disorders in older adults. Am Fam Physician. 2010 Jul 1; 82(1): 61-8.
2. Enix DE, Flaherty JH. Balance Problems in the Geriatric Patient. Interagitative health care. 2011; 2(1): 1-11
3. Gusi N, Adsuar JC, Corzo H, del Pozo-Cruz B, Olivares PR, Parraca JA. Balance training reduces fear of falling and improves dynamic balance and isometric strength in institutionalised older people: A randomised clinical trial. Journal of physiotherapy. 2012 Jun 30; 58(2): 97-104.
4. Bird ML, Hill KD, Fell JW. A randomized controlled study investigating static and dynamic balance in older adults after training with Pilates. Archives of physical medicine and rehabilitation. 2012 Jan 31; 93(1): 43-9.
5. M. Runge, G. Rehfield, E Resnick. Balance training and exercises in geriatric patients. J Musculoskeletal Interaction. 2000; 1: 54-58.
6. Gardner JM. Neurology Falls. Patient Falls Risk Assessment, Neurology Clinic, Johns Hopkins Hospital, Baltimore, MD. 2009 Jul 6.
7. Faber MJ, Bosscher RJ, van Wieringen PC. Clinimetric properties of the performance-oriented mobility assessment. Physical Therapy. 2006 Jul 1; 86(7): 944-54.
8. Podsiadlo D, Richardson S. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. Journal of the American geriatrics Society. 1991 Feb 1; 39(2): 142-8.
9. Hyun J, Hwangbo K, Lee CW. The effects of pilates mat exercise on the balance ability of elderly females. Journal of physical therapy science. 2014 Feb; 26(2): 291.
10. Iwamoto J, Suzuki H, Tanaka K, Kumakubo T, Hirabayashi H, Miyazaki K, Matsumoto H. Preventive effects of exercise against falls in the elderly: A randomized controlled trial. Osteoporos Int. 2009; 20: 1233-1240
11. Kaesler DS, Mellinfont RB, Swete K, Taaffe DR. A novel balance exercise program for postural stability in older adults. J Bodyw Mov Ther. 2007; 11: 37-43.

12. Appell IP, Pérez VR, Nascimento MD, Coriolano HJ. The Pilates method to improve body balance in the elderly. *Archives of Exercise in Health and Disease.* 2012 Dec 1; 3(3): 188-93.
 13. Kloubec JA. Pilates for improvement of muscle endurance, flexibility, balance, and posture. *J Strength Cond Res.* 2010; 24: 661-667
 14. Marie loiuse, Bird M.L. To evaluate the effect of the Pilates intervention on balance and function in older community dwelling adults, *Arch of phys med rehabilitation.* 2012; 93: 43-9.
 15. Ribeiro F, Oliveira J. Aging effects on joint proprioception: The role of physical activity in proprioception preservation. *Eur Rev Aging Phys Act.* 2007; 4: 71-76.
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Bias in Epidemiology

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Abstract

All study designs have an inherent nature of incorporating errors in the various stages of implementation of a study. The major limitations that arise while deriving inferences in epidemiological study designs are chance, bias and confounding which if unidentified results in invalid findings and distortion of the final estimates. Bias is a systematic, non-random error, foreseen in all epidemiological study designs. It has to be avoided at all phases i.e. design, conduct, analysis or during the reporting phase of study design. A mistaken estimate of an exposure's effect on the risk of disease occurs, unless avoided.

Keywords: Bias; Epidemiology; Error; Review; Systematic Error.

Introduction

One of the prime aims in epidemiology is to find out the association between a given variable and an outcome of interest, which may or may not refute causal inferences. All study designs have an inherent nature of incorporating errors in the various stages of implementation of a study. Most of them are introduced unintentionally which can be avoided by attentively creating a sound study design with provisions for identifying and minimizing such errors or methods for counteracting these errors during the analysis phase. Despite, the various measures taken to eliminate these biases, some of them are inevitable which might distort the study estimates significantly.

Hence, this article is written with the objective to describe the types of bias that are inherent in the various epidemiologic study designs and measures or methods taken to eliminate them.

Major Issues in Epidemiological Studies

The major limitations that arise while deriving inferences in epidemiological study designs are

chance, bias and confounding which if unidentified results in invalid findings and distortion of the final estimates. The first two are considered as errors.

Types of Errors

The first one described as Random error occurs due to chance and the latter called bias is a systematic error.

Random Error

In random error, there is a deviation from the true value which is an inherent problem with sampling as the whole population cannot be studied. Since it is at random, the deviation sometimes adds to the estimate and sometimes takes from it. When a large sample or several small samples are studied these deviations cancel each other out. This phenomena is due to "chance" and, as such, is unpredictable. E.g.: Sack of grains: Weevil.

Methods to Overcome Random Errors

- By taking adequately a large sample
- Statistical procedures to calculate the probability by which our result may differ from the true value in the "total population", because of random error.

Bias Definition

Bias has been defined as "any systematic error in

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the design, conduct or analysis of a study that results in a mistaken estimate of an exposure's effect on the risk of disease" [1].

Bias is a systematic, non-random error, foreseen in all epidemiological study designs. It has to be avoided at all phases i.e. design, conduct, analysis or during the reporting phase of study design. A mistaken estimate of an exposure's effect on the risk of disease occurs, unless avoided [2].

Bias is also defined as an inclination, predisposition, partiality, or prejudice that well-meaning, but inexperienced, investigators can inflict on the performance of a study [2]. It is one of the important issues in deriving causal inferences. Bias is universal and cannot be totally eliminated; hence measures should be taken to minimize them.

Types of Bias:

Bias encountered in epidemiological studies are broadly classified under three headings,

- Selection bias
- Information bias/Measurement bias
- Confounding bias
- Miscellaneous

Selection bias

Selection bias arises when the method used to select and enroll subjects are faulty which distorts the characteristics of the study groups [2]. When cases and controls or exposed and non-exposed individuals, are selected such that an apparent association is observed, although in reality, exposure and disease are not associated the results indicate an apparent association which is the result of selection bias.

Every study conducted in human population selects study subjects from a larger population. The nature of this selection potentially affects the generalizability or external validity of the study but does not necessarily affect the validity of the comparisons made within the study or the study's internal validity. On the other hand, when a systematic error is made in selecting one or more of the study groups that will be compared, selection bias may result. Such bias can result in incorrect estimates of odds ratios or relative risk and consequently lead to invalid inferences regarding association of exposure and disease. Selection bias is therefore an error in selecting a study group or groups within the study and can have a major impact on the internal validity of the study and the legitimacy of the

conclusion.

Different types of Selection Bias

Survival bias

It occurs when survivors of a highly lethal disease are more likely to enter a study than other cases.

When we study the role of age as a potential risk factor for viral hemorrhagic fever (VHF), and include only those who are still alive at the time of the study and if older age is associated with increased risk of VHF death, it will decrease the proportion of cases over a certain age in the study, and consequently underestimate the odds ratio.

Detection Bias/Diagnostic Bias/Ascertainment Bias

It is a form of bias that arises through a relation between the exposure and the probability of detecting the event of interest.

For example, a case control study stating women on oral contraceptive pills will have more frequent cervical smears than those who are not, and as a consequence there is a likelihood of detection increases due to frequent screening which can be attributed due to ascertainment bias.

Berksonian Bias

It arises due to the differential rate of admission in hospitals owing to the fact that those who receive medical care are dissimilar and not representative of the general population, or necessarily of all ill persons [3].

For example, the mortality rates in institutional deliveries are higher than for home deliveries, from which one might infer that home deliveries are safer than hospital deliveries which is a fallacy. It arises because of the health seeking behaviour of the complicated cases as compared to the normal ones.

Neyman's Fallacy (Incidence-Prevalence Bias)

When a series of survivors are selected and if the exposure is related to prognostic factors, or the exposure itself is a prognostic determinant, the sample of cases offers a distorted frequency of the exposure

Example: Relationship between sex and risk of colorectal cancer. Incidence of colorectal cancer is slightly higher in males than females. However survival from colorectal cancer is significantly longer in females than males. Since the female colorectal cancer patients live longer than males, a sample of

prevalent cases will include a higher proportion of women than a corresponding sample of incident cases. This results in an apparent inference that incidence of colorectal cancer is more in women than men.

Exclusion Bias

When controls with conditions related to the exposure are excluded, whereas cases with these diseases as co morbidities are kept in the study, we introduce what is known as an exclusion bias.

For example, Heinonen et al reported a matched-pair case control study carried out on surgical patients at a hospital in Helsinki, where women with breast cancer were compared to women without breast cancer admitted for surgical treatment for other benign conditions, in terms of use of reserpine. In selecting the controls, the authors excluded women with the following operations: cholecystectomy, thyroidectomy for thyrotoxicosis, surgery for renal disease, and any cardiac operation, sympathectomy, or vascular graft for which reserpine was used as treatment. They were excluded because the prevalence of reserpine use in the controls would be artificially high, so that even if reserpine use was increased in breast cancer cases, the increase might not be detected. Unfortunately, by excluding patients with these conditions from the controls, they created a control group in which the prevalence of reserpine use was artificially lower because a large group of potential reserpine users were excluded. Thus, even if in reality reserpine use was not increased in women who developed breast cancer, this study could have shown a difference in reserpine use between the cases and the controls only because of the way the controls were selected.

Bias from Non-Response or Loss to Follow up

Non participation and non-response rates can introduce major biases that invalidate the results. Similarly, loss to follow up can be a serious problem. If people with the disease are selectively lost to follow up, the incidence rates calculated between the exposed and non-exposed groups will clearly be difficult to interpret.

Length Time Bias

Length time bias is often discussed in the context of the benefits of cancer screening, where it can lead to the perception that screening leads to better outcomes when in reality it has no effect.

An example: Fast-growing tumors generally have a shorter asymptomatic phase than slower-growing tumors, which means a shorter latent period but, not large enough to cause symptoms, which would cause the patient to seek medical care and be diagnosed without screening. If the same number of slow-growing and fast-growing tumors appear in a year, the screening test will detect more slow-growers than fast-growers and if these slow growing tumors are less likely to be fatal than the fast growers are, the people whose cancer is detected by screening will do better, on average, than the people whose tumors are detected from symptoms (or at autopsy), even if there is no real benefit to catching the cancer earlier. This can give the impression that detecting cancers through screening causes cancers to be less dangerous, when the reality is that less dangerous cancers are simply more likely to be detected by screening.

Healthy Worker Effect

A comparison between health status of military and civilian population may show a better health status among the soldiers which may be attributed to the pre employment medical examination during which the 'unfit' persons are excluded and only 'healthy workers' are included in the army. The basic dictum of selection and comparisons in research should be to "compare likes with likes".

Information Bias

Distortion in the estimate of effect of interest when the measurement of either the exposure or disease is systematically inaccurate. This may occur when there are errors leading to misclassification in exposure and disease status. It is a systematic error in the measurement of information on exposure or outcome.

Types

Misclassification Bias-Non Differential and Differential

Non-differential bias is a random error, unrelated to exposure or outcome status and weakens the measure of association. It results from the degree of inaccuracy that characterizes how information is obtained from any study group, either, cases and controls or exposed and non-exposed persons. Such misclassification is not related to exposure status or to case or control status. It is due to an inherent problem in the data collection methods. The usual effect of non-differential misclassification is that the relative risk or odds ratio tends to be diluted, and it is

shifted toward 1.0. In other words, we are less likely to detect an association even if one really exists.

In contrast, differential bias is a systematic error, related to exposure or outcome status and the measure of association can be distorted in any direction. An example of women who had a baby with a malformation tend to remember more mild infections that occurred during their pregnancies than did mothers of normal infants. Thus, there was a tendency for differential misclassification with regard to prenatal infection, such that more unexposed cases were misclassified as exposed than were unexposed controls. The result was an apparent association of malformations with infections, even though none existed. So a differential misclassification bias can lead either to an apparent association even if one does not really exist or to an apparent lack of association when one does in fact exist.

Misclassification can be Due to,

1. Misclassification of disease: Misclassifying cases as controls and controls as cases in a case control study might arise due to limited sensitivity and specificity of the diagnostic tests or from inadequacy of information collected from medical records.
2. Misclassification of exposure: Misclassification due to inaccurate exposure status based on erroneous reporting in interviews or incomplete records.

Recall Bias

If the presence of disease influences the perception of its causes (*ruminative bias*) or the search for exposure to the putative cause (*exposure suspicion bias*), or in a trial if the patient knows what they receive may influence their answers (*participant expectation bias*). This bias is more common in case-control studies, in which participants know their diseases, although it can occur in cohort studies and clinical trials without participant blinding. An example, is workers who have known about their exposure to hazardous substances may show a trend to report more the effects related to them,

Interviewer Bias/Observer Bias

The knowledge of the hypothesis, the disease status, or the exposure status (including the intervention received) can influence data recording (*observer expectation bias*). The means by which

interviewers can introduce error into a questionnaire include administering the interview or helping the respondents in different ways (even with gestures), putting emphases in different questions, and so on. A particular situation is when the measure of an exposure influences its value (for example, blood pressure) (*apprehension bias*).

Reporting Bias

If subject is reluctant to report an exposure he is aware of because of attitudes, beliefs and perceptions, reporting bias can result.

Example, the relationship of induced abortion to risk of breast cancer. It was suggested that reporting bias might have played a role in those case control studies that reported a positive association. For example, healthy controls may have been more reluctant than women with breast cancer to report that they had had an induced abortion.

Surveillance Bias

If a population is monitored over a period of time, disease ascertainment may be better in the monitored population than in the general population, and may introduce a *surveillance bias*, which leads to an erroneous estimate of the relative risk or odds ratio.

For example, the possible relationship of oral contraceptive use to thrombophlebitis. It was suggested that physicians monitored patients who had been prescribed oral contraceptives much more closely than they monitored the other patients. As a result, they were more likely to identify cases of thrombophlebitis that developed in those patients who were taking oral contraceptives who were closely monitored than other patients who were not so well monitored.

Hawthorne Effect

Described in the 1920s in the Hawthorne plant of the Western Electric Company.

According to legend, worker productivity improved at the Hawthorne plant of the Western electric company not only when the illumination was increased, but also later when it was decreased. The reason for this was supposed to be the attention paid to the workers by the researchers and not the lighting itself.

For example, laboratory physicians increase their agreement rate after knowing that they participate in a research on reliability of diagnostic tests.

Lead Time Bias

Lead time is added time of illness produced by the diagnosis of a condition during its latency period. This bias is relevant in the evaluation of the efficacy of screening, in which the cases detected in the screened group has a longer duration of disease than those diagnosed in the non-screened one.

Protopathic Bias

When an exposure is influenced by early (subclinical) stages of disease. For instance, preclinical pancreatic cancer can produce diabetes mellitus, and thus an association between diabetes and cancer can occur. It is also produced when a pharmaceutical agent is prescribed for an early manifestation of a disease that has not yet been diagnosed.

The sick quitter bias is related to protopathic bias: people with risky behaviors such as heavy alcohol consumption, quit their habit as a consequence of disease; studies analyzing current behavior as a risk factor will label them as non-exposed, thus underestimating the true association.

Will Rogers Phenomenon

The improvement in diagnostic tests refines disease staging in diseases such as cancer. This produces a stage migration from early to more advanced stages and an apparent higher survival. This bias is relevant when comparing cancer survival rates across time or even among centers with different diagnostic capabilities. For example, tertiary compared with primary care hospitals.

Work up Bias

It arises while assessing the validity of a diagnostic test, when the execution of the gold standard is influenced by the results of the assessed test; typically the reference test is less frequently performed when the test result is negative. This bias is increased when the clinical characteristics of a disease influence the test results.

Confounding Bias

Confounding biases are the biases that arise due to presence of certain confounding factors.

Confounding

Confounding is a distortion of the association between exposure and outcome brought about by the

association of another, extraneous exposure (Confounder) with both the disease and the exposure of interest.

Properties of Confounder

- Associated with both the exposure and the disease
- Distributed unequally between the study and the control group
- Independent risk factor for disease

A confounder cannot be an intermediate variable in the causal pathway between the exposure of interest and disease.

Miscellaneous

Ecological Fallacy

Is an error in inference that occurs when association observed between variables of a group level, is assumed to exist at an individual level.

Correlation between Dietary Fat Intake and Breast Cancer by Country

One of the very well quoted studies on women's health obtained data from 20 developed countries from western Europe, USA, Australian, New Zealand and Eastern Asian regions. National data was obtained on per capita consumption of fats in diet as well as incidence of female breast cancer in these countries. (They obtained data from the cancer registries of these countries as regards breast cancer incidence, and from the central marketing organizations of these countries as regards sales of edible fats.)

The results very clearly showed that as per capita consumption of fat in a country increased, the incidence of breast cancer also increased. This finding could compel us to finally agree that dietary fat is a risk factor for breast cancer.

Publication Bias

Regarding an association that is produced when the published reports do not represent the studies carried out on that association. Several factors have been found to influence publication. The most important being statistical significance, size of the study, funding, prestige, type of design, and study quality.

Post Hoc Bias

Another source of potential bias is the use of data

from a cohort study to make observations that were not part of the original study intent. Thus interesting relationships that were not originally anticipated are often observed in cohort studies. These findings should be treated as hypothesis that is an appropriate subject for additional studies.

Biases in Randomized Controlled Trials

During Randomization

Selection Bias

- Subversion of randomization due to inadequate concealment of allocation E.g.: RCT comparing open versus laparoscopic appendectomy
- Withdrawals (New drug* Multiple sclerosis)
- Loss to follow up (RCT comparing medical versus surgical management of cerebrovascular disease)
- Competing risks
- Contamination (E.g.: Awareness regarding menstrual hygiene)

Ascertainment bias

Minimized by blinding

Overcoming bias

Methods to overcome selection bias

- Ensure blinding - definitely in an experimental design
- If possible, do not tell research hypothesis to the subjects (helps preventing recall bias)
- In a follow - up study (cohort study or clinical trial), take a well-defined population to avoid loss to follow up; develop methods to retrieve those subjects who are getting lost to follow up.
- Select two or more than 2 “groups” of controls in a case control study (e.g. one from hospital and another healthy group); try and take different categories of diagnoses if selecting hospital controls.
- In cohort or experimental studies (follow - up studies) specify clearly the future dates of examination and examine all subjects of both groups at the pre - decided dates using “similar” methods of history taking, physical examination and investigations, and measures to minimise loss to follow up.
- In a case control study, use the correct time frame for recording exposure (e.g. for a study between pneumonia and cold exposure, the time frame

should be 6 days and not 6 months).

- In a case control study, ensure that cases and controls are chosen from the same “source” population; and that cases and controls have the same “selection factors” for getting admitted to that particular hospital.
- ❖ Is there any possibility of “survivorship” bias?
- ❖ Is the disease such that the initial symptoms may have led to a change in exposure? (e.g. initial dyspeptic symptoms of gastric CA may cause the patient to give up tobacco).
- ❖ Did the controls have a reasonable chance of being exposed to the factor of interest? (Hysterectomised women in any case do not have a ‘chance’ of exposure to OC, so do not keep them in controls in an Oral Contraceptives Thromboembolism study).
- In an experimental design (clinical trial), ensure Random allocation, Blinding and Placebo control.

Methods of Dealing with Information Bias

- Standardize measurement instruments
- Administer instruments equally to cases and controls (Exposed/Unexposed)
- Use multiple sources of information
 - Questionnaires
 - Direct measurements
 - Registries
 - Case records
- Use multiple controls
- Closed, precise questions, minimize open ended questions
- Seek information on hypothesis through different questions
- Disguise questions on hypothesis in range of unrelated questions
- Field test and refine
- Standardize interviewers technique through training with questionnaires

Methods of Dealing with Confounding Bias

Control During Designing Stage

Randomization

It can be done only in experimental study designs.

Randomization is a statistical procedure by which

the participants are allocated into groups usually called "study" and "control" groups, to receive or not to receive an experimental preventive or therapeutic procedure, maneuver or intervention.

The two groups will be "similar" to each other not only in respect of all "known possible confounding factors" (age, sex, blood groups and so on) but also in respect of those factors which may be "confounders" unaware of (e.g. HLA type and, may be, the average number of hair on the head). The two groups will be absolutely similar to each other with the only difference being that one group gets the trial modality while the other will get the control modality.

Restriction

We can so plan our study that the subjects having the particular confounding variable(s) are not taken up at all; e.g. in a study of the possible association between physical inactivity and IHD, young age (< 35 years) and female sex may be the possible confounding factor. In this case, we may restrict our study to "only males more than 35 years of age".

The difficulty with restriction is that one tends to exclude out a lot of potential subjects, thus increasing the cost and effort of study; Secondly, the effect of the variables on which restriction has been done cannot be studied - e.g. in this example, the role of female sex and younger age cannot be studied.

Matching

Matching is defined as the process by which we select controls in such a way that they are similar to cases with regard to certain pertinent selected variables (e.g., age) which are known to influence the outcome of disease and which if not adequately matched for comparability, could distort or confound the results.

Adjustment During Analysis

Stratified Analysis

Here we make two strata, one with the confounder (tobacco users) and one without the confounder (non-users). If the risk in individual stratum is the same as overall risk, then there is no confounding. On the other hand, if the odds ratios in the strata are very different from the overall OR (e.g. alcohol - oral CA study, the overall OR was 16 but the stratum OR after

adjusting for tobacco was 1 each), we would conclude that there is confounding.

In stratified analysis, we use certain specialized statistical procedures such as Mantel – Haenszel adjustment technique to calculate the adjusted estimates, which give us the estimate of risk due to the exposure variable, after adjusting for the effect of the confounding variable.

Multiple Regression Analysis in the Control of Confounding

While stratified analysis is very effective in control of confounding during analysis, however, if there are a large number of confounding factors, then a large number of strata will have to be made and the individual figures in the individual strata will become very small, often zero. This is the limitation of stratified analysis. In such cases one has to resort to regression analysis.

References

1. Park K. Textbook of Preventive and Social Medicine. 23rd ed. Jabalpur; BanarsidasBhanot: 2011.
2. Gordis L. Epidemiology. 3rd ed. Elsevier Saunders: Philadelphia; 2004.
3. Bhalwar R. Text book of Public Health and Community Medicine. 1st ed. Department of Community Medicine AFMC Pune.2009.
4. Morgenstern H. Ecological studies. In: Rothman k, Lash TC, Greenland S, editor. Modern epidemiology. 3rd ed. Lippincott Williams and Wilkins: Philadelphia. 2008; p.511-531.
5. Macmohan B. Epidemiology, Principles and Methods. 1st ed. Little, brown and company: Boston; 1970.
6. Abramson J H. Survey Methods in Community Medicine. Churchill Livingstone. 1974.
7. CMC Vellore "Epidemiology and biostatistics course" notes.
8. Bias. Delgado-Rodríguez M, Llorca J. J Epidemiol Community Health. 2004; 58: 635-641.
9. Hennekens CH, Buring JE. Epidemiology in Medicine, Lippincott Williams & Wilkins, 1987
10. Caroline A. Macera, Richard Shaffer, Peggy M. Introduction to Epidemiology: Distribution and Determinants of Disease. Delmar Cengage Learning. United States. 2013-152.

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Alcoholism: A Social Menace

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Abstract

Alcohol consumption is linked to many harmful consequences for the individual drinker, the drinker's immediate environment and society as a whole. Such social consequences as traffic accidents, workplace-related problems, family and domestic problems, and interpersonal violence have been receiving more public or research attention in recent years, indicating a growing interest in a broader concept of alcohol-related consequences.

Keywords: Alcoholism; Social Menace.

Introduction

Globally, alcohol problems exert an enormous toll on the lives and communities of many nations, especially those in the developing world. The patterns of alcohol intake around the world are constantly evolving, and alcohol is common today.

People today celebrate every festival. They need no excuse of celebrations to drink. Liquor, brandy, whisky, rum or beer, whatever be the brand, these are the main ingredients of peoples celebrations. Festivals may be different but drinks are common.

For anything and everything they are going in search of alcoholic drinks, birth or death, success or failure, happiness or grief, alcohol lead the way. But in festive celebrations they forget themselves and take more and more than regular menu. Unemployment or poverty never affects drunkard's life. By all means they make sure to get their favorite brands.

Young people, especially teenagers, are more sensitive to alcohol use because their bodies and brains are still developing.

Kerala has the highest per capita alcohol consumption in the country with 8.5 liters alcohol per person. There is also a limited awareness among most of the people regarding the physical and psychological consequences of alcohol use.

Early identification and education may be effective with "at risk" drinkers in reducing serious health problems ad dependence.

A series of studies conducted by ADIC-India from 1986 to 2006 reveals alarming increase and shocking patterns of alcohol use among the young generation. This also leads to increase in criminality and other vices.

The significant trends observed in Kerala are lowering in the age of initiation, alarming increase in the young drinking population and more girls and young women turning to alcohol in spite of strong religious and cultural taboos. "The main factors for the trend are the impact of globalization and liberalization policies, easy availability, starting of more beer parlours, and the influence of cinema and television serials and the influence of Alco-pub culture. The high-paying jobs that youth land up in nowadays leave them with a disposable income that becomes a contributing factor".

Even one or two drinks can result in changes in behavior and a decrease in one's ability to think clearly – both concentration and judgment become impaired. If alcohol consumption is excessive, the drinker will become intoxicated.

Effects of Alcoholism

Alcohol consumption is associated with liver and pancreatic disorders. Recurrent stomach disorder, hypertension, stroke damage to brain, liver and heart, domestic, occupational and road traffic accidents and injury can result from quite light or moderate drinking.

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Gastrointestinal Problems

Inflammation of lining of stomach (gastritis) interference with absorption of vitamin B particularly folic acid and thiamine and other nutrients are associated with alcohol intake. Chronic alcoholism can produce cirrhosis of liver and fatty infiltration of the liver. In cirrhosis of liver there will be the fibrous scar tissue formation in the liver manifested by jaundice, fatigue, loss of appetite, weight loss, anemia, nausea, vomiting, abdominal pain, acites and other disturbances which lead to liver dysfunction.

Increased Risk of Cancer

Chronic alcohol abuse has been linked to higher risk of numerous cancers including cancer of mouth, pharynx, esophagus, larynx, liver colon and rectum. Excessive drinking can affect nervous system causing numbness of hands and feet, hangover, disordered thinking, slurred speech, loss of muscle control, dementia.

Alcohol may interfere with the production of new bone. This can lead to thinning bones and an increased risk of fractures.

Pregnancy Risks

Alcohol can cause numerous birth defects, the most serious being foetal alcohol syndrome. Babies born with foetal alcohol syndrome will have physical abnormalities, mental impairment and problems with behavior.

Conclusion

Alcohol consumption is associated with physical, psychological and social consequences. While it carries connotations of pleasure and sociability in the minds of many, harmful consequences of its use are diverse and widespread. To reduce the harmful social and health consequences of alcohol use much preparation and Planning is required. It is our

responsibility to encourage health awareness and formulate effective public health-oriented countermeasures in order to minimize the use of alcohol

References

- Hingson RW, Heeren T, Zakocs RC, et al. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18–24. *J Stud Alcohol*. 2002; 63(2): 136–144.
- White AM, Kraus CL, Swartzwelder H. Many college freshmen drink at levels far beyond the binge threshold. *Alcohol Clin Exp Res*. 2006; 30(6): 1006–1010.
- Slutske WS. Alcohol use disorders among US college students and their non-college-attending peers. *Arch Gen Psychiatry*. 2005; 62(3): 321–327.
- Wechsler H, Lee JE, Kuo M, et al. College binge drinking in the 1990's: a continuing problem: results of the Harvard School of Public Health 1999 College Alcohol Study. *J Am Coll Health*. 2000; 48: 199–210.
- Hingson R, Heeren T, Winter M, et al. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18–24: changes from 1998 to 2001. *Ann Rev Pub Health*. 2005; 26: 259–279.
- Paschall MJ. College attendance and risk-related driving behavior in a national sample of young adults. *J Stud Alcohol*. 2003; 64(1): 43–49.
- Wechsler H, Dowdall GW, Maenner G, et al. Changes in binge drinking and related problems among American college students between 1993 and 1997. Results of the Harvard School of Public Health College Alcohol Study. *J Am Coll Health*. 1998; 47: 57–68.
- Johnston LD, O'Malley PM, Bachman JG, et al. Monitoring the Future: national results on adolescent drug use: overview of key findings 2005 (online) [Accessed July 5, 2006]. Available at: <http://monitoringthefuture.org/pubs/monographs/overview2005.pdf>.
- O'Hare TM. Drinking in college: consumption patterns, problems, sex differences and legal drinking age. *J Stud Alcohol*. 1990; 51: 536–541.
- Engs RC, Diebold BA, Hansen DJ. The drinking patterns and problems of a national sample of college students, 1994. *J Alcohol Drug Educ*. 1996; 41(3): 13–33.

The Missing Daughters

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Abstract

Female infanticide is the deliberate killing of newborn female children. In countries with a history of female infanticide, the modern practice of sex-selective abortion is often discussed as a closely related issue. Female infanticide is a major cause of concern in several nations including India. It has been argued that the "low status" in which women are viewed in patriarchal societies creates a bias against females. Concerted efforts to break the gender stereotypes particularly at the +2 level. Conscious inputs into curriculum, textbooks, teacher education institutional planning supported by career guidance, counseling. Special awareness generation programmes and campaigns to sensitize the public.

Keywords: Infanticide; Children; Daughters.

Introduction

Missing daughters is the number of difference between 952 and daughters actually born per 1000 boys born in the region. Sex-ratio in India is the number of females per 1000 males (all ages) and in many other countries sex-ratio is the number of males per 100 females. Sex-ratio at birth (SRB) is the number of females born per 1000 males born. Child Sex Ratio (CSR) is the number of female children (0-6 years) per 1000 male children as per census; however now 0-4 yrs age group is taken up as CSR [1].

Missing Daughters in the Last Decade

Biological sex-ratio in India is the number of female babies born per 1000 male babies born naturally. At the Inter-National level 105 boys are born naturally for every 100 girls-born. It is by virtue of better survival of the females which leads to a normal sex-ratio of 1:1 at adulthood naturally.

National Alarm

Child Sex Ratio in India declined from 927 in the yr. 2001 to 914 in the yr 2011.5 million daughters (0-6 yrs) missing in the country in last decade. Out of this, about 2 million addition during this decade only [2].

STATE	CSR 2001	CSR2011	Decline/1000
J &K	941	859	82
Dadar & N Haveli	979	924	55
Maharashtra	913	883	30
Rajasthan	909	883	26
Uttarakhand	908	886	22
M.P	932	912	20
U.P	916	899	17

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States where CSR Improved

STATE	CSR 2001	CSR 2011	Improvement
Punjab	798	846	48
Chandigarh	845	867	22
Haryana	819	830	11
Himachal Pradesh	896	906	10

Causes of Missing Daughters

- Mainly social e.g. dowry, domestic violence, social security, honor, eve-teasing, division of land, 'vansh' etc. leading to son preference.
- Marriages of daughters becoming all the more expensive and finding grooms becoming all the more difficult.
- Most important is the availability of sex determination/selection techniques [3].
- Increased female IMR, due to poor attention of daughters, adding to missing daughters.

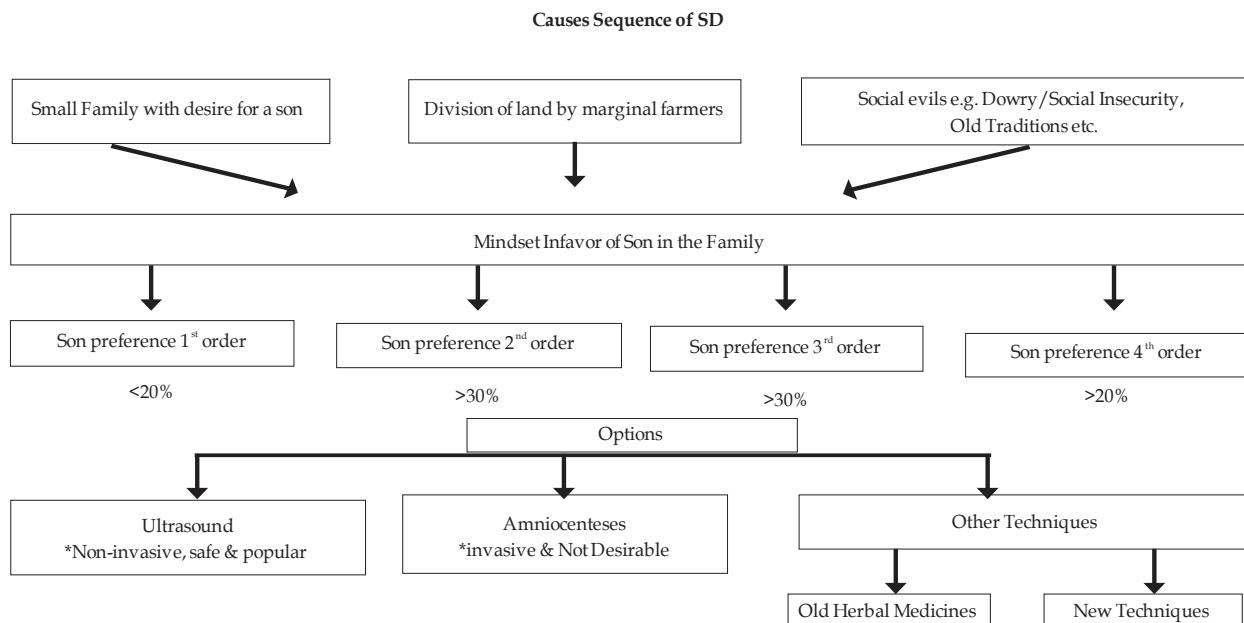


Fig. 1. Causes of Sharp Decline in CSR in Last Two Decades

Due Mindset or Misuse of Medical Technology?

What is mindset?

It is a Manifestation of:

1. Desire (small family but with a son).
2. Prevailing tradition (century old tradition of favor and craving for boys).
3. Available resources (misuse of technology of ultrasonography, misuse of abortion facilities, money for misuse of technology)[4].
4. Commercial angle (comparison of son with buffalo/cow i.e. sex does not matter when visualized from commercial angle)[5].

Prevention of Female Feticide/ Infanticide

Legal Initiative

To check female foeticide, the Pre-Natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994 was enacted [6].

Awareness Campaign

To implement the provisions of the Act the help of media units like AIR, Doordarshan, Song and Drama Division, Directorate of Field Publicity, Press Information Bureau, Films Division and DAVP is also being sought. Workshops and seminars have been organized through voluntary organizations at State, regional, district and all block levels to create awareness against this social evil.

Eradication of Sex

Related Harmful Practices: The community, too acts in strange ways to perpetuate the crime by ridiculing couples who do not have a male child illiteracy, ignorance of the welfare scheme available for the girl child and poverty alleviation and the legal implication of indulging in female infanticide, and the dowry system are some of the reasons for failure of the schemes and interventions undertaken by the government and NGOs to eradicate female infanticide[7].

The Long-Term Strategies should Include Education and Empowerment of Women

- Gender sensitive monitoring in mortality starting from the field level. Priority will be given for educating parents on the importance of providing adequate food for the girl child.
- Extensive use of media for the sensitive promotion of a positive image of women and girls.
- Development of school based strategies for inculcating of positive self-image amongst girls [8,9].
- Concerted efforts to break the gender stereotypes particularly at the +2 level. Conscious inputs into curriculum, textbooks, teacher education institutional planning supported by career guidance, counseling. Special awareness generation programmes and campaigns to sensitize the public.
- NGOs working in affected community areas must build up legal and social pressure to counter this practice.
- Intervention programmes for dais can be implemented.
- Reporting of these deaths must be systematized[10-12].

Conclusion

The life of a girl is not so easy, the battle for her life commences right from the day she is conceived in her mother's womb. Her survival and existence is similar to game of Pitch and Toss. The statistics show that 10 million female foetuses have been aborted in India. Moreover, the ratio of girls to that of the boys is decreasing day by day. The time has come when we need to focus on the implication rather than making out fruitless strategies. Unless we take a step ahead,

these practices will continue to flourish. The result will end up in the sex selective abortions and no sooner women will enter into the list of endangered species

We should notice the reasons for female foeticide in the Indian society and try to solve one by one on regular basis. Female infanticide or female feticide is mainly because of the sex determination. There should be legal stoppage to get control over it. All the laws should be strictly followed by every citizens of India. And one should be surely punished if found guilty for this cruel practice. Permanent termination of license should be done if found practicing this. Marketing of medical equipments especially for illegal sex determination and abortion should be stopped. Parents should be penalized who want to kill their girl baby. Campaigns and seminars should be regularly organized to aware young couples. Women should be empowered so that they can be more attentive to their rights.

References

1. Census of India: Provisional Population Totals 2011: India: Census 2011. (2011). doi: http://censusindia.gov.in/2011-prov-Results/data_files/india/pov_popu_total_presentation_2011.pdf
2. Graham, Ruth H., Rankin, Judith M, Robson, Stephen C. "Understanding feticide: An analytic review. Social Science and Medicine. 2008; 66: 289–300.
3. Gupta, O.P., Pandey, N.L. Legalization of Abortion in India, US National Library of Medicine, National Institutes of Health. doi: <http://www.ncbi.nlm.nih.gov/pubmed/12336413>.
4. Prabhat Jha et. all. (2011). doi: <http://cghr.org.wordpress/wp-content/uploads/Trends-in-selective-abortions-of-girls-in-India-2011.pdf>
5. May DA, Herr DM (1968). Son survivorship motivation and family size in India: A computer simulation. Population Studies. doi: <http://www.ncbi.nlm.nih.gov/pubmed/22091610>.
6. Sen, Amartya (1990). More Than 100 Million Women are Missing. The New York Review of Books. doi: <http://www.nybooks.com/articles/archives/1990/dec/20/more-than-100-million-women-are-missing/?pagination=false>
7. Singh, Anoop Urban India pips sex selection, <http://blog-imfdirect.imf.org/2011/10/25/india-linked-or-de-linked-from-the-global-economy/>
8. United States Census Bureau. doi: <http://quickfacts.census.gov/qfd/states/06/0653000.html>
9. UNFPA. Report of the International Workshop on Skewed Sex Ratios at Birth: Addressing the Issue

- and the Way Forward. doi: http://www.unfpa.org/webdav/site/global/shared/documents/publications/2012/Report_SexRatios_2012.pdf
10. Vemuri, Anuradha.(2012). Presentations made by Resource Persons at the PNDT Workshop. UNFPA. doi:<http://india.unfpa.org/drive/PresentationmadeatthePNDTWorkshop.pdf>
 11. UNFPA India, Reports. (2012) Towards a Stronger Implementation of the Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act. doi: http://india.unfpa.org/drive/PCNDTworkshop_report19final.pdf "2 more female foetuses found," Tribune, last updated September 4, 2006, <http://www.tribuneindia.com/2006/20060905/nation.htm#16>.
 12. www.cry.org

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[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. *J Oral Pathol Med* 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Kälestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. *Acta Odontol Scand* 2003; 61: 347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. *Dermatology* 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. *J Periodontol* 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. *Dent Mater* 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM,

editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online – Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ_20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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NEED ASSESSMENT FOR LIFE SKILLS BASED EDUCATION AMONG SCHOOL GOING ADOLESCENTS IN MYSORE

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ABSTRACT

Adolescence, a vital stage of growth and development, marks the period of transition from childhood to adulthood. Adolescents are intensely influenced by their peers and outside world in general. The evidence shows that one in five adolescents experience significant symptoms of emotional distress and nearly one in ten are emotionally impaired. The most common disorders among adolescents include depression, anxiety disorders and attention-deficit hyperactivity disorder and substance abuse disorder. Life skills education can be an important vehicle to equip young people to enable productive participation in society.

OBJECTIVE

To assess the knowledge regarding life skills among adolescents.

METHODOLOGY

A cross-sectional study was conducted among high school children (adolescents) in Mysore city. Information regarding knowledge of life skills among study subjects was collected by administering the questionnaire to all the students studying in 8th, 9th and 10th standard. Data was entered in an excel sheet and analysed using SPSS software 22.0.

RESULTS

Among 347 subjects included in the study, mean age of the students was 14.5+2.9 years. Life skills score was low (<397) among 21.5% of the students, moderate (398-437) among 50.7% and high (>438) among 27.8% of the students. 94% of the students felt that there is need for life skills based education in the schools.

CONCLUSION

Around 1/5th of the adolescents having lower life skills knowledge scores imply that there is a need for school based life skills education among adolescents.

KEYWORDS

Life Skills, Adolescent, School.

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INTRODUCTION: Adolescence, a vital stage of growth and development, marks the period of transition from childhood to adulthood. Adolescents are intensely influenced by their peers and outside world in general. Some 1.2 billion adolescents (10–19 years) today make up 18 percent of the world's population. More than half of all adolescents live in Asia. In absolute numbers, India is home to more adolescents – around 243 million – than any other country.¹ They constitute around 22.8% of the total population in India. Of this, 12% belong to 10-14 years age group and 10% to 15-19 years age group. The evidence shows that one in five adolescents experience significant symptoms of emotional distress and nearly one in ten are emotionally impaired.

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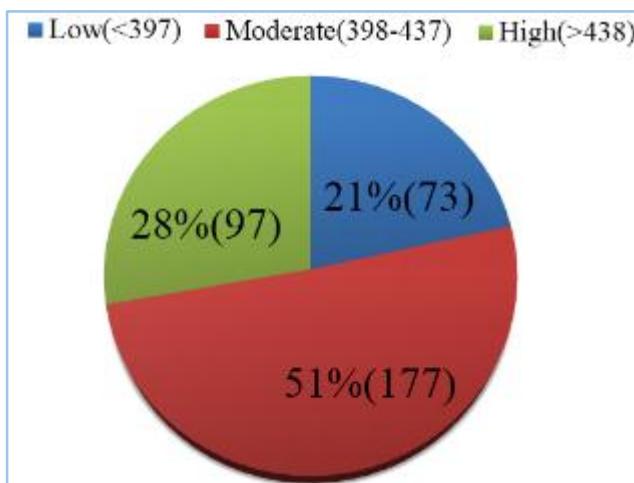
The most common disorders among adolescents include depression, anxiety disorders and attention-deficit hyperactivity disorder and substance abuse disorder. Life skills education can be an important vehicle to equip young people to enable productive participation in society. Life skills have been defined as "the abilities for adaptive and positive behaviour that enables individuals to deal effectively with the demands and challenges of everyday life. The ten core life skills as laid down by WHO are self-awareness, empathy, critical thinking, creative thinking, decision making, problem solving, effective communication, interpersonal relationship, coping with stress, coping with emotion. In this background, the present study was conducted with an objective to assess the knowledge and need regarding life skills based education among adolescent school children.

METHODOLOGY: A cross-sectional study was planned in a selected high school of Mysore city during the month of August 2015. After obtaining Institutional Ethical Committee's clearance, permission from school authorities was obtained.

All the students studying in 8th, 9th and 10th class available on the day of data collection were included for the present study. Students were met and initial rapport was built in their respective classrooms. Verbal consent was obtained from them after briefing them about the purpose of the study. Information regarding knowledge on life skills among study subjects was collected using the questionnaire developed by Vranda et al² after obtaining the permission. Printed forms of questionnaire were distributed among the students and were asked to read and fill it in a designated period of time. Any queries regarding the questionnaire were cleared by the researcher which assisted the students to understand the questions better and reply to it.

The questionnaire contained items related to all the ten life skills: Decision Making (10 Items), Problem Solving (13 Items), Empathy (12 Items), Self-awareness (10 Items), Communication Skills (10 Items), Interpersonal Relationships Skills (18 Items), Coping with Emotions (9 Items), Coping with Stress (9 Items), Creative Thinking Skills (14 Items), Critical Thinking Skills (10 Items). Each item was scored into five different levels: Never (N), Rarely (R), Sometimes (S), Usually (U), Always (A). Each item was entered in excel sheet and analysed using software SPSS version 22.0.

RESULTS: The present study included 347 adolescents. The mean age of the students enrolled in the study was 14.5 years (+2.9 years). It was observed that 48% of the students were females. 94% of the students felt that there is need for life skills based education in the schools. Life skills score was low (<397) among 21.5% of the students, moderate (398-437) among 50.7% and high (>438) among 27.8% of the students. (Graph 1).



Graph 1: Distribution of Study Subjects According to Total Life Skills Score. (n=347)

Life skills	Low	Moderate	High
Decision making	-	41(28.5)	103(71.5)
Problem solving	-	19(13.2)	125(86.8)
Empathy	-	98(68.1)	46(31.9)
Self-awareness	-	22(15.3)	122(84.7)

Communication skills	-	56(38.9)	88(61.1)
Interpersonal relationship skills	-	30(20.8)	114(79.2)
Coping with emotions	1(0.7)	54(37.5)	89(61.8)
Coping with stress	-	55(38.2)	89(61.8)
Creative thinking	-	19(13.2)	125(86.8)
Critical thinking	-	30(20.8)	114(79.2)

Table 1: Distribution of Study Participants According to Awareness Regarding Life Skills (n=347)

Table 1 shows that knowledge level regarding decision making as a life skill was moderate among 28.5% of the adolescents and high among 71.5% of the adolescents. Overall, it was observed that the knowledge regarding life skills was moderate to high among study participants. The study also revealed that around 86% of the students felt that there is a need to include life skills education in their curriculum.

DISCUSSION: A study titled "A study of core life skills of adolescents in relation to their self-concept" developed through Yuva school life skills programme conducted by Dr. Sandhya Khera³, Mrs. Shivani Khoslain, New Delhi investigated the relationship between self-concept and core life skills. The study selected randomly 500 adolescents studying in secondary classes of Sarvodaya schools situated in South Delhi. The Major finding of the study was that there was a positive co-relation between Core Affective Life Skill and Self-concept of adolescents which means those who possess these essential skills are having better confidence in all aspects.

A descriptive cross-sectional survey of adolescents from class VIII, IX, and X of a public co-educational secondary school of Kathmandu.⁴ was done with the help of self-administered questionnaires prepared in English and translated into Nepali. Focus Group Discussions consisting of boys only, girls only and a mixed group comprising of one student from each section of each class were conducted to confirm the results of the study. A total of 347 adolescents participated in the study. 176 adolescents (51%) had life skill scores above the mean, and were termed as having "High level" of life skills and 171 (49%), had "Low level" of life skills scores which is higher than the present study (21.5%), varied questionnaire might be the reason for the same. Mother's education was significantly associated with increased level of life skills in adolescents (P=.001). Most of the teachers were not aware of the concept of life skills. Connectedness and family support were other important factors influencing the level of life skills in the adolescents.

CONCLUSION:

- Life skills education was moderate to high among significant proportion of the study population.
- Life skill management for adolescent is the need of today's world.

- Life Skills Education makes a person "a balanced adult" who contributes meaningfully to society.
- Therefore, life skills education has to be recognised as a methodology to address a variety of issues of child and youth development.

LIMITATIONS:

- The study was limited to a single school as an initial effort towards wider assessment.
- Factors influencing the knowledge regarding life skills were not considered due to time constraint.

REFERENCES

1. Adolescent Health Programme in India. <http://www.azadindia.org/social-issues/adolescent-health-programme-in-india.html>.
2. Vranda MN. Development and standardization of life skills scale. Indian Journal of Social Psychiatry 2009;25(1-2):17-28.
3. Khera S, Khosla S. A study of core life skills of adolescents in relation to their self-concept developed through Yuva school life skill programme. International Journal of Social Science & Interdisciplinary Research 2012;1(11):114-116.
4. Sharma S. Measuring life skills of adolescents in a secondary school of Kathmandu: an experience. Kathmandu University Medical Journal 2003;1(3):170-176.

ASSOCIATION OF ANTHROPOMETRIC PARAMETERS LIKE BODY MASS INDEX, WAIST CIRCUMFERENCE, WAIST-HIP RATIO AS PREDICTORS OF TYPE 2 DIABETES MELLITUS

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ABSTRACT

BACKGROUND

Overweight and obesity have reached epidemic proportions globally with the adoption of westernised lifestyle. The prevalence of Type 2 Diabetes is showing a rapid progression worldwide, a phenomenon largely contributed by increasing prevalence of obesity, body mass index, waist circumference and waist-hip ratio have been shown to be associated with type 2 diabetes.

OBJECTIVES

To study the association of anthropometric parameters like body mass index, waist circumference and waist-hip ratio as predictors of type 2 diabetes mellitus.

METHODS

This cross-sectional study included 125 cases of diabetes compared with 125 age and sex matched controls who visited the Medicine Outpatient Department of JSS Hospital, Mysore, for diabetic care, between November 2007 to June 2009 fulfilling the inclusion and exclusion criteria.

RESULTS

57.1% of the diabetics had BMI in the overweight category and 22.2% were obese, while 41.1% of the controls were in the normal range whereas 51.6% of the female diabetics had BMI in the overweight range and 38.7% were obese, while 44.9% in the control group were in the overweight range and 33.3% had a normal BMI.

CONCLUSION

The present study demonstrated consistently strong associations of body mass index, waist circumference, and waist-hip ratio with diabetes.

KEYWORDS

Diabetes, Waist-Hip Ratio, Body Mass Index.

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INTRODUCTION: Overweight and obesity have reached epidemic proportions globally along with the adoption of a westernised lifestyle characterised by a combination of excessive food intake and inadequate physical activity. The dramatic rise in the prevalence of obesity has resulted in an alarming increase in the incidence and prevalence of Type 2 Diabetes. India is considered the diabetes capital of the world. It is estimated that there are about 39 million diabetics in our country and it is expected to reach 70-80 million by 2030 AD.¹

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Nowhere is the diabetes epidemic more pronounced than in India as the World Health Organization (WHO) reports show that 32 million people had diabetes in the year 2000.² The International Diabetes Federation (IDF) estimates the total number of diabetic subjects to be around 40.9 million in India and this is further set to rise to 69.9 million by the year 2025.³ A study published in the noted medical journal Lancet says India is just behind US and China in this global hazard list of top 10 countries with highest number of obese people.⁴

In 2008, 35% of adults aged 20+ were overweight ($BMI \geq 25 \text{ kg/m}^2$) (34% men and 35% of women). The worldwide prevalence of obesity has nearly doubled between 1980 and 2008. In 2008, 10% of men and 14% of women in the world were obese ($BMI \geq 30 \text{ kg/m}^2$), compared with 5% for men and 8% for women in 1980.⁵

Obesity and overweight are closely associated with development of type 2 diabetes in many studies. Obesity leads to insulin resistance and subsequently type 2 diabetes. The risk of development of diabetes increases two to eight folds at a BMI of 25 kg/m². This risk rises dramatically to 40-90 folds at a BMI above 35 kg/m².⁶ The increased prevalence of type 2 diabetes in obese and overweight individuals is also dependent upon ethnicity. As a race, Asians have a higher risk at a lower BMI, and higher incidence of insulin resistance for given abdominal adiposity. Obesity is determined by an interaction between genetic, environmental and behavioural factors acting through the physiological mediation of energy intake and energy expenditure. Hence, this study was conducted with the objective of studying the association of anthropometric parameters like body mass index, waist circumference and waist-hip ratio as predictors of type 2 diabetes mellitus.

AIMS & OBJECTIVES:

1. To study the association of anthropometric parameters like body mass index, waist circumference and waist-hip ratio as predictors of type 2 diabetes mellitus.
2. To study the association of other risk factors with diabetes.

Methodology: This study included 125 cases of diabetics that were compared with 125 age and sex matched controls who visited the Medicine Outpatient Department of JSS Hospital, Mysore for diabetic care, between November 2007 to June 2009 fulfilling the inclusion and exclusion criteria. The study sample was obtained by simple random sampling technique from the list patients who visited the outpatient department during the defined period.

Inclusion Criteria: All type 2 diabetics of both genders fulfilling WHO diagnostic criteria for diabetes with duration of disease less than 5 yrs. age above 18 yrs. and below 50 yrs., and controls were healthy non-diabetic individuals of both genders.

Exclusion Criteria: Diabetics with complications, patients aged above 50 yrs. and below 18 yrs. pregnant, type 1 diabetics and duration of type 2 diabetes more than 5 yrs. were excluded. Applying statistical calculations, 125 diabetes mellitus cases and equal number of age and sex matched controls were studied. Height was measured to the nearest 0.5 cm by asking the study group to stand with heels, buttocks and shoulders resting lightly against the wall so that the Frankfurt plane is horizontal. Weight is measured to the nearest 0.1 kg by using Doctors Beli Ram and Sons' weighing scale.

Body mass index was calculated by using Quetlet's index (BMI=Weight in Kg/Height in m²).

Waist circumference was measured at halfway between the lower border of the ribs and the iliac crest in a horizontal plane.

Hip circumference is measured at the widest point over the buttocks. Waist-hip ratio is calculated by dividing the mean waist circumference by mean hip circumference. FBS and PPBS were measured by using glucose oxidase method. HbA1C was estimated by using Resin uptake method. By using enzymatic end point method, cholesterol level was measured. HDL was measured by using direct precipitation method and by using Friedewald formula, LDL and VLDL was estimated. Glycerol 3 phosphate oxidase-phenol-aminophenazone method was used to estimate triglycerides. The statistical methods employed in the study were frequencies, descriptive statistics, Chi-square and contingency table analysis.

RESULTS: In this study, comparison of BMI, WC and WHR were done between diabetics and age and sex matched controls. 72.5% of patients belonged to age group range of 41-50 yrs. Among the diabetics, 50.4% were males and 49.6% were females. It was found that 56% of patients had diabetics of less than 1 yr. duration and 16.8% had it for 2-3 yrs. 36.8% of the patients were on dietary treatment and 34.4% on oral hypoglycaemics. 8.8% of diabetics had smoking history whereas in controls it was 24.8%. And this difference was statistically significant ($p=0.001$). 12.8% of diabetics had history of alcohol consumption whereas in controls it was 8.8% ($p=0.308$). Family history of diabetes mellitus was present in 63.2% of the cases, and only 17.6% of the controls and the difference was statistically significant.

Analysis of body mass index in males showed that 57.1% of the diabetics had BMI in overweight category and 22.2% were obese, while 41.1% in the control group were in the normal range of body mass index whereas analysis of body mass index in females revealed that 51.6% of the diabetics had BMI in the overweight range and 38.7% were obese, while 44.9% in the control group were in the overweight range and 33.3% were in normal range and the difference was statistically significant (Table 1).

Analysis of waist circumference in males showed that 44.4% of the diabetics had WC in the range of 90-99, 17.5% had a WC of 100-109 and 7.9% had WC >109, while 32.1% in the control group had WC in the range of 80-89 whereas analysis of waist circumference in females revealed that 35.5% of the diabetics had WC in the range of 80-89, 38.7% had a WC of 90-99 and 14.5% had WC 100-109, while 21.7% in the control group had WC in the range of 80-89 and 39.1% are in the range of 70-79 which was statistically significant (Table 2).

Analysis of waist-hip ratio in males revealed that 30.2% of the diabetics had WHR in the range of 0.90-0.94, 36.5% had WHR of 0.95-0.99, 11.1% had WHR of 1.00-1.04 and 12.7% had WHR >1.05, while 30.4% in the control group had WHR in the range of 0.85-0.89, 1.8% had WHR of 0.80-0.84 and 10.7% had a WHR <0.80. Whereas analysis of waist-hip ratio in females showed that 32.3% had WHR of 0.85-0.89, 35.5% had WHR of 0.90-0.94, 11.3% had WHR of 0.95-0.99 and 8.1% had WHR of 1.00-1.04, while 10.1% in the control group had WHR of 0.80-0.84 and 17.4% had a WHR of <0.80 which was statistically significant. (Table 3)

Similarly, differences in the total cholesterol levels, HDL, LDL, VLDL, triglyceride levels are shown in Table (4, 5, 6, 7, 8).

BMI(Kg/m ²)	Male		Female	
	Diabetics	Controls	Diabetics	Controls
<18.5	0	14(25.0%)	0	11(15.9%)
18.51-23	13(20.6%)	23(41.1%)	6(9.7%)	23(33.3%)
23.1-27.5	36(57.1%)	19(33.9%)	32(51.6%)	31(44.9%)
>27.5	14(22.2%)	0	24(38.7%)	4(5.8%)
Total	63(100%)	56(100%)	62(100%)	69(100%)

Table 1: Body Mass Index in Males and Females

Contingency coefficient: 0.481; p value: 0.000

WC	Males		Females	
	Diabetics	Controls	Diabetics	Controls
<70	0	0	0	4(5.8%)
70-79	1(1.6%)	16(28.6%)	4(6.5%)	27(39.1%)
80-89	18(28.6%)	18(32.1%)	22(35.5%)	15(21.7%)
90-99	28(44.4%)	11(19.6%)	24(38.7%)	17(24.6%)
100-109	11(17.5%)	4(7.1%)	9(14.5%)	4(2.9%)
>109	5(7.9%)	7(12.5%)	3(4.8%)	4(5.8%)
Total	63(100%)	56(100%)	62(100%)	69(100%)

Table 2: Waist Circumference in Males and Females

Contingency coefficient: 0.409, p value: 0.001

WHR	Male		Female	
	Diabetics	Controls	Diabetics	Controls
<0.8	0	6(10.7%)	2(3.2%)	12(17.4%)
0.8-0.84	0	1(1.8%)	3(4.8%)	7(10.1%)
0.85-0.89	6(9.5%)	17(30.4%)	20(32.3%)	18(26.1%)
0.9-0.94	19(30.2%)	12(21.4%)	22(35.5%)	19(27.5%)
0.95-0.99	23(36.5%)	10(17.9%)	7(11.3%)	8(11.6%)
1.00-1.04	7(11.1%)	8(14.3%)	5(8.1%)	4(5.8%)
>1.05	8(12.7%)	2(3.6%)	3(4.8%)	1(1.4%)
Total	63(100%)	56(100%)	62(100%)	69(100%)

Table 3: Waist-Hip Ratio in Males and Females

Contingency coefficient: 0.397, p value: 0.01

Total Cholesterol	Diabetics	Controls	Total
<200	67(53.6%)	116(92.8%)	183(73.2%)
201-250	38(30.4%)	8(6.4%)	46(18.4%)
>251	20(16.0%)	1(0.8%)	21(8.4%)
Total	125	125	250

Table 4: Total Cholesterol Levels

Contingency coefficient: 0.408; p value: 0.000

HDL Level	Diabetics	Controls	Total
<30	50(40.0%)	45(36.0%)	95(38.0%)
31-70	75(60.0%)	78(62.4%)	153(61.2%)
>71	0	2(1.6%)	2(0.8%)
Total	125	125	250

Table 5: HDL Levels

Contingency coefficient: 0.161; p value: 0.036

LDL Levels	Diabetics	Controls	Total
<70	13(10.4%)	28(22.4%)	41(16.4%)
71-100	25(20.0%)	66(52.8%)	91(36.4%)
101-130	42(33.6%)	22(17.6%)	64(25.6%)
>131	45(36.0%)	9(7.2%)	54(21.6%)
Total	125	125	250

Table 6: LDL Levels

VLDL Levels	Diabetics	Controls	Total
<40	90(72.0%)	114(91.2%)	204(81.6%)
>40	35(28.0%)	11(8.8%)	46(18.4%)
Total	125	125	250

Table 7: VLDL levels

Contingency coefficient: 0.240; p value: 0.000

Triglyceride	Diabetics	Controls	Total
<70	0	14(11.2%)	14(5.6%)
71-130	14(11.2%)	43(34.4%)	57(22.8%)
131-190	49(39.2%)	62(49.6%)	111(44.4%)
191-250	29(23.2%)	5(4.0%)	34(13.6%)
>251	33(26.4%)	1(0.8%)	34(13.6%)
Total	125	125	250

Table 8: Triglycerides Levels

Contingency coefficient: 0.486, p value: 0.000.

DISCUSSION: Diabetes Mellitus: More commonly referred to as "Diabetes"- a chronic disease associated with abnormally high levels of the sugar glucose in the blood. Diabetes is Due to One of Two mechanisms:

1. Inadequate production of insulin (which is made by the pancreas and lowers blood glucose), or
2. Inadequate sensitivity of cells to the action of insulin.

The two main types of diabetes correspond to these two mechanisms and are called insulin dependent (Type 1) and non-insulin-dependent (Type 2) diabetes. In type 1 diabetes, there is no insulin or not enough of it. In type 2 diabetes, there is generally enough insulin but the cells upon it should act are not normally sensitive to its action.⁷ Obesity is one of the most important modifiable risk factors for type 2 diabetes mellitus. Most of the patients with diabetes is overweight or obese. It is well known that excess bodyweight induces or aggravates insulin resistance, which is a characteristic feature of type 2 diabetes. Thus,

bodyweight plays a central role in the prevention and treatment of diabetes. Recent data suggest that lifestyle intervention in patients with impaired glucose tolerance results in an impressive reduction in the conversion to overt diabetes, which is greater than the effect of early intervention with drugs such as metformin or acarbose. The prevention of diabetes has been shown to be associated with the extent of weight loss. In patients with type 2 diabetes, weight loss by any means is followed by an improvement of metabolic control and associated risk factors.

The prevalence of Type 2 diabetes is showing a rapid progression worldwide, a phenomenon largely resulting from the epidemic proportions reached by obesity in various populations of the world.⁸ Several cross-sectional epidemiological and prospective cohort studies suggest that obesity and particularly abdominal obesity is strongly linked to increased risk of diabetes.⁹ Indeed, obesity is considered to be the link between insulin resistance and several metabolic abnormalities which include diabetes,

hypertension and dyslipidaemia, all of which are risk factors of coronary artery disease.¹⁰

Obesity, along with type 2 diabetes, has become a health problem of epidemic proportions, both in developed and developing countries in the past two decades. Correspondingly, both diabetes and obesity generate immense health care costs.¹¹ In the present study, 8.8% of the patients in the cases group had a history of smoking, which was comparable with the study done by Sargeant LA et al¹² in which 9.8% of the diabetics were smokers. In the present study, 12.8% of the patients in cases group had a history of alcohol consumption, whereas in the study done by Sargeant et al, they found that history of alcohol consumption was seen in 39.2% of the diabetics.¹² It was revealed that 57.1% of the males had a BMI in the overweight category and 22.2% were in the obese range. Most of the patients in the control group had a BMI in the normal range. Widlansky ME and associates in their study postulated that in the men with a body mass index higher than 28 were more likely to have diabetes.¹³

CONCLUSION: To conclude, there is an association of anthropometric parameters like body mass index, waist circumference, waist-hip ratio with type 2 Diabetes Mellitus.

REFERENCES

1. Kaveeshwar SA, Cornwall J. The current state of diabetes mellitus in India. *Australas Med J* 2014;7(1):45-48. www.ncbi.nlm.nih.gov
2. Wild S, Roglic G, Green A, et al. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27(5):1047-1053.
3. Sicree R, Shaw J, Zimmet P. Diabetes and impaired glucose tolerance. In: Gan D, ed. *Diabetes Atlas*. 3rd edn. Belgium: International Diabetes Federation 2006:15-103.
4. India the third most obese country in the world. IHME 2014:14-15. <http://indiatoday.intoday.in/story/obesity-india-weighs-third-on-obesity-scale/1/365876.html>
5. WHO obesity. www.who.int/gho/ncd/risk_factors/obesity_text/en/.
6. Must A, Spadano J, Coakley EH, et al. The disease burden associated with overweight and obesity. *JAMA* 1999;282(16):1523-1529. www.ncbi.nlm.nih.gov
7. Definition of diabetes mellitus. <http://www.medicinenet.com/script/main/art.asp?articlekey=2974>.
8. Despres JP. Intra-abdominal obesity: an untreated risk factor for type 2 diabetes and cardiovascular disease. *J Endocrinol Invest* 2006;29(Suppl 3):77-82.
9. Ferrannini E, Camastra S. Relationship between impaired glucose tolerance, non-insulin dependent diabetes mellitus and obesity. *Eur J Clin Invest* 1998;28(suppl 3-6):6-7.
10. Reaven GM. A syndrome of resistance to insulin stimulated uptake (syndrome X): definitions and implications. *Cardiovascular Risk Fact* 1993;3:2-11.
11. Ford ES, Williamson DF, Liu S. Weight change and diabetes incidence: findings from a national cohort of US adults. *Am J Epidemiol* 1997;146(3):214-222.
12. Sargeant LA, Bennett FI, Forrester TE, et al. Predicting incident diabetes in Jamaica: the role of anthropometry. *Obes Res* 2002;10(8):792-798.
13. Widlansky ME, Sesso HD, Rexrode KM, et al. Body mass index and total and cardiovascular mortality in men with a history of cardiovascular disease. *Arch Intern Med* 2004;164(21):2326-2332.

A CLINICAL STUDY OF BENIGN LESIONS OF PINNA

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ABSTRACT

BACKGROUND AND OBJECTIVES

To study the clinical aspects of benign lesions of pinna and to evaluate aetiopathological factors, prevalence and management options.

METHODS

The study included 115 patients during the period from January 2013 to December 2013. The selection criteria included patients presenting with swellings of pinna which included keloids, seromas, sebaceous cyst, preauricular sinus, haemangioma, dermoid and neurofibroma. A detailed clinical history regarding onset, predisposing factors and associated conditions was documented and analysed.

RESULTS

Of total 115 cases in our study, 66 cases (57%) presented with keloid followed by 33 cases (29%) of pseudocyst of auricle, sebaceous cyst were seen in 10 cases, i.e. 9% and only 1 case of Neurofibroma, Haemangioma and Dermoid was diagnosed (<1%); 94 percent of patients presenting with Keloid were females; 88% of them had unilateral and just 12% had bilateral disease. Trauma was the factor in causation of pseudocyst of auricle in 11 cases (34%), diabetes also was seen in 3 cases (9%). Of all 33 cases of pseudocyst of auricle, 27 cases (82%) were managed by window procedure and 6 cases (18%) were managed with aspiration.

CONCLUSION

Trauma is the most important factor in causation of number of benign lesions of pinna. Other factors being high ear piercing through the cartilage. Diabetes mellitus plays a significant role and should be controlled simultaneously. Wide bore needle aspiration can be done for some of the cases of seroma patients who have recurrence and other cases can be managed by window procedure. Other lesions like keloid, sebaceous cyst, haemangioma and dermoid can be managed by complete surgical excision. A firm pressure bandage should be applied in most of the cases after surgery. Neurofibroma can be managed conservatively.

KEYWORDS

Keloid, Pinna, Preauricular Sinus, Benign Lesions, Trauma, External Ear.

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INTRODUCTION

Pinna contributes enormously to the facial aesthetics and is an important part of peripheral auditory system.¹ The peripheral auditory system functions to receive mechanical vibrations conduct these vibrations to the site of the primary receptor cells and thereby transduce this energy into an encoded electrical signal form, appropriate for conduction into and analysis by central nervous system. The Reception, Conduction and Transduction processes are strictly determined by structural and functional characteristics of this special receptor.

The ear functions as an early warning system by detecting and locating potentially threatening environmental sound.

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Keloid is a benign connective tissue hypertrophy characterized by smooth, pink, rounded scar-like tumour that invariably follows trauma or incision in the skin. It appears to be secondary to a defect in collagenase, which results in overgrowth of collagen as opposed to hypertrophied scar, which is composed of immature collagen that has failed to convert from tertiary to quaternary form.² Pseudocyst or seroma is an uncommon asymptomatic, non-inflammatory swelling of pinna, characterized by endochondral cyst formation. First case of seroma was documented in mid 1800 and Hartmann was the first to report such a condition in the year 1846. Engel coined the term "Auricular Pseudocyst."³ Sebaceous cyst is a common benign cyst caused by blockage of draining ducts of sebaceous glands leading to cystic dilatation of the gland as a result of accumulation of sebum. Retention or epidermal cyst is relatively common around the auricle, especially in the postauricular sulcus and lobule because it is rich in sebaceous glands. Some may arise from the hair follicle.⁴ Neurofibromas are circumscribed, but non-encapsulated neoplasms of the nervous system. They can arise in all peripheral nerve elements including Schwann's cells, neurons, fibroblasts and perineurial cells. This may occur in

isolation or as a part of Von Recklinghausen's syndrome.⁵ The aim of this clinical study is to ascertain various benign lesions of pinna presenting in the outpatient and to manage them with appropriate and timely intervention.

MATERIALS AND METHODS

This study was carried out at Rajarajeswari Medical College and Hospital, Bangalore. A total of 115 cases attending ENT OPD with swelling of the pinna were studied. A prospective study was carried out during the period January 2013 to December 2013. All patients attending Otolaryngology outpatient with benign lesions of pinna were counseled for inclusion. A total of 115 patients got listed with written informed consent and were studied. Pre-structured questionnaire including sociodemographic profile about the risk factors leading to benign lesions of pinna, history taking and clinical examination were done. The Performa was designed based on the objectives of the study. It was pre-tested and used after modifications. The selection criteria included patients presenting with swellings of pinna. A detailed clinical history regarding onset, predisposing factors and associated conditions was documented. In addition to the routine blood and urine examination, blood sugar levels were measured in relevant cases. Surgery was carried out under local anesthesia in all of the cases after obtaining written consent and from parents/guardians in case of children.

RESULTS

A total of 115 cases who presented to the ENT OPD with complaint of ear swelling were examined and diagnosed clinically before subjecting them to minimum relevant investigations and managed with appropriate timely intervention under strict aseptic precautions. Most of the patients in our study were in the age group of 10 to 19 years, i.e. 46 patients constituting 40%. Next common age group was 20 to 29 with 35 patients or 30%; 71 of patients (62%) in the study were females and 44 i.e. 38% were males. The male-to-female ratio was found to be 1:1.4; 58% presented with keloid followed by 29% of pseudocyst of auricle and 2.6% presented with pre-auricular cyst. Sebaceous cyst were seen in 9% of patients. Only 1 case each of Neurofibroma, Hemangioma and Dermoid were diagnosed (<1% each).

Most of the cases presenting with Keloid were females, i.e. 94%, only 6% were males. Keloid was unilateral in 88% and bilateral in 12%. Ear piercing was the only predisposing factor seen in our studies; 62 cases (94%) were managed with complete excision of the lesion followed by intralesional triamcinolone and 4 patients were instituted only intralesional triamcinolone.

Out of 33 cases of pseudocyst of auricle, 91% were males and 9% were females in our study. Predisposing factors like trauma and diabetes was seen in 34% and 9% of the patients, respectively; 6 patients underwent aspiration of fluid out of which 2 cases responded to the treatment; 13 cases which recurred after initial aspiration were treated with window procedure and 100% treatment results was seen. Trauma as a predisposing factors was seen in 10% of all cases and 57% had ear piercing as predisposing factor. Diabetes was observed in 3% of patients and no factors could be elicited 30%. Aspiration of fluid was done in 5% of patients; 63 cases, i.e. 55% of the patients underwent complete excision of the lesion, 3% of the

patients was treated by intralesional triamcinolone injections only and 1 case was managed conservatively.

DISCUSSION

Most of the patients in our study were young because young people are more concerned about their cosmetic appearance and since pinna is very important part of facial aesthetics, any lesions attracts their attention early. Another reason that could explain the high incidence in this active working age group is the hazards they encounter in their occupation. Socioeconomic status was based on modified Kuppuswamy scale. Here the education level, occupation of head of the family and per capita family income was taken into account. In our study 64% belonged to middle socioeconomic status, 5% were of upper class and the rest 30% belonged to lower class. This is because lesions of pinna-like keloid are quite common in middle and lower socioeconomic status, since poor hygienic conditions and aseptic ear piercing is widely practiced in this group. Also unhealthy social practices are not uncommon, which predispose to various lesions of pinna. Moreover illiteracy, lack of knowledge about asepsis and delayed seeking of medical assistance predisposes to more complication rates.

Keloid

The increased prevalence of Keloid could be attributed to increase in the "High piercing," i.e. ear piercing in the cartilaginous part of the pinna and ear lobule piercing which is considered fashion and traditional customs in society. This can be substantiated by a study by Christophfolz et al. on complications related to body piercing, male-to-female ratio was 1:2.2. Most of the recorded complications were related to the new vogue of piercing with the ear affected most commonly. The overall complication rate of ear piercing was found to be 35%. High ear piercing accounted for most of the complications in their study.⁶ The reason for female preponderance is the custom of compulsory ear piercing by the females of our Indian society. Laterality of keloids depends on the site of ear piercing as well as on the genetic predilection of the individual to develop Keloid. In our study ear piercing was the only factor seen in causation of keloid.

In our study, 62 cases 94% were managed with complete excision of the lesion followed by intralesional triamcinolone acetonide 10mg/mL, 0.5 to 2mL, depending upon the length of the scar at monthly intervals for 4 months starting 2 weeks post-op as early institution may result in wound dehiscence; 6% of the patients which had no visible swelling, but Keloid could be palpated and found to <5mm in dimensions were instituted only intralesional triamcinolone in a dose mentioned above for 4 months. Patients were followed up for 6 months with no recurrences and no complications. Daniel J Rosen, et al. did a retrospective analysis of 64 patients representing 92 ear keloids. The treatment protocol consisted of excision with an intraoperative and two postoperative steroid injections. Success was achieved in 80% excised.⁷

Pseudocyst of Auricle

In our study trauma was the most common factor in causation of pseudocyst of auricle, seen in 11 cases (34%), 3 cases (9%) had diabetes mellitus which if uncontrolled can lead to delayed fluid resorption and in worst scenario may even cause perichondritis followed by destruction of auricular cartilage. Rest of the cases, 57% did not have any specific etiology. Our results are comparable with the study conducted by Kishore

Chandra Prasad, Karthik S and Sampath Chandra Prasad, who with their experience of 116 cases of seroma found trauma as the leading predisposing factors accounting for 82 cases followed by insect bite in 13 and ear piercing in 21 cases.¹

In our study, 6 cases of pseudocyst of auricle were initially managed by aspiration under aseptic precautions followed by pressure bandage for 5 days with multivitamin and multiminerals supplementation. Two cases responded very well to aspiration and pressure bandage alone. Four cases who had recurrence following aspiration and also rest of the patients (27) were managed by window procedure with broad-spectrum antibiotic cover. Pressure dressing was applied in all cases. Following window procedure, all cases i.e. 31 cases (100%) were treated successfully. Combined needle aspiration and pressure dressing on Pseudocyst with a short course of oral corticosteroids have an excellent result without recurrence. It has an additional advantage of being non-invasive modality of treatment.⁸

In a retrospective descriptive analysis by Lim et al. of pseudocyst of auricle, all 9 patients who had simple aspiration of the cyst had prompt re-accumulation of the pseudocyst. None of the patients had recurrence following excision and compression buttoning of the pseudocyst. The complication rate in study was 2.4%. Only one patient developed initial perichondritis.⁹

Sebaceous Cyst

Ten cases of postauricular sebaceous cyst were included in our series and were managed with complete excision without any recurrences. It was in correlation with the study by Kishore Chandra Prasad, Karthik S and Sampath Chandra Prasad, who

in their study of 39 cases of sebaceous cyst managed them by complete excision and did not observe any recurrence.¹

Hemangioma and Dermoid

One case each of hemangioma and dermoid of pinna was observed in our study. This was managed with complete surgical excision.

Neurofibroma

Only 1 case of Neurofibroma of pinna was observed in our study. This patient had otitis externa and was managed by antibiotics.

CONCLUSION

The various benign lesions of pinna presenting to OPD in our study were found to be keloid, pseudocyst of auricle, pre-auricular sinus or cyst, sebaceous cyst, hemangioma, dermoid and neurofibroma of pinna, which present with swelling of the pinna with or without pain. Trauma is the most important factor in causation of number of benign lesions of pinna. Other factors are ear piercing as in keloids, diabetes mellitus plays a significant role in a few of the conditions and should be controlled simultaneously wide bore needle aspiration can be done for some of the cases of seroma. Patients who had recurrence can be managed by window procedure. Other lesions like keloid, sebaceous cyst, pre-auricular sinus or cyst can be managed by complete excision. Hemangioma and dermoid cases were managed by complete surgical excision with no recurrences and complications. A firm pressure bandage is to be applied in most of the cases after surgery. Neurofibroma can be managed conservatively.

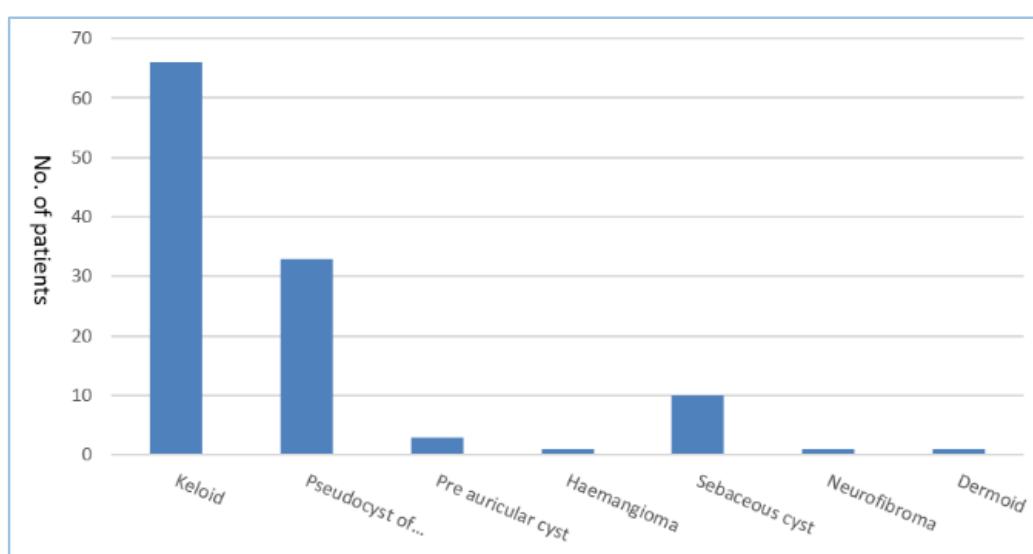
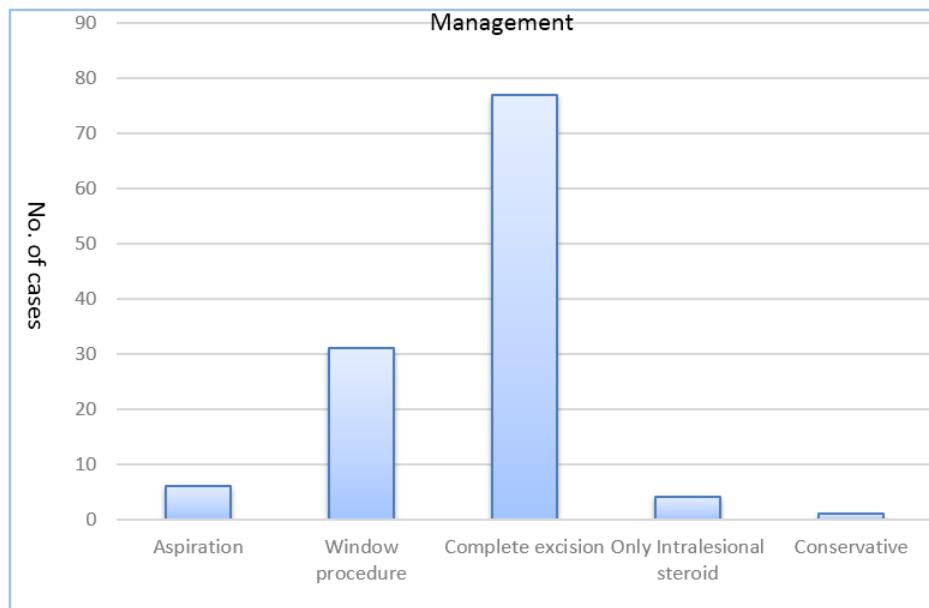


Fig 1: Case Distribution

Diagnosis	Trauma	Ear Piercing/Iatrogenic	Diabetes Mellitus	Unknown
Keloid	-	66	-	-
Pseudocyst of auricle	11	-	03	19
Sebaceous cyst	-	-	-	10
Neurofibroma	-	-	-	01
Pre-auricular sinus/cyst	-	-	-	03
Haemangioma	-	-	-	01
Dermoid	-	-	-	01
Total	11(9%)	66(57%)	03(3%)	35(30%)

Table 1: Summary of predisposing factors

**Fig 2: Treatment Options of all Cases****BIBLIOGRAPHY**

1. Kishor Chandra Prasad, Karthik S and Sampath Chandra Prasad: A comprehensive study on lesions of pinna: American Journal of Otolaryngology-head and neck medicine and surgery (yearbook), 26(2005):1-6.
2. Masellis M, Ferrara MM. Extensive keloids in the auricle-surgical treatment by means of autologous grafts: Annals of Burns and Fire Disasters - vol. XII - n°4 - December 1999.
3. Engel D. Pseudocyst of auricle in Chinese. Arch Otolaryngol 1966;83:197-202.
4. Diseases of the external ear. Timothy TK Jung, MD, PhD; Tae Hoon Jinn, MD; Ballenger's Otorhinolaryngology; 16th edition; page 230-247.
5. Azhar M Shaida, Matthew W Young. Neurofibroma of pinna: ENT Journal 2007 Jan; 86(1):36-37.
6. Amy Han, Lian-Jie Li, Paradi Mirmirani. Successful treatment of auricular pseudocyst using a surgical bolster: a case report and review of the literature: Cutis. 2006 Feb; 77(2):102-4.
7. Daniel J Rosen, et al. A primary protocol for the management of ear keloids: results of excision combined with intraoperative and postoperative steroid injections: Plast Reconstr Surg. 2007 Oct; 120(5):1395-400.
8. Kaur S, Thami GP, Bhalla M. Pseudocyst of the auricle. Indian J Dermatol Venereol Leprol 2003;69:85-6.
9. Lim et al. Pseudocyst of the auricle: Laryngoscope. 2002 Nov; 112(11):2033-6.

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A Novel Surgical Approach to Nasolabial Fistula

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**Gautham Ullas****K. V. Vishwas****B. M. Joshna**

Abstract

Infection of hair follicle is commonly called 'boil' or furunculosis. This can result in abscess formation leading to accumulation of pus and necrotic tissue. This can be more common in immunocompromised patients such as uncontrolled diabetes mellitus.

Commonest organism to cause furunculosis is believed to be *Staphylococcus aureus*.

We present an elderly patient where multiple nasal vestibular furunculosis suppurred resulting in extensive tissue damage and nasolabial fistula. Reconstruction was

delayed to accommodate tissue healing from hyperglycemic insult and necrosis. Alar advancement flap was employed to give a suitable 3 layer closure to the fistula.

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Recurrent furunculosis - Challenges and management: A review

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Furunculosis is a deep infection of the hair follicle leading to abscess formation with accumulation of pus and necrotic tissue. Furuncles appear as red, swollen, and tender nodules on hair-bearing parts of the body, and the most common infectious agent is *Staphylococcus aureus*, but other bacteria may also be causative. In some countries, methicillin resistant *S. aureus* is the most common ... [\[Show full abstract\]](#)

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May 2017

Arun Kant · Ashok Kumar Bajaj · Upma Narain

Background: The occurrence of recurrent furunculosis is common. However, the only cause for the infection reported till this date was aerobes and prior reported series never identified anaerobes and fungi as causative organisms. Methods: A retrospective study of 1760 patients with furunculosis was done to determine the incidence of recurrent furunculosis and its anaerobic and fungal ... [\[Show full abstract\]](#)

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Unusually high incidence and complications of nasal furunculosis at North East region of Assam

January 2014 · National Journal of Otorhinolaryngology and Head and Neck Surgery

 Md Jamil · A. Das ·  Hirok JYOTI Borah · [...] · B.K. Das

Objective: to evaluate the unusually high incidence and complications associated with nasal furunculosis at North East region of Assam. Materials and methods: A one year retrospective study was done in the dept. of ENT, Gauhati Medical College and Hospital. The study included 52 patients who were treated for complications following nasal furunculosis. Treatment was mostly conservative in nature ... [\[Show full abstract\]](#)

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Recurrent furunculosis is an infection of hair follicles which results in formation of abscesses. Previous studies showed that the pathogenesis of the disease may include an immune-mediated component as the proliferative response of peripheral blood lymphocytes to staphylococcal antigen is depressed. The aim of our study was to evaluate cytokines concentration in the plasma of patients with ... [\[Show full abstract\]](#)

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			A	B	T	A	B	T	A	B	T	A	B	T
1	Anatomy		8	8		3	3		4	4	0	15	15	
2	Physiology		0	1		1			3	3	1	3	4	
3	Biochemistry		8	8		3	3		0	0	0	11	11	
4	Pathology		5	5		6	6		9	9	0	20	20	
5	Microbiology		10	10		9	9		5	5	0	24	24	
6	Pharmacology		8	8		4	4		12	12	0	24	24	
7	Forensic Medicine		0			0			1	1	0	1	1	
8	Community Medicine		5	5		12	12		0	0	0	17	17	
9	General Medicine		1	1		7	7		6	6	0	14	14	
10	Psychiatry		0			0			0	0	0	0	0	
11	Dermatology		3	3		6	6		4	4	0	13	13	
12	TB & CD		0			0			1	1	0	1	1	
13	General Surgery		6	6		8	8		7	7	0	21	21	
14	Orthopedics		2	2		1	1		7	7	0	10	10	
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16	Ophthalmology		4	4		2	2		1	1	0	7	7	
17	ENT		0			0			0	0	0	0	0	
18	Radio diagnosis		2	2		27	27		8	8	0	37	37	
19	Anaesthesiology		17	17		6	6		4	4	0	27	27	
20	OBG		10	10		14	14		3	3	0	27	27	
21	CRL		2	2		2	2		4	4	0	8	8	
Net Total		0	96	96	1	113	114	0	84	84	1	293	294	

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11	2015	COMPLETE METOPIC SUTURE WITH MULTIPLE WORMIAN BONES IN AN ADULT HUMAN SKULL	Shruthi BN	INTERNATIONAL JOURNAL OF ADVANCES IN CASE REPORTS	12/09/2015	International	2(20)	:1216-1219	2349 - 8005	Index copernicus	MCI apporved
12	2015	A cadavaric study on coronary Preponderance	Vinitha G	INTERNATIONAL JOURNAL OF ADVANCES IN CASE REPORTS	31-8-2015	International	3(3)	1289-92	2321-4287	Index copernicus	MCI apporved
13	2015	AN ADDITIONAL RIGHT RENAL VEIN AND PRE HILAR PRIMARY TRIBUTARIES OF LEFT RENAL VEIN: EMBRYOLOGICAL BASIS AND CLINICAL SIGNIFICANCE- A CASE REPORT	Bharathi.D	International Journal of Healthcare Sciences	Mar-15	International	2(2)	176-179	2348-5728	Google Scholar	Non MCI approved
14	2015	Microscopic Appearance of Human Spleen at Different Gestational Age Groups: A Fetal Histological Study	Anne D Souza	Cukurova Medical Journal	2015	International	40(1)	36-41	2602-3032	Index copernicus	MCI apporved

Biochemistry											
15	2015	Study of lipoprotein ratios for predicting risk of coronary artery disease in overweight and obese subjects	Priyadarshini K.S	National Journal of Medical Sciences	42005	National	4(1)		pISSN: 2249-4995 & eISSN: 2277-8810	Index Copernicus	MCI approved
16	2015	Effect of high blood lead levels on Serum calcium and phosphorus in patients exposed to lead.	Bindu C.M	International Journal of advances in health sciences	2015	International	2(2)	134-138	eISSN: 2349-7033	Index Copernicus	MCI approved
17	2015	Study of Serum ferritin levels in preterm labour	Usha S.M.R	International Journal of Recent Trends in Science and Technology	42064	International	14(2)	477-480	Print ISSN No. 2277-2812 & eISSN: 2249-8109	Index Copernicus	MCI approved
18	2015	Study of plasma TG/HDL-C Ratio in patients with & without metabolic syndrome	Usha S.M.R	International Journal of Recent Trends in Science and Technology	42095	International	14(3)	660-665	Print ISSN No. 2277-2812 & eISSN No.: 2249-8109	Index Copernicus	MCI approved
19	2015	Study of Albumin Creatinine ratio a predictor of coronary artery disease in essential hypertension patients	Usha S.M.R	International Journal of Recent Trends in Science and Technology	42095	International	14(3)	499-506	Print ISSN No. 2277-2812 & eISSN No.: 2249-8109	Index Copernicus	MCI approved
19	2015	Comparison of the values of low density lipoprotein by the direct and indirect methods friedewald equation	Priyadarshini.K.S	International Journal of Recent Trends in Science and Technology	42095	International	14(3)	534-536	Print ISSN No. 2277-2812 & eISSN No.: 2249-8109	Index Copernicus	MCI approved
20	2015	Study of serum hs CRP & lipid profile in preeclampsia	Usha S.M.R	International Journal of Recent Trends in Science and Technology	42095	International	14(3)	605-609	Print ISSN No. 2277-2812 & eISSN No.: 2249-8109	Index Copernicus	MCI approved
21	2015	Effect of Menstrual cycle phase on glucose kinetics in healthy women and women with Pre-Menstrual symptoms.	Bindu C.M.	International journal of Pharmacological Research.	42309	International	5(11)	269-272	eISSN: 2277-3312	Index Copernicus & Google Scholar	MCI approved

Pathology											
22	2015	Efficacy of Fluorescent Method over Conventional ZN Method in Detection of Acid Fast Bacilli among Various Cytomorphological Patterns of Tubercular Lymphadenitis	Dr. Chakkirala NaliniMohan	International Journal of Science and Research (IJSR)	42248	International	Volume 4 Issue 9	222-225	2319-7064	Index Copernicus	MCI approved
23	2015	Evaluation of Cord Blood - Haematological Scoring System as an Early Predictive Screening Method for the Detection of Early Onset Neonatal Sepsis	Vamseedhar Annam	Journal of Clinical and Diagnostic Research	Sep-15	International	Vol-9(9)	6-Apr		Index Copernicus	MCI approved
24	2015	Clinico-pathological study of non-neoplastic lesions of uterine cervix with their histopathological categorization	Vamseedhar Annam2	International Journal of Science and Research (IJSR)	Feb-15	International	Volume 4 Issue 2	2094-2098	2319-7064	Index Copernicus	MCI approved
25	2015	Hereditary elliptocytosis	PS Sharmila, Kannupriya	The journal of medical sciences	Apr-Jun 2015	International	1 (2)	41-43		Index Copernicus	MCI approved
26	2015	An unusual case of carcinoma ex-pleomorphic adenoma of the parotid gland: a comprehensive clinicopathological review	PS Sharmila	The journal of medical sciences	Apr-Jun 2015	International	1 (2)	44-45		Index Copernicus	MCI approved
Microbiology											
27	2015	Axillary lymph node tuberculosis masquerading as inflammatory breast carcinoma in an immune-compromised patient	Panduranga Chikkannaiah et.al	International Journal of STD & AIDS	Feb-15	International	0(0)	1 - 3	17581052	Scopus, Web of Science	MCI approved
28	2015	Microbiological profile and antibiogram of uropathogens in pediatric age group	Benachinmardi et al	International Journal of Health & Allied Sciences	January-March 2015	International	4 (1)	61	2278-4292	Index Copernicus	MCI approved
29	2015	Microbial Flora in Chronic Periodontitis: Study at a Tertiary Health Care Center from North Karnataka	Kirtilaxmi K Benachinmardi, et.al	Journal of Laboratory Physicians	Jan-Jun 2015	National	7 (1)	49	0974-2727	Index Copernicus	MCI approved
30	2015	Bacterial Pathogens in Urinary Tract Infection and Antibiotic Susceptibility Pattern from a Teaching Hospital, Bengaluru, India	S.A. Lakshminarayana et.al	International Journal of current microbiology and applied sciences	2015	International	4(11)	731-736	2319-7706	Index Copernicus	MCI approved
31	2015	Detection of ESBL Producing Gram Negative Uropathogens and their Antibiotic Resistance Pattern from a Tertiary Care Centre, Bengaluru, India	S.A. Lakshminarayana	International Journal of current microbiology and applied sciences	Number 12 (2015)	International	4(12)	578-583	2319-7706	Index Copernicus	MCI approved
32	2015	Bacterial Pathogens in Urinary Tract Infection and Antibiotic Susceptibility Pattern from a Teaching Hospital, Bengaluru, India	S.A. Lakshminarayana,	International Journal of current microbiology and applied sciences	2015	International	4 (11)	731-736	2319-7706	Index Copernicus	MCI approved
33	2015	Microbiological Profile of CSOM and their Antibiotic Sensitivity Pattern in a Tertiary Care Hospital	Y. K. Harshika	Int.J.Curr.Microbiol.App.Sci	2015	International	4(12)	735-743	2320-1770	Index Copernicus	MCI approved
34	2015	Occurrence of Intestinal Parasitic Infections and its correlation with haemotological Parameters in a tertiary care centre	Allavarapu Ramya Sree,et.al	JOURNAL OF INTERNATIONAL MEDICINE AND DENTISTRY	2015	International	2(1)	47-52	2350-045X	Index Copernicus	MCI approved
35	2015	BACTERIOLOGY AND ANTIBIOTIC SUSCEPTIBILITY OF WOUND INFECTIONS IN A TEACHING HOSPITAL, BENGALURU	Sakolkar Shalmali et.al	J of Evolution of Med and Dent Sci	2015	International	4(74)	12824-29	eISSN- 2278-4802	Index Copernicus	MCI approved
36	2015	STANDARD PRECAUTIONS: AN ASSESSMENT OF AWARENESS AMONG HEALTH CARE PERSONNEL IN A TEACHING HOSPITAL, SOUTH INDIA	Sangeetha S et.al	J of Evidence Based Med & Hlthcare	9-Feb-15	International	2(6)	638-644	2349-2562	Index Copernicus	MCI approved
37	2015	Serologic Hepatitis B Immunity in Vaccinated Health Care workers	Vijaya Doddaiyah et.al	American Journal of Life Sciences	11-May-15	International	3(3)	162-166	ISSN: 2328-5702	Index Copernicus	MCI approved
Pharmacology											

38	2015	EFFECTS OF LEVETIRACETAM AND TOPIRAMATE ON BONE HEALTH IN ADULTS, USING BONE SPECIFIC BIOMARKERS	Chanda Kulkarni	Med. Res. Chron	2015	International	2(1)	61-66	2394-3971	Index Copernicus	MCI Approved
39	2015	Need for ‘teratovigilance’ in women with epilepsy on anti-epileptic drugs	Chanda Kulkarni	Neurology Asia	2015	International	20(2)	207 – 209	1823-6138	Index Copernicus	MCI Approved
40	2015	A NEW METHOD DEVELOPMENT AND VALIDATION FOR ESTIMATION OF PARACETAMOL IN PHARMACEUTICAL DOSAGE FORM BY REVERSE PHASE-HIGH PERFORMANCE LIQUID CHROMATOGRAPHY	SAHAJANAND H	International Journal of Pharmacy and Pharmaceutical Sciences	2015	International	7(8)	190-194	0975-1491	Index Copernicus	MCI Approved
41	2015	PROFILE OF DRUG UTILISATION IN ACUTE BRONCHIAL ASTHMA IN A TERTIARY CARE HOSPITAL	Dr. Basavaraj Bhandare	World Journal of Pharmaceutical Research	2015	International	4(2)	758-765	2277– 7105	Index Copernicus	MCI Approved
42	2015	PATTERN OF ANTIHYPERTENSIVE THERAPY AMONG DIABETIC HYPERTENSIVES	Dr. Basavaraj Bhandare	World Journal of Pharmaceutical Research	2015	International	4(8)	2403-2410	2277– 7105	Index Copernicus	MCI Approved
43	2015	DIABETIC NEPHROPATHY: MEANS OF PHARMACOLOGICAL INTERVENTION	Dr. Basavaraj Bhandare	World Journal of Pharmaceutical Research	2015	International	4(10)	853-860	2277– 7105	Index Copernicus	MCI Approved
44	2015	Chronopharmacology: Tailoring Therapy to Endogenous Rhythms	Satyaranayana V	JOURNAL OF INTERNATIONAL MEDICINE AND DENTISTRY	2015	International	2(1)	PP.3-6	2350-045X	Index Copernicus	MCI Approved
45	2015	Prescription Pattern of Drugs in Osteoarthritis	Poornima B	International Journal for Pharmaceutical Research Scholars (IJKRS)	2015	International	4(3)	27-33	2277 - 7873	Index Copernicus	MCI Approved

Forensic Medicine											
46	2015	Pattern of neck injuries in hanging deaths and its correlation with recent concepts and theories	Pradeep Kumar et al	Journal of South India Medicolegal Association	Jul-15	International	7(1)	20-25	0974-6196	Scopus	MCI Approved
47	2015	Accidental fatal lung injury by compressed air: A case report	Anand et al	American Journal of Forensic Medicine and Pathology	2015	International	36(1)	Page 1-2	0195-7910	Scopus	MCI Approved
48	2015	Role of fluid dynamics in cardiac blast effect: A case report	Pradeep Kumar M V et al	Journal of Forensic Medicine and Toxicology	2015	International	5(2)	111-115	0971-1929	Scopus	MCI Approved
49	2015	Pattern of internal neck injuries in strangulation deaths with special reference to laryngeal fractures	Anand P Rayamane et al	Journal of Indian Academy of Forensic Medicine	Apr-15	International	37(2)	179-182	0971-0973	Scopus	MCI Approved
50	2015	An autopsy based study of adipocere formation and its correlation with time, cause and location	Pradeep Kumar M V et al	Journal of South India Medicolegal Association	Sep-15	International	7(2)	51-57	0974-6196	Scopus	MCI Approved
51	2015	A Profile of 100 Cases of Insecticide Poidoning Deaths	Thippeswamy et al	Journal of South India Medicolegal Association	2015	International	7(2)	64-66	0974-6196	Scopus	MCI Approved
52	2015	Estimation of Age of an Individual by Radiological Study of Epiphyseal Union at the Lower End of Radius and Ulna	Jayaprakash G et al	Journal of South India Medicolegal Association	2015	International	7(2)	82 – 87	0974-6196	Scopus	MCI Approved
53	2015	Accidental Choking – A Case Study	Nisar Ahmed	Japanese Federation of Music Therapy	2015	International	32(1)	106-108	1504-1611	non-Indexed	Non MCI approved
54	2015	Suicidal ligature strangulation without a knot- A case Report	Pradeep Kumar P M.V	SAJ Forensic Science	2015	International	1(1)	pp.1-5	2381-8697	Google Scholar	MCI Approved
55	2015	Sudden Death of Middle Aged Male due to Cardiac Temponade	Nisar Ahmed et al	Japanese Federation of Music Therapy	2015	International	32(1)	19-21	1504-1611	non-Indexed	Non MCI approved
56	2015	Lightning death – A case Review	Pradeep Kumar M V et al	Japanese Federation of Music Therapy	2015	International	37(1)	93-95	1504-1611	non-Indexed	Non MCI approved
Community Medicine											
57	2015	Reproductive Health and Child Health Profile in the Field Practice Area of Rajarajeswari Medical College and Hospital, Bengaluru : A Descriptive Study	Shashikala Manjunatha, K.S Ramya	The Journal of Medical Sciences,	April- June	National	3(2):	27-31	ISSN2321-354X	PubMed, Index Copernicus	MCI approved
58	2015	Morbidity Profile of construction workers aged above 14 years in selected areas of Bangalore urban district.	Sandeep H, Shashikala M, Ramya K S.	Journal of Evolution of Medical and Dental sciences 2015; DOI: 10.14260/jemds/2015/1238	15-Jun	International	Vol 4, Issue 49	Page 8552-8560.	eISSN2278-4802/pISSN 2278-4748	Indexed – Global Index Medicus	MCI approved
59	2015	Influenza like illness (ILI): Prevalence and Preventive Practices among Indian Haj Pilgrims of Karnataka.	Jameel Fatema, Shashikala Manjunatha Mohammed Abrar ul Huq Kruthika N,	International Journal of Public Mental Health And Neurosciences,	Aug-15	International	Volume 2, Issue 2.,	Page: 23,24-28.	ISSN-2394-4668	Google Scholar	Non MCI
60	2015	Assessment of stress among auto-rickshaw drivers in bangalore city - a cross sectional study	Amit Kumar Sinha, Shashikala M,	International Journal of Public Mental Health And Neurosciences	Apr-15	International	Volume 2, Issue 1,	Page: 45,46,47.	ISSN-2394-4668	Google Scholar	Non MCI
61	2015	Awareness of eye donation among medical students in a tertiary care hospital, Bangalore	Vidusha K S , Shashikala M.	Asian Journal of health sciences	2015	National	Vol 1(2).	2	ISSN 2347-5218	Google Scholar	Non MCI
62	2015	Prevalence of adverse pregnancy outcomes: a community based longitudinal study	Vidya G. S, Lalitha K, Hemanth T, Murthy N	J of Evolution of Med and Dent Sci	22-Jun-15	International	Vol.4/ Issue	50	eISSN- 2278-4802, pISSN- 2278-4748/	Crossref	MCI approved
63	2015	Impact of educational intervention on knowledge regarding infant feeding practices among medical students at Mysore	Vidya GS, Renuka M, Praveen Kulkarni,	International Journal of Health & Allied Sciences	Oct-Dec 2015	International	Vol. 4 Issue 4	XX	2278-4292	Index Copernicus	MCI approved

General medicine											
64	2015	Safety and outcome using endoscopic dilation for benign esophageal stricture without fluoroscopy	M. V. Krishna	Journal of Digestive Endoscopy	2015	International	6(2)	55-58	0915-5635	Index copernicus	MCI approved
Psychiatry											
65	2015	Antenatal Depression in a Tertiary Care Hospital	Amar D. Bavle	Indian J Psychol Med	2015	International	38(1)	31-35	0253-7176	SCOPUS	MCI approved
66	2015	Case Report of Clozapine-Induced Neutropenia and Rechallenge	Amar Bavle	J Neuropsychiatry Clin Neurosci	Jul-05	International	27(1)	e61	1545-7222	SCOPUS	MCI approved
67	2015	Effectiveness and Utilization Pattern of Cognitive Behavior Therapy of Anxiety Disorders: Evidence from a Psychiatry Clinic	Sudhir Hebbar	J Medical Sciences	2015	International	1(3)	:52-54	1997-3438	SCOPUS	MCI approved
Dermatology											
68	2015	Psoriasis: an eye opener – a cross-sectional study in a Tertiary Care Hospital of South India	Hari Kishan Kumar Yadalla	Our Dermatol	2015	International	6(1)	pp.5-11	2081-9390	Index copernicus	MCI approved
69	2015	Zosteriform Lesions in an Elderly Man-Look Beyond Herpes Zoster	Leena Raveendra et al	Indian J Dermatol	2015	International	60(5)	522	0019-5154	Index copernicus	MCI approved
70	2015	Narrow-band ultraviolet B in childhood vitiligo: An open prospective uncontrolled study in 28 children of South India	Y Hari Kishan Kumar	Indian Journal of Paediatric Dermatology	2015	International	16(1)	17-22	2319-7250	Index copernicus	MCI approved
General Surgery											
71	2015	A Rare Case of Wilkie's Syndrome	Hari prasad T R	International Journal of Scientific Research	2015	International	4(8)	50-52	2277-8179	Index copernicus	MCI approved
72	2015	Clinical Presentation and Management of Amoebic Liver Abscess	Naveen S	Journal of Evolution of Medical and dental Sciences	2015	International	4(104)	16916-16918	2278-4748	Index copernicus	MCI approved
73	2015	current Trends in paediatrics Intususceptions	Kesavamurthy M	Journal of Evolution of Medical and dental Sciences	2015	International	4(76)	13195	2278-4748	Index copernicus	MCI approved
74	2015	A Simple tool to assess the Severity and Predict the Morbidity and Mortality in acute pancreatitis	Hari prasad T R	Journal of Evolution of Medical and dental Sciences	2015	International	4(101)	16642	2278-4748	Index copernicus	MCI approved
75	2015	Breast Tuberculosis:A Frequently overlooked entity in the epitome of Tuberculosis,"India"	Hari prasad T R	Journal of Evolution of Medical and dental Sciences	2015	International	4(101)	16698-16701	2278-4748	Index copernicus	MCI approved
76	2015	clinico pathological Study of Carcinoma breast	Hari prasad T R	Journal of Evolution of Medical and dental Sciences	2015	International	4(105)	17058 - 17061	2278-4748	Index copernicus	MCI approved
77	2015	A Rare Case of Jejunal diverticular perforation	Prashanth Anadinni	Journal of Evolution of Medical and dental Sciences	2015	International	4(96)	16203	2278-4748	Index copernicus	MCI approved

Orthopedics											
78	2015	SURGICAL TREATMENT OF MALUNITED COLLES' FRACTURE BY CORRECTIVE OSTEOTOMY	Gopinath K. M	J of Evidence Based Med & Hlthcare	2015	International	2(54)	8785-8788	2349-2570	Non Indexed	Non MCI approved
79	2015	FUNCTIONAL EVALUATION OF HEMIARTHROPLASTY IN NEGLECTED FRACTURE NECK OF FEMUR IN YOUNG ADULTS	Pramod Kumar M	J of Evidence Based Med & Hlthcare	2015	International	2(55)	8810-8815	2349-2562	Non Indexed	Non MCI approved
80	2015	Surgical Management of fracture Shaft humerus with LCDCP and screws	Suresh	International Journal of Medicine and Allied Health Sciences	2015	International	6(1)	428	2348-3229	Index copernicus	MCI approved
81	2015	MONITORING DEPTH OF ANAESTHESIA USING PRST SCORE AND BISPECTRAL INDEX	Rahul R	J of Evolution of Med and Dent Sci	2015	International	4(25)	4282-4292	2278-4748	Non Indexed	Non MCI approved
82	2015	Arthroscopic Evaluation and Management of Anterior Shoulder Instability	K S Basavarajappa	Anatomica Karnataka	2015	International	9(2)	17-22	2249-5398	Non Indexed	Non MCI approved
83	2015	RESULTS OF SURGICAL TREATMENT OF PAEDIATRIC DIAPHYSEAL FRACTURES OF LONG BONES USING INTRAMEDULLARY ELASTIC NAIL	Arun Kumar C	Journal of Evolution of Medical and Dental Sciences	2015	International	4(103)	16822-16826	2278-4748	Index copernicus	MCI approved
Pediatrics											
84	2015	A Study on knowledge and perception about breast feeding among lactating mothers	Dr. Adrsh E	international Journal of Recent Trends in Science and Technology	2015	International	xx-xx	1 to 5	2277-2812	Index Copernicus	MCI approved
85	2015	Comparison of Horizontal Corneal Diameter in Premature Infants and Mature Infants--	Dr. Nanda L	IOSR Journal of Dental and Medical Sciences	2015 may	National	xx-xx	41 to 44	2279-0861	Index Copernicus	MCI approved
86	2015	Study of factors contributing to psychosomatic disorder among children aged 7 to 17 years –	Dr. Prema R	International journal of Medical and applied sciences	2015	International	Volume 4	169 to 201	2320-3137	Index Copernicus	MCI approved
87	2015	Association of Vitamin D Levels with severity of Paediatric Asthma---	Dr. Surendra H.S	International Journal of Medical and Applied Sciences	2015	International	Volume 4	116-119	2320-3137	Index Copernicus	MCI approved
88	2015	Study of Liver profile in Dengue Fever	Dr. Surendra H.S	International Journal of Medical and Applied Sciences	2015	International	xx-xx	XX	2320-3137	Index Copernicus	MCI approved
89	2015	Clinical Profile of dengue infection in a tertiary care hospital	Dr. Adrsh E	Indian Journal of Child Health	2015 April to june	National	Issue 2	68 to 71	2349-6118	Index Copernicus	MCI approved
Ophthalmology											
90	2015	A Case Report of Bilateral iris, Lens and Chorioretinal Coloboma	Nanda L	IOSR Journal of Dental and Medical Sciences	2015	International	14(4)	32-34	2279-0861	Index copernicus	MCI approved
91	2015	A Case of Report of Meimobian gland Carcinoma of Thyroid	Nanda L	International Journal of Scientific Study	2015	International	5	Nil	2321-6379	Index copernicus	MCI approved
92	2015	A Case Report of Traumatic Conjunctival Inclusion Cyst	Nithisha .T.M	IOSR Journal of Dental and Medical Sciences	2015	International	14(6)	41-43	2279-0861	Index copernicus	MCI approved
93	2015	Comparison Of Horizontal Corneal Diameter in premature Infants and Mature Infants	Nanda L	IOSR Journal of Dental and Medical Sciences	2015	International	14(5)	41-44	2279-0861	Index copernicus	MCI approved
94	2015	Pattern of ocular Morbidity Among School Children in Bagalkot City	Jayashree M P	International Journal of Medical and Pharmaceutical Sciences	2015	International	6(2)	17-21	2231- 2188	non-indexed	non MCI approved

ENT											
95	2015	A Study of Correlation of Preoperative Fine Needle Aspiration Cytology (FNAC) with Histopathological Examination (HPE) in Goitre	Srirangaprasad K et.al	Journal of Evolution of Medical & Dental Sciences	November, 2015	International	4(89)	15414	2278-4802	non-indexed	non MCI approved
Radio Diagnosis											
96	2015	Case report-Tetra-phocomelia, A rarest of rare case	Anil Kumar Shukla	Journal of Clinical and Diagnostic Research	2015	International	9(3)	pp.03-04	0973-709X	Scopus	MCI approved
97	2015	Cardiac rhabdomyoma: an antenatal illustration	Anil Kumar Shukla	BMJ Case Rep	2015	International	xx-xx	xx-xx	2044-6055	Scopus	MCI approved
98	2015	Role of ultrasonography in grading of penile fractures	Anil Kumar Shukla	Journal of Clinical and Diagnostic Research.	2015	International	9(4)	pp.01-03	0973-709X	Scopus	MCI approved
99	2015	Case report- Pyknodysostosis	Anil Kumar Shukla	Journal of Clinical and Diagnostic Research	2015	International	9(5)	pp.09-10	0973-709X	Scopus	MCI approved
100	2015	A comparative evaluation of vistascan and ultrasound imaging in the diagnosis of periapical lesions of endodontic origin – an in vivo study	Seetha Pramila V V	Archives of Dentistry	Jan – April 2015	International	1(1)	xx-xx	2229-6352	index copernicus	MCI approved
101	2015	Case Report : Pulmonary Agenesis	Seetha Pramila V V	JRRTI	Jul - Dec 2015	International		pp.11-12	2456-0642	non-index	non MCI approved
102	2015	Measurement of fetal foot length in the estimation of gestational age by ultrasound	Seetha Pramila V V	JRRTI	Jul - Dec 2015	International	1(1)	pg 7-9	2456-0642	non-index	non MCI approved
103	2015	Role of ultrasonography in grading of penile fractures	Seetha Pramila V V	Journal of Clinical and Diagnostic Research	2015	International	9(4)	pp.01-03	0973-709X	index copernicus	MCI approved
Anaesthesiology											
104	2015	Dexmedetomidine and clonidine as adjuvants to levobupivacaine in supraclavicular brachial plexus block: a comparative randomized prospective Controlled study	Dr.Karthik, Dr.Sudheer.R,	Journal of Evolution of Medical and Dental Sciences	5-Mar-15	National	Volume 4 Issue 19	3207-3221	2278- 4748	Index Copernicus	MCI approved
105	2015	Monitoring Depth of Anaesthesia using PRST score and Bispectral index	Dr.Rahul R, Dr.Sowmya MJ,	Journal of evolution of medical and dental sciences	26-Mar-15	National	Volume 4, issue25	4282-4292	2278- 4748	Index Copernicus	MCI approved
106	2015	Multimodal Analgesia Using Bilateral Ilioinguinal-Iliohypogastric Block Along With Rectal Diclofenac for Post Caesarean Section Cases	Kayalvizhi.K.B, Venkatesh Murthy.K.T, & Deepak S	IJCMAAS	May-15	International	vol.6/Issue 3	193-198.	2321-9335	Index Copernicus	MCI approved
107	2015	Non-compaction cardiomyopathy in an apparently healthy. Patient: a case report	Dr.Madhumala, Dr.Antara	Journal of Evolution of Medical and Dental Sciences	Jan26, 2015.	National	Vol 4/ issue 08	1381-1387	2278- 4748	Index Copernicus	MCI approved
108	2015	Effects of intravenously administered clonidine on haemodynamics and on plasma cortisol level during laparoscopic cholecystectomies	Dr.Sahajananda H, & Dr.Rao S	Indian Journal of Anaesthesia	2015	National	Vol-59/ Issue - 1	53-56	0019-5049	Embase, Pubmed Central	MCI approved
109	2015	Acute Respiratory Distress Syndrome in Pregnancy	Dr.Madhumala H.R et al.	Journal of Evolution of Medical and Dental Sciences	20-Apr-15	National	Vol.4, Issue 32	5600-5605	2278- 4748	Index Copernicus	MCI approved
110	2015	An Epidemiological study of poisoning in a tertiary care hospitals	Dr.H Sahajanand et al.	Journal of Evolution of Medical and Dental Sciences	May 18 2015	National	vol 4,Issue 40	7013-7020	2278- 4748	Index Copernicus	MCI approved

111	2015	Acute Budd Chiary syndrome During Pregnancy	Dr.Venkatesh Murthy, Dr.Kayali vizhi, Dr.Sahajananda	Journal of Evolution of Medical and Dental Sciences	21-May-15	National	Vol. 4/ Issue 41	7233-7236	2278-4802	Index Copernicus	MCI approved
10	2015	delayed presentation of tension gastrothorax complicating Acute traumatic diaphragmatic rupture	Dr.H. Sahajananda, Dr.K.T. Venkatesh	Journal of Evolution of Medical and Dental Sciences	21-May-15	National	Vol. 4/ Issue 41	7241	2278-4802	Index Copernicus	MCI approved
112	2015	Atypical Hemolytic Uremics Syndrome with Obstructive Hydrocephalus in an Infant. A Case Report	Sahajananda H, Kayalvizhi K.B, K.T.	Journal of Evolution of Medical and Dental Sciences	May-15	National	Vol. 4 /Issue 41	7249-7254.	2278-4802	Index Copernicus	MCI approved
113	2015	Effect of Premedication with Intravenous Clonidine on Haemodynamic Changes in Laproscopic Cholecystectomy: A Randomises Study	Dr.Sudheer R, Dr.Karthik G.S, Dr.Sahajananda H & Dr.Rangalakshmi	Journal of Evolution of Medical and Dental Sciences	May 23,2015	National	vol.4/Issue 24		2278-4802	Index Copernicus	MCI approved
114	2015	Endotracheal Intubation using Propofol, Midazolam, Lignocaine Induction Along with fentanyl in two different doses; without using neuromuscular Blocking Drugs: A Comparative Randomised Prospective Study	Dr.Bhanuprakash S, Dr.Sudhir Kumar P, Dr.Sahajananda H, Dr.Sowmya M.J & Dr.Venkatesh Murthy K.T	Journal of Evolution of Medical and Dental Sciences	July 20,2015	National	vol.4/Issue 58		2278-4802	Index Copernicus	MCI approved
115	2015	A Clinical Audit of quality indicator in Anaesthesia practice	Dr.Maya Nadakarni, Dr.Prakruthi & Dr.Sahajananda H	Journal of Evolution of Medical and Dental Sciences	Jul-Sep 2015	National	Vol 1 issu3:JEMDS	47-51	2278-4802	Index Copernicus	MCI approved
116	2015	A retrospective study of attempted suicide cases admitted into critical care unit of a tertiary care hospital	Dr.Pawan, Dr.SoumyaRohit	Journal of Evolution of Medical and Dental Sciences	Nov-15	National	Vol 4 Issue 93	Pages 15885 – 15887	2278-4802	Index Copernicus	MCI approved
117	2015	Anaesthetic Management of a Parturient with congenital complete heart block for emergency lower segment cesarean section	Dr.Mamatha.R Dr.Sowmya M.J,	Journal of Evolution of Medical and Dental Sciences	Oct-dec 2015	National	1(4):74-76	74-76	2278-4802	Index Copernicus	MCI approved
118	2015	Discharge Criteria in Ambulatory Surgery	Dr. H Sahajananda	The Journal of medical sciences	Oct-Dec 2015	National	Issue 4	Page4-10.	2321-354x	Index Copernicus	MCI approved
119	2015	Postoperative Nausea & vomiting in day care patients: A comparative randomized controlled trial of total Intravenous Anaesthesia with propofol, air & oxygen vs Inhalation Anaesthesia with Isoflurane & Nitrous oxide	Dr.A Sandhya, Dr.Mamatha.R,Dr.Antra ra, Dr.H Sahajananda	The Journal of medical sciences	Oct-Dec 2015	National	Issue 4	Page63-68	2321-354x	Index Copernicus	MCI approved
120	2015	Anesthetic management of an elderly patient with permanent pacemaker posted for fixation of tibia and radial fracture	Dr.Praveen Halagunki, Dr.GS Karhik,	The Journal of medical sciences	2015	National	1(4)	77-79	2321-354x	Index Copernicus	MCI approved
121	2015	Awareness about scope of anesthesiology, attitudes towards the specialty and stress levels amongst postgraduate students in anesthesiology: A cross sectional study .	Chaitanya A.Kamat,	Indian Journal of Anesthesia	2015	National	1(4)	77-79	2321-354x	Index Copernicus	MCI approved
OBG											
122	2015	Uterine necrosis following B-Lynch and Gunasheela's Global stitch Sutures for primary postpartum Hemorrhage	Sai Lakshmi MPA- IAuthor	The Journal of Medical Sciences	Apr-15	National	VOL.-3 ISSUE-2	XX	XX	Index Copernicus	MCI approved

123	2015	Observational Study of maternal and fetal outcome in Elderly primigravida	Sai lakshmi MPA-IAuthor	International Journal of Science and Research	Mar-17	International	VOL.-6	XX	2319-7064	Index Copernicus	MCI approved
							ISSUE-3				
124	2015	Study of Depression in pregnancy in a tertiary care Hospital	Nagarathnamma.R	Journal of Psychiatry	2015	National		XX	XX	Index Copernicus	MCI approved
125	2015	Puerperal Psychosis – chapter in FOGSI FOCUS	Nagarathnamma.R	Postnatal Care	2015	National		XX		Embase	MCI approved
126	2015	Success term pregnancy in a post renal transplant patient	Rashmi A.G	Journal of south Asian Federation of obstetrics and gynaecology	May-15	International	7(2)	89-90	XX	Index C Embase	MCI approved
		Case report									
127	2015	Perspective & practice of contraception in women	Vishma shetty	Journal of South Asian Federation of Obstetrics and Gynaecology	Jan-16	National	8(1)	16-20	XX	Embase	MCI approved
128	2015	Observational study of subclinical hypothyroidism in pregnancy	Pavanaganga. A,	Indian Journal Of Obstetrics And Gynecology Research	2015	National	2(4)	255-260	Nil	Embase,	MCI approved
129	2015	WHO 75 gram OGTT-A single step procedure for screening and diagnosis of Gestational diabetes mellitus”	Chandana.M.P,	International journal of Reproduction, Contraception and Obstetrics And Gynaecology	Dec-15	International	VOL.-4	2022-2027	ISSN-2320-1770	Index Copernicus	MCI approved
130	2015	Studt of serum ferritin levels in pteterm labour	Rupakala B.M	International Journal of Recent trends in science and technology	Mar-15	International	14(2)	477-480	ISSN -0973-709 X	PubMed central	MCI approved
131	2015	Prevalence, characteristics and management of endometriosis amongst infertile women : A one year retrospective study	Rashmi A.G	Journal of clinical diagnosis and research	Jun-15	National	9(6)	QC01-QC03	ISSN -0973-709 X	PubMed central	MCI approved
132	2015	WHO 75 gram OGTT-A single step procedure for screening and diagnosis of Gestational diabetes mellitus”	Manorama Eti	International journal of Reproduction, Contraception and Obstetrics And Gynaecology	2015 Dec	International	4(6)	2022-2027	P-2320 -1770	Index Copernicus	MCI approved
									E-2320-1789		

CRL											
133	2015	Effects of intravenously administered Clonidine on Haemodynamics and on Plasma Cortisol level during Laparoscopic Cholecystectomies	Sahajanda H, Sudheer Rao	Indian Journal of Anaesthesia	2015	National	59(1)	53-55	0019-5049	IndMed, PubMed SCOPUS, Web of Science	MCI Approved
134	2015	Effects of Levetiracetam and Topiramate on bone health in adults, using bone specific biomarkers	Dwajani.S, GRK.	Medico Research Chronicles	2015	National	2(1)	61-66	2394-3971	Index Copernicus	MCI Approved
135	2015	A New method development and validation for estimation of paracetamol in pharmaceutical dosage form by rp-hplc	Mohan T Prabhakara S	Int j pharm pahrm sci	2015	National	7(8)	190-194	0975 - 1491	Google Scholar, Index Copernicus, Index Medicus for WHO South-East Asia	MCI Approved
136	2015	Teratogenicity of women with epilepsy on antiepileptic drugs: a prospective and retrospective observational study	Chanda Kulkarni, GRK.Sarma, Dwajani.S, Errol.F, Sheela.CN	Neurology Asia	2015	International	2(6)	127-129	1823-6138	Thompson Reuters, Scopus, WHO Index Medicus, Embase, Google Scholar and DOAJ	MCI Approved

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Publication by the faculty for the Calender Year 2016

S.No	Calender Year	Title	Author	Name of the Journal	Month & Year of Publication	National / International	Volume / Issue	Page No	ISSN No	Index	Remarks
Anatomy											
1	2016	Quadrifurcation of coeliac trunk- A case report	N Padmalatha	MedPulse	18 May 2016	International	3(5)	536-538	2348-2516	Index Copernicus	MCI approved
2	2016	complete Ossification of Superior Transverse Scapular Ligament and Its Clinical Significance - A Case Report	Mangala S	International Journal of Health Sciences and Research	8th August 2016	International	6(8)	386-389	2249-9571	Index Copernicus	MCI approved
3	2016	Estimation of heights from percutaneous length among south Indian population	Anitha M.R	Indian journal of clinical anatomy and physiology	Dec-16	National	3(4)	405-407	2394-2118	Google Scholar	Non MCI
4	2016	A cadaveric study of the testicular artery and its clinical significance	Sushma R. Kotian	Jornal Vascular Brasileiro	.July 28, 2016	International	15(4)	280-285	1677-5449	Index Copernicus	MCI approved
Physiology											
5	2016	Prevalence of Low Mental Health Among Nurses in Medical Intensive Care Units	Bhirange Swapnil	International Journal of Contemporary Medical Research	2016	international	3(8)	2444-2447	2454-7379	GOOGLE SCHOLAR	Non MCI approved
Biochemistry											
6	2016	Vitamin D status in a sample population representing urban youth	Usha S.M.R	International Journal of Clinical Biochemistry and Research	2016	International	3(2)	231-235	Print No. 2394-6369 & e-ISSN No.: 2394-6377	Index Copernicus	MCI approved
7	2016	Utility of Lipoprotein (a) as a marker of cardiovascular disease risk in hypothyroid patients	Usha S.M.R	International Journal of Biochemistry Research & Review	Jun-16	International	12(3)	1-7	Print No. 2394-6369 & e-ISSN No.: 2394-6377	Index Copernicus	MCI approved
8	2016	Role of pro-oxidant Myeloperoxidase and an oxidative stress marker Malondialdehyde in prediction of preeclampsia	Reena R	International Journal of Biochemistry Research and Review	Aug-16	International	13(1)	1-7	ISSN: 2231-086X	Pub Med	MCI approved
9	2016	Study of serum ferritin and its relation with Glycemic control in type 2 diabetes mellitus	K.S Manjula	International Journal of Biomedical Research	2016	International	7(9)	633-637	pISSN-2455-0566 & eISSN NO. -0976-9633	Index Copernicus	MCI approved
10	2016	Study of Insulin Resistance in Polycystic Ovarian Syndrome	Usha S.M.R	International Journal of Biochemistry Research & Review	Sep-16	International	13(3)	1-6	ISSN: 2231-086X	Pub Med	MCI approved

Pathology											
11	2016	ACROANGIODERMATITIS OF MALI	Lucky Sinha	J. Evolution Med. Dent. Sci	Mar. 03, 2016	International	Vol. 05/ Issue 18	911-913	eISSN- 2278-4802, pISSN- 2278-4748	Index Copernicus	MCI approved
12	2016	Clinicopathological Study of Surface Epithelial Tumours of the Ovary: An Institutional Study	Nalini Modepalli	Journal of Clinical and Diagnostic Research	2016 Oct	International	Vol-10(10)	4-Jan		Index Copernicus	MCI approved
13	2016	Evaluation of Serum Procalcitonin Levels and Sequential Organ Failure Assessment Score in Assessing the Severity and Outcome of Sepsis	Vamseedhar Annam	International Journal of Scientific Study	Jan-16	International	Vol 3 & Issue 10	48-51		Index Copernicus	MCI approved
14	2016	HISTOPATHOLOGICAL SPECTRUM OF HYPERPIGMENTED LESIONS OF SKIN	Shushan Shweta Jayker	J. Evolution Med. Dent. Sci	Apr. 28, 2016	International	Vol. 05/ Issue 34	1913-1917	eISSN- 2278-4802, pISSN- 2278-4748	Index Copernicus	MCI approved
15	2016	NEUROFIBROMATOSIS AND NEOPLASMS-TWO INTERESTING CASES	Preethi Dinesh	J. Evolution Med. Dent. Sci	Feb. 04, 2016	International	Vol. 5/ Issue 10/	442-445	eISSN- 2278-4802, pISSN- 2278-4748/	Index Copernicus	MCI approved
16	2016	PRIMARY OVARIAN NEOPLASMS: 5-YEAR INSTITUTIONAL STUDY	Nalini Modepalli	J. Evolution Med. Dent. Sci.	9-Jun-16	International	Vol. 05/ Issue 46	3004-3008	eISSN- 2278-4802, pISSN- 2278-4748	Index Copernicus	MCI approved
Microbiology											
17	2016	Semi-quantitative analysis of cerebrospinal fluid chemistry and cellularity using urinary reagent strip: An aid to rapid diagnosis of meningitis	Panduranga Chikkannaiah, et. Al	National Institute of Mental Health and Neuroscience	2016	National		605-609	2319-7706	Google Scholar	Non MCI
18	2016	A Study on Metallo-beta-lactamase Mediated Resistance in Clinical Isolates of Pseudomonas aeruginosa	S.A. Lakshminarayana et.al	International Journal of Current Microbiology and Applied Sciences	18-Nov-16	International	5(12)	499 - 506	2319-7706	Index Copernicus	MCI approved
19	2016	Rotaviral Diarrhoea in Children Less than 5 years with Reference to their Vaccination Status in a Tertiary Care Hospital	Santhoshini Vaijnath, et.al	Int.J.Curr.Microbiol.App.Sc i	15-Feb-16	International	5(3)	206-211	2319-7706	Index Copernicus	MCI approved
20	2016	Significance of Modified Widal Test with Conventional Widal Test in the Diagnosis of Enteric Fever	K. Sendil kumar, et.al	International Journal of Current Microbiology and Applied Sciences	20-Feb-16	International	5(3)	605-609	2319-7706	Index Copernicus	MCI approved
21	2016	Secondary Pneumonia due to Rothia mucilaginosa in H1N1 patient	Prakash R et.al	JOURNAL OF INTERNATIONAL MEDICINE AND DENTISTRY	2016	International	3(1)	58-60	2454-8847	Index Copernicus	MCI approved
22	2016	Rotaviral Diarrhoea in Children Less than 5 years with Reference to their Vaccination Status in a Tertiary Care Hospital	Santhoshini Vaijnath et.al	Int.J.Curr.Microbiol.App.Sc i	2016	International	5(3)	206-211	2319-7706	Index Copernicus	MCI approved
23	2016	Significance of Modified Widal Test with Conventional Widal Test in the Diagnosis of Enteric Fever	K. Sendil kumar et.al	Int.J.Curr.Microbiol.App.Sc i	2016	International	5(3)	605-609	2319-7706	Index Copernicus	MCI approved
24	2016	Isolation Identification and its Drug Susceptibility Pattern in Orthopaedic Wound Infections	B. Chandrashekara et.al	Int.J.Curr.Microbiol.App.Sc i	2016	International	5(9)	213-218	2319-7706	Index Copernicus	MCI approved
25	2016	Lactobacilli and Obesity	Akshita Ramani et.al	Int.J.Curr.Microbiol.App.Sc i	2016	International	5(2)	711-718	2319-7706	Index Copernicus	MCI approved
26	2016	Isolation Identification and its Drug Susceptibility Pattern in Orthopaedic Wound Infections	B. Chandrashekara et.al	Int.J.Curr.Microbiol.App.Sc i	2016	International	5(9)	213-218	2319-7706	Index Copernicus	MCI approved
Pharmacology											
27	2016	Diagnostic use of bone biomarkers and drugs affecting bone remodelling	Dwijani S	Indian Journal of Pharmacy and Pharmacology	2016	International	3(4)	155-161	2393-9079	Index Copernicus	MCI approved

28	2016	PREScribing PAttern of DRUGS IN PAEDIATRIC IN-PATIENTS WITH LOWER RESPIRATORY TRACT INFECTION AT A TERTIARY CARE HOSPITAL	Dr. Basavaraj Bhandare	WORLD JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES	2016	International	5(4)	2278 – 4357	2278-4357	Index Copernicus	MCI approved
29	2016	Drug Prescribing Pattern in Ophthalmology Out Patient Department of a Medical College	Md Faiz Akram	International Archives of Biomedical and Clinical Research	2016	International	2(4)	2454-9886	2454-9894	Index Copernicus	MCI approved
30	2016	Diagnostic use of bone biomarkers and drugs affecting bone remodelling	Dwajani S	Indian Journal of Pharmacy and Pharmacology	2016	International	3(4)	155-161	2393-9079	Index Copernicus	MCI approved
Forensic medicine											
31	2016	Bicuspid Aortic Valve : Cause For Sudden Cardiac Death – A Case Study	Bhagavan et al	Journal of Indian Academy of Forensic Medicine	2016	International	38(4)	509	0971-0973	Index Copernicus	MCI approved
32	2016	Suicidal Electrocution- A Case Report	Nisar Ahmed	Japanese Federation of Music Therapy	2016	International	33(1)	pp.1-3	1504-1611	Index Copernicus	MCI approved
Community Medicine											
33	2016	Editorial- Mental Health	ShashikalaManjunta,	The Journal of Medical Sciences	2016 April/June-2016	national	2016	XX	2321-354X	Indexed – Pub Med, Index Copernicus	MCI approved
34	2016	Health-related Quality of life among Diabetics visiting Rajarajeswari medical college and hospital, Bangalore	Samantha S komalSrividya V.	The Journal of Medical Sciences	2016 April/June-2016	National	April/June-2016	31-35	2321-354X	Index Copernicus	MCI approved
35	2016	Association of anthropometric parameters like body mass index, waist circumference, waist-hip ratio as predictors of type 2 diabetes mellitus	Vidya .J :-	J. Evid. Based Med. Health	Jul-16	Ntional	4-Jul-16	Issue 53	2349-2562	Google Scholar	Non MCI
36	2016	Knowledge and attitude on HIV/AIDS among adolescent school children in urban Mysuru: a cross sectional study	Vidya .J	International Journal of Community Medicine and Public Health	May – 2016	National	Vol 3 Issue 5	XX	2394-6040	Index Copernicus	MCI approved
37	2016	Bias in epidemiology	Vidya .J	Indian Journal of Preventive Medicine /	July-Dec-2016	National	Volume 4 Number 2	XX		Google Scholar	Non MCI
38	2016	Need assessment for life skills based education among school going adolescents in Mysore	Vidya .J	J. Evid. Based Med. Healthc.	Jul-16	International	3/Issue 54/	XX	2349-2562	Google Scholar	Non MCI
39	2016	When to Ring the Bell??: Perception on Warning Signals of Cancer in a Rural Community, Mysuru	Vidya .J	Indian Journal of Preventive Medicine	January June 2016	national	Volume 4 Number 1,	XX	2454-9894	Google Scholar	Non MCI
40	2016	Risk factors for preterm birth: a community based longitudinal study in rural Mysuru, Karnataka, India	Rashmi A.1*, Narayananmurthy M. R.2, Vidya G. S.3, Vidyalaxmi K.4, Renuka	International Journal of Community Medicine and Public Health	Dec-16	International	Vol 3 Issue 12		2394-6040	Google Scholar	Non MCI

41	2016	Attitude of Medical Students in Davangere towards Older People and Willingness to Consider a Career in Geriatric Medicine	Santosh A	National Journal of Research in Community Medicine.	Feb. 04, 2016	national	Vol.5. Issue 3.	155-159)	2277-1522	Google Scholar	Non MCI
42	2016	A study to determine the hidden part of the iceberg of diabetes, using Indian diabetes risk score as a screening tool in rural population of Bangalore, Karnataka, India	Santosh A	International Journal of Community Medicine and Public Health	Nov-16	national	Vol 3 Issue 11	Page 3076	2394-6040	Google Scholar	
43	2016	Bringing elder abuse out of the shadows: a study from the old age homes of Davangere district, Karnataka, India	Santosh A	International Journal of Community Medicine and Public Health	Jun-16	International	Vol 3 Issue 6	Page 1	2394-6040	Google Scholar	Non MCI
44	2016	Socio demographic and economic factors associated with people on Hemo-dialysis in a tertiary care hospital, Davangere: A cross sectional study	Santosh A	National Journal of Research in Community Medicine.	Oct.-Dec.-2016	national	Vol.5. Issue 4.	(241-245)	2277-1522	Google Scholar	Non MCI
45	2016	Geriatric health: assessment of nutritional status and functional ability of elderly living in rural area of Bangalore, Karnataka	Santosh A	International Journal of Community Medicine and Public Health	Dec-16	International	Vol 3 Issue 12	Page 3460	2394-6040	Google Scholar	Non MCI
General medicine											
46	2016	A Study of Microalbuminuria in patients with essantial hypertension	Anil kumar H	International journal of contemporary Medical research	2016	International	3(5)	1468	2393-915X	Index Copernicus	MCI approved
47	2016	Evaluation of serum creatine kinase levels in patients with hypothyroidism	Rekha Nanjundasetty Hemavathi	Evolution of Med.Den.Sci	2016	International	5(35)	2053	2278-4802	Index Copernicus	MCI approved
48	2016	Correlative study of ECG and Echo cardiographic findings in COPD Patients	Anil Kumar Hanumamthaiah	Evolution of Med.Den.Sci	2016	International	5(18)	897	2278-4802	Index Copernicus	MCI approved
49	2016	Recurrent Right-Sided Massive Pleural Effusion of Pancreatic Etiology	Sunayana S Nagendra	Journal of Medical Sciences	2016	International	2(4)	62	1682-4474	Index Copernicus	MCI approved
50	2016	A Study of Microalbuminuria in Patients with Essential Hypertension	Kumar A et al	International Journal of Contemporary Medical Research	2016	International	3(5)	1468-1470	2393-915X	Index Copernicus	MCI approved
51	2016	Comparison between chest X-ray,Electrocardiogram and Echocardiography in detecting Left Ventricular Hypertrophy in essential hypertension	Pooja Shashidharan	International journal of contemporary Medical research	2016	International	3(7)	1921-1923	2393-915X	Index Copernicus	MCI approved
52	2016	A Study of Non Traumatic Coma with respect to Etiology and Outcome	Ramesh S Hiremath	International journal of contemporary Medical research	2016	International	3(6)	1854-1858	2393-915X	Index Copernicus	MCI approved
53	2016	Clinical Profile of Acute Renal failure	Rekha Nanjundasetty Hemavathi	Scholar journals of Applied Medical Sciences	2016	International	4(12A)	4197	2320-6691	Non-Indexed	Non MCI
Psychiatry											
54	2016	Dance-like movements in obsessive compulsive disorder	Amar Bavle	Indian J Psychol Med	Mar 2016	International	38(2)	157-159	0253-7176	SCOPUS	MCI approved
Dermatology											
55	2016	Profile of childhood vitiligo with associated ocular abnormalities in South India	Belliappa Pennanda Raju	Indian Journal of Paediatric Dermatology	2016	International	17(3)	179-185	2319-7250	Index Copernicus	MCI approved

56	2016	Comparative Study of Positive Versus Negative Autologous Serum Skin Test in Chronic Spontaneous Urticaria and its Treatment Outcome	Yadalla Hari Kishan Kumar	North American Journal of Medical Sciences	2016	International	8(1)	25-30	1947-2714	Index Copernicus	MCI approved
57	2016	Juvenile plantar dermatosis: A barrier disease beyond eczema: An open prospective uncontrolled study in a tertiary care hospital of South India	Hari Kishan Kumar	Indian Journal of Paediatric Dermatology	2016	International	17(1)	13-7	2319-7250	Index Copernicus	MCI approved
58	2016	Autologous Smashed Dermal Graft with Epidermal Re-closure: Modified Technique for Acne Scars	Umeshankar Nagaraju	Journal of Cutaneous and Aesthetic Surgery	2016	International	9(4)	258-262	0974-2077	Index Copernicus	MCI approved
59	2016	QUALITY OF LIFE AMONG ADOLESCENTS WITH ACNE IN A TERTIARY REFERRAL CENTRE IN BANGALORE	Belliappa Pemmanda Raju	J. Evid. Based Med. Healthc.,	2016	International	3(62)	3345-3349	2349-2570	Index Copernicus	MCI approved
60	2016	CHARACTERISTICS OF CHILDHOOD VITILIGO IN A TERTIARY REFERRAL CENTRE IN BANGALORE	Belliappa Pemmanda Raju	J. Evid. Based Med. Healthc.,	2016	International	3(43)	2157-2161	2349-2570	Index Copernicus	MCI approved
TB & CD											
61	2016	Intrapulmonary Solitary Fibrous Tumor of the Lung: A Rare Case Presentation	Parinita S,	jp-journals	April-June 2016	National	2(2)	42-44	2455-6254	non-index	Non MCI
62	2016	Rv3881c from Mycobacterium tuberculosis Elicits PolyFunctional CD8+ T cells in PPD Positive Healthy Volunteers and Affords Significant Protection in the Guinea Pig Model	Vijaya Satchidanandam	Journal of Immunological Techniques in Infectious Diseases	42433	International	5(2)	2 of 6	2329-9549	non-index	Non MCI
63	2016	The Secreted Protein Rv1860 of Mycobacterium tuberculosis Stimulates Human Polyfunctional CD8 T Cells	Vijaya Satchidanandam	Clinical and Vaccine Immunology	42461	International	23	283-289	1556-6811	Scopus	MCI approved
General Surgery											
64	2016	Surgical anatomy of thyroid and incidence of malignancy in solitary nodule of thyroid	Uday Muddebihal M	International Surgery Journal	2016	International	3(2)	893-899	2349-3305	index copernicus	MCI approved
65	2016	Modified Alvarado Score and its Applications in the Diagnosis of acute Appendicitis	Uday Muddebihal M	International Journal of Contemporary medical Research	2016	International	3(5)	1398-1400	2454-7379	index copernicus	MCI approved
66	2016	Clinico pathological Evaluation and Management of Gastrointestinal Hollow Viscous Perforation	Rajashekhar Jade	IJSS Journal of Surgery	2016	International	2(2)	33-36	2320 9240	index copernicus	MCI approved
67	2016	A Clinical Study of lymphedema management	Mahesh M.s	International Surgery Journal	2016	International	3(2)	1 to 6	2349-3305	index copernicus	MCI approved
68	2016	An Institutional Experience on Complicated Groin Hernias	Saishyam Muralidharan	Indian Journal of Applied Research	2016	National	6(4)	183	2249-555X	index copernicus	MCI approved
69	2016	Ileoileal Knot as a Content of obstructed Hernia	Madusudhan Madihalli	Iran J Med Sci	2016	International	41(3)	238	0974-2077	scopus	MCI approved
70	2016	An Alternate to flap Cover for Bare Bones and Tendons	Prema Dhanraj	Acta Medica international	2016	International	3(1)	146-150	2349-2562	scopus	MCI approved
71	2016	Comparison of Ripasa and Avarado scoring systems in diagnosis of acute appendicitis	Gopal S	International Journal of Applied Research	2016	International	2(12)	767-769	2394-5869	index copernicus	MCI approved
72	2016	Role of permanent Sigmoidostomy in fornier's gangrene	Gopal S	International Journal of Applied Research	2016	International	3(1)	195-197	2394-3069	index copernicus	MCI approved
73	2016	Juvenile plantar dermarosis:A Barrier disease beyond eczema :An open prospective uncontrolled study in a tertiary care hospital of south india	keerthi Shankar	International Surgery Journal	2016	International			2076-3271	index copernicus	MCI approved

Orthopedics											
74	2016	A Comparative Study between Closed Reduction and Cast Application Versus Percutaneous K-Wire Fixation for Extra-Articular Fracture Distal end of Radius	Raghu Begur Venkatesh	Journal of Clinical and Diagnostic Research	2016	International	10(2)	PP.5-9	0973-709X	Index copernicus	MCI approved
Pediatrics											
75	2016	Study of PEER in urban lower and middle class high school children at Bangalore, India	Dr. adarsh E	Journal of Contemporary pediatrics	2016 feb	national	volume 03	189 to 192	2349-3291	Index Copernicus	MCI approved
76	2016	Ocular Manifestations in Down's Syndrome	Dr. Nanda L	Journal of Contemporary Medical Research	2016 May	national	Volume 3	1332 to 1335	2475-7379	Index Copernicus	MCI approved
77	2016	Serum Magnesium levels in children with febrile convulsions	Dr. Sreekrishna	Journal of Evaluation Research	2016 jan	national	Volume 2	04 to 06	2349-3291	Index Copernicus	MCI approved
Ophthalmology											
78	2016	Vitreomacular Traction Causing Idiopathic Full-Thickness Macular Hole Determined by Spectral-Domain Optical Coherence Tomography	Vijay Kumar Srivastava	International Journal of Scientific Study	Jan-16	International	3(10)	1 to 3	2321 - 595X	Index copernicus	MCI approved
79	2016	Ocular Manifestations in Down's Syndrome	Nanda L	International Journal of Contemporary Medical Research	May-16	International	3(5)	1332-1335	2454-7379	Index copernicus	MCI approved
ENT											
80	2016	A Clinical Study of Begin Lesions of Pinna	Srirangaprasad et.al	Evolution Med. Dent.Sci	Feb-16		5(10)	414	2278-4802	Index copernicus	MCI approved
Radio Diagnosis											
81	2016	Imaging in Gluteal Hernia	Anil Kumar Shukla	Open Journal of Medical Imaging	2016	International	6	16-19	2164-2788	Index Copernicus, Google Scholar, Global index Medicus	MCI approved
82	2016	Transverse cerebellar diameter – an ultrasonographic parameter for estimation of fetal gestational age	Anil Kumar Shukla	International Journal of Contemporary Medical Research	2016	International	3(4)	1029-1031	2454-7379	index copernicus	MCI approved
83	2016	Ultrasonographic correlation of placental thickness with fetal gestational age and grading of placental maturity	Prabhu M.R, Sahajanand H, Dwajani.S	J. Evid. Based Med. Healthc	2016	International	3(20)	825-829	2349-2562	Index copernicus	MCI approved
84	2016	Bilateral ovarian teratomas – a case report	Anil Kumar Shukla	International Journal of Contemporary Medical Research	2016	International	3(4)	1113-1115	2454-7379	Index copernicus	MCI approved
85	2016	An ultrasonographic evaluation of foetal cephalic index	Anil Kumar Shukla	J.Evid. Based Med. Healthc	2016	International	3(42)	2059-2063	2349-2562	Index copernicus	MCI approved
86	2016	Ultrasonographic estimation of fetal gestational age by humerus length and it's comparison with femur length	Anil Kumar Shukla	J. Evid. Based Med. Healthc	2016	International	3(74)	4040-4044	2349-2562	Index copernicus	MCI approved
87	2016	Intraventricular Silicone Oil: An Imitator	Anil Kumar Shukla	J Med Sci	2016	International	2(3)	48-49	2076-3271	Index copernicus	MCI approved
88	2016	Multidetector Computed Tomography Evaluation of Malignant Superior Vena Cava Syndrome	Anil Kumar Shukla	J Med Sci	2016	International	2(3):	pp.1-3	2076-3271	Index copernicus	MCI approved
89	2016	Multidetector Computed Tomography Evaluation of Juvenile Nasopharyngeal Angiofibroma	Anil Kumar Shukla	J Med Sci	2016	International	2(2)	38-41	2076-3271	Index copernicus	MCI approved

90	2016	Ultrasonographic correlation of placental thickness with fetal gestational age and grading of placental maturity	Seetha Pramila V V	Journal of Evidence Based Medicine and Healthcare	Mar-16	International	3(20)	2349-2562	2394-3069	Index copernicus	MCI approved
91	2016	Transverse cerebellar diameter- A trans-sonographic parameter for estimation of fetal gestational age	Seetha Pramila V V	International Journal of Contemporary Medical Research	Apr-16	International	3(4)	1029- 1031	2393-915X	Index copernicus	MCI approved
92	2016	Case Report : Bilateral ovarian teratomas	Seetha Pramila V V	International Journal of Contemporary Medical Research	Apr-16	International	3(4)	1113-1115	2393-915X	index copernicus	MCI approved
93	2016	An ultrasonographic evaluation of fetal cephalic Index	Seetha Pramila V V	Journal of Evidence Based Medicine and Healthcare	Apr-16	International	3(42)	pg 2059-2063	2394-3069	index copernicus	MCI approved
94	2016	Ultrasonographic estimation of foetal gestational age by humerus length and its comparison with femur length	Seetha Pramila V V	J. Evid. Based Med. Healthc	Sept.2016	International	3(74)	xx	2349-2562	index copernicus	MCI approved
95	2016	Mayer-Rokitansky-kuster-hauser syndrome-a rare case of uterine and bilateral ovarian agenesis	Seetha Pramila V V	Journal of Research in Radiodiagnosis, Teleradiology and Imaging	Jul-Dec ,2016	International	2(2)	xx	0254~1475	non-index	Non MCI
96	2016	MultiDetector Computed Tomography evaluation of Juvenile Nasopharyngeal Angiofibroma	Seetha Pramila V V	The Journal of Medical Sciences	Apr-Jun 2016	International	2(2)	38-41	2349-3305	Index copernicus	MCI approved
97	2016	MRI evaluation of Carotid Cavernous Fistula	Seetha Pramila V V	Journal of Research in Radiodiagnosis, Teleradiology and Imaging	Jul-Dec ,2016	International	2(2)	xx	2454-7379	non-index	Non MCI
98	2016	A rare case of late presentation of Congenital Diaphragmatic Hernia	Seetha Pramila V V	The Journal of Medical Sciences	Oct-Dec 2016	International	2(4)	65-67	2320 9240	Index copernicus	MCI approved
99	2016	Combined mammographic and sonographic evaluation of palpable breast masses in correlation with histopathological examination	Pravin G U	JMSCR	Feb-16	International	4(2)	9371-80	2349-3305	Index copernicus	MCI approved
100	2016	Secondary pleural hydatosis-a case report	Pravin G U	JMSCR	Feb-16	International	4(2)	xx	2249-555X	Index copernicus	MCI approved
101	2016	Urethrorectal fistula-complication of tuberculosis of prostate	Pravin G U	EBMH	Feb-16	International	3(12)	xx	0974-2077	Index copernicus	MCI approved
102	2016	Septo-optic dysplasia: a case report	Parthsarathi	JMSCR	FEBRUARY, 2016	International	4(2)	xx		Index copernicus	MCI approved
103	2016	ROLE OF SONOLOGICAL FETAL CEREBELLAR MEASUREMENT IN GESTATIONAL AGE DETERMINATION	Parthsarathi	JMSCR	Mar-16	International	4(3)	xx	2394-5869	Index copernicus	MCI approved
104	2016	URETHRORECTAL FISTULA-COMPLICATION OF TUBERCULOSIS OF PROSTATE	Gautam. M	Journal of Evidence Based Medicine and Healthcare	FEB,2016	International	3(12)	xx	2394-3069	Index copernicus	MCI approved
105	2016	Combined mammographic and sonographic evaluation of palpable breast masses in correlation with histopathological examination	Sindhu N	JMSCR	FEB, 2016	International	4(2)	9371-80	2076-3271	Index copernicus	MCI approved
106	2016	Urethrorectal fistula-complication of tuberculosis of prostate	Bysani Swaroop	Journal of Evidence Based Medicine and Healthcare	FEB,2016	International	3(12)	xx	2349-2562	Index copernicus	MCI approved
107	2016	Practicability and Accuracy of Thyroid Imaging Reporting and Data System as a Tool to Stratify Cancer Risk in Patients with Thyroid Nodules	Yashwanth	International Journal of Science and Research	Dec-16	International	5(12)	1661-1664	2319-7064	Index copernicus	MCI approved

108	2016	Ultrasound Evaluation of Colorectal Malignancy with contrast Enhanced Coputed Tomography as gold standard	Rameez Gouse	International Jor. Of sci and research	Dec-16	International	XX	xx	0254~1475	Index copernicus	MCI approved
109	2016	ROLE OF CT IN THE STUDY OF PREVALENCE OF NEUROCYSTICERCOSIS IN A RURAL AND SUBURBAN TEACHING HOSPITAL	Amith	J. Evid. Based Med. Healthc	2016	International	3(64)	3476-3481		Index copernicus	MCI approved
110	2016	Pancreatic pseudocysts and their unusual locations: a prospective study	Amith	J. Evid. Based Med. Healthc	21-Jul-16	International	3(58)		2349-2562	Index copernicus	MCI approved
Anaesthesiology											
111	2016	Comparative study of Inj. 0.5% bupivacaine and Inj. 0.75% Ropivacaine for their duration of anaesthesia/analgesia in transversus Abdominis plane block for unilateral inguinal hernia repair	Dr.Venkatesh Murthy K.T, Dr.Sowmya M.J, Dr.Sahajananda H, Dr.Maya D Nadakarni, Dr.Sivadharshini S	Journal of Evolution of Medical and Dental Sciences	July- Sep 2016	National	vol.3/issue 3	329-334	2278-4802	Index Copernicus	MCI approved
112	2016	Comparison of patient controlled epidural analgesia with continuous epidural infusion for labour analgesia	Dr.Sumaiyah Tahseen, Dr.Kassim Mohammed, Dr.Sahajananda , Dr.Praveen B. Halagunaki	Journal of Evolution of Medical and Dental Sciences	2016	National	XX	XX	2278-4802	Index Copernicus	MCI approved
113	2016	Comparative retrospective study on anaesthesia approaches for lumbar spine surgery	Rangalakshmi S, Praveen B. Halagunaki, Roshankumar B	Journal of Evolution of Medical and Dental Sciences	2016	National	Vol-5, Issue-60	4217-4220	2278-4802	Index Copernicus	MCI approved
114	2016	Diagnostic use of bone biomarkers and drugs affecting bone remodelling. Indian Journal of Pharmacy and Pharmacology	Dr.Prabhu M.R, Dr. H Sahajananda H, Dr.Dwajani S. Dr.Prabhu M.R	Indian Journal of Pharmacy and Pharmacology	2016	National	Vol-3 Issue- 4	155-161	0253-7613	Index Copernicus	MCI approved
115	2016	Nitrobenzene along with Organophosphorous Compound Poisoning	Hosur V, Dr.Karthik GS, Dr.Rangalakshmi S, Dr.Sahajananda	The Journal of Medical sciences	2016;	National	Vol-2 Issue-3	56-58	2321-354x	Index Copernicus	MCI approved
116	2016	Effect of two types of dietary ghee on serum lipid levels in rats	Dr.Nirmala KS, Dr.Manjula BS & Dr.Sahajananda H	Journal of Evolution of Medical and Dental Sciences	2016	National	Vol-5	XX	2278-4802	Index Copernicus	MCI approved
OBG											
117	2016	Dengue Fever during Pregnancy: Maternal and fetal Complications	Sai lakshmi MPA	Journal of South Asian Federation of obstetrics and Gynaecology Accepted for publication	2016	International	Vol.01	XX	P-0974 -8938 E-0975-6434	Embase	MCI approved
118	2016	A prospective study of prevalence, risk factors, isolates & antimicrobial sensitivity pattern in Asymptomatic	Nagarathanamma.R	Indian Journal of Obstetrics and Gynecology Research	2016	National	3(3)	229-233	ISSN -2394-2746	Index Copernicus	MCI approved

119	2016	Significance of Cervical length and Cervical gland area in Cervical maturation	R. Nagarathnamma	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.	2016	International	VOLUME -5 ISSUE- 8	6	2320-1789	Index Copernicus	MCI approved
120	2016	Study on outcome of Laparoscopic management of adnexal pathology complicating pregnancy	R. Nagarathnamma	International Journal of Reproduction, obstetrics and Gynecology	2016 Aug	International	VOLUME -5 ISSUE- 8	3	2320-1789	Index Copernicus	MCI approved
121	2016	Diagnosis of genital tuberculosis: correlation between polymerase chain reaction positivity and laparoscopic findings	R. Nagarathnamma	International journal of Reproduction, Contraception and	2016 Oct	International	VOLUME -5 ISSUE- 10	3425-3432	2320-1789	Index Copernicus	MCI approved
122	2016	Effectiveness of Selected Mind Body Interventions on Anxiety Related to Childbirth and Labour Outcome among Parturient Women Undergoing Medical Induction of Labour	Dr. R Nagarathnamma	Journal of International Journal of Health sciences and Research	Oct-16	International	VOLUME -6 ISSUE- 10	XX	2249-9571	Index Copernicus	MCI approved
123	2016	A Study on teenage pregnancy and its maternal and fetal outcome	Dr. Rupakala B.M- IAuthor	International Journal of science and research technology	May-16	International	VOL. 6, ISSUE- 10	477.48	2319-7064	Index Copernicus	MCI approved
124	2016	Role of pro-oxidant Myeloperoxidase and an oxidative stress marker Malondialdehyde in prediction of preeclampsia	Dr. Rupakala B.M- II Author	International Journal of Biochemistry and research & Review(IJBCRR)	2016	International	XX	XX	2231-086X	Index Copernicus	MCI approved
125	2016	Study of Insulin resistance in polycystic Ovarian Syndrome	Dr. Rupakala B.M- II Author	International Journal of Biochemistry and research & Review(IJBCRR)	2016	International	XX	XX	2231-086X	Index Copernicus	MCI approved
126	2016	Knowledge of obesity and its effects on cardiometabolic and reproductive health in women	Dr. Rupakala B.M- III Author	International Journal of Reproduction contraception obstetrics and gynacology	2016	International	XX	XX	2320-1789	Index Copernicus	MCI approved
127	2016	Ovarian yolk sac tumor: a case report with review of literature	Dr. Rupakala B.M- II Author	The journal of Medical Sciences of India	2016	National	XX	XX	ISSN 2321-354X EISSN 2455-6254	Scopus	MCI approved

128	2016	Study on outcome of Laparoscopic management of adnexal pathology complicating pregnancy	Dr.Sarojamma.C, II - Author	International Journal of Reproduction, obstetrics and Gynecology	2016	International	XX	XX	P-2320-1770 E-2320-1789	Index Copernicus MCI
129	2016	A prospective study of prevalence, risk factors, isolates & antimicrobial sensitivity pattern in Asymptomatic Bacteruria among Antenatal women in RRMCH	Dr. Nagendra Prasad.N, II-Author	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):229-233	2016	National	XX	XX	ISSN -2394-2746	Index copernicus MCI
130	2016	B-directional barbed suture in laparoscopic myomectomy : a clinical study	Dr. Nagendra Prasad.N, I- Author	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):220-224	2016	National	XX	No.6	ISSN -2394-2746	Index copernicus MCI approved
131	2016	Dengue Fever during Pregnancy: Maternal and fetal Complications	Dr. Pavamangala.A-I Author	Journal of South Asian Federation of obstetrics and Gynaecology	Jun-17	International	XX	Vol.4	P-0974 -8938 E-0975-6434	Embase MCI approved
132	2016	Prevalence of Gestational Diabetes Mellitus and associated risk factors at a tertiary care hospital in Karnataka	Dr. Chandana.M.P	Indian Journal Of Obstetrics And Gynecology.	Apr-16	National	VOL.-4 No-1	10-May	P-2321-1636 E-2455-5339	Index Copernicus MCI approved
133	2016	Knowledge of obesity and its effects on Cardio-metabolic and reproductive health in women	Dr. Manorama Eti , I- Author	International journal of Reproduction, Contraception and Obstetrics and Gynaecology	Jan-16	International	VOLUME-5 ISSUE-1	143-147	ISSN-2320-1789	Index Copernicus MCI approved
134	2016	A prospective observational study of thyroid dysfunctions during pregnancy in a tertiary care hospital	Dr.Nagendra Prasad. N, II-Author	International Journal of Reproduction, obstetrics and Gynecology	2016 Nov	International	5 (11)	7-Jan	P-2320-1770	Index Copernicus MCI approved
135	2016	Knowledge of obesity and its effects on Cardio-metabolic and reproductive health in women	Dr. Chandana.M.P,-II Author	International journal of Reproduction, Contraception and Obstetrics and Gynaecology.	2016	International	5(1)	143-147	P-2320 -1770	Index Copernicus MCI approved
136	2016	B-directional barbed suture in laparoscopic myomectomy : a clinical study	Dr. Savitha C IV - Author	Indian Journal of Obstetrics and Gynecology Research	2016	National	3(3):	220-224	ISSN -2394-2746	Index Copernicus MCI approved
137	2016	Diagnosis of genital tuberculosis: correlation between polymerase chain reaction positivity and laparoscopic findings	Dr. Savitha C-II Author	International journal of Reproduction, Contraception and Obstetrics And Gynaecology	2016 Oct	International	5(10)	3425-3432	E-2320-1789	Index Copernicus MCI approved

CRL											
138	2016	Effect of Two types of dietary ghee on serum lipid levels in rats	Karamaradi S Nirmala, Bhat Manjula S, Sahajanand H	J Evolution Med Dent	2016	National	5(49)	3240-3244	2278-4802	Index Copernicus, Academic one file, Google Scholar, J-Gate, WHO-HINARI, Indian Science Abstracts, Journal seek Database, Global index Medicus	MCI approved
139	2016	Development and Validation of new RP-HPLC Method for Quantitative Estimation of Vitamin-D3 in Bulk drug and Pharmaceutical Dosage Form	Mohan T, Prabhakara S, Anbazhagan K, Pavithra Krishnan, Basavaraj Bhandare, Sahajanand H	Indian Drugs	2016	National	53(6)	40-45	0019-462X	Scopus, Embase, International Pharmaceutical Abstracts, SCIMAGO, Index Copernicus, Indian Citation Index, DRJI, Science Library Index	MCI approved
140	2016	Diagnostic use of bone biomarkers and drugs affecting bone remodelling	Prabhu M.R, Sahajanand H, Dwajani.S	Indian Journal of Pharmacy and Pharmacology	2016	National	3(4)	155-161	2393-9087	Index Copernicus, Google Scholar, Cite Factor, Open Academic Journal Index, Infobase Index, Academic Resource Index	MCI approved

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Publication by the faculty for the Calendar Year 2017

S.No	Calender Year	Title	Author	Name of the Journal	Month & Year of Publication	National / International	Volume / Issue	Page No	ISSN No	Index	Remarks
Anatomy											
1	2017	Third Coronary artery: A Cadaveric Study	Jyothi Lakshmi G.L	International Journal of Anatomy and Research	31 Jan 2017	International	5(1)	3410-14	2321-4287	Index copernicus	MCI Approved
2	2017	A study of shape pterion in human adult skull	Kaleel.N	Indian journal of anatomy	Dec-17	National	1(2)	552-553	2320-0022	Index copernicus	MCI Approved
3	2017	A stady of position infraorbital foramen	Shaik hussain saheb	International Journal of Anatomy and Research	31-8-2017	International	5(3)	50-57	2321-4287	Index copernicus	MCI Approved
4	2017	A study on Morphological and morphometric features of foramen ovale	Shruthi B.N	Indian Journal of Anatomy Research	1-Oct-17	International	xx-xx	4523-4526	2321-4287	Index copernicus	MCI Approved
Physiology											
5	2017	surya namaskar versus spot jogging on cardiovascular and HRV parameter in young adult - a pilot study	priyanka singh	International journals of physiolohy	9-Jul-05	International	5(2)	219-223	2320-6039	Non-indexed	Non MCI
6	2017	comparitive palmonary functions test obses and non absels adoliescent	puneeth M	International journals of physiolohy	june/ july 2017	International	5(1)	73-76	5958-2320	Non-indexed	Non MCI

7	2017	Comparitive study on effects on surya namaskar spot jogging on resperatory a parameter-a pilot study	priyanka singh	International journals of physiolohy	jan-june 2017	International	5(1)	142-144	5958-2320	Non-indexed	Non MCI
8	2017	A STUDY ON THE EFFECT OF HAEMOGLOBIN CONCENTRATION ON AUDIO visual reaction time	Rashmi S	INTERNATIONAL JOURNAL OF CURRENT RESEARCH	June, 2017	International	9(6)	53073-53076	0975-833X	Index Copernicus	MCI Approved
Biochemistry											
9	2017	Acute Phase Reactant Profile of Subjects with Prediabetes and Type 2 Diabetes Mellitus	S. M. R. Usha	International Journal of Biochemistry Research & Review	Nov-17	International	19(4)	1-6	2231-086X	Pub Med	MCI Approved
Pathology											
10	2017	Osteitis Fibrosa Cystica of Tibia as Initial Manifestation of Primary Hyperparathyroidism.	Jayker SS,	Journal of Case Reports	05-JAN-2017	International	7(1):	xx	xx	Index Copernicus	MCI Approved
11	2017	Sudden Death In Sickle Cell Disease: An Autopsy Diagnosis	Nanditha Sheshanna, Gurpreet Sethi, Jyothi A Raj, Sumitha M Prakash, Sharmila P	The Journal Of Medical Sciences	Oct-Dec 2017	International	3(4):	113-115	xx	Index Copernicus	MCI Approved
12	2017	Role of Cell Block Technique by Fixed Sediment Method in Fluid Cytology	Sumitha MP	Annals of Clinical Cytology and Pathology	20-Feb-17	International	3(1)	7-Jan	xx	Index Copernicus	MCI Approved
13	2017	Comparative Study of cell Block Versus Centrifuged Smear Examination from Aspirates of Cystic Lesions	Sumitha Prakash2	Annals of Pathology and Laboratory Medicine	Mar- Apr 2017	International	Vol. 04,	A188-A194	eISSN: 2349-6983; pISSN: 2394-6466	Index Copernicus	MCI Approved

14	2017	Multilocular Cystic Renal Cell Neoplasm of Low Malignant Potential: A Case Report with Review of Literature	Dr Shashikala K	International Journal of Health Sciences and Research	Aug-17	International	Vol.7	492- 496	ISSN: 2249-9571	Index Copernicus	MCI Approved
15	2017	Histopathological spectrum of non-neoplastic and neoplastic lesions of thyroid: A 5 year prospective study in a tertiary care hospital	M Padmavathi	The Journal Of Medical Sciences	Jul-Sept 2017	International	Vol 3	63-85	ISSN 2321-354X, eISSN 2455-6254	Index Copernicus	MCI Approved
16	2017	A rare case of transitional cell carcinoma of ovary: case report and review of literature	TS Anisha	The Journal Of Medical Sciences	Jul-Sept 2017	International	3(3)	82-85		Index Copernicus	MCI Approved
17	2017	Diagnostic efficacy endometrial aspiration cytology in gynecological pathology	K. Shashikala	Indian Journal of Pathology and Oncology,	Oct-Dec 2017	National	4(4)	517-522		Index Copernicus	MCI Approved
18	2017	Diagnostic accuracy of acute appendicitis with significant pre-operative inflammatory markers (TLC, Neutrophil count) and post-operative histopathological diagnosis encountered at RRMCH	Dr.Shashikala K	International Journal of Current Research	Jul, 2017	International	Vol. 9, Issue. 07	53439-53441	ISSN: 0975-833X	Index Copernicus	MCI Approved
Microbiology											
19	2017	Role of biofilm in cerebrospinal fluid shunt infections: A study at tertiary neurocare center from South India	Kirtilaxmi K et.al	Journal of Neuroscience Rural Practices	14-Jun-17	National	8 (3)	335-341	0976-3147	Scopus	MCI Approved

20	2017	Thrombocytopenia – An Indicator of Impending Complications in Dengue Virus Infection	Mamatha B. Patil, et.al	International Journal of Current Microbiology and Applied Sciences	4-Nov-17	International	6(10)	145-150	2319-7706	Index copernicus	MCI Approved
21	2017	Successful treatment of primary cerebral mucormycosis: Role of microbiologist	KK Benachinmardi et.al	Indian Journal of Medical Microbiology	17-Apr-17	National	34 (4)	550	0255-0857	Scopus	MCI Approved
22	2017	Blood Stream Infection in Pediatric Patients of a Tertiary Care Hospital A Bacteriological and Antimicrobial Profile	A. Ramya et.al	International Journal of Current Microbiology and Applied Sciences	22-Feb-17	International	6(3)	1444-1449	2319-7706	Index copernicus	MCI Approved
23	2017	Postoperative Catheter induced bacteriuria in obstetrics and gynaecological cases	Rupakala B. M.	International Journal of Reproduction, Contraception, Obstetrics and Gynecology	2017 May	International	6(5)	1965-1968	2320-1770	Index copernicus	MCI Approved
24	2017	Thrombocytopenia – An Indicator of Impending Complications in Dengue Virus Infection	Kanthishree B. Haritsa et.al	Int.J.Curr.Microbiol.App. Sci	2017	International	6(10)	145-150	2319-7706	Index copernicus	MCI Approved
25	2017	Study of Penicillin Resistance and Multidrug Resistance of Streptococcus pneumoniae in a Tertiary Care Hospital	L. Nandini et.al	Int.J.Curr.Microbiol.App. Sci	2017	International	6(3)	913-918	2319-7706	Index copernicus	MCI Approved
Pharmacology											
26	2017	A study to compare the efficacy of methotrexate alone vs. methotrexate plus pioglitazone in the management of plaque-type psoriasis	Shabeer D	International Journal of Basic & Clinical Pharmacology	2017	International	6(4)	859-863	2279-0780	Index Copernicus	MCI Approved
27	2017	Prescribing pattern of drugs in chronic kidney disease patients on hemodialysis at a tertiary care hospital	Narayana Murthy B. V.	International Journal of Basic & Clinical Pharmacology	2017	International	6(4)	928-932	2279-0780	Index Copernicus	MCI Approved

28	2017	Significance of prescription elements and determination of prescription errors in psychiatry outpatient department of a tertiary care hospital	Pradeep Kumar R	International Journal of Basic & Clinical Pharmacology	2017	International	6(4)	978-983	2279-0780	Index Copernicus	MCI Approved
29	2017	Study on assessment of awareness about concepts in undergraduate pharmacology curriculum among clinicians in a tertiary care teaching hospital	Rekha M. B	International Journal of Basic & Clinical Pharmacology	2017	International	6(3)	633-635	2279-0780	Index Copernicus	MCI Approved
30	2017	A study of the effect of Baclofen on blood glucose level in alcohol dependence syndrome(ADS) patients at a tertiary care hospital	Vishnu Vardhan G	Indian Journal of Pharmacy and Pharmacology	2017	International	4(1)	55-61	2393-9079	Index Copernicus	MCI Approved
31	2017	Analgesic use and potential hearing loss: a pharmacovigilance study	Meena K. N	International Journal of Basic & Clinical Pharmacology	2017	International	6(10)	2380-2383	2279-0780	Index Copernicus	MCI Approved
32	2017	AWARENESS OF ANTI-DIABETIC TREATMENT IN TYPE 2 DIABETES MELLITUS PATIENT ATTENDING TERTIARY CARE HOSPITAL	Dr. Basavaraj Bhandare	World Journal of Pharmaceutical Research	2017	International	6(12)	532-540	2277-7105	Index Copernicus	MCI Approved
33	2017	Association between serum sodium levels and selective serotonin reuptake inhibitors in patients with depression	Rajiv S	International Journal of Basic & Clinical Pharmacology	2017	International	6(2)	349-353	2279-0780	Index Copernicus	MCI Approved
34	2017	A retrospective study of Electroencephalographic (EEG) findings and its interpretation in Adults and children	Dwajani S	Indian Journal of Neurosciences	2017	International	3(3)	83-87	2278-2656	Index Copernicus	MCI Approved

35	2017	Antibiotic resistance and usage – a questionnaire based study among medical students in southern India	Basavaraj Bhandare	International Journal of Research in Pharmacology & Pharmacotherapeutics	2017	International	6(3)	262-266	2278-2656	Index Copernicus	MCI Approved
36	2017	A prospective study to evaluate oral iron preparations in antenatal women at a tertiary care hospital	Satyanarayana V	International Journal of Basic & Clinical Pharmacology	2017	International	6(4)	851-854	2279-0780	Index Copernicus	MCI Approved
37	2017	TO ASSESS THE WOUND HEALING PROPERTY OF TOPIRAMATE – EXCISION MODEL IN IMMUNOSUPRESSED ALBINO RATS	Dwajani S	EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH	2017	International	4(7)	530-532	2394-3211	Index Copernicus	MCI Approved
Forensic Medicine											
38	2017	Estimation of Stature from Cephalometric Measurements among students of allied medical sciences of Chennai	Balaji Singh et al	Journal of South India Medicolegal Association	2017	International	10(1)	43-49	0974-6196	Scopus	MCI Approved
39	2017	A Cross Sectional Study on Homicidal Asphyxial Deaths	Punitha et al	The Journal of Karnataka Medico-Legal Society	2017	International	26(1)	pp.9-12	0972-0839	Index Copernicus	MCI Approved
Community Medicine											
40	2017	Prevalence and pattern of internet addiction among medical students, Bengaluru.	Rangantaha S C, Usha S.	International journal of community medicine and public health	Dec-17	National	/vol 4/Issue 12		eISSN 2394-6040	Index Copernicus	MCI Approved
41	2017	Clinico-epidemiological profile of Dengue cases in a Medical College Hospital, Bengaluru, Karnataka	Sridhya VKruthika N	International Journal of Community Medicine and Public Health	Apr-17	National	4(4)	928-932	PISSN 2394-6032 eISSN 2394-6040		MCI Approved
General Medicine											

42	2017	Role of High-Sensitivity C-reactive Protein as a predictor of severity of Chronic Obstructive Pulmonary Disease in Correlation with Clinical Parameters	Mamatha B Patil	Journal of Medical Sciences	2017	International	3(2)	50-54	1682-4474	Index Copernicus	MCI Approved
43	2017	Study of Atherosclerotic Risk Factors in patients with prediabetes and Type-II diabetes Mellitus with special reference to carotid intima -media thickness	Anita Bhosale	Journal of Medical Sciences	2017	International	3(1)	15-19	1682-4474	Index Copernicus	MCI Approved
44	2017	A Study of hematological parameters and requirements of platelet transfusion in dengue fever	Yashaswini L S	International Journal of Advances in medicine	2017	International	4(6)	831	2349-3933	Index Copernicus	MCI Approved
45	2017	Role of Procalcitonin and C-reactive protein in urinary tract infection diagnosis in adults	Ramesh S Hiremath	International Journal of Advances in medicine	2017	International	4(2)	1	2349-3933	Index Copernicus	MCI Approved
46	2017	A Study to determine the Association between Creatine Kinase and Hypertension-Study	Sanjay Kumar H R	Indian Medical Gazette	2017	International	Nil	48	Thesis	Index Copernicus	MCI Approved
47	2017	Study of prevalence of Hypomagnesemia in patients with Type II Diabetes Mellitus	N H Rekha	Journal of Medical Sciences	2017	International	3(2)	1,2,3,4	1682-4474	Index Copernicus	MCI Approved
Dermatology											
48	2017	Methicillin-resistant Staphylococcus aureus in community-acquired pyoderma in children in South India	Umashankar Nagaraju	Indian Journal of Paediatric Dermatology	Mar-17	International	18(1)	14-17	2319-7250	Index Copernicus	MCI Approved
49	2017	Old age comes early	Harsha Siddappa	Indian Dermatol	2017	International	8(5)	382-383	0019-5154	Index Copernicus	MCI Approved
50	2017	Autologous Platelet-rich Fibrin Matrix in Non-healing Trophic Ulcers in Patients with Hansen's Disease	Umashankar Nagaraju	Journal of Cutaneous and Aesthetic Surgery	2017	International	10(1)	3 to 7	0974-5157	Index Copernicus	MCI Approved

51	2017	A study of Knowledge and Attitude about Leprosy among Medical Students	R Leena	Indian journal of leprosy	2017	National	89	91-97	0254-9395	Index Copernicus	MCI Approved
52	2017	A Study of Vitiligo in Type 2 Diabetic Patients	Leena Raveendra,	Indian Journal of Dermatology	2017	International	62(2)	168-170	0019-5154	Index Copernicus	MCI Approved

TB &CD

53	2017	Metabolic syndrome in chronic obstructive pulmonary disease	M. D. Majeed Pasha	International Journal of Advances in Medicine	11-May-17	International	5(3)	597-603	2349-3925	Google Scholar	Non MCI
54	2017	An Unusual Case of Multiple Primary Malignancies with Fungal Infection	K.N. Mohan Rao	The Journal of Medical Sciences,	July-September 2017	National	3(3)	86-88	1045-0064	Not Indexed	Non MCI
55	2017	EFFICACY OF CB-NAAT IN DETECTING PULMONARY TUBERCULOSIS	K. N. Mohan Rao	Indian Association of Clinical Medicine	Nov. 02, 2017	International	4(88)	1001-1004	2349-2570	Scopus	MCI Approved
56	2017	EVALUATION OF CLINICAL, DIAGNOSTIC AND TREATMENT OUTCOME IN ACUTE EXACERBATION OF BRONCHIECTASIS IN ADULTS	Vinod Kolla	Indian Association of Clinical Medicine	April 30, 2017.	International	4(62)	PP.01-06	2349-256	Scopus	MCI Approved

General Surgery

57	2017	Necrotizing gastritis	Tejas A P	International Surgery Journal	Aug,2017	International	4(10)	3535-3538	2349-3305	Index copernicus	MCI Approved
58	2017	Study of Acute Scrotum:An Evaluation,Diagnosis,Intervention and management	S.J.Haridarshan	International Journal of Scientific Research	2017	International	6(5)	531-536	2277-8179	Index copernicus	MCI Approved
59	2017	Effect of Implementation of W.H.O Surgical Safety Check list:our institutional Analysis	S.J.Haridarshan	Indian Journal of Surgery	2017	International		1 to 4	0973-9793	Web of Science	MCI Approved

60	2017	Role of permanent sigmoidostomy in fournier'sgangrene	Gopal S	International Journal of Applied Research	2017	International	3(1)	195-197	2394-5869	No Index	Non MCI
61	2017	Ergonomics in Laproscopy :a questionnaire survey of physical discomfort and symptoms in surgeons following laparoscopic surgery	Madhu Shankar K C	International Surgery Journal	2017	International	4(12)	1	2349-3305	Index copernicus	MCI Approved
62	2017	Isolated segmental mega-diverticulosis of ileum :a rare presentation of acute intestinal obstruction	Veena A	International Surgery Journal	2017	International	4(6)	2098-2100	2349-3305	Index copernicus	MCI Approved
63	2017	Correlation between Human Epidermal growth factor receptor and Hormonal Receptor status with grade and nodal status in Carcinoma Breast	Manjunath K	Indian Journal of Surgery	2017	International	8(3)	364-367		Web of Science	MCI Approved
64	2017	prognostication of Acute Pancreatitis Using simple sir Score & serum Interleukin-6 Concentration for effective intervention of Serve Acute Pancreatitis in primary health care	Manjunath K	International Journal of Current Research	2017	International	9(3)	47569-47573	0975-833X	Index copernicus	MCI Approved
65	2017	Analysis of cellulitis in diabetic lower limb along with its local completions using Amit Jain's Staging system	Gopal S	International Surgery Journal	2017	International	4(12)	3915-3920	2349-3305	Index copernicus	MCI Approved
66	2017	Analysis of prolene hernia system in the management of uncomplicated inguinal hernia in comparison to lichtension mesh repair	Santosh M P	Indian Journal of Surgery & Orthopedics	2017	International	3(4)	99-106	2455-5436	Scopus	MCI Approved
67	2017	A Typical mycobacterial infection in post laparoscopy Surgical wounds	Rohit Krishnappa	International Surgery Journal	2017	International	4(9)	2943-2946	2349-3305	Index copernicus	MCI Approved

orthopedics

68	2017	A comparative study of proximal femoral fracture fixation with proximal femoral nail and Dynamic hip screw & plating	Mahesh Kumar NB	International Journal of Orthopaedics Sciences	2017	International	3(1)	499-505	2395-1958	Index Copernicus	MCI Approved
69	2017	To assess the improvement of cerebral palsy patients with single event multilevel surgery	Avinash CK	International Journal of Orthopaedics Sciences	2017	International	3(1)	537-539	2395-1958	Index Copernicus	MCI Approved
70	2017	To study the functional outcome of the fracture of proximal tibia and the duration of union in proximal tibial fracture treated with LCP	Ullas Mahesh	National Journal of Clinical Orthopaedics	2017	International	1(1)	5 to 10	2521-3466	Index Copernicus	MCI Approved
71	2017	To determine the rate of union, complications, and functional outcomes in intertrochanteric fractures treated by PFN	Ullas Mahesh	International Journal of Orthopaedics Traumatology & Surgical Sciences	2017	International	3(II)	609-615	2455-0809	Index Copernicus	MCI Approved
72	2017	Prospective Study of Surgical Management of Distal Tibial Fractures in Adults	Ullas Mahesh	Journal of Trauma & Treatment	2017	International	6(2)	pp.1-4	2167-1222	Non-index	Non MCI
73	2017	ACL avulsion managed with pullout suture technique- A prospective study	Shivakumar Kerakkavar	Indian Journal of Orthopaedics Surgery	2017	International	3(4)	335-338	2395-1958	Index Copernicus	MCI
74	2017	Arthroscopy VRS MRI Correlation in Shoulder Joint Pathology: Multicentric Study in Indian Population	Shivakumar B. Kerakkavar	Journal of Orthopaedic Education	2017	International	3(2)	182-186	2454-7956	Non-index	Non MCI
75	2017	Effect of intravenous tranexamic acid on blood loss and blood transfusion in total knee replacement: a prospective, randomized study in Indian population	Shivakumar Kerakkavar	International Journal of Research in Orthopaedics	2017	International	3(5)	916-921	2455-4510	Index Copernicus	MCI Approved

76	2017	Functional outcome of closed metacarpal shaft fractures managed by low-profile miniplate osteosynthesis: A prospective clinical study	Shivakumar Kerakkavar	Journal of Orthopaedics and Allied Sciences	2017	International	5(2)	63-67	2347-436X	Index Copernicus	MCI Approved
Pediatrics											
77	2017	Association of Bottle Feeding with acute Diarrhoea in children aged 0-5years	Dr. Noveditha	Journal of Evaluation of Research in Pediatrics and Neonatology	2017	National			2475-507X	Index Copernicus	MCI Approved
78	2017	Correlation of neonatal hyperbilirubinaemia in infants with neonatal Hyperbilirubinaemia in siblings--	Dr. Dhanyatha	Journal of Evaluation of Research in Pediatrics and Neonatology	2017 jan	National	Vol. 03	03 to 05	2475-507X	Index Copernicus	MCI Approved
79	2017	Antibiogram resistance pattern of extended-spectrum beta-lactamase-positive bacterial isolates--	Dr. Manjunath	Indian Journal of Child Health	2017	National			2349-6118	Index Copernicus	MCI Approved
80	2017	A hospital based prospective study to determine incidence of retinopathy of prematurity among premature and low birth weight babies admitted to NICU in Rajarajeshwari Medical College and	Dr. Dharshan K Raj	International Journal of Contemporary Pediatrics	2017 may - june	International	Volume 04	1008 to 1011	2349-3283	Index Copernicus	MCI Approved
81	2017	Idiopathic acute onset pulmonary artery hypertension in infancy need for research	Dr. Sangeetha V.B	International Journal of Contemporary Pediatrics	2017	International			2349-3283	Index Copernicus	MCI Approved
ophthalmology											
82	2017	A Case report of Retinal Vasculitis in Systemic Lupus Erythematosus	Kaushal Kumar	Journal .evid Based Med. Health sciences	Sep-17	International	4(76)	4503	2349-2562	non-index	Non MCI
83	2017	A multidisciplinary approach to sphenoid wing dysplasia presenting with pulsatile proptosis in neurofibromatosis Type 1: A rare case report	Prathibha Shanthaveerappa	Indian Journal of Ophthalmology	2017	International	XX(XX)	1 to 3	0301-4738	Index copernicus	MCI

84	2017	Choroidal Melanoma	Shivakumar Mallappa	Journal .evid Based Med. Health sciences	2017	International	4(65)	3928-3930	2349-2562	non-index	Non MCI
ENT											
85	2017	Facial Nerve Paralysis in Accute Superative Otitis Media-Management	Srirangaprasad et.al	Indian Journal Otolaryngol Head and Neck Surgical	Jan-Mar 2017	National	69(1)	58-61	2349-2570	Index copernicus	MCI Approved
86	2017	A Rare Case of Plunging Ranula without Oral component - A Case Report	Praveen Kumar et.al	Evolution Med. Dent.Sci	22-Jun-17	International	6(50)	25	2349-256	Index copernicus	MCI Approved
Radio Diagnosis											
87	2017	MRI evaluation of carotid cavernous fistula – a case report	Anil Kumar Shukla	Indian J Case Reports	2017	International	3(1)	pp.8-10	2455-0809	Index copernicus	MCI Approved
88	2017	Reliability of Ultrasound in the Identification and Measurement of Blood Supply to the Anterior Part of the Mandible	Anil Kumar Shukla	J Med Sci	2017	International	3(1)	20-24	2167-1222	Index copernicus	MCI Approved
89	2017	Imaging of a Rare Case of Diaphragmatic Tumor	Anil Kumar Shukla	The Journal of Medical Sciences	2017	International	3(1)	25-27	2395-1958	Index copernicus	MCI Approved
90	2017	Evaluation of spermatic cord thickness by ultrasonography	Anil Kumar Shukla	European Journal of Biomedical and Pharmaceutical Sciences	2017	International	4(5)	394-397	2454-7956	Index copernicus	MCI Approved
91	2017	Role of Magnetic Resonance Imaging in Cerebral Stroke	Anil Kumar Shukla	British Journal of Pharmaceutical and Medical Research	2017	International	2(2)	426-436	2455-4510	Index copernicus	MCI Approved

92	2017	A rare neglected case of large leptomeningeal cyst: A case report	Anil Kumar Shukla	Indian J Case Reports	2017	International	3(3)	137-139	2347-436X	Index copernicus	MCI Approved
93	2017	Trigonocephaly pre- and post-operative evaluation by multidetector computed tomography	Anil Kumar Shukla	Indian J Case Reports	2017	International	3(3)	156-158	2349-2570	Index copernicus	MCI Approved
94	2017	MRI EVALUATION OF INTERNAL DERANGEMENT OF KNEE	A Srikanth Chowdhary	J Evid.Based Med. Health	2018	International	5(4)	296-302	2349-256	Index copernicus	MCI Approved
Anaesthesiology											
95	2017	To assess the wound healing property of topiramate - excision model in immunosuppressed albino rats.	Dr.Dwajani. S, Abhijit B.R, Dr.Sahajananda.H	European Journal of Pharmaceutical and Medical Research	2017	National	Vol 4, issue 7	530-532		Index copernicus	MCI Approved
96	2017	A retrospective study of Electroencephalographic (EEG) findings and its interpretation in Adults. Indian Journal of Neurosciences	Dr.Dwajani.S, Dr. Nirmala K.S. Dr.Sahajananda.H	Indian Journal of Neurosciences.	2017	National	Vol 3, issue 3	83-87		Index copernicus	MCI Approved
97	2017	Comparison of Efficacy of Different Doses of Clonidine with 0.5% Bupivacaine for Spinal Anesthesia in Lower Limb Orthopedic Surgeries	Dr.KT Venkatesh Murthy, Dr.Maya D Nadkarni, Dr.N Amaranath	The Journal of Medical Sciences	2017	National	Vol 3, issue 2	45-49	2321-354x	Index Copernicus	MCI Approved
98	2017	Acute pulmonary edema in a patient undergoing appendectomy under spinal anaesthesia; A case report	Dr.Venkatesh Murthy K.T, Dr.Vani Thantri, Dr.Veeresh, Dr.Sahajananda H	The Journal of Medical Sciences	2017, july - september	National	Vol 3 , issue 3	76-78	2321-354x	Index Copernicus	MCI Approved

99	2017	Anesthetic Management of a 9-day-old Neonate with Intestinal Evisceration due to Dog Bite	Dr.Sowmya M Jois, Dr.K.T.Venkatesh Murthy, Dr.Sadanand Ankitha, Dr.H.Sahajanand	The Journal of Medical Sciences	2017, October-december	National	Vol 3 , issue 4	111-112	2321-354x	Index Copernicus	MCI Approved
100	2017	Comparision of effect of oxytocin 3 iu bolus + i.v. infusion of 30 IU IN 500 ml at the rate of 125 ml / Hr. (0.125 IU/MIN.) And oxytocin i.v. infusion at 0.125 iu /min only, in maintaining uterine tone and hemodynamic stability in pregnant women undergoing elective caesarean delivery.	Dr.Venkatesh Murthy K.T, Dr.Roopakala B.M, Dr.Sangeetha C, Dr.Asha G, Dr.Maya D Nadakarni	Indian Journal of Clinical anaesthesia	2017	National	Vol 4, issue 4	503-507	2394-4781	Index Copernicus	MCI Approved
OBG											
101	2017	Study of post dated and term pregnancy with fetomaternal out come	Dr. Sai lakshmi MPA-II Author	Indian journal of Obstetrics and		National			2394-2754	Index Copernicus	MCI Approved
102	2017	A case report of tubo-ovarian torsion in 4 years old girl	Dr. Rupakala B.M-II Author	International Journal of Reproduction contraception obstetrics and gynacology		International				Index Copernicus	MCI Approved
103	2017	Postoperative catheter induced bacteriuria in obstetrics and gynecological cases	Dr. Rupakala B.M-I Author	International Journal of Reproduction contraception obstetrics and gynacology	May-17	International	VOLUME-6 ISSUE-5	4		ISSN-2320-1789	MCI Approved
CRL											
104	2017	To assess the wound healing property of topiramate- excision model in immunosupressed albino rats	Dwajani S, Abijit B.R, Sahajanand H	European Journal of Pharmaceutical and Medical Research	2017	International	4(7)	530-532	2394-3211	Google Scholar, Indian Science Publication, Infobase Index, ISRA, Index Copernicus, Journal Index, ESJI, IJIF, Pubmed Database	MCI Approved

105	2017	A retrospective study of Electroencephalographic (EEG) findings and its interpretation in Adults and children	Dwajani S, Karamaradi S Nirmala, Sahajanand H	Indian Journal of Neurosciences	2017	National	3(3)	83-87	2455-8451	Index Copernicus, Google Scholar, Cite Factor, Open Academic Journal Index, Infobase Index, Academic Resource Index	MCI Approved
106	2017	Penoscrotal Hypospadias with Bilateral undescended testes (cryptorchidism) in a one year child- A case report. Manuscript under Review in Indian Journal of Human Genetics	Prabhakara S, V Sreedhar Reddy, Anbazhagan Kolandaswamy, J Vineetha Mercy, Basanth K Reddy	The Journal of Medical Sciences	2017	National	3(3)	001-003	2321-354X	Index Copernicus, ESJI, Cosmos, DRJI, Systemic Impact Factor, Advanced Science Index, Eurasian Scientific Journal Index	MCI Approved

107	2017	Analgesic use and potential hearing loss: a pharmacovigilance study. International Journal of Basic & Clinical Pharmacology	Meena K. N, Dwajani S, Nagaraj T. M, Roshan Kumar B. N, Rajiv S	International Journal of Basic & Clinical Pharmacology	2017	National	6(10)	2380-2383	2279-0780	Index Copernicus, Cross Ref, EBSCO A-Z, Journal Index, Google Scholar, J-Gate, Research BIB, ICMJE	MCI Approved
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Pocket & 14, Sector & 8, Dwarka, New Delhi & 110 077

No. MCI-12(1)/2015-TEQ /131880

Date: 03/09/2015
Speed Post/ Courier

To,

The Health Secretary, all the State Govts.
The DMEs, all the States
The Vice-Chancellor, all the Universities
The Director, all the Post Graduate Institutes
The Dean/Principal, all the Medical Colleges.

**Sub:- Clarification with regard to research publications in the matter of promotion
for Teaching faculty in a medical college/ Institutions**

Sir/Madam,

It is to inform you that in light of provisions of the Minimum Qualifications for Teachers In Medical Institutions Regulations 1998 as amended under which the academic qualifications, Teaching Experience and Research Publications are prescribed, the Executive Committee of the Council at its meeting held on 08.05.2015 approved the recommendations of the Academic Committee held on 14.07.2015 with regard to clarification on research Publications in the matter of promotion for teaching faculty:-

- a) Indexing agencies:
Scopus, PubMed, Medline, Embase/Excerpta Medica, Index medicus and index Copemicus
- b) Types of articles to be considered:
Original research articles and original research papers.
- c) Criteria for National/International journal:
Published by a National/International – Speciality Journal/Journal of a National/International Society provided it included in one of the indexes mentioned above.
- d) Authorship:
First author, second author.
- e) E-journals: e-journals not included

The above would also be applicable for "accepted for publication" papers/articles.

In view of above, I am directed to request you to consider the above with regard to research publications in the matter of promotion for teaching faculty in medical college/institutions.

Yours faithfully,

(Dr. Reena Nayyar)
Secretary I/c.





RajaRajeswari Medical College & Hospital

(Recognized by Medical Council of India & Govt. of India and
Affiliated to Rajiv Gandhi University of Health Sciences, Bengaluru)

Sponsored by: MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST



Ref: RRMCH/NIRF Rankings - 2019/ 2018-19/105

Date: 18.02.2019

To:

The Member Secretary,
NIRF Rankings - 2019,
National Board of Accreditation,
NBCC Place, East Tower, 4th Floor,
Bisham Pitamah Marg, Pragati Vihar,
New Delhi - 110 003

Respected Sir,

Sub: Furnish of Indexed publication by the faculty of our institution other than Scopus & Web of Science for the calendar year 2015/2016 &2017– Reg.

Ref: 1. Mail received from NIRF on 11.02.2019 by the institution.
2. Institution application ID: IR-D-C- 40063.

With reference to the above subject and mail (**Ref:2**)cited, we wish to submit the followings for your kind consideration and further processing of NIRF Rankings – 2019

Patent:

- Our RajaRajeswari Medical College & Hospital Bangalore applied the patents (06 No's) to the authority concerned through our central Research Laboratory during the month of November – December 2018. Approval is awaiting from the authority.

Web of Science & Scopus:

- Institution is hereby accepted for the indexed count of publications by the faculty as **55 No's to Scopus** indexed and **85 No's to web of science** indexed as per the NIRF/Institution Portal.
- In this regard our institution wishes to submit to the NIRF authority that, our institution is having **294 Publications** by the faculty for the calendar year **2015, 2016 & 2017** excluding the above said count of Scopus and web of science indexed journals.

Campus

202 Kambipura, Mysore Road, Bengaluru-560 074.

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RajaRajeswari Medical College & Hospital

(Recognized by Medical Council of India & Govt. of India and
Affiliated to Rajiv Gandhi University of Health Sciences, Bengaluru)

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S.No	Name of the Index	Year 2015	Year 2016	Year 2017	Total
1.	Index Medicus	0	1	0	1
2.	Indus Copernicus	96	113	84	293
	Net Total	96	114	84	294

- We wish to submit that above mentioned **Index Medicus & Index Copernicus** are approved by the Medical Council of India, New Delhi vide letter no. **MCI-12(1)/2015-TEQ/131880 Dt: 03-09-2015**. Copy of MCI Letter Dated: **03.09.2015** is enclosed herewith for your kind reference.

In this regard, we request your good self, to kindly consider the above said Index namely **Index Medicus & Index Copernicus** as approved by the Medical Council of India, New Delhi vide letter no. **MCI-12(1)/2015-TEQ/131880 Dt: 03-09-2015** and the count of index of **294 Publications of our faculty** may kindly be accounted into the affiliation of RajaRajeswari Medical College & Hospital, Bangalore for further processing of NIRF Rankings 2019.

This is submitted for your kind information and oblige.

Thanking You Sir,

Yours faithfully,

Executive Director

Dr. S. VIJAYANAND, M.Tech, Ph.D

EXECUTIVE DIRECTOR

**RAJARAJESWARI MEDICAL COLLEGE & HOSPITAL
BENGALURU - 560 074**

Encl: 1. Copy of MCI Letter Dated: 03.09.2015.

2. Details of Publication by the Faculty for the calendar year 2015/2016 & 2016/2017

RAJARAJESWARI MEDICAL COLLEGE & HOSPITAL
DEPARTMENT OF OBG
LIST OF STAFF PUBLICATIONS

Sl No	Topic	Journal	Author	Year	International / National	Indexing	Impact factor
1	“Autoimmune thyroid disorders in pregnancy”,	International journal of Reproduction, contraception and obstetrics and gynaecology. Int.J Reprod Contracep Obstet Gynecol 2014 Jun;3(2): 321-324 Vol.3,Issue 2	Dr. MPA Sailakshmi-I Author	2014	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
2	Uterine necrosis following B-Lynch and Gunasheela's Global stitch Sutures for primary postpartum Hemorrhage	The Journal of Medical SciencesVolume 1	Dr. Sai lakshmi MPA-I Author	2015	National	Index Copernicus	Index Copernicus
3	Observational study of subclinical hypothyroidism in pregnancy.	Indian Journal Of Obstetrics And Gynecology Research 2015;2(4):255-260,Volume 2,Issue 4	Dr. Sai lakshmi MPA-III Author	2015	National	Embase,Index Copernicus P-10.5958/2394-2754	ICV 2014 65.47
4	Observational Study of maternal and fetal outcome in Elderly primigravida	International Journal of Science and Research ISSN (online):2319-7064	Dr. Sai lakshmi MPA-I Author	2015	International	Index Copernicus 78.96	6.391
5	Dengue Fever during Pregnancy: Maternal and fetal Complications	Journal of South Asian Federation of obstetrics and Gynaecology Accepted for publication	Dr. Sai lakshmi MPA-II Author	2016	International	Embase P-0974 -8938 E-0975-6434	Index Copernicus Value: 5.14
6	Study of post dated and term pregnancy with fetomaternal out come at RRMCH	Indian journal of Obstetrics and Gynecology research.	Dr. Sai lakshmi MPA-II Author	2017	National		
7	Perspective & practice of contraception in women	Journal of South Asian Federation of Obstetrics and Gynaecology, January – March 2016;8(1):16-20	Dr. Nagarathnamma R II Author	2015	National	Embase P-0974 -8938 E-0975-6434	<u>Index Copernicus</u> <u>Value: 5.14</u>
8	Study of Depression in pregnancy in a tertiary care Hospital	Accepted for Journal of Psychiatry	Dr. Nagarathnamma.R	2015	National		

9	Puerperal Psychosis – chapter in FOGSI FOCUS	Postnatal Care -2015	Dr. Nagarathnamma.R	2015	National	Embase P-0971-9202 E-0975-6434	
10	Significance of Cervical length and Cervical gland area in Cervical maturation	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.Vol 5,Issue 8; 2634-2639	Dr. R. Nagarathnamma	2016	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
11	Study on outcome of Laparoscopic management of adnexal pathology complicating pregnancy	International Journal of Reproduction, obstetrics and Gynecology 2016 Aug :5 (8) :2519-2521	Dr. R Nagarathnamma	2016	International	Index Copernicus P-2320-1770 E-2320-1789	0.786
12	B-directional barbed suture in laparoscopic myomectomy : a clinical study	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):220-224	Dr. Nagarathanamma.R, III - Author	2016	National	ISSN -2394-2746	ICV 2014 65.47
13	Diagnosis of genital tuberculosis: correlation between polymerase chain reaction positivity and laparoscopic findings	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.Vol 2016 Oct 5(10):3425-3432	Dr. R. Nagarathnamma	2016	International	Index Copernicus P- 2320-1770 E- 2320-1789	0.786
14	A prospective study of prevalence, risk factors, isolates & antimicrobial sensitivity pattern in Asymptomatic Bacteruria among Antenatal women in Rajarajeswari Medical College & Hospital	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):229-233	Dr. Nagarathanamma.R, IV - Author	2016	National	ISSN -2394-2746	ICV 2014 65.47
15	A prospective observational study of thyroid dysfunctions during pregnancy in a tertiary care hospital	International Journal of Reproduction, obstetrics and Gynecology 2016 Nov :5 (11) :01-07	Dr. R Nagarathnamma –IV Author	2016	International	Index Copernicus P-2320-1770 E-2320-1789	0.786
16	Effectiveness of Selected Mind Body Interventions on Anxiety Related to Childbirth and Labour Outcome among Parturient Women Undergoing Medical Induction of Labour	Journal of International Journal of Health sciences and Research	Dr. R Nagarthnamma	2016	International		
17	A prospective study of prevalence, risk factors, isolates & antimicrobial sensitivity pattern in Asymptomatic Bacteruria among Antenatal women in Rajarajeswari Medical College & Hospital	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):229-233	Dr. Rupakala B.M- III Author	2016	National	ISSN -2394-2746	ICV 2014 65.47

18	A prospective observational study of thyroid dysfunctions during pregnancy in a tertiary care hospital	International Journal of Reproduction, obstetrics and Gynecology 2016 Nov :5 (11) :01-07	Dr. Rupakala B.M- III Author	2016	International	Index Copernicus P-2320-1770 E-2320-1789	0.786
19	Studt of serum ferrtin levels in pteterm labour	International Journal of Recent trends in science and technology March 2015 :14(2)477.480	Dr. Rupakala B.M- III Author	2015	International		
20	Role of pro-oxidant Myeloperoxidase and an oxidative stress marker Malondialdehyde in prediction of preeclampsia	International Journal of Biochemistry and research & Review(IJBCRR)	Dr. Rupakala B.M- II Author	2016	International		
21	Study of Insulin resistence in polycystic Ovarian Syndrome	International Journal of Biochemistry and research & Review(IJBCRR)	Dr. Rupakala B.M- II Author	2016	International		
22	A Study on teenage pregnancy and its maternal and fetal outcome	International Journal of science and research technology March 2015 :14(2)477.480	Dr. Rupakala B.M- IAuthor	2016	International	Index Copernicus 2013-6.14	2015-6.391
23	Knowledge of obesity and its effects on cardiometabolic and reproductive health in women	International Journal of Reproduction contraception obstetrics and gynacology	Dr. Rupakala B.M- III Author	2016	Internationa		
24	Ovarian yolk sac tumor: a case report with review of literature	The journal of Medical Sciences of india	Dr. Rupakala B.M- II Author	2016	National	ISSN 2321-354X EISSN 2455-6254	
25	Postoperative catherter induced bacteriuria in obstetrics and gynecological cases	International Journal of Reproduction contraception obstetrics and gynacology	Dr. Rupakala B.M- I Author	2017	International		
26	A case report of tubo-ovarian torsion in 4 years old girl	International Journal of Reproduction contraception obstetrics and gynacology	Dr. Rupakala B.M- II Author	2017	International	PISSN 2320-1770 ELSSN 2320-1789	
27	Thrombocytopenia in hypertensive disorders of pregnancy	International Journal of Reproduction contraception obstetrics and gynacology	Dr. Rupakala B.M- I Author	2018	International	Index Copernicus P-23230-1770 E-2320-1789	
28	Comparative study of pap smear and microbiological pattern in bacterial vaginosis	International Journal of Reproduction contraception obstetrics and gynacology	Dr. Rupakala B.M- II Author	2018	International	Index Copernicus PISSN2320-1770 EISSN 2320-1789	

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30	Ocular changes in pregnancy:AN OBSERVATIONAL study.	International journal of scientific study.	Dr. Rupakala B.M- II Author	2018	International	Index Copernicus ISSN2321-6379 ISSN-2321-595X	
31	Study on outcome of Laparoscopic management of adnexal pathology complicating pregnancy	International Journal of Reproduction, obstetrics and Gynecology 2016 Aug :5 (8) :2519-2521	Dr.Sarojamma.C, II - Author	2016	International	Index Copernicus P-2320-1770 E-2320-1789	0.786
32	B-directional barbed suture in laparoscopic myomectomy : a clinical study	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):220-224	Dr. Sarojamma C, II - Author	2016	National	ISSN -2394-2746	ICV 2014 65.47
33	A prospective study of prevalence, risk factors, isolates & antimicrobial sensitivity pattern in Asymptomatic Bacteruria among Antenatal women in Rajarajeswari Medical College & Hospital	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):229-233	Dr. Sarojamma C, I – Author	2016	National	ISSN -2394-2746	ICV 2014 65.47
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39	A clinical study of ectopic pregnancy	Journal of clinical diagnosis and research; 2012;Jun vol (6):867-869	Dr Rashmi A G	2012	National	PubMed central ISSN -0973-709 X	0.65
40	Cancellous Screw with Tension Band Wiring for Fractures of the Olecranon	Journal of clinical diagnosis and research; 2013;Jun vol 7(2) 339-341	Dr. Rashmi AG II Author	2013	National	PubMed central ISSN -0973-709 X	0.65
41	Prevalence, characteristics and management of endometriosis amongst infertile women : A one year retrospective study	Journal of clinical diagnosis and research; 2015;jun;vol 9(6):QC01-QC03	Dr. Rashmi A.G-II Author	2015	National	PubMed central ISSN -0973-709 X	0.65
42	Success term pregnancy in a post renal transplant patient Case report	Journal of south Asian Federation of obstetrics and gynaecology;2015;7(2):89-90	Dr. Rashmi A.G	2015	International	Index C Embase P-0974 -8938 E-0975-6434	Index Copernicus Value: 5.14
43	Comparison of Audiovisual Method and Traditional Didactic Lecture to Assess Learning Outcome amongst Students in Obstetrics and Gynecology	International Jounal of contemporary surgery: 2018 Volume:6 : No.1 :50-54	Dr. Rashmi A.G	2018	International	Index ISSN-2320-9615	Index Copernicus 6
44	"Partogram analysis in Primigravida"	Journal of Obstetrics and Gynaecology of India, (November –December 2012) 62(6):635-640 DOI 10.1007/s13224-012-0208y	Dr. Vishma Shetty-III Author	2013	National	Embase P-0971-9202 E-0975-6434	0.24
45	"A case report of Lymphangioma Circumscriptum",	The Journal of Obstetrics and Gynaecology of India, October 2013 Journal : The Journal of Obstetrics and Gynaecology of India, October 2013 Dol:10.1016/j.ijgo.2011.12.009	Dr. Vishma shetty	2013	National	Embase P-0971-9202 E-0975-6434	0.24
46	Role of ultrasonography in diagnosis of ectopic pregnancy with clinical analysis and management in tertiary care hospital.	Journal of Obstetrics and Gynaecology of India, Sep- Oct	Dr. Vishma shetty	2014	National	Embase P-0971-9202 E-0975-6434	0.24

47	Perspective & practice of contraception in women	Journal of South Asian Federation of Obstetrics and Gynaecology, January – March 2016;8(1):16-20	Dr. Vishma shetty, I Author	2015	National	Embase P-0974 -8938 E-0975-6434	<u>Index Copernicus Value: 5.14</u>
48	“Comparative study of vaginal misoprostol in induction of labour	Journal of South Asian Federation of obstetrics and Gynaecology, Sep-Dec 2013;5(3):111-115	Dr. Pavanaganga A-III Author	2013	International	Embase P-0974 -8938 E-0975-6434	Index Copernicus Value: 5.14
49	“Autoimmune thyroid disorders in pregnancy”,	International journal of Reproduction, contraception and obstetrics and gynaecology. Int.J Reprod Contracep Obstet Gynecol 2014 Jun;3(2): 321-324 Vol.3,Issue 2	Dr. Pavanaganga.A-II Author	2014	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
50	Observational study of subclinical hypothyroidism in pregnancy.	Indian Journal Of Obstetrics And Gynecology Research 2015;2(4):255-260, Volume 2,Issue 4	Dr. Pavanaganga. A, I- Author	2015	National	Embase,Index Copernicus P-10.5958/2394-2754	ICV 2014 65.47
51	Dengue Fever during Pregnancy: Maternal and fetal Complications	Journal of South Asian Federation of obstetrics and Gynaecology Accepted for publication	Dr. Pavanaganga.A-I Author	2016	International	Embase P-0974 -8938 E-0975-6434	Index Copernicus Value: 5.14
52	WHO 75 gram OGTT-A single step procedure for screening and diagnosis of Gestational diabetes mellitus”	International journal of Reproduction, Contraception and Obstetrics And Gynaecology. Int J Reprod Contracept Obstet Gynecol. 2015 Dec; 4(6):2022-2027.	Dr. Chandana.M.P, I- Author	2015	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
53	Knowledge of obesity and its effects on Cardio-metabolic and reproductive health in women	International journal of Reproduction, Contraception and Obstetrics and Gynaecology.2016 Vol 5,Issue 1;143-147	Dr. Chandana.M.P,-II Author	2016	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
54	Prevalence of Gestational Diabetes Mellitus and associated risk factors at a tertiary care hospital in Karnataka	Indian Journal Of Obstetrics And Gynecology Vol 4 November 1, January -April 2016 Issue 1; 5-10.	Dr. Chandana.M.P	2016	National	Index Copernicus P-2321-1636 E-2455-5339	

55	WHO 75 gram OGTT-A single step procedure for screening and diagnosis of Gestational diabetes mellitus”	International journal of Reproduction, Contraception and Obstetrics And Gynaecology. Int J Reprod Contracept Obstet Gynecol. 2015 Dec; 4(6):2022-2027.	Dr. Manorama Eti II Author	2015	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
56	Knowledge of obesity and its effects on Cardio-metabolic and reproductive health in women	International journal of Reproduction, Contraception and Obstetrics and Gynaecology.2016 Vol 5,Issue 1;143-147	Dr. Manorama Eti , I- Author	2016	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
57	Significance of Cervical length and Cervical gland area in Cervical maturation	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.Vol 5,Issue 8; 2634-2639	Dr. Savitha C, I- Author	2016	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
58	B-directional barbed suture in laparoscopic myomectomy : a clinical study	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):220-224	Dr. Savitha C IV -Author	2016	National	ISSN -2394-2746	ICV 2014 65.47
59	Diagnosis of genital tuberculosis: correlation between polymerase chain reaction positivity and laparoscopic findings	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.Vol 2016 Oct 5(10):3425-3432	Dr. Savitha C-II Author	2016	International	Index Copernicus P- 2320-1770 E- 2320-1789	0.786
60	Significanceof transvaginal sonographic assessment of cervix length before induction of labour	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.Vol 7 no 9 sep 2018	Dr. Shreya M.S	2018	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786

RAJARAJESWARI MEDICAL COLLEGE & HOSPITAL
DEPARTMENT OF OBG
LIST OF STAFF PUBLICATIONS

Sl No	Topic	Journal	Author	Year	International / National	Indexing	Impact factor
1	“Autoimmune thyroid disorders in pregnancy”,	International journal of Reproduction, contraception and obstetrics and gynaecology. Int.J Reprod Contracep Obstet Gynecol 2014 Jun;3(2): 321-324 Vol.3,Issue 2	Dr. MPA Sailakshmi-I Author	2014	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
2	Uterine necrosis following B-Lynch and Gunasheela's Global stitch Sutures for primary postpartum Hemorrhage	The Journal of Medical SciencesVolume 1	Dr. Sai lakshmi MPA-I Author	2015	National	Index Copernicus	Index Copernicus
3	Observational study of subclinical hypothyroidism in pregnancy.	Indian Journal Of Obstetrics And Gynecology Research 2015;2(4):255-260,Volume 2,Issue 4	Dr. Sai lakshmi MPA-III Author	2015	National	Embase,Index Copernicus P-10.5958/2394-2754	ICV 2014 65.47
4	Observational Study of maternal and fetal outcome in Elderly primigravida	International Journal of Science and Research ISSN (online):2319-7064	Dr. Sai lakshmi MPA-I Author	2015	International	Index Copernicus 78.96	6.391
5	Dengue Fever during Pregnancy: Maternal and fetal Complications	Journal of South Asian Federation of obstetrics and Gynaecology Accepted for publication	Dr. Sai lakshmi MPA-II Author	2016	International	Embase P-0974 -8938 E-0975-6434	Index Copernicus Value: 5.14
6	Study of post dated and term pregnancy with fetomaternal out come at RRMCH	Indian journal of Obstetrics and Gynecology research.	Dr. Sai lakshmi MPA-II Author	2017	National		
7	Perspective & practice of contraception in women	Journal of South Asian Federation of Obstetrics and Gynaecology, January – March 2016;8(1):16-20	Dr. Nagarathnamma R II Author	2015	National	Embase P-0974 -8938 E-0975-6434	<u>Index Copernicus</u> <u>Value: 5.14</u>
8	Study of Depression in pregnancy in a tertiary care Hospital	Accepted for Journal of Psychiatry	Dr. Nagarathnamma.R	2015	National		

9	Puerperal Psychosis – chapter in FOGSI FOCUS	Postnatal Care -2015	Dr. Nagarathnamma.R	2015	National	Embase P-0971-9202 E-0975-6434	
10	Significance of Cervical length and Cervical gland area in Cervical maturation	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.Vol 5,Issue 8; 2634-2639	Dr. R. Nagarathnamma	2016	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786
11	Study on outcome of Laparoscopic management of adnexal pathology complicating pregnancy	International Journal of Reproduction, obstetrics and Gynecology 2016 Aug :5 (8) :2519-2521	Dr. R Nagarathnamma	2016	International	Index Copernicus P-2320-1770 E-2320-1789	0.786
12	B-directional barbed suture in laparoscopic myomectomy : a clinical study	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):220-224	Dr. Nagarathanamma.R, III - Author	2016	National	ISSN -2394-2746	ICV 2014 65.47
13	Diagnosis of genital tuberculosis: correlation between polymerase chain reaction positivity and laparoscopic findings	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.Vol 2016 Oct 5(10):3425-3432	Dr. R. Nagarathnamma	2016	International	Index Copernicus P- 2320-1770 E- 2320-1789	0.786
14	A prospective study of prevalence, risk factors, isolates & antimicrobial sensitivity pattern in Asymptomatic Bacteruria among Antenatal women in Rajarajeswari Medical College & Hospital	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):229-233	Dr. Nagarathanamma.R, IV - Author	2016	National	ISSN -2394-2746	ICV 2014 65.47
15	A prospective observational study of thyroid dysfunctions during pregnancy in a tertiary care hospital	International Journal of Reproduction, obstetrics and Gynecology 2016 Nov :5 (11) :01-07	Dr. R Nagarathnamma –IV Author	2016	International	Index Copernicus P-2320-1770 E-2320-1789	0.786
16	Effectiveness of Selected Mind Body Interventions on Anxiety Related to Childbirth and Labour Outcome among Parturient Women Undergoing Medical Induction of Labour	Journal of International Journal of Health sciences and Research	Dr. R Nagarthnamma	2016	International		
17	A prospective study of prevalence, risk factors, isolates & antimicrobial sensitivity pattern in Asymptomatic Bacteruria among Antenatal women in Rajarajeswari Medical College & Hospital	Indian Journal of Obstetrics and Gynecology Research 2016;3(3):229-233	Dr. Rupakala B.M- III Author	2016	National	ISSN -2394-2746	ICV 2014 65.47

18	A prospective observational study of thyroid dysfunctions during pregnancy in a tertiary care hospital	International Journal of Reproduction, obstetrics and Gynecology 2016 Nov :5 (11) :01-07	Dr. Rupakala B.M- III Author	2016	International	Index Copernicus P-2320-1770 E-2320-1789	0.786
19	Studt of serum ferritin levels in pteterm labour	International Journal of Recent trends in science and technology March 2015 :14(2)477.480	Dr. Rupakala B.M- III Author	2015	International		
20	Role of pro-oxidant Myeloperoxidase and an oxidative stress marker Malondialdehyde in prediction of preeclampsia	International Journal of Biochemistry and research & Review(IJBCRR)	Dr. Rupakala B.M- II Author	2016	International		
21	Study of Insulin resistence in polycystic Ovarian Syndrome	International Journal of Biochemistry and research & Review(IJBCRR)	Dr. Rupakala B.M- II Author	2016	International		
22	A Study on teenage pregnancy and its maternal and fetal outcome	International Journal of science and research technology March 2015 :14(2)477.480	Dr. Rupakala B.M- IAuthor	2016	International	Index Copernicus 2013-6.14	2015-6.391
23	Knowledge of obesity and its effects on cardiometabolic and reproductive health in women	International Journal of Reproduction contraception obstetrics and gynacology	Dr. Rupakala B.M- III Author	2016	Internationa		
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44	“Partogram analysis in Primigravida”	Journal of Obstetrics and Gynaecology of India, (November –December 2012) 62(6):635-640 DOI 10.1007/s13224-012-0208y	Dr. Vishma Shetty-III Author	2013	National	Embase P-0971-9202 E-0975-6434	0.24
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60	Significanceof transvaginal sonographic assessment of cervix length before induction of labour	International journal of Reproduction, Contraception and Obstetrics And Gynaecology.Vol 7 no 9 sep 2018	Dr. Shreya M.S	2018	International	Index Copernicus P-2320 -1770 E-2320-1789	0.786

Department of Ophthalmology **PUBLICATIONS**

Sl No	TITLE OF ARTICLE	NAME OF JOURNAL	FIRST AUTHOR	YEAR
1	A case of External Ophthalmomyiasis in Semi Urban Area in Bangalore	Journal of Evolution of Medical and Dental Sciences	Dr. Nithisha T.M	2014-2015
2	A case Report of Bilateral iris, lens and chorioretinal Coloboma	Journal of Dental and Medical Sciences	Dr. Nanda .L	
3	Efficacy and safety of grid photocoagulation in diffuse diabetic macular edema in rural setup:	JDMS	Dr.Prathibha	
4	PC IOL Implantation in Lens induced Glaucoma. Original article	Medical Innovatica	Dr. Nithisha T.M	
5	Outcome of cataract surgery in a patient with Bilateral micro-cornea and IRIS coloboma	Journal of Evolution of Medical and Dental Sciences	Dr. Nanda .L	
6	A rare case report of Meibomian gland carcinoma of the eye lid	International Journal of Scientific Study	Dr. Nanda .L	
7	A case report of Traumatic Conjunctival Inclusion Cyst	Journal of Dental and Medical Sciences	Dr. Nithisha T.M	
8	Comparision of Corneal Diameter in Premature and mature infants	Journal of Dental and Medical Sciences	Dr. Nanda .L	
9	Pattern of ocular morbidity among school children in Bagalkot city	International Journal of Medical & Pharmaceutical Sciences	Dr.Shwetha	
10	Vitreomacular Traction causing Idiopathic Full-Thickness macular hole determined by Spectral Domain Optical Coherence Tomography	IJSS	Dr.Shivakumar	

11	Ocular Manifestation Of Down's Syndrome	International Journal of Contemporary Medical Research	Dr. Nanda .L	2016-2017
12	"Study of Variation in Intraocular Pressure Spike (IOP) Following Nd-YAG Laser Capsulotomy"	JCDR	Dr.Sriya	
13	A case report of Retinal Vasculitis in Systemic Lupus Erythematosus	JEBMH	Dr. Shivakumar Mallappa	2017-2018
14	A multidisciplinary approach to sphenoid wing dysplasia presenting with pulsatile proptosis in neurofibromatosis Type 1: A rare case report.	IJO	Dr.Prathibha	
15	Choroidal Melanoma - A Case Report	JEBMH	Dr. Shivakumar Mallappa	
16	Cataract surgery in Pseudoexfoliation Syndrome Original article	IJSS Journal	Dr. Nithisha T.M	
17	A Comparative study on efficacy of nepafenac and flurbiprofen in maintenance of intraoperative mydriasis during cataract surgery: an open label randomized controlled trial	IJBCP	Dr. Kaushal Kumar	2018-2019
18	Eye Lid lesions-Clinical study	IJSS	Dr.Nanda	
19	Clinical Profile and Visual Outcome of Ocular Injuries Presenting to Tertiary Care Hospital Located on a State Highway	IJSS	Dr.Sunil Kumar M	

Department of Ophthalmology **PUBLICATIONS**

Sl No	TITLE OF ARTICLE	NAME OF JOURNAL	FIRST AUTHOR	YEAR
1	A case of External Ophthalmomyiasis in Semi Urban Area in Bangalore	Journal of Evolution of Medical and Dental Sciences	Dr. Nithisha T.M	2014-2015
2	A case Report of Bilateral iris, lens and chorioretinal Coloboma	Journal of Dental and Medical Sciences	Dr. Nanda .L	
3	Efficacy and safety of grid photocoagulation in diffuse diabetic macular edema in rural setup:	JDMS	Dr.Prathibha	
4	PC IOL Implantation in Lens induced Glaucoma. Original article	Medical Innovatica	Dr. Nithisha T.M	
5	Outcome of cataract surgery in a patient with Bilateral micro-cornea and IRIS coloboma	Journal of Evolution of Medical and Dental Sciences	Dr. Nanda .L	
6	A rare case report of Meibomian gland carcinoma of the eye lid	International Journal of Scientific Study	Dr. Nanda .L	
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19	Clinical Profile and Visual Outcome of Ocular Injuries Presenting to Tertiary Care Hospital Located on a State Highway	IJSS	Dr.Sunil Kumar M	

RAJARAJESWARI MEDICAL COLLEGE AND HOSPITAL

VIII & IX TERM THERORY CLASS ATTENDANCE FROM 01/06/2018 TO 06/02/2019

SL.NO.	REG NO.	NAME	TCC	TCA	%TAGE	SIGNATURE
1	11M8642	N Hamsini	40	30	75	
2	11M8666	Maheswaran R	40	22	55	
3	11M8713	Seethal Koshy	40	25	63	
4	12M7762	Angelin Blessy A H	40	27	68	
5	12M7807	Lanusangla Walling	40	7	18	
6	12M7830	Nichanametla Ravalı	40	33	83	
7	12M7831	Nimmy Mary Jacob	40	38	95	
8	12M7882	Subhashree Jana	40	25	63	
9	12M7892	Vinay P A	40	0	0	
10	13M7786	Dantuluri Nishita Varma	40	8	20	
11	13M7790	Emil Benny	40	27	68	
12	13M7848	Raghul Prasath G M	40	25	63	
13	13M7856	Ronak Kumar Rai	40	1	3	
14	13M7862	Sameera Firthouse	40	23	58	
15	13M7890	Vignesh S	40	16	40	
16	13M7892	Vilnu Irene	40	16	40	
17	14M7754	Abhishek T C	40	24	60	
18	14M7756	Aiswarya J	40	33	83	
19	14M7790	Geethanjali M	40	37	93	
20	14M7794	Hari Krishna P A	40	26	65	
21	14M7799	Idrees N S	40	12	30	
22	14M7824	Manoj Gowda R V	40	32	80	
23	14M7837	Pooja Gowda S P	40	9	23	
24	14M7840	Praharsha G S	40	33	83	
25	14M7841	Prajwal B	40	33	83	
26	14M7846	Pruthvi Ganesh Kanuma	40	23	58	
27	14M7858	Samriddhi Shreyas	40	24	60	
28	14M7859	Sanath Shankar H	40	20	50	
29	14M7863	Santhosh K M	40	38	95	
30	147874	Sudarshan K S	40	26	65	
31	14M7877	Supreetha T	40	36	90	
32	14M7888	Uma Maheswari C	40	32	80	
33	14M7891	Vibha V Bhat	40	31	78	
34	14M7898	Yamuna C	40	31	78	
35	14M7899	Yashaswi G J	40	37	93	

Prof & HOD
Dept of Orthopaedics

Rajarajeswari Medical College and Hospital
DEPARTMENT OF ORTHOPAEDICS,
National & international publication

Date: 07/02/2019

Sl.No.	Topic	Journals	Author	Year	International / National	Index
2015-2016						
1	MONITORING DEPTH OF ANASTHESIA USING PRST SCORE AND BISPECTRAL INDEX.	Journals of Evolution of medical and Dental Sciences	Dr.Roshankumar.B.N Prof and HOD	Vol.4/issue/march 26, 2015	International	Copernicus P-2278-4748
2	Surgical treatment of Malunited colle's fracture by corrective osteotomy	Journal of Evidence based Medicine and Healthcare	Dr.Gopinath.K.M	Vol 2/ Issued 54 December 07/2015	National	Copernicus P-ISSN- 2349-2562 e-ISSN- 2349-2570
3	Functional Evaluation of Hemiarthroplasty in Neglecte Fracture Neck of Femur in Young Adults”.	Journal of Evidence based Medicine and Healthcare	Dr.Gopinath.K.M	Vol-2 Issue-55 December 10, 2015	National	Copernicus P-ISSN 2349-2562 e-ISSN- 2349-2570
4	Results of surgical treatment of pediatric diaphyseal fractures of long bones using intramedullary elastic nail	Journals of Evolution of medical and Dental Sciences	Dr.Gopinath.K.M	Vol - 4 issued 103 December 24/ 2015	National	Copernicus PISSN- 2278-4748 e-ISSN-2278-4802
5	A comparative study between closed reduction end cast application versus percutaneous K- wire fixation for extra articular fracture distal end of radius	Journal of clinical diagnostic research	Dr.Gopinath.K.M	Vol 10 issued 2 February 2016	National	PUBMED Central P- 2249-786X Online – 0973-709X
6	Practice patterns and their influence on prevalence of musculoskeletal disorders among Indian	. International Journal of Research in Medical Sciences	Dr.Raghavendra.S	December 2015 Vol 3 Issue 12 Page 3459.	National	PISSN 2320-6071 EISSLN 2320-6012
7	Hybrid stabilisation of periprosthetic distal femoral fractures following total knee replacement:	Journal of medical Sciences	Dr.Shivaprasad.K	May- 2016	National	

	Technique and results- Kalyanasundaram et al, Techniques in Orthopaedics					
8	Functional Evaluation of Hemiarthroplasty in Neglected Fracture Neck Of Femur in Young Adults	Journal of Evidence based Medicine and Healthcare	Dr.Pramodkumar. M	December 10, 2015	National	Copernicus P-ISSN 2349-2562 e ISSN 2349-2570
9	To assess the improvement of cerebral palsy patients with single event multilevel surgery	International Journal of Orthopaedics	Dr.Ullas Mahesh Dr.Avinash.C.K	2016	National	ISSN. No.2395-1958
10	A Comparative study of proximal femoral nail and Dynamic hip screw and plating.	International Journal of Orthopaedic Sciences	Dr.Maheshkumar.N. B Dr.Ullas Mahesh	Vol-03, December 13. 2016	National	ISSN- 2395-1958
11	A Comparative Study of Proximal Femoral Fracture Fixation Femoral Anil and Dynamic Hip Screw and plating	International Journal of Orthopaedic Sciences	Dr.Maheshkumar.N. B Dr.Ullas Mahesh	13/12/2016	National	ISSN: 2395-1958
12	Outcome of Single Event Multi Level Surgery In Untreated Spastic Cerebral Palsy Children A-Study of 143 Children	Kerala Journal of Orthopaedics	Dr.Avinash.C.K	Vol- 28 July-December 2015	National	

1	Comparative study of efficacy between platelet plasma v/s Corticosteroid injection in the Treatment of Lateral Epicondylitis	Journal of medical Sciences	Dr.Gopinath.K.M	Vol,3 Issue-1 Page.No. 1-4 March 2017	National	Copernicus PISSN 2321-354 X ISSN 2455-6254
2	Current Strategies in the management of Symptomatic Vertebral Hemangiomas	Indian Journal Of Medical Sciences	Dr.Raghavendra.S	April 2017	National	ISSN NO.0019-5359 On line 1998-3654
3	Implementation of the WHO Surgical Safety Checklist at a teaching in India and evaluation of the effect on Perioperative Complications	Indian Journal of Orthopaedic Surgery	Dr.Raghavendra.S	30 th October 2017		
4	Long proximal femoral nail versus short proximal femoral nail in treatment of unstable intertrochantric fractures – a prospective randomized comparative study at RRMC&H	Indian Journal of Orthopaedic Surgery	Dr.Maheshkumar.N. B	Jan 2017 Vol-03	National	ISSN 2395-1354 PRINT eISSN 2395-1362 online
5	To study the functional outcome of the fracture of proximal tibia and the duration of union in proximal tibial fracture treated with LCP	National Journal of clinical Orthopaedics	Dr.Ullas Mahesh	03/03/2017	National	ISSN No. 2521-3466.,
6	Short- term Clinico- Radiological outcome of chronic knee synovitis among haemophilia A patients postPhosphorus-32 radiosynoviorthesis single group prospective study	Journal of orthopaedic surgery	Dr.Prasanna.T.Y	2017		
7	Clinical outcome of Radiosynovectomy in haemophilia patients with	International journal of orthopaedics	Dr.Prasanna.T .Y	29/06/2017		ISSN:2395-1958

	chronic knee synovitis					
8	Prospective study of surgical management of distal tibial fractures in adults	National Journal of clinical Orthopaedics	Dr.Ullas Mahesh	2017	National	ISSN:2167-1222

2018

1	“A Randomized control study to assess the efficacy of platelet rich plasma and local corticosteroid injection in treatment of chronic plantar fasciitis.	Indian Journal of Orthopaedic Surgery	Dr.Gopinath. K.M	Vol.4 Issue-2 11/6/2018	National	PSSN No.2395-1354 ISSN,2395-1362
2	Comparative study of clinical outcome in the Management of open vs closed tibial shaft fractures with intramedullary interlocking nailing technique	Indian Journal of Orthopaedic Surgery	Dr.Mahehkumar Dr.Ullas Mahesh	11/12/2018	National	ISSN:2521-3466
3	Medial patellofemoral ligament reconstruction using dual patella docking technique	International journal of orthopaedics Sciences	Dr.Ullas Mahesh Dr.Anil.R.Patil	25/06/2018		ISSN:2395-1958
4	Study of functional outcome after arthroscopic repair recurrent traumatic anterior dislocation of shoulder	National journal of orthopaedics	Dr.Ullas Mahesh	18/05/2018		ISSN : 2521-3466

Prof & HOD

Dept. of Orthopaedics

CASE REPORT

A Rare Case of Splenic Pseudocyst

¹MR Shruthi Gowthami, ²Dipiya Tikoo, ³Sumitha M Prakash, ⁴Mahanthachar Veerabasappa, ⁵Sharmila P Surhone

ABSTRACT

We present here a case of pseudocyst of spleen, a rare entity. In our case, the patient presented with pain abdomen since 5 to 6 months. She gave the history of abdominal trauma 2 years ago. Ultrasonography (USG) and computed tomography (CT) of abdomen and pelvis showed a well-defined cyst arising in spleen. Open splenectomy was followed. Histopathology of the splenectomy specimen showed features of pseudocyst.

Keywords: Pseudocyst, Splenectomy, Splenic.

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Source of support: Nil

Conflict of interest: None

INTRODUCTION

Pseudocysts of spleen are rare in day-to-day surgical practice. They usually develop secondary to trauma.¹ False cysts of spleen or the pseudocysts comprise 75% of the nonparasitic cysts.²

Cysts of the spleen are classified as parasitic and nonparasitic or etiologically as congenital, inflammatory, vascular, posttraumatic, and neoplastic cysts.³

Nonparasitic cysts are further classified as true cysts and pseudocysts in reference to presence or absence of surface epithelium. True cysts have an epithelial lining, which is lacking in pseudocyst. True cysts include epidermoid cyst, epithelial, or congenital cysts.^{3,4}

Hydatid cysts due to *Echinococcus granulosus* are the leading cause of parasitic cysts. Berlot first described splenic hydatidosis through autopsy.^{5,6}

CASE REPORT

A 34-year-old female displayed intermittent pain in the left upper outer quadrant of abdomen, which started 5 to 6 months ago. There was past history of blunt trauma to

abdomen due to fall about 2 years ago. On examination, there was splenomegaly.

The USG and CT of abdomen and pelvis revealed a cyst in the spleen measuring 9 × 8 cm with peripheral wall calcification, probably hydatid cyst. Patient underwent splenectomy. Specimen was received in 10% formalin in the histopathological section of our laboratory. Patient was given pneumococcal and meningococcal vaccines.

Grossly spleen was of 200 gm in weight, measured 14 × 11 × 5 cm (Fig. 1). External surface showed a large grayish-white cyst measuring 9 × 8 cm. Cut surface thick cyst wall noted and exuded brownish fluid (Fig. 2).

Microscopically, multiple sections studied show structure of spleen with red pulp and white pulp. Congestion of sinusoids was noted in the red pulp. A calcified cyst with thickened wall lacking lining epithelium was seen. Features of hydatid cyst were absent. The cystic fluid



Figs 1A and B: Specimen of spleen along with a gray-white cyst

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Fig. 2: Cut surface of the cyst showing thickened wall

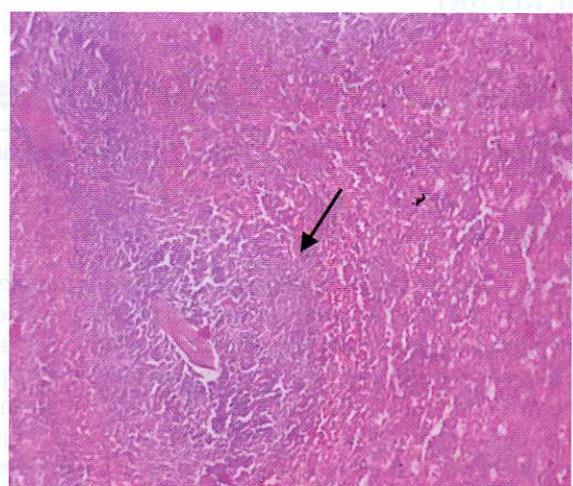


Fig. 3: Photomicrograph shows structure of spleen with red pulp and white pulp (10x, hematoxylin and eosin)

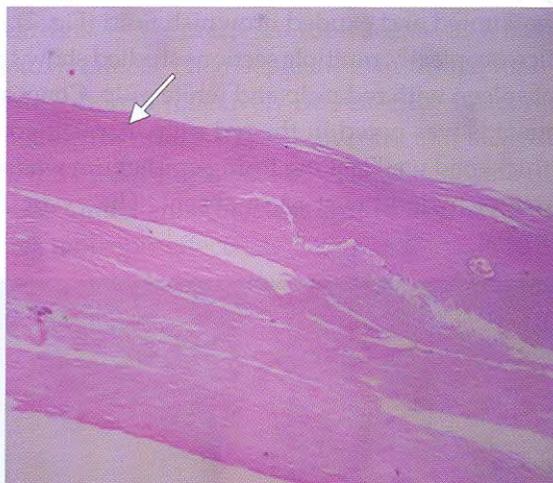


Fig. 4: Photomicrograph shows structure of spleen along with thick fibrous cyst wall (4x, hematoxylin and eosin)

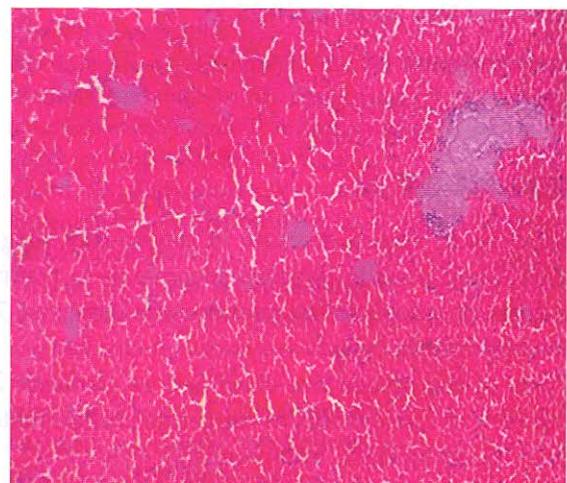


Fig. 5: Photomicrograph shows blood clot with few inflammatory cells (10x, hematoxylin and eosin)



Fig. 6: Photomicrograph shows calcified cyst wall lacking lining epithelium (4x, hematoxylin and eosin)

revealed only evidence of hemorrhage without atypical cells or parasites. Hence, a diagnosis of pseudocyst of spleen was considered (Figs 3 to 6).

DISCUSSION

Pseudocysts of spleen are rare in clinical practice. They usually develop secondary to trauma.¹ False splenic cysts or the pseudocysts comprise 75% of the nonparasitic cysts.² Pseudocysts lack a lining epithelium and thus are differentiated from the true cysts on histology.⁴

Pathogenesis of cysts of spleen is yet to be discerned. Resolved and liquefied hematoma as a result of abdominal trauma is thought to give rise to pseudocysts of spleen, but can be an outcome of infection or degeneration also.⁷ In the present case, the cyst could be a consequence of resolved hematoma due to antecedent trauma.

Cysts of the spleen are usually discovered incidentally by abdominal imaging.⁸

Symptoms if appear correspond to the size and position of the cyst. Common presentations include left hypochondrial pain and discomfort due to splenomegaly and capsular stretch, nausea, and vomiting due

to compression effect.⁹ In the present case also the patient presented with left hypochondrial pain. Also there was splenomegaly. Complications of splenic pseudocysts include rupture, hemorrhage, and infection.⁹

The pseudocyst is formed of dense fibrous cyst wall lacking epithelial lining and infrequently contains hemosiderin.¹⁰ Likewise, in our case, there was a calcified thick fibrous cyst wall with absence of epithelial lining. Raised levels of serum cancer antigen 19-9 are noted in most true cysts but are seldom raised in hemorrhagic pseudocysts, which lack epithelial lining.¹⁰

Surgery is the primary choice for the prevention or treatment of complications of pseudocysts.¹ Splenectomy is the treatment of choice for large cyst with minimal splenic tissue and is curative. Conservative treatment is opted for small cysts, which helps safeguard the immunological function of spleen.¹¹

CONCLUSION

Splenic cysts are uncommon lesions of spleen. Parasitic cysts are the most common type among them. Splenic hydatid cyst caused by *E. granulosus* is the commonest parasitic cyst. Pseudocysts of spleen are rare and usually develop secondary to trauma. It is important to distinguish pseudocysts from other splenic cysts, especially from the hydatid cyst.

REFERENCES

- Bugalia RP, Garg P, Salvi A, Saxena D, Jenaw RK, Singh RA, Kankaria J. Pseudocyst spleen: case report. Sch J Med Case Rep 2015;3(2):168-171.
- Rosai J. Rosai and Ackerman's surgical pathology. 10th ed. Vol. 2. Spleen. Chapter 22. St. Louis (MO): Elsevier; 2011. pp. 1902-1903.
- Altintoprak F, Dikicier E, Kivilcim T, Ergonenc T, Dilek ON. Pseudocyst of spleen. Eur J Gen Med 2012;99(Suppl 1):43-46.
- D'Souza C, Bhagavan KR. Giant pseudocyst of spleen. J Clin Diagn Res 2012 Feb;6(1):110-112.
- Singh H, Arora S. Primary hydatid cyst of the spleen. Med J Armed Forces India 2003 Apr;59(2):169-170.
- Malik AA, ul Bari S, Younis M, Wani KA, Rather AA. Primary splenic hydatidosis. Indian J Gastroenterol 2011 Jul;30(4):175-177.
- Kalinova K. Giant pseudocyst of the spleen: a case report and review of the literature. J Indian Assoc Pediatr Surg 2005 Jul-Sep;10(3):176-178.
- Kishanchand C, Naalla R, Kumar S, Mathew M. Non-traumatic pseudocyst of spleen presenting as chronic abdominal pain and vomiting. BMJ Case Rep 2014 Sep;2014:207133.
- Geraghty M, Khan IZ, Conlon KC. Large primary splenic cyst: a laparoscopic technique. J Minim Access Surg 2009 Jan-Mar;5(1):14-16.
- Madia C, Lumachi F, Veroux M, Fiamingo P, Gringeri E, Brolese A, Zanus G, Cillo U, D'Amico DF. Giant splenic epithelial cyst with elevated serum markers CEA and CA 19-9 levels: an incidental association. Anticancer Res 2003 Jan-Feb;23(1B):773-776.
- Chawla S, Kumar P, Gogna RL. Post-traumatic pseudocyst of the spleen. Med J Armed Forces India 2005 Jul;61(3):279-280.



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Characterization of *Rubia cordifolia* L. root extract and its evaluation of cardioprotective effect in Wistar rat model

Chandrashekhar BS, Prabhakara S¹, Mohan T¹, Shabeer D², Basavaraj Bhandare², Nalini M³, Sharmila PS³, Meghana DL⁴, Basanth Kumar Reddy¹, Hanumantha Rao HM¹, Sahajananda H⁵, Anbazhagan K⁶

Abstract:

OBJECTIVES: *Rubia cordifolia* L. (RC) is a well-known and highly valuable medicinal plant in the Ayurvedic system. The present study involves evaluating antioxidant and cardioprotective property of RC root extract.

MATERIALS AND METHODS: The characterization of RC root extract was carried out using standard phytochemical and biochemical analysis. The functional groups were analyzed by Fourier transform infrared (FTIR) spectroscopy and phytotherapeutic compounds were identified using high-resolution mass spectrometry (HR-MS). Cardioprotective activity of RC root extract was investigated against cyclophosphamide (CP; 100 mg/kg, i.p)-induced cardiotoxicity in male albino Wistar rats. RC (100, 200, and 400 mg/kg, p.o) or silymarin (100 mg/kg, p.o) was administered immediately after CP on the 1st day and the next consecutive 10 days. Biochemical and histopathological analysis was performed to observe the cardioprotective effects of RC root extract.

RESULTS: Phytochemical analysis revealed the presence of secondary metabolites that include alkaloids, flavonoids, saponins, and anthraquinones in RC root extract. FTIR analysis revealed the presence of several functional groups. Based on HR-MS analysis, eight major phytotherapeutic compounds were identified in methanol root extract of RC. Biochemical analysis in CP-induced rat model administered with RC extract revealed significantly enhanced levels of antioxidant markers such as superoxide dismutase, catalase, and glutathione S-transferase. Histopathological study showed that the rat model treated with the root extract had reduced the cardiac injury.

CONCLUSION: Our results have shown that the RC extract contains various antioxidant compounds with cardioprotective effect. Treatment with RC root extract could significantly protect CP-induced rats from cardiac tissue injury by restoring the antioxidant markers.

Keywords:

Antioxidants, cardioprotection, cyclophosphamide, Fourier transform infrared, high-resolution mass spectrometry, *Rubia cordifolia* L.

Introduction

Heart failure is one of the most common cardiovascular diseases in humans across the globe. Coronary heart diseases and stroke are major public health issues in developed as well as developing

countries.^[1] Several classes of medicines and their combinational drugs are available in the market to treat cardiovascular diseases, but overall treatment is expensive and is known to cause side effects such as allergic reaction, hypotension, arrhythmia, and dizziness with severities ranging

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from minimal to fatal outcomes. Medicinal plants are considered as an important source of therapeutic agents and inherently have lesser side effects. Hence, herbal medicines may help in lowering the risk of heart failure and improve the normal functioning of the cardiovascular system by multitarget approach. Further, herbal medicines are less expensive and more affordable to all socioeconomic groups of the society.

Rubia cordifolia L. (RC) is a valuable medicinal plant in Ayurvedic system owing to its multiple pharmacological properties and often referred as common Madder or Indian Madder in the coffee family *Rubiaceae*. RC is also known as Manjistha, an Ayurvedic herb mentioned by Bhatt and Kushwah.^[2] RC exhibits several beneficiary roles such as antioxidant, potent blood purifier, calcium channel blocker, diuretic, antiplatelet, antidiabetic, anti-stress, and vasodilating properties in cardiac health.^[2,3] RC is known to inhibit platelet activating factor-induced platelet aggregation and may play a beneficial role in coronary artery disease.^[4] Further, RC relaxes the spasms of smooth muscles of heart and blood vessels, like standard "calcium channel blocker" drug. This potent spasmolytic activity of RC suggests the presence of calcium channel blocker(s) like phytoconstituents. Therefore, it indicates possibility to treat arrhythmias (irregular heartbeats) resulting ischemia-reperfusion condition due to calcium overload.^[5] RC also consists of chemical constituents such as rubiadin, quinine, morphine, aspirin, iridoids, glycosides, bicyclic hexapeptides, triterpenes, and many other bioactive secondary metabolites.^[6] The free anthraquinones and combined anthraquinones present in RC exhibits antioxidant properties, which can be used in detoxification of ischemia-induced free-radical generation.^[7]

The patients undergoing treatment for cardiac failure, who are overburdened with drug-induced toxic effects may seek remedy using herbal medicine for more efficacious, safer, and affordable option. Therefore, there is room for a novel approach in the treatment of heart failure with compounds having lesser side effect profile and higher efficacy than the existing treatment. Hence, the primary aim is to screen and characterize phytoconstituents in RC extract. Further, secondary aim is to evaluate the potential benefits of RC extract against cyclophosphamide (CP)-induced cardiotoxicity in albino Wistar rats.

Materials and Methods

Chemicals and reagents

The analytical grade chemicals and reagents were supplied by Merck India Ltd. Organic solvents such as petroleum ether, chloroform, ethyl acetate, and methanol

(high-pressure liquid chromatography grade, Merck) were used. De-ionized water was obtained from ELGA water purification system (Metrohm, UK). The drugs used were Silymarin (Alrin-Bcap70 mg; Admac Pharma Ltd., India) and CP (Cyclomet 50 mg; BDH Industries Pvt. Ltd., India).

Collection of plant material

RC plant material was identified with the help of Senior Scientist Chandrasekhar B.S. presently working in the Institute of Wood Science and Technology, Ministry of Environment and Forests, Government of India. The plant material of RC was collected from Shimoga forest area situated in Karnataka, India. Fresh and healthy leaf, stem, and root parts were collected and thoroughly washed and shade dried for 15–20 days at room temperature ($25^{\circ}\text{C} \pm 2^{\circ}\text{C}$), further pulverized to powdered form.

Preparation of extract and phytochemical screening

Powdered samples of leaf, stem, and root of RC was extracted using petroleum ether, chloroform, ethyl acetate, methanol, and distilled water for 18 h in the order of sequential polarity of solvents. The condensed extract was used for preliminary screening to determine the presence of bioactive compounds using the standard qualitative procedures.^[8] The various phytoconstituents in extracts were confirmed by phytochemical tests such as Dragendorff's test, Mayer's test and Wagner's test for alkaloids, Borntrager's test and Modified Borntrager's test for anthraquinones, Anthrone reagent test, Benedict's reagent test and Molish's test for carbohydrates, sodium hydroxide test for coumarins, Shinoda test and Ammonia test for flavonoids, Benedict's reagent test and Fehling solution test for glycosides, ferric chloride test and phosphomolybdic acid test for phenols, sodium hydroxide test for quinines, foam test for saponins, Lieberman–Burchard test and Salkowski test for steroids and terpenoids, and Braemer's test for tannins were tested.

Identification of functional groups by Fourier transform infrared spectroscopy

Fourier transform infrared (FTIR) spectrum was analyzed to characterize the functional groups present in methanolic root extract of RC by potassium bromide (KBr) pellet technique. Dried powder of methanolic solvent extracts of RC was used for FTIR analysis. Ten milligrams of the dried extract powder was mixed along with 100 mg of KBr salt and compressed into a thin pellet and was loaded in FTIR spectroscope (BRUKER-TENSOR 27, Germany) using translucent sample discs. Infrared spectra were recorded on FTIR spectroscopy using OPUS software. The sample of RC was scanned with a spectral range of

4000–400 cm⁻¹ with 64 scans at a resolution of 4 cm⁻¹. Based on absorption frequencies, the functional group of all the spectra was interpreted.

Evaluation by high-resolution mass spectrometry

High-resolution mass spectrometry (HR-MS) analysis of RC methanolic root extract was performed using HR-MS quadrupole time-of-flight (Q-TOF) instrument (WATERS, SYNAPT G2-S, Milford, USA). About 10 mg of sample was dissolved in 1% formic acid in methanol and filtered using 0.45 µ PTFE membranes filter (PTFE, Waters, Milford, USA) and was injected. The sample was analyzed using BEH C18 column (150 mM × 4.6 mM, 5 µm id). A gradient elution of 35:65 1% formic aqueous solution: Acetonitrile (v/v) was used. The flow rate was 1.00 ml/min and the injection volume was 10 µl, and the sample was stored at 4°C in autosampler. HR-MS instrument employs the following conditions; the detection was operated in electron spray ionization mode with capillary voltage of 1 kV.

HR-MS parameters were optimized as follows: The temperature source was 90°C with desolvation gas temperature of 200°C and desolvation gas flow of 350 L/h. For the desired compound, a scan range of m/z of 50–1100 was selected, the automatic gain control was set at 3E6 and the injection period was set to 200 ms. Scan rate was at two scans s-1. External calibration was carried out using a calibration solution in positive and negative modes before each sample series. A targeted MS analysis was performed using the mass inclusion list and molecular weight of the targeted analysis with a 30 s time. The precursor's ions are filtered by the quadrupole which operates at an isolation window of m/z. The fore vacuum, high vacuum, and ultrahigh vacuum were maintained approximately 2 m bar, from 105 and below 1010 m bar, respectively. Collision energy (HCD cell) was operated at 30 kV. The software MassLynx H.I was used for data processing. Molecular name and structure were identified using MassBank database (<http://www.massbank.jp>) based on the molecular weights of the sample.^[9]

Animal experiments

Animal studies were conducted after approval (No: MC/UCMS/IAEC-RRMCH-11/2015) from the Institutional Animal Ethics Committee (IAEC) of Rajarajeswari Medical College and Hospital, Bengaluru. IAEC was formed as per the guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals, Ministry of Animal Welfare Division, and Government of India. Male albino Wistar rats weighed between 120 and 150 g were selected and procured from Liveon Biolabs, Karnataka, Bengaluru, for experiments. Wistar rats were maintained under standard laboratory conditions at 25°C ± 2°C and fed

with the standard pellet diet and accessed for water throughout the experiment. Totally 51 rats were selected, among this, 15 rats were used for acute toxicity test and remaining 36 rats were used for the further experiments. The dose selection for the drug was based on acute toxicity test. For determining the acute toxicity, each group of five Wistar rats was administered orally with 1000 mg/kg, 1500 mg/kg, and 2000 mg/kg body weight of root extract of RC in water. After 24 h, 40% of death rate was recorded in 2000 mg/kg body weight. LD-50 value of RC methanolic root extract was found to be 1000 mg/kg. Hence, 1/10th (100 mg), 2/10th (200 mg), and 4/10th (400 mg) of dose were considered to be safe for the animals, and same was selected as the therapeutic dose for evaluating cardioprotective activity of RC root extract.

Experimental protocol

The experimental animals were randomly grouped into six groups, having six rats in each group as follows:

- Group 1: Control rats received distilled water (1 ml/kg bwt), orally for 10 days
- Group 2: Rats were injected intraperitoneally with a single drug concentration of CP (100 mg/kg bwt, ip) dissolved in saline, on the initial day of the experimental period
- Group 3: Rats received CP as in Group 2, quickly after that supplemented with RC extract (100 mg/kg bwt, po) through gavages for 10 continuous days
- Group 4: Rats received CP as in Group 2, quickly after that supplemented with RC extract (200 mg/kg bwt, po) through gavages for 10 continuous days
- Group 5: Rats received CP as in Group 2, quickly after that supplemented with RC extract (400 mg/kg bwt, po) through gavages for 10 continuous days
- Group 6: Rats received CP as in Group 2, quickly after that supplemented with silymarin (100 mg/kg b.wt, p.o) through gavages for 10 continuous days.

Serum collection and organ preparation

Collection of blood sample from rats was done adhering to Good Laboratory Practices. Rats were anesthetized by ether and approximately 3–4 ml of blood was collected by cardiac puncture. Serum was separated and stored at -80°C until use. The hearts were dissected instantly and perfused with chilled saline. After washing with chilled saline, the hearts were gently patted dry, weighed, and each heart was divided longitudinally to produce two equal left and right halves. One half was homogenized in 10 volumes of (w/v) of phosphate buffer (50 mM, pH 7.4). The homogenates were centrifuged at 7000 ×g for 10 min at 4°C, and the supernatants were analyzed for catalase (CAT), superoxide dismutase (SOD), glutathione S-transferase (GST), and lipid peroxidation (LPO) levels.

Other half of heart tissue was subjected to histopathological study. The heart tissue was fixed with 10% buffered formalin solution. The tissue was embedded in paraffin; sections were cut at 5 µm and stained with hematoxylin and eosin and examined for histoarchitectural changes under light microscope.

Determination of superoxide dismutase, catalase, glutathione S-transferase, and LPO levels

SOD assay was performed as per Kakkar *et al.*; The assay reaction mixture contained 1.2 ml of 0.052 M sodium pyrophosphate buffer (pH 8.3), 0.1 ml of 186 µM phenazine methosulphate, 0.3 ml of 300 µM nitroblue tetrazolium, and 0.2 ml of 780 µM NADH. Required dilutions of enzyme extract of cardiac tissue and water were added to make up to total volume 3 ml. The reaction was started by adding NADH and incubated at 30°C for 90 s. The reaction was stopped by adding 1 ml glacial acetic acid and was stirred vigorously with 4 ml of n-butanol and allowed to stand for 10 min. The mixture was centrifuged at 4000 rpm for 10 min and butanol layer was taken out for spectrophotometer measurements at 560 nm. The unit of enzyme activity was defined and expressed in units/mg protein.^[10] CAT activity was measured as specified by Aebi. The total volume of assay reaction mixture was 3 ml, containing a 0.1 ml enzyme extract of cardiac tissue, 1.9 ml of phosphate buffer (50 mM, pH 7), and 1.0 ml of 30 mM H₂O₂. The reaction was started by adding H₂O₂ and initial and final absorbance was recorded at 240 nm using ultraviolet-visible Spectrophotometer for 3 min with 30 s intervals. Controls were prepared using 0.1 ml phosphate buffer (0.1 M, pH 7.4). Finally, the CAT activity expressed as µmoles of H₂O₂ metabolized/mg protein/min.^[11] GST was assessed as per Habig *et al.* The assay reaction volume was 3 ml containing 0.1M potassium phosphate buffer pH 6.5, 1 mM 1-chloro-2, 4-dinitrobenzene (CDNB), 1 mM GSH, and 0.1 ml of enzyme extract. The change in the optical density was read at 340 nm for 3 min and absorbance change per min was recorded. A complete assay mixture without enzyme was used as control. Finally, activity was expressed as nmol of CDNB conjugated/mg protein/min.^[12] Lipid peroxidation (LPO) levels were determined by thiobarbituric acid (TBA) method as per Ohkawa *et al.* The assay mixture contained 0.1 ml of the enzyme extract of cardiac tissue, 0.2 ml of sodium dodecyl sulfate (8.1%), 1.5 ml of acetic acid solution (20%, pH 3.5), and 1.5 ml of 0.8% aqueous solution of TBA. The mixture was made up to 4 ml with distilled water and heated at 95°C for 60 min. After cooling, 1 ml of distilled water and 5 ml of n-butanol: Pyridine (15:1, v/v) were added and the mixture was shaken briskly followed by centrifugation at 4000 rpm for 10 min. The absorbance of the organic layer was measured at 532 nm and the standard curve was developed using tetraethoxypropane. Finally, results

were expressed as TBA reactive substances in nmol/g wet weight.^[13] For estimation of lipid peroxide (LPO) levels in serum, 50 µl of sample was treated with 4.0 ml of 0.083 N H₂SO₄ and 0.5 ml of 10% phosphotungstic acid. It was mixed well and allowed to stand for 5 min at room temperature, centrifuged at 4000 rpm for 10 min. Supernatant was discarded and repeated above steps with 2.0 ml of 0.083N H₂SO₄ and 0.3 ml of 10% phosphotungstic acid. The obtained pellet was further resuspended in 4 ml of sterile distilled water and 1 ml of TBA reagent and incubated at 95°C for 60 min. After cooling, 5 ml of n-butanol was added and centrifuged at 4000 rpm for 15 min. Organic layer was taken for absorbance at 553 nm, and results were expressed as TBA reactive substances in nmol/ml serum.^[14]

Statistical analysis

Data were analyzed using the SPSS version 17 (SPSS Inc., Chicago, IL, USA). All the *in vivo* experiments were analyzed, and the results were expressed as mean ± standard error of mean for six rats in each group was analyzed using one-way analysis of variance followed by Student's paired *t*-test. The *P* < 0.05 is considered as statistically significant.

Results

Phytochemical screening

The yields of different extracts of RC are given in Table 1. It was observed that methanolic root extract produced maximum yield of phytochemicals and was about 14.18%. The major phytochemicals such as combined anthraquinones, free anthraquinones, alkaloids, steroids, flavones, flavonoids, phenols, saponins, tannins, proteins, and glycosides were found in solvent root extract. The result of phytochemical screening of root extract is summarized in Table 2.

Fourier transform infrared spectroscopy and functional group analysis

Table 1: Yield obtained from leaves, stem and root extract of *R.cordifolia*

Sample	Extract	Percentage yield (% w/w)
Leaves	Petroleum Ether	10.00
	Chloroform	11.00
	Ethyl Acetate	10.33
	Methanol	12.00
Stem	Petroleum Ether	1.18
	Chloroform	1.39
	Ethyl Acetate	2.36
	Methanol	3.75
Root	Petroleum Ether	11.81
	Chloroform	11.63
	Ethyl Acetate	12.36
	Methanol	14.18

The FTIR spectroscopy was used to identify the functional groups of the active components present in methanolic root extract based on the peak values in the IR region. In the current investigation, FTIR analysis of RC has confirmed the presence of alcohol, phenols, amines, and carboxylic acids. The NH₂ scissoring stretching frequency at 1629 cm⁻¹ shows the presence of unsaturated amine group. The major IR stretching frequency at 3404 cm⁻¹ was due to primary amines. The frequency at 2936 cm⁻¹ was due to hydroxyl and aromatic C-H stretching frequency. The band at 1249 cm⁻¹ and 1384 cm⁻¹ were due to the >C=C< and CH₂ groups, respectively. This together indicates the presence of a carboxylic acid group. The absorbance at 1065 cm⁻¹ was due to OH stretching which indicates the presence of alcohols and phenols functional groups. There was no absorbance between the regions of 1800–2200 cm⁻¹ indicates that there was no cyanide group in this extract. This result shows that RC does not contain any fatal toxic substances. The occurrence of functional groups in RC was shown in Figure 1 and IR absorption frequencies are tabulated in Table 3.

Table 2: Phytochemical screening of leaves, stem and root extract of *R.cordifolia*

Phytochemical constituents	Leaves				Stem				Root			
	A	B	C	D	A	B	C	D	A	B	C	D
Alkaloids	-	+	-	-	-	-	+	+	+	+	+	+
Triterpenoids	+	-	-	-	+	-	-	-	-	-	-	-
Coumarins	-	-	+	+	-	-	+	+	+	+	+	+
Sterols	-	+	-	+	+	+	-	-	+	-	-	+
Tannins	+	-	+	-	+	-	+	+	-	-	-	+
Saponins	-	-	-	-	-	-	-	-	+	+	+	+
Flavones	-	-	+	-	-	-	-	-	-	-	-	+
Quinones	+	+	+	+	-	+	+	-	+	-	-	+
Flavonones	-	-	-	-	+	-	-	+	-	-	-	+
Anthocyanins	-	+	+	-	-	-	-	-	-	-	-	-
Phenols	-	-	+	-	-	+	+	-	+	+	+	+
Protein	+	+	+	+	+	+	+	-	+	+	+	+
Glycosides	+	+	-	-	-	+	+	-	+	+	+	+
Volatile Oils	+	-	-	+	-	+	+	-	+	-	-	-
Combined Anthraquinones	+	+	-	+	+	+	+	+	+	+	+	+
Free Anthraquinone	-	+	+	-	+	+	+	+	+	+	+	+
Carbohydrates	-	-	+	+	-	+	+	-	-	+	-	+

A - Petroleum ether; B - Chloroform; C-Ethyl Acetate; D- Methanol.

"+" Present; "-" Absent

High resolution-mass spectrometry analysis

HR-MS was used for identifying large number of phytoconstituents in root extract of RC. Methanolic root extract of RC sample was subjected to HR-MS and analysis of MS spectra lead to identification of 42 different peaks in RC sample. The result of different peaks indicating the presence of phytocompounds was shown in the Figure 2. In this study, the samples were analyzed and spectra were acquired using high-resolution tandem Q-TOF mass spectrometer, which enables the precise measurements of m/z values. Based on molecular weight, respective phytocompounds were identified using MassBank database. In total, 42 unique mass signals were noted in methanolic root extract RC sample. Among these, eight major bioactive components were identified and were found to be griseolic acid (Mol.Wt: 365.09715), triacetyl-ganciclovir (Mol.Wt: 381.12845), succinyl adenosine (sAdo) (Mol.Wt: 383.10771), tetracenomycin (Mol.Wt: 383.07669), aniracetam (Mol.Wt: 219.08954), uridine 5-diphospho-N-acetylglucosamine (Mol.Wt: 527.11524), phosphonate compounds and carbonyl derivatives (Mol. Wt: 293.09293), and isoorientin (Mol.Wt: 413.08726). In our present study, the major eight compounds having a different molecular formula were tabulated in Table 4.

Animal experiment

During acute toxicity test, we did not observe any behavioral changes such as shivering, spasm, salivation or hypersalivation, loose bowels, dormancy, or sleep for the duration of initial 4 h with RC extract (1000, 1500, and 2000 mg/kg b.wt) administration. There was no death

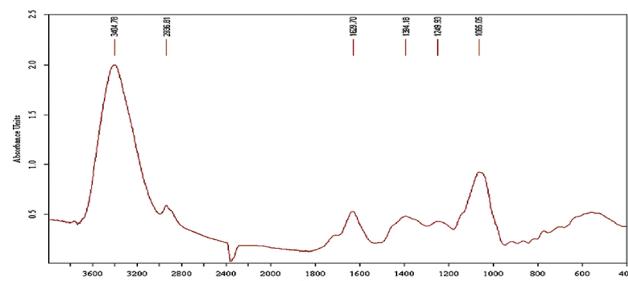


Figure 1: Fourier transform infrared spectrum of methanolic root extract of *Rubia cordifolia*

Table 3: Major functional groups observed in the Fourier transform infrared spectra of methanolic root extract

IR spectral values (cm ⁻¹)	Bond and Functional Groups	Probable Phytochemicals
3404.78	(N-H) Primary Amines	Alkaloids and flavonoids
2936.81	(CH ₃ , CH ₂ and CH) Alkanes	Alkaloids, flavonoids and Polyphenols.
1629.70	(NH ₂ scissoring) Amines	Alkaloids, flavonoids and Polyphenols.
1384.18	(CH ₂ and CH ₃) Alkanes, (O-H bending) Alcohols and Phenols	Flavonoids, tannins and Polyphenols.
1249.93	(C-N) Amines, (O-C) Carboxylic acid and derivatives	Alkaloids, flavonoids, Polyphenols, carboxylic acids and phytochemicals
1065.05	(O-H) Alcohols and Phenols (N-H) Amines	Alkaloids, flavonoids, Polyphenols and phytochemicals etc.

Table 4: Phytocompounds predicted in methanolic root extract of *R.cordifolia* by high-resolution mass spectrometry

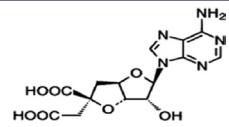
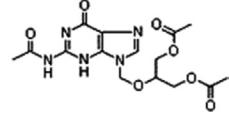
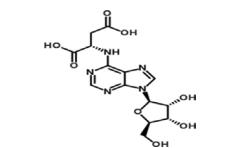
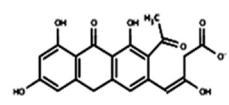
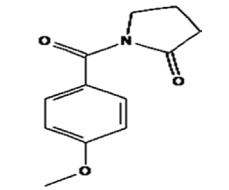
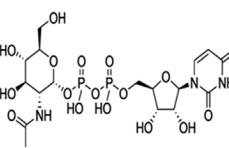
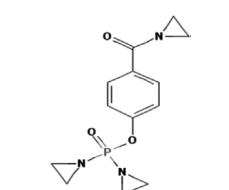
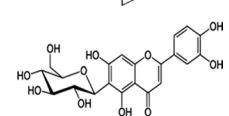
Compound name	Molecular weight	Molecular formula	Structural formula
Griseolic Acid	365.09715	C ₁₄ H ₁₅ N ₅ O ₇	
Triacetyl-Ganciclovir	381.12845	C ₁₅ H ₁₉ N ₅ O ₇	
Succinyl Adenosine	383.10771	C ₁₄ H ₁₇ N ₅ O ₈	
Tetraenomycin	383.07669	C ₂₀ H ₁₅ O ₈	
Aniracetam	219.08954	C ₁₂ H ₁₃ NO ₃	
Uridine 5-diphospho-N-acetyl glucosamine	527.11524	C ₁₇ H ₂₆ N ₃ O ₁₄ P	
Phosphonate compounds and carbonyl derivatives	293.09293	C ₁₃ H ₁₆ N ₃ O ₃ P	
Isoorientin (Homoorientin)	413.08726	C ₂₁ H ₁₇ O ₉	

Table 5: Histological changes in myocardial tissues

Groups	Vacuolation	Inflammation	Myofibrillar loss
Normal	0	0	0
CP 100 mg/kg	++	++	+++
CP + RC 100 mg/kg	++	++	+
CP + RC 200 mg/kg	+	+	+
CP + RC 400 mg/kg	+	0	+
CP + Silymarin100 mg/kg	0	0	+

Photomicrographs were used to evaluate the damage in the heart tissue: 0=No damage, + = mild damage, ++ = moderate damage, +++ = marked damage

observed after 24 h in 1000 mg/kg and 1500 mg/kg body weight. The 40% mortality rate was observed in 2000 mg/kg body weight. Hence, the LD-50 value of 1000 mg/kg dose was finalized.

In the current study, intraperitoneal injection of single dose of CP alone in Group 2 showed extreme biochemical changes as well as oxidative injury in the cardiac tissue. Biochemical activities of glutathione-dependent antioxidant enzymes (GST) and antiperoxidative enzymes such as SOD and CAT were reduced significantly ($P < 0.05$) in heart tissue of Group 2 when compared to Group 1 control rats [Figure 3a-c]. Further, Group 3 to 5 showed an improvement in the levels of these enzymes as compared to Group 2 ($P < 0.05$). Group 5 rats receiving extract of RC at 400 mg/kg bwt showed almost same enzyme activity levels as compared to Group 6 reference control. SOD, CAT, and GST activity in tissue showed a dose-dependent increase with increasing dose of RC extract. This may be due to the protective property rendered by RC, against oxidative-induced tissue injury by CP.

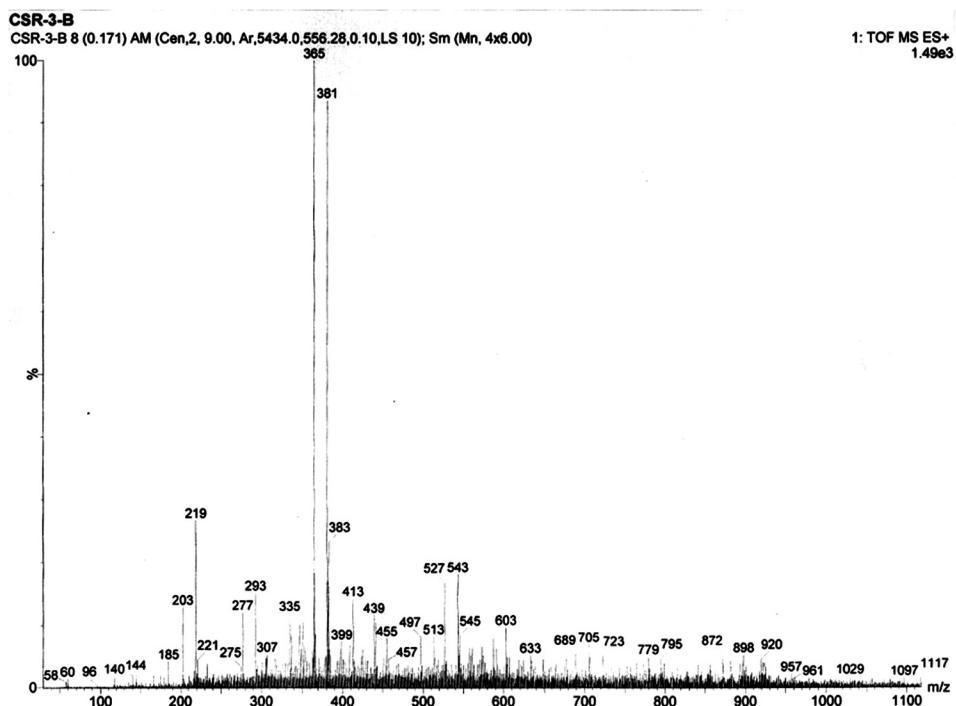
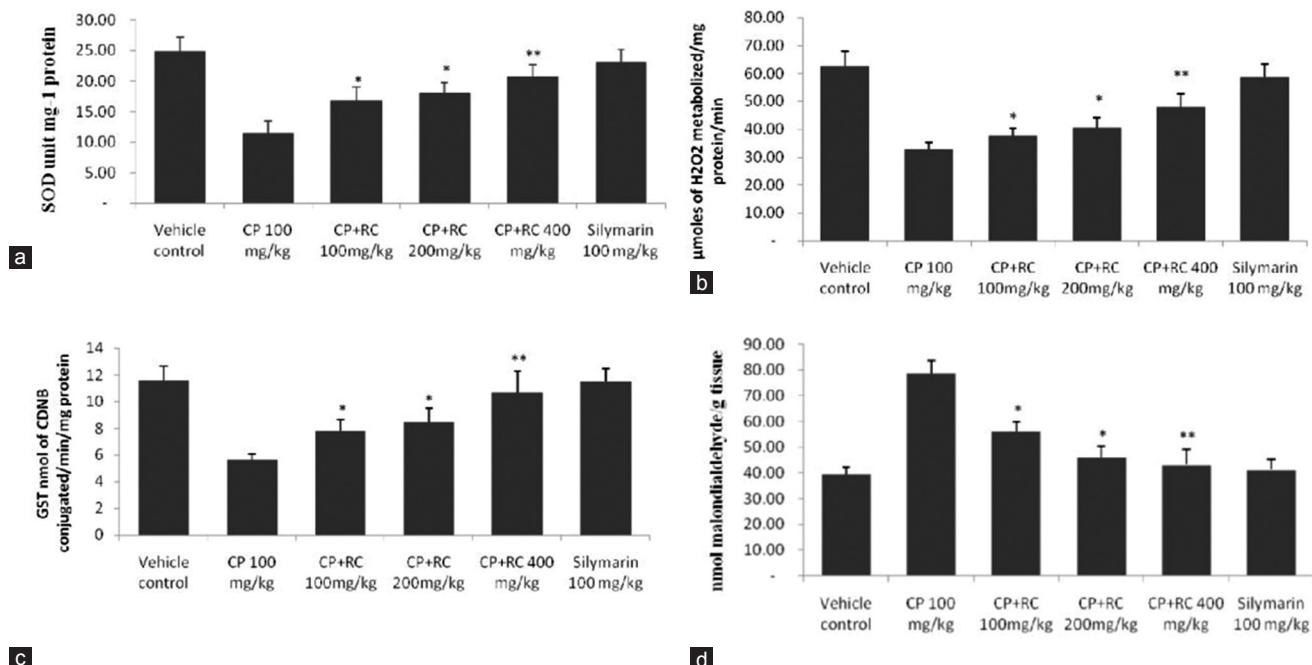
Figure 2: Mass spectrum of isolated compounds from methanolic root extract of *Rubia cordifolia*

Figure 3: Effect of *Rubia cordifolia* on tissue superoxide dismutase (a), catalase (b), glutathione S-transferase (c), and lipid peroxidation (d) levels in cyclophosphamide-induced cardiotoxicity in rats. The data are expressed as the means \pm standard error mean of six rats per group and analyzed using one-way analysis of variance followed by Student's paired *t*-test. **P* < 0.05, ***P* < 0.01 when compared to cyclophosphamide-induced group. Note: *Rubia cordifolia*, cyclophosphamide

CP-treated rats showed a significant (*P* < 0.05) increase in the LPO levels when compared to vehicle control rats. The administration of RC extract after CP treatment in Groups 3 to 5 showed a significant decrease in the LPO levels compared to Group 2 [Figures 3d and 4], with maximum statistical difference found in Group 5

(*P* < 0.01). RC root extract 400 mg/kg group significantly decreased LPO levels as compared to CP-induced group.

Histopathological examination

CP-induced changes in the myocardium showing significant level of vacuolar changes in cardiac

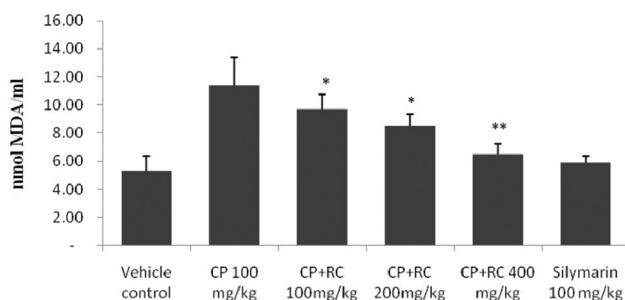


Figure 4: Effect of *Rubia cordifolia* on lipid peroxidation in cyclophosphamide-induced cardiotoxicity in rats. The data are expressed as the means \pm standard error mean of six rats per group and analyzed using one-way analysis of variance followed by Student's paired *t*-test. * $P < 0.05$, ** $P < 0.01$ when compared to cyclophosphamide-induced group. Note: *Rubia cordifolia*, cyclophosphamide

muscle fibers [Figure 5 and Table 5]. Disintegration of myocardial tissue, vacuolization of cardiomyocytes, invasion of inflammatory cells, and myofibrillar loss were prominent observations in CP-treated rats [Figure 5b] when compared to vehicle control [Figure 5a] and silymarin treated rats [Figure 5f]. RC root extract provided dose-dependent protection against CP-induced myocardial damage as shown in Figure 5c-e.

Discussion

Phytochemical screening and identification of compounds

Therapeutic properties of medicinal plants are due to the presence of diverse secondary metabolites such as flavonoids, alkaloids, saponins, glycosides, and sterols.^[15] In our study, we characterized phytoconstituents of RC extract using various phytochemical techniques. Based on our analysis, methanolic root extract of RC has shown higher yield of phytochemicals as compared to leaves and stem [Table 1]. Hence, the methanolic root extract was selected for further characterization. Earlier studies have reported that the presence of anthraquinones in this plant could be responsible for its antioxidant and cardioprotective properties.^[2,7] Our results also have shown the presence of cardioprotective phytoconstituents that includes alkaloids, flavonoids, saponins, tannins, combined anthraquinones, and free anthraquinones, which are tabulated in Table 2. Hence, our observation in RC is critical due to the presence of all above-mentioned vital classes of phytochemicals in methanolic root extract. Additional evidence generated from the FTIR analysis of RC root extract has shown the presence of functional groups such as alcohols, phenols, aldehydes, carboxylic acids, amines, and alkanes, thus revealing the presence of vital phytoconstituents [Table 3]. Studies have reported that these phytochemicals exhibits antioxidant, antidiabetic and anti-inflammatory properties.^[3,16]

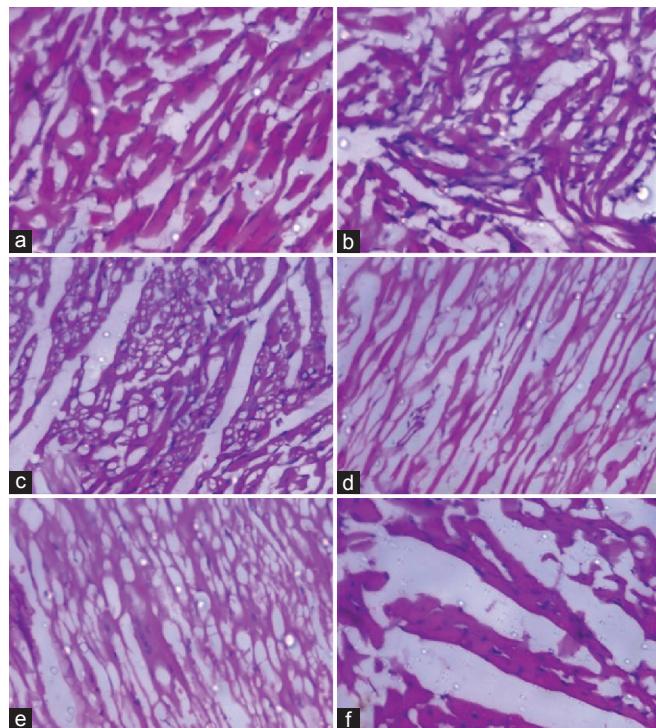


Figure 5: Histopathological evaluation of heart tissue in (a) Normal (H and E, 200 \times); (b) Cyclophosphamide 100 mg/kg treated (H and E, 200 \times); (c) Cyclophosphamide + *Rubia cordifolia* 100 mg/kg treated (H and E, 100 \times); (d) Cyclophosphamide + *Rubia cordifolia* 200 mg/kg treated (H and E, 100 \times); (e) Cyclophosphamide + *Rubia cordifolia* 400 mg/kg treated (H and E, 100 \times); (f) Cyclophosphamide + silymarin 100 mg/kg treated rats (H and E, 400 \times)

HR-MS analysis revealed the presence of 42 constituents including eight major bioactive components uridine-5-diphospho-N-acetylglucosamine, phosphonate compounds and carbonyl derivatives, griseolic acid, ganciclovir, sAdo, tetracenomycin, aniracetam, and isoorientin [Figure 2 and Table 4]. Among these, uridine-5-diphospho-N-acetylglucosamine and phosphonate compounds and carbonyl derivatives are of particular importance due to their free-radical scavenging property involved in the endogenous mechanism of cardioprotection.^[17-20]

Studies have shown that O-linked N-acetyl glucosamine levels change in response to nutrition and stress, as well as their signaling is shown to have cardioprotection by direct modification of nuclear and cytoplasmic proteins.^[17,18] In the present study, uridine-5-diphospho-N-acetylglucosamine has been identified in RC, which might play an important role in cardioprotection by acting against free-radical injury of cardiac myocytes. We also identified the presence of (N)-methanocarbaphosphonate, an analog of 5'-AMP, acting as cardioprotective agent through cardiac P2X receptors, which is a trimeric ligand-gated ion channel explored as a target for the treatment of heart failure.^[19,21,22] Other six compounds, griseolic acid, ganciclovir, s-Ado, tetracenomycin, aniracetam, and isoorientin

are used as therapeutic agents in antiasthmatic, psychotropic, neurotrophic, anti-inflammatory, and Type-II diabetes.^[23-28] Hence, the study on RC containing above-mentioned compounds is of particular interest in medicine owing to its wide array of potential pharmacological effects.

Cardioprotective effect of *Rubia cordifolia* extract in Wistar rats

We treated CP-induced rat models with RC extract and monitored for cardioprotective effect. These rats were monitored for LPO levels, SOD, CAT, and GST activity to evaluate the degree of myocardial injury. Enzyme activity levels of SOD, CAT, and GST increased, whereas LPO levels decreased significantly in CP-induced rats treated with RC extract indicating cardioprotection by scavenging of free radicals. Histopathological observation in CP-induced rats showed varying degree of vacuolation, inflammatory infiltrate, and myofibrillar damage in the myocardium. However, treatment with RC root extract effectively inhibited CP-induced cardiac damage by preventing the destructive pathological processes [Figure 5 and Table 5]. Our study revealed the presence of uridine-5-diphospho-N-acetylglucosamine, phosphonate compounds, and carbonyl derivatives, which are active ingredients in RC root extract might be responsible for the abrogation of CP-elicited cardiotoxicity. Studies suggest that uridine-5-diphospho-N-acetyl glucosamine, phosphonate compounds, and carbonyl derivatives possess cardioprotective properties.^[16,18] Hence, these phytoconstituents in RC root extract might be responsible for the protective effect against CP-induced cardiotoxicity.

Conclusion

Based on phytoscreening, FTIR, and HR-MS analysis, we observed the presence of different compounds including uridine-5-diphospho-N-acetylglucosamine, phosphonate compounds, and carbonyl derivatives in root extract of RC. These components may be involved in antioxidant, anti-inflammatory, and cardioprotective properties. Our study demonstrates that root extract of RC augmented the myocardial SOD, CAT, and GST enzyme activity levels and preserved histoarchitecture in CP-induced rats. This cardioprotective property of RC root extract might be due to synergistic effect of bioactive compounds present in them making it good source for the production of cardioprotective herbal medicines. These compounds may provide new directions for identification of cardioprotective agents, which may be given concomitantly with existing drugs used for heart failure. However, further investigations are essential to elucidate the precise molecular mechanism of these bioactive components present in RC.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Fuster V, Kelly BB, editors. Institute of Medicine (US) Committee on Preventing the Global Epidemic of Cardiovascular Disease: Meeting the Challenge to Achieve Global Health. Washington (DC): National Academies Press (US); 2010. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK45693/>. [Last accessed on 2017 Aug 16].
2. Bhatt P, Kushwah AS. *Rubia cordifolia* overview: A new approach to treat cardiac disorders. *Int J Drug Dev Res* 2013;5:47-54.
3. Divakar K, Chandrasekar SB, Goli D. Diuretic activity of root extract of *Rubia cordifolia* linn. *Pharmacologyonline* 2009;1:597-603.
4. Tripathi YB, Pandey S, Shukla SD. Anti-platelet activating factor property of *Rubia cordifolia* linn. *Indian J Exp Biol* 1993;31:533-5.
5. Gilani AH, Janbaz KH, Zaman M, Lateef A, Suria A, Ahmed HR, et al. Possible presence of calcium channel blocker(s) in *Rubia cordifolia*: An indigenous medicinal plant. *J Pak Med Assoc* 1994;44:82-5.
6. Rao GM, Rao CV, Pushpangadan P, Shirwaikar A. Hepatoprotective effects of rubiadin, a major constituent of *Rubia cordifolia* linn. *J Ethnopharmacol* 2006;103:484-90.
7. Yen GC, Duh PD, Chuang DY. Antioxidant activity of anthraquinones and anthrone. *Food Chem* 2000;70:437-41.
8. Harborne AJ. Phytochemical Methods a Guide to Modern Techniques of Plant Analysis. Netherlands: Springer Science & Business Media; 1998.
9. Horai H, Arita M, Nishioka T. Comparison of ESI-MS Spectra in MassBank Database. In BioMedical Engineering and Informatics, 2008. BMEI 2008. Vol. 2. International Conference on; 2008. p. 853-7.
10. Kakkar P, Das B, Viswanathan PN. A modified spectrophotometric assay of superoxide dismutase. *Indian J Biochem Biophys* 1984;21:130-2.
11. Aebi H. Catalase *in vitro*. *Methods Enzymol* 1984;105:121-6.
12. Habig WH, Pabst MJ, Jakoby WB. Glutathione S-transferases. The first enzymatic step in mercapturic acid formation. *J Biol Chem* 1974;249:7130-9.
13. Ohkawa H, Ohishi N, Yagi K. Assay for lipid peroxides in animal tissues by thiobarbituric acid reaction. *Anal Biochem* 1979;95:351-8.
14. Yagi K. Simple assay for the level of total lipid peroxides in serum or plasma. Free Radical and Antioxidant Protocols. Humana Press: Totowa, NJ; 1998. p. 101-6.
15. Cowan MM. Plant products as antimicrobial agents. *Clin Microbiol Rev* 1999;12:564-82.
16. Diaz P, Jeong SC, Lee S, Khoo C, Koyyalamudi SR. Antioxidant and anti-inflammatory activities of selected medicinal plants and fungi containing phenolic and flavonoid compounds. *Chin Med* 2012;7:26.
17. Jones SP, Zachara NE, Ngoh GA, Hill BG, Teshima Y, Bhatnagar A, et al. Cardioprotection by N-acetylglucosamine linkage to cellular proteins. *Circulation* 2008;117:1172-82.
18. Zachara NE, Hart GW. O-GlcNAc a sensor of cellular state: The role of nucleocytoplasmic glycosylation in modulating cellular function in response to nutrition and stress. *Biochim Biophys Acta* 2004;1673:13-28.
19. Shen JB, Cronin C, Sonin D, Joshi BV, Gongora Nieto M, Harrison D, et al. P2X purinergic receptor-mediated ionic current in cardiac myocytes of calsequestrin model of cardiomyopathy: Implications for the treatment of heart failure. *Am J Physiol Heart Circ Physiol* 2007;292:H1077-84.
20. Haltiwanger RS, Holt GD, Hart GW. Enzymatic addition of O-GlcNAc to nuclear and cytoplasmic proteins.

- Identification of a uridine diphospho-N-acetylglucosamine: Peptide beta-N-acetylglucosaminyltransferase. *J Biol Chem* 1990;265:2563-8.
21. Coddou C, Yan Z, Obsil T, Huidobro-Toro JP, Stojilkovic SS. Activation and regulation of purinergic P2X receptor channels. *Pharmacol Rev* 2011;63:641-83.
22. Shen JB, Pappano AJ, Liang BT. Extracellular ATP-stimulated current in wild-type and P2X4 receptor transgenic mouse ventricular myocytes: Implications for a cardiac physiologic role of P2X4 receptors. *FASEB J* 2006;20:277-84.
23. Tulshian DB, Czarniecki M. Total synthesis of griseolic acid. *J Am Chem Soc* 1995;117:7009-10.
24. Drew WL, Miner RC, Busch DF, Follansbee SE, Gullett J, Mehalko SG, et al. Prevalence of resistance in patients receiving ganciclovir for serious cytomegalovirus infection. *J Infect Dis* 1991;163:716-9.
25. Yue S, Motamedi H, Wendt-Pienkowski E, Hutchinson CR. Anthracycline metabolites of tetracenomycin C-nonproducing *Streptomyces glaucescens* mutants. *J Bacteriol* 1986;167:581-6.
26. Lee CR, Benfield P. Aniracetam. An overview of its pharmacodynamic and pharmacokinetic properties, and a review of its therapeutic potential in senile cognitive disorders. *Drugs Aging* 1994;4:257-73.
27. Krijt J, Kmoch S, Hartmannová H, Havlíček V, Sebesta I. Identification and determination of succinyladenosine in human cerebrospinal fluid. *J Chromatogr B Biomed Sci Appl* 1999;726:53-8.
28. Anilkumar K, Reddy GV, Azad R, Yarla NS, Dharmapuri G, Srivastava A, et al. Evaluation of anti-inflammatory properties of isoorientin isolated from tubers of *Pueraria tuberosa*. *Oxid Med Cell Longev* 2017;2017:5498054.

CASE REPORT

Chondrosarcoma masquerading as an Abscess in the Gluteal Region

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ABSTRACT

Pelvic chondrosarcomas (CHSs) are malignant cartilaginous tumors. Due to their slow growth, CHSs tend to cause symptoms over a prolonged period of time, and their diagnosis might be delayed. Since radiotherapy and chemotherapy have proved ineffective in the treatment of CHSs, wide surgical excision remains the treatment of choice. Although CHSs rarely metastasize and have a very good prognosis after surgery, local recurrence is a quite common occurrence especially following inadequate excision. In this report, we present a case of pelvic CHS mistaken for an abscess.

Keywords: Abscess, Arthritis, Chondrosarcoma, Gluteal swelling.

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INTRODUCTION

Chondrosarcoma is a rare malignant tumor that produces cartilaginous matrix and accounts for 17 to 24% of primary malignant bone tumors. The estimated overall incidence of CHSs is 1 in 200,000 per year, and it is the third most frequent malignant bone tumor after multiple myeloma and osteosarcoma. The majority of patients are between 35 and 60 years old with equal sex distribution.¹ Chondrosarcomas can either arise *de novo* as primary tumors, or less frequently, they can originate from previously existing benign cartilaginous tumors, such as osteochondromas and enchondromas.²

CASE REPORT

We report the case of a 45-year-old male with complaints of low back ache (nocturnal), radiating to the right leg since 4 months, for which he received around

50 gluteal intramuscular injections for pain relief by local practitioners. Following this, he developed a swelling in the right gluteal region and inner aspect of proximal thigh.

Hematological and biochemical parameters were normal, except erythrocyte sedimentation rate (ESR) and alkaline phosphatase (ALP) which were elevated.

Clinical differentials considered were gluteal abscess, tubercular arthritis, and pyogenic arthritis. Tubercular and pyogenic arthritis were considered as differentials because of the short duration of symptoms which were mainly pain and swelling in the gluteal region.

Radiological examination showed cortical destruction over superior pubic ramus. Right hip joint showed reduced joint space with irregular borders and early sclerosis. Computed tomography scan finding was a large heterogeneous collection of fluid, mixed with bony fragments, around the right hip joint, iliac blade, and also lower psoas and quadratus lumborum muscles, displacing the urinary bladder to the left iliac fossa, and erosion of right iliac blade, acetabulum and head of femur, pubic bone, and ischium (Fig. 1). Computed tomography scan findings were confirmed by magnetic resonance imaging. Radiological differential diagnosis provided tuberculosis or antbioma.

Aspiration of the abscess (swelling) in gluteal region was tried under ultrasound guidance. It did not yield any fluid. Arthrotomy of the right hip was done through the posterior approach. Fluid was aspirated from right hip joint, 2 to 3 mL, serous in nature and sent for culture and sensitivity. It was a sterile tap with no cells. A hard mass around the greater trochanter was found. Incision biopsy was taken and sent for histopathological examination.

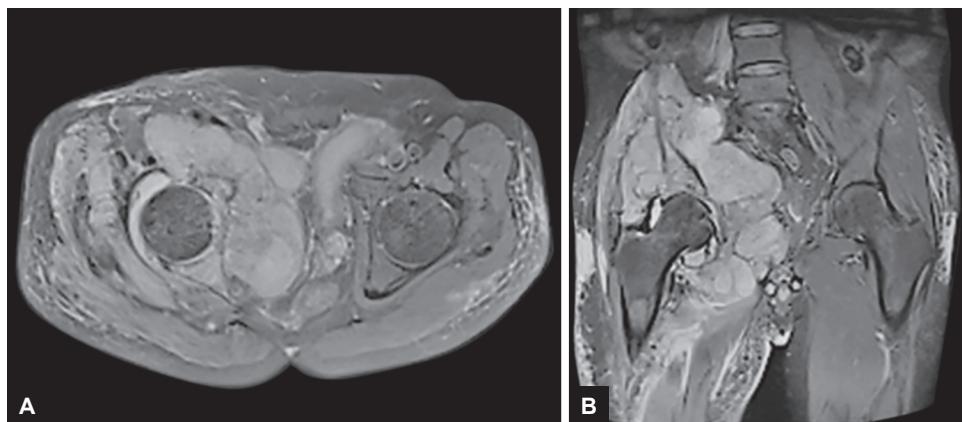
Grossly, we received an irregular, nodular, gray-white to gray-brown, firm to hard tissue measuring 3.0 × 3.0 × 1.5 cm. Cut surface showed gray-white to gray-brown tissue admixed with gelatinous areas (Fig. 2).

Microscopy showed a tumor composed of lobules and islands of malignant cartilaginous tissue separated by fibrous septae. The islands are composed of round to oval chondrocytes exhibiting marked cellular and nuclear atypia, such as hyperchromatism, pleomorphism, binucleate, and multinucleated lacunae. Areas of extensive hyaline and myxoid changes were seen. The tumor was extending up to the adjacent fibromuscular tissue.

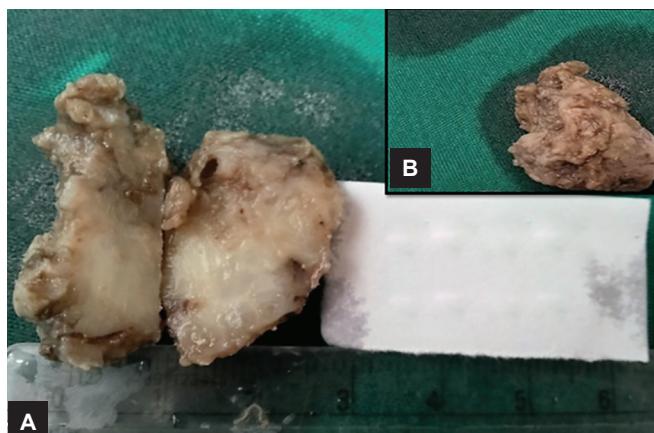
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Figs 1A and B: Large irregular heterogeneously enhancing collection involving the superficial and deep muscle planes of right gluteal region extending into anterior and medial compartment of proximal thigh, causing displacement of the surrounding vessels, urinary bladder, rectum, sigmoid colon, and muscles



Figs 2A and B: (A) Cut surface showing gray-white to gray-brown tissue admixed with gelatinous areas; and (B) inset shows an irregular, firm, hard gray-white to gray-brown soft tissue bit.

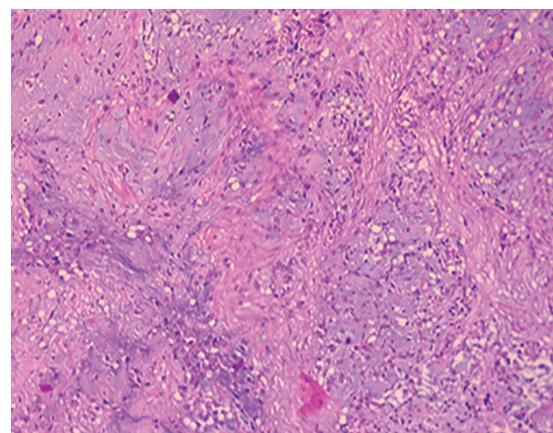


Fig. 3: Tumor composed of islands of malignant cartilaginous tissue (hematoxylin and eosin, 10 \times)

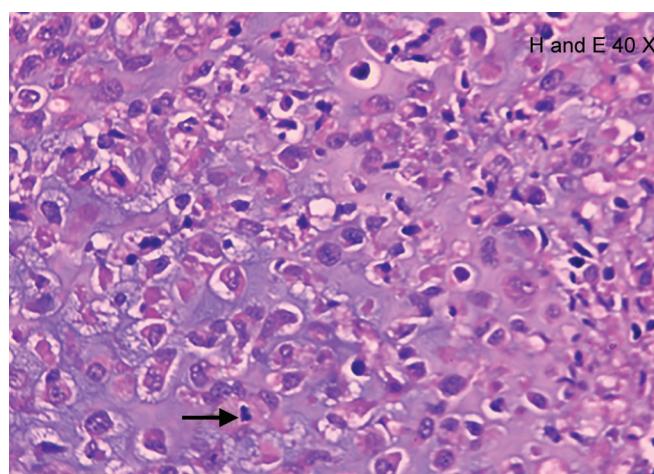


Fig. 4: Islands of atypical chondrocytes with mitotic figures (hematoxylin and eosin, 40 \times)

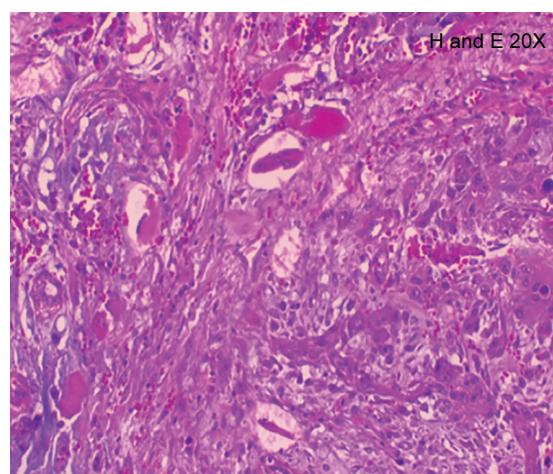


Fig. 5: Adjacent skeletal muscle invasion by tumor cells (hematoxylin and eosin, 20 \times)

Evidence of vascular invasion was also present (Figs 3 to 5). Impression was given as CHS grade II, pelvis.

On diagnosing it as a case of CHS grade II, patient was referred to Kidwai Memorial Institute of Oncology and was lost to follow-up.

DISCUSSION

The salient feature of the case under review was the dilemma of diagnosing a CHS, which was confused to be a gluteal abscess. Chondrosarcoma, a malignant tumor of cartilage-forming tissues, is the third most frequent

malignant neoplasm of bone, occurring less frequently than only myeloma and osteosarcoma.² It is divided into two major categories based on microscopic criteria: Conventional CHS and CHS variants. Each of these categories comprises several distinct types, some defined on microscopic grounds and others based on the location within the affected bone.³ There is higher preponderance in axial than appendicular skeleton with the pelvis being most common site accounting for about 40% of most cases.² Early diagnosis is difficult because patients with pelvic CHS are usually relatively asymptomatic early in the course of the disease and tend to present at a later stage where the tumor has already reached a large size. This is because of the wide space within the pelvic cavity that can accommodate a growing tumor without any compressive symptoms until it is large enough to cause mass effect. The symptoms created by CHS of the pelvis can easily be mistaken for mechanical back pain. Laboratory evaluation including ESR and ALP can also provide additional information. In fact, the ESR can be more sensitive than plane radiographs in the initial diagnosis of spinal cancer as was seen in our case.⁴ The diagnosis of CHS is among the most difficult problems in orthopedic tumor pathology. The histology of CHS was first described by Lichtenstein and Jaffe. It usually contains an abundant amount of hyaline type cartilage, a lobulated growth pattern with round and oval cells in lacunae with enlarged nuclei. Features, such as foci of atypical spindle cells, myxoid degeneration of the matrix, and calcification or ossification of the matrix may be seen.⁵ The absence of osteoid and neoplastic bone in the case presented here ruled out chondroblastic variant of osteosarcoma. Chondrosarcoma is classified histologically from I to III of Evan's classification by nuclear size, differentiation, and nuclear pleomorphism. Chondrosarcoma is one of the few tumors in which microscopic grading has a significant prognostic value. Grading is based on cellularity of the lesion and the nuclear changes of the chondrocytes. Grade I CHSs show increased cellularity compared with an enchondroma. The chondrocytes are enlarged and more irregular. Grade II CHSs show even more cellularity than grade I CHSs, and the nuclear

changes are more pronounced. Grade III CHSs show marked cellularity, marked pleomorphism of the nuclei, and some spindling at the periphery of the lobules.⁶ Wide surgical tumor excision with adequate margins appears to be the procedure of choice in CHS treatment, since this is the most effective way of reducing tumor recurrence rate.⁷ The 5-year survival is 89% for patients with grade I, the combined group of patients with grades II and III have a 5-year survival of 53%.¹

CONCLUSION

Chondrosarcomas are malignant tumors with a predilection for the pelvis. Their presentation may simulate mechanical low back pain and mass lesions like infections and abscesses. The clinician should be aware of such a possibility in the differential diagnosis of patients presenting with the same to avoid making a misdiagnosis. Because at times rare lesions are readily diagnosed as a result of their rarity, the common ones go unnoticed as they are less sought after.

REFERENCES

1. Fletcher, C.; Krishnan Unni, K.; Mertens, F. Chapter 10: cartilage tumor. In: Pathology and genetics of tumors of soft tissue and bone. Lyon: IARC Press; 2002. pp. 247-249.
2. Fletcher, CD.; Inwards, CY.; Oliveira, AM. Chapter 25: tumors of the osteoarticular system. In: Fletcher CD, editor. Diagnostic histopathology of tumors. Philadelphia (PA): Saunders/Elsevier; 2013. pp. 1884-1890.
3. Rosai, J.; Ackerman, L. Chapter 24: bone and joints. In: Rosai and Ackerman's surgical pathology. Edinburgh: Mosby; 2011. pp. 2038-2042.
4. Hains F, David Cassidy J, Dust W. Pelvic chondrosarcoma presenting as mechanical back pain: two case reports. *J Can Chiropr Assoc* 1993 Mar;37(1):15-21.
5. Kundu S, Pal M, Paul RR. Clinicopathologic correlation of chondrosarcoma of mandible with a case report. *Contemp Clin Dent* 2011 Oct;2(4):390-393.
6. Sharma M, Madan M, Manjari M, Kaur H. Pituitary chondrosarcoma presenting as a sellar and suprasellar mass with parasellar extension: an unusual presentation. *Iran J Pathol* 2016 Spring;11(2):161-166.
7. Mahajan AM, Ganvir SM, Hazarey VK, Mahajan MC. Chondrosarcoma of the maxilla: a case report and review of literature. *J Oral Maxillofac Pathol* 2013 Oct;17(2):269-273.

Characterization of Auditory Acuity in Different Phases of Menstrual Cycle



Medical Science

KEYWORDS : Menstrual Cycle, Auditory Acuity, Pre-menstrual phase, Post-menstrual phase.

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ABSTRACT

Background: Auditory functions are very important for communication, which in turn have leveraging influence on several sectors of lifestyle. Hormonal changes in menstrual cycle can affect fluid homeostasis, which may affect Auditory functions and thus may impinge women's performance in various aspects of lifestyle.

Aim: To determine the Audiological status in different frequencies in different phases of the menstrual cycle.

Objectives:

- 1) To perform Pure Tone Audiometry in pre-menstrual phase and post-menstrual phase.
- 2) To compare the results of Audiometry in pre-menstrual phase and post-menstrual phase.

Methods: After procuring the Ethical Committee clearance, this prospective study was conducted on 60 healthy female subjects with regular menstrual cycle with consideration of inclusion and exclusion criteria. Written informed consent was taken and Menstrual History Questionnaire was administered. Each subject was instructed to come to the lab twice, once during pre-menstrual phase (18th to 25th day), and then during post-menstrual phase (8th to 12th day) of the Menstrual cycle. Anthropometric measurements were taken. Audiometric tests were performed in both the ears for Auditory Acuity using Pure Tone Audiometry with ARPHI 500 MK in both the phases. Using appropriate tools, results were compiled and statistically analyzed.

Results: Statistically significant increase in weight was seen in pre-menstrual phase ($P<0.01$). Hearing threshold values were compared between the two phases and statistically significant decibel loss was observed at all frequencies in both the ears for air conduction and bone conduction in the pre-menstrual phase ($P<0.01$).

Conclusion: Statistically significant decibel loss was seen in both the ears for all frequencies in both air conduction and bone conduction in pre-menstrual phase attributing to increased Ovarian Hormones modulating the auditory functions at various levels of auditory system.

INTRODUCTION

Women constitute 48.5% of Indian population, and in them reproductive age group women constitute 22.2% of Indian population (Ministry of Statistics and Programme implementation [MOSPI] 2013). Every woman in reproductive age group undergoes monthly rhythmical cyclical pattern of menstrual cycle. The levels of ovarian hormones Estrogen and Progesterone vary according to each phase of regular menstrual cycle; this variation is controlled by the hypothalamic-hypophyseal-ovarian system (C Ishii et al. 2009).

The Menstrual cycle may be defined as the interval between the first day of the menstruation and first day of the next menstruation. (C Ishii et al. 2009) A well defined, predictable pattern of hormonal fluctuations takes place over the course of an Menstrual Cycle. In Eumenorrheic females, an average menstrual cycle has 28 days but may range from 20 to 45 days. Some Studies divide The Menstrual cycle as pre-menstrual, menstrual and post-menstrual phase. Apart from the Menstruation, varying concentrations of Estrogen and Progesterone differentiate the phases of Menstrual cycle. In a 28 day cycle, in post-menstrual Phase (8th day -12th day) both the hormonal levels are low and in Pre-Menstrual Phase (18th -25th day) both Estrogen and Progesterone levels are High.(Owen JA, 1975 & Landgren BM et al 1980 & Williams TJ et al 1997)

Most of the changes in women take place in the pre-menstrual phase that arises between 10 to 14 days before menstruation and disappears after it begins. These changes include fluid retention, weight gain, increased energy demands, changes in glucose uptake, a slower gastrointestinal transit time, altered lipid profiles, altered Vitamin D, calcium, magnesium and iron metabolism, emotional hypersensitivity, generalized pain and changes in dietary habits (C Ishii et al. 2009).

Previous study done by Andrew et al (1992) describes women experiencing dizziness, aural pressure and low frequency hearing loss during pre-menstrual time. Because of this possible influence of ovarian hormones in different phases of menstrual cycle on auditory function, there has been an interest in seeking auditory status that might affect hearing during these phases.

Thus, the purpose of this study was to verify whether there was any change in the auditory acuity in women during pre-menstrual phase and post-menstrual period.

OBJECTIVES

1. To perform Pure Tone Audiometry in pre-menstrual phase and post-menstrual phase
2. To compare the results of Audiometry in pre-menstrual phase and post-menstrual phase

MATERIALS AND METHODS

This prospective study intended to measure auditory acuity in females of reproductive age group and the study was done from April 2014 to October 2014 in the Lifestyle Lab attached to Victoria Hospital of Bangalore Medical College and Research Institute.

Recruitment

After procuring the Ethical committee clearance, 60 healthy female subjects were recruited for the study based on inclusion and exclusion criteria.

Inclusion Criteria

1. Regular Menstrual Cycle
2. Intact External Acoustic Meatus
3. Written Informed Consent

Exclusion Criteria

1. History of specific hearing disorders

2. History of residing in noisy environment
3. History of Ingestion of Ototoxic medications
4. Usage of Contraceptives in last 6 months
5. Ovarian or uterine disorders
6. Kidney or Liver disorders
7. Alcohol consumption and smoking
8. Any Chronic Illness

Methodology

Sixty healthy female subjects of reproductive age group with regular menstrual cycle gave their written informed consent after knowing the aims and procedure. Menstrual history questionnaire was administered to all subjects in order to rule out the subjects who were on contraceptives and irregular menstrual cycle, and also to know the duration of menstrual cycle and to determine the phase of menstrual cycle. Subjects were instructed clearly to visit lifestyle lab twice, that is during pre-menstrual phase (18th to 25th day), and post-menstrual phase (8th to 12th day) of the menstrual cycle. In every visit, general physical examination and systemic examination was done. Height was measured to the nearest 0.5cm on wall mounted stadiometer and weight to nearest 0.1 kg on standard weighing scale with subjects dressed in light clothing and no footwear. Otological examination was done using otoscope and tuning fork, which was followed by Pure Tone Audiometry.

Pure Tone Audiometry

The method is based on American Society for Speech and Hearing Association [ASHA] 2005 Guidelines for manual pure-tone threshold audiometry. The purpose of pure tone audiometry is to determine hearing thresholds levels for pure tones.

The threshold of hearing is defined as the level of a sound at which, under specified conditions, a person gives 50 percent of correct detection responses on repeated trials. The normal test sound is pure tone pulses at standardized frequencies in range of 125-8000 Hz and the normal presentation mode is monaurally by means of a standardized type of earphones.

After familiarizing the subject about the procedure, the subject was made to wear earphones for air conduction assessment. First, sound at 1000 Hz was presented followed by 2000, 4000, 6000, and 8000 Hz and then again 1000 Hz, followed by 500 and 250 Hz. The intensity was increased in ascending order, 5 dB each time till the subject made a positive response by raising one hand. When the subject could hear the faintest sound, again the intensity was decreased by 10 dB, and another ascending series begun.

For Bone Conduction Assessment, measurements were performed at Octave Intervals from 250 Hz to 4000Hz and at 3000Hz, Standard bone-conduction vibrator was placed on mastoid or forehead. The initial frequency was tested at 1000 Hz. After the initial test frequency, the frequencies at 2000, 3000, and 4000 Hz were tested which was followed by a retest of 1000 Hz before testing 500 and 250 Hz.

The auditory thresholds were measured using ARPHI 500 MK 1 audiometer. All the results thus obtained were tabulated in standard Audiogram. For conventional audiometry, the vertical scale is to be designated *hearing level in decibels*; the horizontal scale is to be labeled *frequency in hertz*.

STATISTICAL ANALYSIS

The Statistical software SPSS 17.0 was used for the analysis of data. Microsoft Word and Microsoft Excel have been used to generate graphs and tables. Individual comparisons between the two phases were performed with Student's t test. Results were considered significant if P values were less than 0.01. All results are expressed as Mean \pm SD.

RESULTS

Table 1: Comparison of Weight of subjects in pre-menstrual and post-menstrual phases

Average Pre-menstrual (Kg)	Weight	Average Post-menstrual Weight (Kg)	P-Value
53.02		52.01	< 0.01

Figure 1: Comparison of Weight of subjects in pre-menstrual and post-menstrual phases

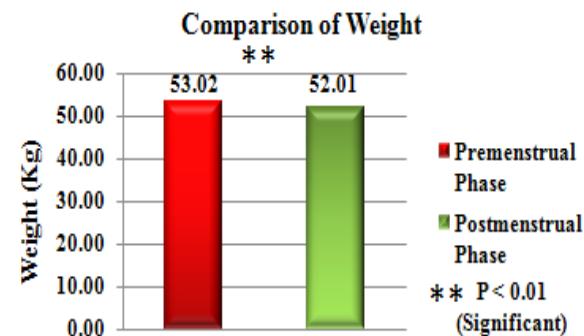


Table 1 and Figure 1 show the statistically significant increase in the mean average weight in the pre-menstrual phase ($P < 0.01$)

Table 2: Comparison of Hearing thresholds in decibels for different frequencies in Pre-menstrual and Post-menstrual phases (Mean \pm SD) in Right Ear (Air Conduction)

Frequency	Air Conduction of Right Ear (n = 60)		
	Pre-menstrual	Post-menstrual	P-value
250 Hz	23.92 \pm 4.23	20.33 \pm 4.77	< 0.00001
500 Hz	21.17 \pm 5.55	17.41 \pm 5.08	< 0.00001
1000 Hz	19.92 \pm 5.79	17.33 \pm 5.25	0.000328
2000 Hz	18.67 \pm 5.81	15.83 \pm 5.22	< 0.00001
4000 Hz	16.67 \pm 6.42	14.33 \pm 5.16	0.000528
6000 Hz	14.83 \pm 6.17	11.83 \pm 5.29	< 0.00001
8000 Hz	12.67 \pm 5.56	10.17 \pm 4.60	< 0.00001

Figure 2: Comparison of Hearing thresholds in decibels for different frequencies in Pre-menstrual and Post-menstrual phases (Mean \pm SD) in Right Ear (Air Conduction)

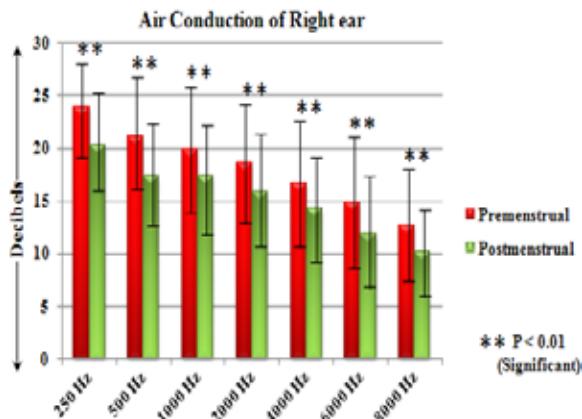


Table 2 and Figure 2 show statistically significant increase in the hearing thresholds at all frequencies in the Pre-menstrual phase in the right ear (Air Conduction) ($P < 0.01$)

Table 3: Comparison of Hearing thresholds in decibels for different frequencies in Pre-menstrual and Post-menstrual phases (Mean \pm SD) in Left Ear (Air Conduction)

Frequency	Air Conduction of Left Ear (n = 60)		
	Pre-menstrual	Post-menstrual	P-value
250 Hz	23.67 \pm 4.77	20.33 \pm 4.77	< 0.00001
500 Hz	20.67 \pm 5.33	17.41 \pm 4.91	< 0.00001
1000 Hz	20.67 \pm 5.33	17.41 \pm 4.91	< 0.00001
2000 Hz	19.17 \pm 5.14	16.08 \pm 5.30	< 0.00001
4000 Hz	16.67 \pm 5.26	14.08 \pm 4.91	0.000007
6000 Hz	14.50 \pm 4.85	12.58 \pm 4.74	0.001489
8000 Hz	12.58 \pm 4.83	9.91 \pm 4.16	< 0.00001

Figure 3: Comparison of Hearing thresholds in decibels for different frequencies in Pre-menstrual and Post-menstrual phases (Mean \pm SD) in Left Ear (Air Conduction)

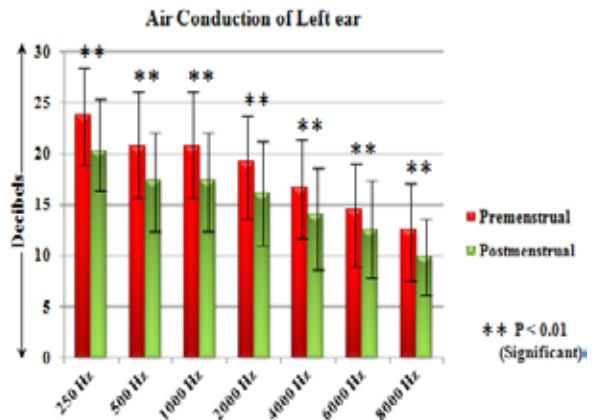


Table 3 and Figure 3 show statistically significant increase in the hearing thresholds at all frequencies in the Pre-menstrual phase in the left ear (Air Conduction) ($P < 0.01$)

Table 4: Comparison of Hearing thresholds in decibels for different frequencies in Pre-menstrual and Post-menstrual phases (Mean \pm SD) in Right Ear (Bone Conduction)

Frequency	Bone Conduction of Right Ear (n = 60)		
	Pre-menstrual	Post-menstrual	P-value
250 Hz	27 \pm 5.06	23.17 \pm 5.75	< 0.01
500 Hz	23.5 \pm 6.26	19.83 \pm 5.67	< 0.01
1000 Hz	22.17 \pm 6.73	19.5 \pm 5.94	< 0.01
2000 Hz	21 \pm 6.56	18.33 \pm 5.80	< 0.01
4000 Hz	19.08 \pm 7.51	17 \pm 5.61	0.01

Figure 4: Comparison of Hearing thresholds in decibels for different frequencies in Pre-menstrual and Post-menstrual phases (Mean \pm SD) in Right Ear (Bone Conduction)

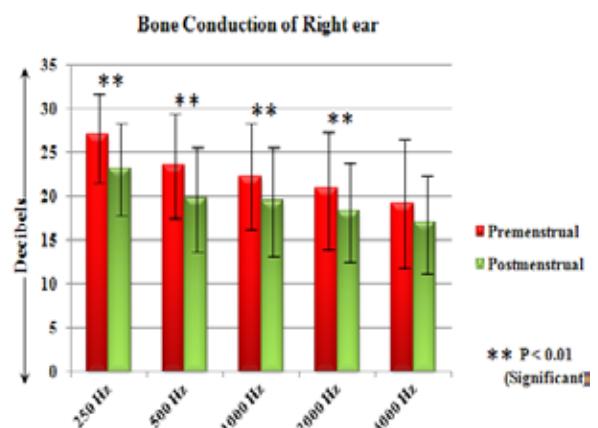


Table 4 and Figure 4 show statistically significant increase in the hearing thresholds at all frequencies in the Pre-menstrual phase in the right ear (Bone Conduction) ($P < 0.01$)

Table 5: Comparison of Hearing thresholds in decibels for different frequencies in Pre-menstrual and Post-menstrual phases (Mean \pm SD) in Left Ear (Bone Conduction)

Frequency	Bone Conduction of Left Ear (n = 60)		
	Pre-menstrual	Post-menstrual	P-value
250 Hz	26.5 \pm 5.23	22.83 \pm 5.00	< 0.01
500 Hz	23.08 \pm 5.83	19.5 \pm 5.10	< 0.01
1000 Hz	23.33 \pm 5.65	20.75 \pm 5.51	< 0.01
2000 Hz	21.92 \pm 6.04	19.25 \pm 5.81	< 0.01
4000 Hz	19.5 \pm 6.09	16.33 \pm 5.81	< 0.01

Figure 5: Comparison of Hearing thresholds in decibels for different frequencies in Pre-menstrual and Post-menstrual phases (Mean \pm SD) in Left Ear (Bone Conduction)

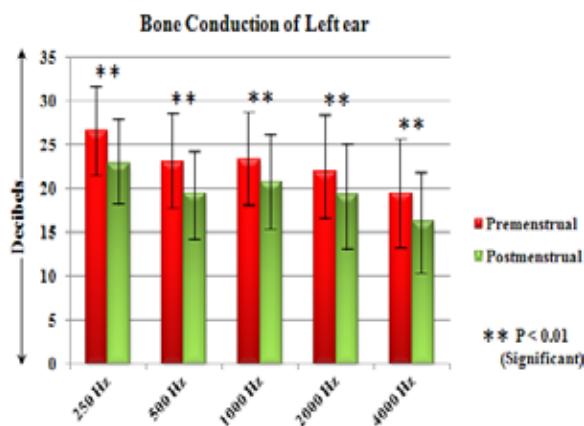


Table 5 and Figure 5 show statistically significant increase in the hearing thresholds at all frequencies in the Pre-menstrual phase in the left ear (Bone Conduction) ($P < 0.01$)

DISCUSSION

Table 1 and Figure 1 show statistically significant increase in mean body weight in pre-menstrual period. These results are in unison with several previous studies done by Mehta V et al (1993), S. Das et al (1997) and Andrews et al(1992). In pre-menstrual phase, there is increase in ovarian hormones. Weight gain can be attributed to increased estrogen levels which in turn has aldosterone like activity which causes fluid and water retention and thus increase in weight gain (PJ .Haybach ,1999).

Table 2, Figure 2, Table 3 and Figure 3 show audiometric thresholds of hearing for different frequencies for air conduction in both the ears in pre-menstrual and post-menstrual phase. Statistically significant decibel loss was observed at all frequencies

for air conduction in both the ears in the pre-menstrual phase. This is in congruous with the study done by C Ishii et al (2009) but incongruous with the study done by S.Das et al (1997). As discussed earlier elevated estrogen levels can cause fluid retention which causes swelling around the Eustachian tube which interferes with middle ear function. This in an undefined way may lead to hearing impairment (P.J. Haybach,1999). During pre-menstrual phase there is also increase in Progesterone levels which leads to temporary decompensation due to its depressant's property which leads to temporary hearing impairment (P.J.Haybach,1999).

Table 4, Figure 4, Table 5 and Figure 5 show audiometric thresholds of hearing for different frequencies for bone conduction in both the ears in pre-menstrual and post-menstrual phase. Statistically significant decibel loss was observed at all frequencies for bone conduction in both the ears in pre-menstrual phase. This is in accordance with the study done by C Ishii et al (2009). In pre-menstrual phase viscosity of the blood increases for unknown reasons, which in turn may compromise blood flow to inner ear and causes changes in fluid balance which in turn produces mild hearing loss.(P.J. Haybach., 1999).

During pre-menstrual phase, there is increase in Estrogen levels. Estrogen has an influence at the cochlear level. At the cochlear level, estrogen receptors alpha (ER α) and beta (ER β) have been identified in the inner ear including spiral ganglion type-1 cells, the stria vascularis and cochlear blood vessels in both humans and animal models (rats and mice) (Stenberg et al., 2001 and 1999). The presence of these receptors suggests that estrogen influences auditory transmission and affects fluid electrolyte balance in the cochlear fluids (Lee & Marcus, 2001). In the inner ear, potassium channels KCNQ1-KCNE facilitates the K $^{+}$ recycling in endolymph (Geoffrey W. Abbott, 2014). Estrogen decreases secretion of K $^{+}$ by inhibition of these potassium channels via a nongenomic mechanism and thus causing hearing impairment due to potassium imbalance (Lee & Marcus 2001). Additionally, Estrogen receptors in cochlear blood vessels influences auditory function by modulating cochlear blood flow (Laugel et al., 1987).

During pre-menstrual phase, there is also an increase in Progesterone levels. Progesterone receptors have not been identified in the auditory system, but progesterone may cross-react with other steroid receptors (such as glucocorticoid and mineral corticoid receptors) present in the cochlea or more proximal areas of auditory system (Lang et al 1990, Nathan et al 1999). Progesterone and its metabolites may influence the auditory system through its interaction with the steroid binding sites on GABA-A receptors acting as GABA-A agonist and thus having an inhibitory action on vestibular nuclei that are involved with the optokinetic, Vestibulo-ocular and Vestibulospinal reflexes (Darlington CL et al., 2001, Follessa et al., 2001). Progesterone also decreases 5-HT levels and this may affect auditory processing indirectly (Birzniece et al., 2006).

Thus, hearing impairment can be attributed to increased ovarian hormones and its modulatory effect on Auditory processing at different auditory levels.

CONCLUSION

Results of this study show statistically significant decibel loss in both ears at all frequencies for both air conduction and bone conduction in pre-menstrual phase. This can be attributed to increased Ovarian hormones modulating the Auditory functions at various levels of Auditory system, by direct action through the receptors within the auditory system, and also by indirect actions like modulating blood supply, modulating the fluid electrolyte balance of the body fluids and cochlear fluids, and modulating the effects of neurotransmitters along the auditory pathways.

LIMITATIONS

1. Small sample size
2. Serum Analysis of Estrogen and Progesterone in both the phases would have enhanced the quality of the present study.

REFERENCE

1. Abdel-Nabi, E.A., Lasheen, M.N., Motawee, E., and Taha A.(1984). "A Study of Vertigo and Dizziness in the PreMenstrual Period". Journal of Laryngology and Otology, 98, 273-275. 2. Al-mana, D., Ceranic, B., Djahanbakch, O., Luxon, L.M. (2008). "Hormones and the Auditory System: A Review Of Physiology and Pathophysiology"Neuroscience, 153,881-900. 3. Andrews, J.C., Ator GA, Honurbia V(1992),The Exacerbation of Symptoms in Meniere's Disease during the Premenstrual Period. Archives of Otolaryngology-Head and Neck surgery, 118,74-78. 4. Birzniec, V., Backstrom, T., Johansson, I.M., Lindblad, C., Lundgren, P., Lofgren, M. (2006). "Neuroactive steroid effects on cognitive functions with a focus on the serotonin and GABA systems" Brain Res Rev 51(2),212-239. 5. Cinita Ishii, Lucia, KN, and Carlos, A.H.C.(2009). "Vestibular Characterisation in Menstrual Cycle".Brazilian Journal Of Otorhinolaryngology, 75(3), 375-80 6. Cox, J.R., (1980), "Hormonal Influence on auditory Function".Ear and Hearing, 1(4),219-222 7. Darlington, C.L., Ross, A., King, J., Smith, P.F.(2001). "Menstrual cycle effects on postural stability but not optokinetic function." Neuroscience letters, 307, 147-150. 8. Doskin, V.A., Kozeva, T.V., Listskaya, T.S., and Shokina E.(1979). "Changes in Working Capacity of Female Athletes in different Phases of Menstrual Cycle". Human Physiology,5, 144-149. 9. Das, S., Gandhi, A., and Mondal, S.(1997). "Effect Of Premenstrual Stress On Audiovisual Reaction Time and Audiogram". International Journal of Physiology and Pharmacology, 41(1), 67-70 10. Elkind-Hirsch, K.E.,Stoner, W.R.,Stach, B.A., and Jerger J.F.(1992). "Estrogen Influences Auditory Brainstem Responses during Normal Menstrual Cycle".Hearing Research,60(2), 143-148 11. Follesa, P., Concas, A., Porcu, P., Sanna, E., Serra, M., Mostallino, M.C (2001). "Role of allopregnanolone in regulation of GABA(A) receptor plasticity during long-term exposure to and withdrawal from pro-gestosterone." Brain Res Brain Res Rev 37(1-3),81-90. 12. Geoffrey, W. Abbott,(2014) "Biology of the KCNQ1 Potassium Channel" New Journal of Science,2,pp 26 13. Girija, B., and Veeraiah, S. (2011). "Effect of Different Phases of Menstrual cycle on Physical Working Capacity In Indian population. Indian Journal of physiology and Pharmacology,55(2), 165-169 14. Haybach, P.J. (1999) "Hormones and Vestibular Disorders". Vestibular Disorders Association. Retrieved from <http://www.vestibular.org> 15. Hall, J.E.(12th ed.) (2012). "Guyton and Hall Textbook Of Medical Physiology".Philadelphia, Saunders. 16. Landgren, B.M., Unden, A.L., Diczfalusy, E. (1980) "Hormonal profile of the cycle in 68 normally menstruating women". Acta Endocrinol, 94(1), 89-98. 17. Lang, I., Zielinski, C.C., Tempel, H., Spona, J., Geyer G (1990). "Medroxyprogesterone acetate lowers plasma corticotropin and cortisol but does not suppress anterior pituitary responsiveness to human corticotropin releasing factor." Cancer 66(9),1949-1953. 18. Laugel, G.R., Dengerink, H.A., Wright, J.W. (1987). "Ovarian steroid and vasoconstrictor effects on cochlear blood flow". Hear Res, 31(3), 245-251. 19. Lee, J.H., Marcus, D.C (2001). " Estrogen acutely inhibits ion transport by isolated stria vascularis." Hear Res, 158(1-2), 123-130. 20. Mehta, V., and Chakrabarty, A.S. (1993) "Autonomic Functions During different Phases of menstrual Cycle". Indian Journal of Physiology and Pharmacology, 37(1), 56-58 21. Ministry Of Statistics and Programme Implementation, Government of India,(2013). "Women and Men In India". Central Statistics Office, New Delhi.Retrieved from http://mospi.nic.in/Mospi_New/upload/women_men_india_2013_part1.pdf 22. Nathan, C.A., Kim, T.S., Harris, J.P., Koutnouyan, H.A., Ryan, A.F. (1999). "Absence of mRNA encoding estrogen receptor in the rat cochlea." Acta Otolaryngol 119(8),853-857. 23. Owen, J.A.(1975) " Physiology Of Menstrual Cycle". American Journal Of Clinical Nutrition, 28, 333-338. 24. Reid, R.L., and Yen,S.S.C. (1981). "Premenstrual Syndrome". American Journal Of Obstetrics and Gynecology, 139, 85-104 25. Stenberg, A.E., Wang, H., Fish, J., III., Schrott-Fischer A., Sahlén L., Hultcrantz M (2001). "Estrogen receptors in the normal adult and developing human inner ear and in Turner's syndrome". Hear Res, 157(1-2),87-92. 26. Stenberg, A.E., Wang, H., Sahlén, L., Hultcrantz, M (1999). " Mapping of estrogen receptors alpha and beta in the inner ear of mouse and rat." Hear Res 136(1-2),29-34 27. Williams, T.J., Krahenbuhl, G.S.(1997). " Menstrual cycle phase and running economy". Med Sci Sports Exerc, 29(12),1609-18.

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stylist disorders. Physical inactivity is a major concern of technology has led to increase in the stress and life

Modern industrial revolution with rapid advancement of technology has led to increase in the stress and life

INTRODUCTION

Keywords : Surya-namaskar, spot jogging, HRV

dominance.

Conclusion: Surya-namaskar & spot jogging are found to be equally beneficial in improving the cardiac & autonomic parameters; whereas Surya-namaskar showed better improvement towards parasympathetic

group.

Result: The results showed that SBP, DBP, HR decreased significantly in both surya-namaskar and spot jogging group. LF values decreased significantly in spot jogging group, while a statistically significant increase in HF values was found in surya-namaskar group. LF/HF values decreased significantly in both the groups. On comparing surya-namaskar and spot jogging groups, it was found that difference between the mean values (pre and post) among the two groups was statistically significantly higher for HF component in surya-namaskar group.

Method: The subjects were randomly divided into Group I-surya-namaskar group ($n=20$) and Group II-spot jogging group ($n=20$). Group I performed surya-namaskar and Group II performed spot jogging (5 min/day for 6 weeks duration). Cardiovacular and Heart rate variability (HRV) parameters (SBP, DBP, heart rate(HR), VLF, LF, HF and LF/HF ratio) were recorded before and after six weeks of training in each group.

namaskar with each other.

Aim: To evaluate the individual effect of spot jogging and surya-namaskar of similar duration on cardiac parameters and Heart rate variability of healthy subjects and to compare the effects of spot jogging and surya-

namaskar with each other. form of spot jogging on the Cardiovacular & Heart rate variability in young healthy subjects. Hence, we proposed to compare the effect of surya-namaskar with aerobic exercise in the very small extent. Hence, we propose to compare the effect of surya-namaskar, a form of yogic practice has been utilised exercises & yoga have proved to be highly beneficial. Surya-namaskar, a form of yogic practice has been utilised to evaluate the individual effect of spot jogging and surya-namaskar of similar duration on cardiac parameters and Heart rate variability of healthy subjects and to compare the effects of spot jogging and surya-namaskar with each other.

Background: Lifestyle diseases are increasing at a tremendous rate, especially in developing countries. Physical inactivity has been majority blamed for the rise in these diseases, due to automation and advancement in the technology.

ABSTRACT

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Surya Namaskar Versus Spot Jogging - Effects on Cardiovacular and HRV Parameters in Young Adults: A Pilot Study

density lipoproteins along with increase in high-density lipoproteins and perhaps equally important is that physically fit persons have more bodily reserves to call on when he or she becomes stressed.

Aerobic exercise training increases cardiovascular functional capacity and decreases myocardial oxygen demand at any level of physical activity in apparently healthy person as well as in most subjects with cardiovascular diseases^[4,5].

Physical activity in ancient India was part of routine life style & it was also complemented with yogic practices which supposedly had definite cardiovascular benefits; which has now been proved scientifically. Reviews have shown that psycho-physiological changes by yoga help in improvement of both musculoskeletal and cardio-pulmonary functions^[6-8].

Surya-namaskar is one such yogic practices which has shown to be effective in making the body supple in terms of stretching many muscles and performing movements at many joints of the body. It involves physical and mental exercises which may or may not be compared to aerobic exercise^[1,9].

The literal meaning of surya-namaskar is salutation to Sun. Surya-namaskar comprises of a series of 12 postures, teaching to co-ordinate rhythmic breathing with body postures into a flowing routine. The asanas in surya-namaskar is designed in such a way that each asana will be complimentary to the next. During surya-namaskar muscles of entire body experience stretch and pressure alternately and therefore it is said to give more benefits with less expenditure of time^[9-11].

This work was undertaken because there is scarcity of research which evaluates the physiological benefits of surya-namaskar and spot jogging in the healthy subjects and weigh against the benefits at the same time. The aim of the study was to evaluate the individual effect of surya-namaskar and spot jogging of similar duration on cardiovascular & HRV parameters of healthy subjects and inturn compare these effects with each other.

METHOD

The study was conducted in department of Physiology, Himalayan Institute of Medical Sciences (HIMS), Swami Ram Nagar, Dehradun. After obtaining ethical clearance from the Institutional ethical committee, the study was conducted on 40 healthy

medical students aged 18-30 years. Trained individuals in yoga & sports, smokers, obese and individuals with history of major surgery and illness were excluded from the study. Subjects were explained the study protocol & the right to terminate during the course of study & written informed consent was taken.

The subjects were randomly divided into two groups.

Group I:- 20 participants performed surya-namaskar for 5 min/day for 6 weeks duration under the guidance of investigator.

Group II:- 20 participants performed spot jogging for 5 min/day for 6 weeks duration under the guidance of investigator.

Prior to the study, baseline data were collected from all the participants after taking a detailed medical history on the same time of the day. The following parameters were recorded: age, height, weight, BMI, SBP, DBP, HR and HRV parameters.

The data collection was done using computerized polygraph, which is a window based machine using software physiopac (Medicaid). HR and HRV was measured using it. BP was recorded using automated digital sphygmomanometer.

After recording of baseline parameters, the volunteers were trained in surya-namaskar or spot jogging depending on their respective groups. Once trained, the volunteers were instructed to practice their respective exercises for six weeks at the same time daily. Following six weeks practice, the cardiovascular & HRV parameters were reassessed.

STATISTICAL ANALYSIS

All the values obtained before and after performing surya-namaskar and spot jogging were expressed as Mean \pm SD. Data was analyzed by statistical package for social science (SPSS version 17). Anthropometric parameters of both the groups were analyzed and compared, using independent t-test. Cardiovascular parameters of pre & post surya-namaskar and spot jogging groups were analyzed and compared, using ANOVA and post hoc test LSD. Difference of mean values pre & post surya-namaskar and pre & post of spot jogging group was calculated and analyzed using independent t-test. P < 0.05 was considered as

Variables	Group I (n=20)		Group II (n=20)		p value	group
	Pre surya-namaskar	Post surya-namaskar	Pre spot jogging	Post spot jogging		
SBP (mm Hg)	114.6±7.5	108.6±5.9*	111.4±6.4*	106.3±4.5**		
DBP (mm Hg)	76.8±5.4	73.2±3.8*	76.2±5.9*	73.2±3.9*		
HR (beats/min)	82.6±3.1	79.3±4.5**	82.8±4.0*	80.5±2.8*		
VLF (Hz)	0.028±0.009	0.025±0.008*	0.029±0.007*	0.026±0.008*		
LF (Hz)	0.074±0.037	0.059±0.022*	0.081±0.038*	0.058±0.022*		
HF (Hz)	0.19±0.029	0.222±0.034**	0.187±0.030*	0.185±0.033*		
LF/HF	0.402±0.213	0.276±0.119*	0.445±0.25*	0.324±0.137*		

Table-2: Comparison of Cardiovacular & HRV parameters among surya-namaskar and spot jogging group

Pre and post training cardiovacular & HRV parameters of surya-namaskar and spot jogging groups shown in table-2 indicate that mean SBP, DBP and HR of post surya-namaskar group was significantly lower, while HF was significantly higher than that of pre surya-namaskar group. There was also significant decrease in mean SBP, DBP, HR and LF value in post spot jogging as compared to pre spot jogging.

p value : <0.05(significant); >0.05(not significant)

Variables	Group I (n=20)		Group II (n=20)		p value	(Group II)
	Group I (n=20)	Group II (n=20)	Group I (n=20)	Group II (n=20)		
BMI (kg/m ²)	21.3±2.1	21.5±2.3	0.581			
Weight (kg)	57.9±7.6	59.8±10.2	0.190			
Height (cm)	166.2±10.5	165.8±10.0	0.920			
Age (years)	18.6±1.2	19.2±1.4	0.803			
Variables	Group I (n=20)	Group II (n=20)	Group I (n=20)	Group II (n=20)		

Table-1: Comparison of anthropometric parameters among surya-namaskar (Group I) and spot jogging

Anthropometric parameters, cardiovacular & HRV recordings were compared between surya-namaskar and spot jogging group and there was no significant difference between the groups (p value >0.05) (Table 1, Table-2).

RESULTS

statistically significant.

namaskar

¥ : comparison between group II post and pre aerobic exercise

On comparing the difference of mean values (pre and post) of cardiovascular & HRV parameters among surya-namaskar and spot jogging group; statistically significant increase in HF was observed in Group I as compared to Group II, whereas the difference in mean values of SBP, DBP, HR, VLF, LF, LF/HF among the two groups was statistically insignificant(Table-3).

Table-3: Comparison of differences in the mean values of Cardiovascular & HRV parameters of (pre & post) surya-namaskar (Group I) and (pre & post) spot jogging (Group II)

Variables	Group I (n=20)	Group II (n=20)	p value
SBP(mm Hg)	6.0 ±4.4	5.1 ±6.6	0.615
DBP (mm Hg)	3.6± 3.1	3.0 ±4.1	0.600
HR(beats/min)	3.3± 3.1	2.3± 2.1	0.253
VLF(Hz)	0.003±0.006	0.003±0.009	0.984
LF(Hz)	0.015 ±0.02	0.075±0.05	0.491
HF(Hz)	0.032±0.026	0.002 ±0.04	0.01
LF/HF	0.126 ±0.133	0.121 ±0.0294	0.946

p value <0.05 is significant; >0.05 is not significant) by independent t test

DISCUSSION

Our study showed that cardiovascular and HRV parameters changed significantly in surya-namaskar group as well as spot jogging group.

Surya-namaskar group showed statistically significant decrease in mean values of SBP and DBP. These finding are in accordance with Bhutkar et al and Herur et al, who also reported a statistically significant reduction in SBP and DBP after six months of yogic practice among normal subjects. Sasi et al reported a statistically significant increase in SBP and statistically significant decrease in DBP, following 45 days of daily practice of surya-namaskar by healthy school students^[11-13].

In our study a statistically significant decline in mean values of HR was observed in surya-namaskar group. This observation is in accordance with the studies conducted by Bhutkar et al and Sasi et al on healthy subjects who practiced surya-namaskar for 6 months and 45 days respectively^[11,13]. Fondran found statistically insignificant decrease in heart rate after training for 6 weeks of surya-namaskar^[14].

On evaluating the HRV parameters following

surya-namaskar practice, it was observed that the HF component increased and was statistically significant. LF/HF component decreased significantly while there was statistically insignificant decrease in LF values. Sarang et al in their study found a decrease in LF and LF/HF component and increase in HF component after cyclic meditation^[15].

In our study both the SBP and DBP showed a statistically significant decrease following spot jogging. Seamus et al, reported a statistically significant reduction in both SBP and DBP on comparing aerobic exercise and control group^[16]. White et al reported an increase in SBP and decrease in DBP after 12 weeks of exercise program in young and middle aged non-obese women, but these changes were statistically insignificant^[17].

In current study a statistically significant decline in mean values of heart rate was observed after spot jogging. This is in accordance with the work of Simon et al and Stein et al who found a statistically significant reduction in HR after aerobic conditioning of 12 weeks and 12 months respectively^[18,19]. Tulppo et al found statistically significant decrease in HR in sedentary subjects after eight weeks training in both moderate and high-volume aerobic exercise groups^[20].

- SOURCE OF FUNDING:** Personal funds.
- Ethical Clearance:** Permission was taken from institutional research and ethical committee.
- REFERENCES**
1. Haggis M, Moore W, Rundle A. Does Practicing Hatha Yoga Satify Requirements for Intensity of Physical Activity which Improves and Maintains Health and Cardiorespiratory Function? *BMJ* 2007; 334: 40.
 2. Hewitt JA, Whyte GP, Morton M, van Someren KA and Levine TS. The Effect of a Graduated Aerobic Exercise Programme on Cardiorespiratory Function in Healthy Subjects. *BMJ* 2008; 337: 1266.
 3. Murphy MH, Murtagh EM, Borreham CA, Harrelson MG, Casperen C, Chatman B et al. Statement on Exercise: Benefits and Recommendations for Cardiac Rehabilitation. *Circulation* 1996; 94: 857-62.
 4. Fletcher GF, Balady G, Blair SN, Blumenthal J, Casperen C, Chatman B et al. Statement on Exercise: Benefits and Recommendations for Cardiac Rehabilitation. *Circulation* 1996; 94: 857-62.
 5. Baughaman KL. The Risks and Benefits of Exercise: Do we have a Finite Number of Heartbeats? *J Am Heart J* 2000; 140(3): 101-2.
 6. Madamnohan, Udupa K, Bhavani AB, Khanam AA, Sachdeva U, Gulheria R and Deepak Pharmacol 2005; 49(3): 313-8.
 7. KK, Study of Pulmonary Function of Asthma Patients after Yoga Training. *Indian J Physiol Pharmacol* 1996; 40(4): 318-24.
 8. Ray US, Pathak A, Tomer OS, Hatha Yoga Practice: Energy Expenditure, Respiratory Changes and Intensity of Exercise. *Evidence-based Complementary and Alternative Medicine* [Online] 2011. <http://www.hindawi.com/journals/ecam/2011/241294/>.
 9. Shinha B, Ray US, Pathak A, Selvamurthy V. In conclusion, a few weeks of disciplined practice of either surya-namaskar or aerobic exercise can lead to improvement in cardiovascular & autonomic functions of either surya-namaskar or aerobic exercise. **Conflict of Interest:** None
- In our study a statistically significant decline was seen in LF/HF component in both surya-namaskar and spot jogging group, while LF component showed a statistically significant reduction in spot jogging group and HF component showed a statistically significant increase in HF component. On comparing both the groups for the difference between mean values (pre and post) for the above mentioned parameters, the increase in HF component was found to be more, which is in accordance with Bowman et al, who reported a statistically significant increase in HF value after six weeks of yoga training[23]. Sathyaprabha et al, showed significant improvement in parasympathetic parameters in epileptic patients after 10 weeks of yoga as compared with healthy volunteer while the exercise group did not show any significant improvement[24].
- In conclusion, a few weeks of disciplined practice of either surya-namaskar or aerobic exercise can lead to improvement in cardiovascular & autonomic functions of either surya-namaskar or aerobic exercise. **Conflict of Interest:** None
- dominance was observed following surya-namaskar, however a greater tilt towards parasympathetic dominance was observed following surya-namaskar.

namaskar

¥ : comparison between group II post and pre aerobic exercise

On comparing the difference of mean values (pre and post) of cardiovascular & HRV parameters among surya-namaskar and spot jogging group; statistically significant increase in HF was observed in Group I as compared to Group II, whereas the difference in mean values of SBP, DBP, HR, VLF, LF, LF/HF among the two groups was statistically insignificant(Table-3).

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1. Haggins M, Moore W, Rundle A. Does Practicing Hatha Yoga Safely Recommandations for Intensity of Physical Activity which Improves and Maintains Health and Cardiorespiratory Function? BMC Complementary and Alternative Medicine 2007; 7: 40.
2. Hewitt JA, Whyte GP, Moreton M, van Someren KA and Levine TS. The Effect of a Graduated Aerobic Exercise Programme on Cardiorespiratory Function. Trials 2008; 3:7.
3. Murphy MH, Murtagh EM, Borreham CA, Harrell LG, Nevill AM. The Effect of a Worksite Based Randomized Controlled Trial. J of Occup Medicine 2008; 50(1): 136.
4. Fletcher GE, Baldry G, Blair SN, Blumenthal J, Caspereli C, Chaitman B et al. Statement on Circulation. Baughman KL. The Risks and Benefits of Exercise: Do we have a Finite Number of Heartbeats? J Am Heart J 2000; 13(3): 101-2.
5. Baughman KL. The Risks and Benefits of Exercise: Circulation. 1996; 94(4): 857-62.
6. Madanmohan, Udupa K, Bhavani AB, Vijayalakshmi P, Surendran A. Effect of Slow and Fast Pranayams on Reaction Time and Cardiorespiratory Variables. Ind J Physiol Pharmacol 2005; 49(3): 313-8.
7. Khanam AA, Sachdeva U, Gulferia R and Deepak KK. Study of Pulmonary Function of Asthma Patients after Yoga Training. Indian J Physiol Pharmacol 1996; 40(4): 318-24.
8. Ray US, Pathak A, Tomer OS. Hatha Yoga Practices: Energy Expenditure, Respiratory Changes and Intensity of Exercise. Evidence-based Complementary and Alternative Medicine [Online] 2011. <http://www.hindawi.com/journals/ecam/2011/241294/>.
9. Simha B, Ray US, Pathak A, Selvamurthy VV. In conclusion, a few weeks of disciplined practice of either surya-namaskar or aerobic exercise can lead to improvement in cardiovascular & autonomic functions of either surya-namaskar or aerobic exercise while the exercise group did not show any significant improvement^[24].
- Conflict of Interest: None

- Energy Cost and Cardiorespiratory Changes During the Practice of Surya Namaskar. Indian J Physiol Pharmacol 2004; 48(2):184-90.
10. Singh A, Sarika, Sandhu JS. The Journal of Research and Education in Indian Medicine [cited 2010 March 12] Available from file:///C:/Users/Currys/Desktop/surya%20namaskar/COMBINE D%20EFFECTS%20OF%20SURYANAMASKA R%20AND%20UJJAYI%20printed.htm
 11. Bhutkar PM, Bhutkar MV, Taware GB, Doijad V, Doddamani BR. Effect of Surya Namaskar Practice on Cardio-respiratory Fitness Parameters: a Pilot Study. Al Ameen J Medicine Science 2008; 1(2):126-9.
 12. Herur A, Kolagi S, Chinagudi S. Effect of Yoga on Cardiovascular and Mental Status in Normal Subjects Above 30 years Of Age. Al Ameen J Med Sci 2010 3 (4): 337-44.
 13. Sasi Kumar A, Sivapriya DV, Shyamala Thirumeni. Effect of Suryanamsakar on Cardio Vascular and Respiratory Parameters in School Students. Rec Res in Sci and Tech 2011, 3(10): 19-24.
 14. Fondran K M. The Effect of Surya namaskar Yoga Practice on Resting Heart Rate and Blood Pressure, Flexibility, Upper Body Muscle Endurance, and Perceived Well-being in Healthy Adults. Cleveland Ohio Cleveland State University 2008. <http://etd.ohiolink.edu/sendpdf.cgi/Fondran%20Kristine%20Marie.pdf?csu1220456637>.
 15. Sarang, Patil, Telles, Shirley. Effects of Two Yoga Based Relaxation Techniques on Heart Rate Variability . International J of Stress Management 2006; 13(4): 460-475.
 16. Whelton SP, Chin A, Xin X, He J. Effect of Aerobic Exercise on Blood Pressure: a Meta-analysis of Randomized, Controlled Trials. Ann Intern Med. 2002; 136(7):493-503.
 17. White GM, Young RJ. Effect of a Twelve Week Exercise Programme on Cardio-respiratory and Body Composition Variables in Non-obese Young and Middle-aged Females. Br J Sports Med. 1978; 12(1): 27-32.
 18. Sloan RP, Shapiro PA, DeMeersman RE, Bagiella E, Brondolo EN, McKinley PS et al. The Effect of Aerobic Training and Cardiac Autonomic Regulation in Young Adults. Am J Public Health. 2009; 99(5): 921-8.
 19. Stein PK, Ehsani AA, Domitrovich PP, Kleiger RE, Rottman JN. Effect of Exercise Training on Heart Rate Variability in Healthy Older Adults. Am Heart J. 1999; 138(3 Pt 1):567-76.
 20. Tulppo MP, Hautala AJ, Makikallio TM, Laukkanen RT, Nissila S, Hughson RL et al. Effects of Aerobic Training on Heart Rate Dynamics in Sedentary Subjects. J of App Physiology 2003; 95(1):364-72.
 21. Sandercock GRH, Bromley PD, Brodie DA. Effects of Exercise on Heart Rate Variability: Inferences from Meta-Analysis. Exercise 2005; 37(3):433-39.
 22. Telles S, Narendran S, Raghuraj P, Nagarathna R, Nagendra HR. Comparison of Changes in Autonomic and Respiratory Parameters of Girls after Yoga and Games at a Community Home. Percept Mot Skills. 1997; 84(1): 251-7.
 23. Bowman AJ, Clayton RH, Murray A, Reed JW, Subhan MM, Ford GA. Effects of Aerobic Exercise Training and Yoga on the Baroreflex in Healthy Elderly Persons. Eur J Clin Invest. 1997; 27(5):443-9.
 24. Sathyapraba TN, Satishchandra P, Pradhan C, Sinha S, Kaveri B, Thennarasu K et al. Modulation of Cardiac Autonomic Balance with Adjuvant Yoga Therapy in Patients with Refractory Epilepsy. Epilepsy Behav. 2008; 12(2):245-52.

A Comparative Study of Pulmonary Function Tests in Obese and Non Obese Adolescents

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ABSTRACT

Background: Obesity is an emerging problem especially among adolescents due to their lifestyle changes related to low level of physical activity and high calorie diet. Excess adipose tissue is often associated with respiratory abnormalities such as reduction in lung volumes, capacities and expiratory flow rates. So there is a need to assess the pulmonary functions and to create awareness among adolescents regarding the drawbacks of obesity in adolescents as this is the high risk period for the onset of obesity which predict BMI in adulthood.

Objectives: To compare lung function parameters FVC, FEV1, FEV1/FVC, PEFR, FEF25-75% of obese adolescents with those of non obese adolescents.

Materials and Method: Study included 80 obese adolescents as cases and 80 non obese adolescents as controls in the age group of 10-19 years, which was further subdivided into 10-14 years and 15-19 years. Pulmonary function tests of each subject were recorded using a Spirothor Wavefront Hand held Spirometer. The results were compiled and statistically analyzed for significant differences.

Results: It was found that the following PFT parameters FVC, FEV1, PEFR and FEF 25-75% were significantly reduced in obese adolescents in comparison with non obese adolescents in both the age groups i.e. 10-14 years and 15-19 years.

Conclusion: Results of the study conclude that obese adolescents have a significantly lower pulmonary function in comparison with non-obese adolescents.

Keywords: Obesity; adolescents; pulmonary function test.

INTRODUCTION

Adolescents constitute 22.8% of the total population in India. There are approximately 230 million adolescents in India between the age group of 10-19 yrs¹. Adolescence period is marked by a characteristic set of salient biologic, psychological and social features and many premature deaths².

Obesity is an emerging problem in developing countries like India, especially among adolescents due

to their lifestyle changes related to low level of physical activity and high calorie diet^{3,4}. In India the prevalence of obesity is between 5.6% and 24% in children and adolescents⁵. Obesity is defined as abnormal or excessive fat accumulation that may impair health. BMI is used to classify overweight and obesity and is defined as person's weight in kilograms divided by square of height in meters (kg/m^2)⁶.

In children and adolescents, overweight and obesity are defined using age and sex specific normograms of BMI. Children with a BMI equal to or exceeding the age-gender-specific 95th percentile is defined as obese. Those with a BMI equal to or exceeding the 85th percentile but below 95th percentiles are defined as overweight.

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PFT parameters	Cases	Controls	P value
PEFR	5.11±1.33	5.78±1.69	0.009**
FEF 25-75%	3.22±1.28	3.24±1.07	0.909
FEV 1/FVC%	90.24±6.33	91.13±5.42	0.342
FEV 1	2.46±0.64	2.77±0.76	0.006**
FVC	2.73±0.71	3.03±0.81	0.013*

Table 1: PFT parameters in the age group 10-19 years adolescents in the age group 10-19 years

RESULTS

Significant figures
+ Significant significance (P value: 0.05 < P ≤ 0.10)
* Moderately significant (P value: 0.01 < P ≤ 0.05)
** Strongly significant (P value: P ≤ 0.01)

Student t test (two tailed, independent) has been used to find the significance of study parameters on non-obese adolescents as subjects and 80 non-obese adolescents as controls based on inclusion criteria. The following parameters - FVC, FEV1, PEFR, FEV1/FVC, FEF25-75% were recorded and excluded based on inclusion criteria. The following parameters - FVC, FEV1, PEFR, FEV1/FVC, FEF25-75% were recorded and demonstrated the procedure and results. Three recordings were done and the best of the three was considered.

Statistical analysis

BMI is calculated using formula $Wt(kg)/ht(m^2)$ and percentile will be calculated by using pediatric BMI and percentile will be calculated by sex specific. Later charts according to local age and sex specific. Later subjects are subjected to PFT recording.

Exact test has been used to find the significance of study analysis (Chi-square/ Fisher's exact test) on metric parameters. Continuous scale between two groups (Inter group used to find the significance of study parameters on groups on categorical scale between two or more groups.

Student t test (two tailed, independent) has been used to find the significance of study parameters on non-obese adolescents as subjects and 80 non-obese adolescents as controls based on inclusion criteria. The procedure was explained and a exclusion criteria. The procedure was taken up for the study. 10-14 yrs and 15-19 yrs will be sub grouped into group of 10-19 years, which will be sub grouped into 10-14 yrs and 15-19 yrs, which will be taken up for the study. The obese and non obese adolescents, in the age group of 10-19 years, which will be sub grouped into 10-14 yrs and 15-19 yrs, which will be taken up for the study. The obese and non obese adolescents, in the age

5. Neuromuscular disorders
4. History of cardiovascular and endocrine disorders.

Inclusion Criteria	Exclusion Criteria
1. Age group - 10 to 19 yrs of both genders.	1. Age <10 yrs and >19 yrs.
2. Obese Adolescents with BMI >= to 95 _{th} percentile for age and sex.	2. Smokers and tobacco chewers
3. Non Obese Adolescents with BMI <= to 85 _{th} percentile for age and sex.	3. Subjects with acute or chronic respiratory disease.

Data was collected using a Spirometer Wavefront held Spirometer which is a portable instrument. Data collection using a Spirometer Wavefront was done and the best of the three was recorded. The following parameters were done and demonstrated the procedure and results. Three recordings were done and the best of the three was considered.

Method of Collection of Data (including sampling procedure)
University colleges of Bangalore between the age group of 10-19 yrs. Subjects selected based on inclusion and exclusion criteria.
Data was collected from various schools and pre-

Source of Data

MATERIALS AND METHOD

Health needs of adolescents are tremendous and these have seldom met as there is no comprehensive program for adolescent health in India, and hence there is a need to assess the Pulmonary functions and to create awareness among adolescents regarding the drawbacks of obesity in adolescents as this is the main risk period for the onset of obesity which predicts adult in adulthood.

Excess adipose tissue is often associated with respiratory abnormalities such as reduction in lung volumes, capacities and expiratory flow rates, which due to reduced chest wall expansion and lung compliance and increased respiratory resistance.^{8,9} The most common Pulmonary function abnormality in adolescents who are obese is a reduction in ERV₁₀. The most common Pulmonary function abnormality in adolescents and increased respiratory resistance.^{8,9} The reduced chest wall expansion and lung compliance, capacities and expiratory flow rates, which due to reduced chest wall expansion and lung compliance and increased respiratory resistance.^{8,9} These have seldom met as there is no comprehensive program for adolescent health in India, and hence there is a need to assess the Pulmonary functions and to create awareness regarding the drawbacks of obesity in adolescents as this is the main risk period for the onset of obesity which predicts adult in adulthood.

Table 1 shows that the PFT parameters FVC, FEV1 and PEFR were significantly reduced in obese adolescents (10-19years) in comparison with controls. However FEV1/FVC% and FEF25-75% were not significantly different between the two groups.

Table 2: PFT parameters in cases and controls in Age group 10-14 yrs

PFT parameters	Cases	Controls	P value
FVC	2.30±0.45	2.59±0.64	0.024*
FEV 1	2.06±0.39	2.38±0.61	0.006**
FEV 1/FVC%	89.73±6.96	91.98±5.52	0.113
FEF 25-75%	2.46±0.79	3.04±0.87	0.002**
PEFR	4.18±1.03	4.82±0.97	0.005**

* Moderately significant (P value:0.01<P≤0.05) ** Strongly significant (P value : P≤0.01)

Table 2 shows that the PFT parameters FVC, FEV1, FEF 25-75% and PEFR were significantly reduced in obese adolescents (10-14years) in comparison with controls. However FEV1/FVC% was not significantly different between the two groups.

Table 3: PFT parameters in cases and controls in Age group 15-19 yrs

PFT variables	Cases	Controls	P value
FVC	3.16±0.67	3.47±0.71	0.043*
FEV 1	2.86±0.59	3.15±0.70	0.048*
FEV 1/FVC%	90.75±5.67	90.28±5.26	0.699
FEF 25-75%	3.98±1.23	3.43±1.21	0.049*
PEFR	6.03±1.37	6.74±1.72	0.046*

* Moderately significant (P value:0.01<P≤0.05) ** Strongly significant (P value : P≤0.01)

Table 3 shows that the PFT parameters FVC, FEV1, FEF 25-75% and PEFR were significantly reduced in obese adolescents (15-19years) in comparison with controls. However FEV1/FVC% was not significantly different between the two groups.

DISCUSSION

Obesity may be associated with a number of pulmonary abnormalities, including reduced chest wall compliance, increased work of breathing, increased minute ventilation due to increased metabolic rate, and decreased functional residual capacity and expiratory reserve volume¹¹.

The study is in accordance with the study done by Farida M.El-Baz et al "Impact of Obesity and Body fat Distribution on Pulmonary Function of Egyptian Children" who found statistically significant reductions

in FVC, FEV1, PEF, and MVV in obese children.

The study of pulmonary functions done by Bambang Supriyatno et al in 110 obese adolescents showed pulmonary dysfunction in 58.2% obese adolescents and the most common abnormality was combined type (30%), followed by restrictive (25.5%) and obstructive type (2.7%). Mean FEV1, FVC values were below normal, while the mean FEV1/FVC ratio was normal in obese adolescents in comparison with controls.

In the study of pulmonary functions done by Swapnil J.Paralikar et al in 30 obese and 30 non obese adolescents which showed that FEV1, FEV1/FVC, MVV were significantly reduced in the obese group where as FVC and flow rates (PEFR and FEF25-75%) were not significantly different in the obese and control groups.

2. Marcello AV. Adolescence. In: Kliegman, Nelson, Behrman, Stanton, editors. Nelson Textbook of Pediatrics, 18th ed. Vol (1). Philadelphia: Saunders; 2007. p. 60.
1. Lal S, Adarsh, Panika. Text book of community medicine. 2nd ed. Delhi(India): CBS Publishers and distributors Pvt. Ltd; 2009. p. 151.

REFERENCES

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Conflict of Interest: None

The study was conducted in adolescents only and there is a need to study in other groups. In this study the correlation of Pulmonary Function Test Parameters with the degree of obesity was not evaluated, which might have yielded much more information regarding severity of obesity. We were not able to evaluate the lung function of obese individuals. FRC and ERV as these parameters can be measured by a higher version of spirometer, which could not be measured by hand held spirometer; which are studies conducted which have shown that the FRC and ERV as the most commonly reduced parameters in obese individuals.

LIMITATIONS

The prevention of sedentary behavior, pharmacotherapy and restriction of sedentary behavior, pulmonary enhancement, dietary management, multi-phase approach, which includes multidisciplinary, multi-phase approach, which includes a bariatric surgery.

The above study thus concludes that Obesity function in comparison with Non-Obese adolescents have a significantly lower pulmonary function in adolescents that includes a

hyperactivity from an obesity related decrease in airway caliber, inhibition of deep breathing, and lack of tidal stretch¹⁶ and GERD and airway wall edema from pulmonary vascular congestion also contribute to decline in lung function¹⁷.

Obese people have an increased airway

upregulate airway inflammation¹⁸.

inflammatory cytokines such as interleukin-6, interleukin-1, and tumor necrosis factor-a which is a proinflammatory state, with increased leptin secreted with increased airway inflammation. Obesity is associated with childhood obesity is

reported that childhood obesity is associated with increased expiratory volume reduction. Spahopoulos et al¹³ reported that the extrinsic mechanical compression due to fat accumulation which may be reduced in massive obesity¹².

TLC may fall in massive obesity and RV is normal (but TLC may fall in massive obesity) and RV is normal (but because respiratory muscle strength and lung recoil remain normal, TLC is typically unchanged (although reduced outward recoil of the chest wall, and FRC falls, preserved inward recoil of the lung overbalances the recoil is blunted due to the weight of chest wall fat and the moderate obesity, the outward recoil of the chest

may be reduced in massive obesity groups. The study was also in conflict with the study conducted by Ergun Cetinkaya et al "Effect of obesity on Pulmonary Function in Children" and found that the FVC, FEV1, FEF25-75% and PEF showed no significant changes between obese and non obese groups.

The study however was in conflict with the study conducted by Perren Bornan et al in children with a mean age of 7-15 years and found no significant differences in the pulmonary function test parameters; FVC, FEV1, FEF25-75% and PEF showed no significant differences between obese boys and FVC and FEV1 were significantly reduced in obese children and overweight children.

In the study done by Josey C. Eisenmann et al in the study included 256 Hopi children between 6-12 years of age and they found an increase in pulmonary function between normal weight and overweight children, which included Navajo children between 6-12 years of age and 557 Navajo children between 6-12 years of age and FVC and FEV1 were significantly reduced in obese girls as compared to normal weight and overweight children.

In the study of pulmonary function done by AM Li et al in 64 obese adolescents and found that the FVC and FEV1 values were less, but RV and RV/TLC ratio were increased in comparison with controls.

3. Chhatwal J, Verma M, Riar SK. Obesity among preadolescents and adolescents of a developing country (India). *Asia Pac J Clin Nutr* 2004;13(3): 231-5.
4. Ghai OP, Gupta P, Paul VK, editors. Ghai Essential Pediatrics. 6th ed. Delhi (India): CBS Publishers and distributors Pvt. Ltd; 2004. p. 76.
5. Paralikar SJ, Kathrotia RG, Pathak NR, Jani MB. Assessment of pulmonary functions in obese adolescent boys. *Lung India* 2012;29(3):236-240
6. <http://www.who.int/mediacentre/factsheets/fs311/en/> accessed on 1/9/2014.
7. Raj M, Kumar RK. Obesity in children and adolescents. *Indian J Med Res*. Nov 2010;132(5): 598–607.
8. Drumond SC, Fontes MJF, Assis I, Duarte MA, Lamounier JA, Orlandi LCL et al. Comparison of three sets of reference equations for spirometry in children and adolescents with distinct body mass indices. *J Bras Pneumol* 2009 May;35(5): 415-22.
9. Boran P, Tokuc G, Pisgin B, Oktem S, Yegin Z, Bostan O. Impact of Obesity on Ventilatory function. *J.Pediatr.(RioJ)* 2007 Mar/Apr;83(2)
10. Bedell GN, Wilson WR, Seebohm PM. Pulmonary function in obese persons. *J Clin Invest*. Jul 1958;37(7):1049–1060.
11. Flier JS, Maratos-Flier E. Biology of Obesity. In: Longo, Fauci, Kasper, Hauser, Jameson, Loscalzo, editors. *Harrison's Principles of Internal Medicine*. 18th ed. Vol (1). New York: McGraw Hill Companies; 2012. p. 622,628
12. Naureckas ET, Solway J. Disturbances of Respiratory Function. In: Longo, Fauci, Kasper, Hauser, Jameson, Loscalzo, editors. *Harrison's Principles of Internal Medicine*. 18th ed. Vol (2). New York: McGraw Hill Companies; 2012. p. 2093
13. Spathopoulos D, Paraskakis E, Trypsianis G, Tsalkidis A, Arvanitidou V, Emporiadou M et al. The effect of obesity on pulmonary lung function of school aged children in Greece. *Pediatr Pulmonol*. 2009 Mar;44(3):273-80.
14. Chow JS, Leung AS, Li WW, Tse TP, Sy HY, Leung TF. Airway inflammatory and spirometric measurements in obese children. *Hong Kong Med J* 2009 Oct;15(5):346-52.
15. Weiss ST. Obesity: insight into the origins of asthma. *Nat Immunol*. 2005 Jun;6(6):537-9.
16. Kapsali T, Permutt S, Laube B, et al. Potent bronchoprotective effect of deep inspiration and its absence in asthma. *J Appl Physiol* 2000 Aug;89(2):711-720.
17. Tantisira KG, Weiss ST. Complex interactions in complex traits: obesity and asthma. *Thorax* 2001; 56 (Suppl II):ii64-ii74.

Prevalence of Low Mental Health Among Nurses in Medical Intensive Care Units

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ABSTRACT

Introduction: Professional nurses who work in ICU experienced more stressful conditions compared to those involved in other wards of hospitals. Excessive workloads, job factors, and organizational factors stand to be the leading causes of mental health problem in nurses. However, a little attention has been directed towards determining the prevalence of occupational stress and mental health problem in ICU nurses. The present study was intended to determine the prevalence of mental health problems among nurses working in the intensive care units in various private hospitals in Amravati city.

Material and Methods: The objective of this cross-sectional study was to determine the prevalence of mental health problems in ICU nurses working in various Private Hospitals. The mental health status of the nurses working in the ICU was characterized using the 28-item General Health Questionnaire (GHQ-28). 68 female ICU nurses completed the questionnaires. Statistical significance was analyzed using independent samples t-test as appropriate.

Results: The prevalence of somatic symptoms, anxiety, social dysfunction, and depression were 56.68%, 64.60%, 69.96%, and 14.18%, respectively. As per the independent samples t-test, somatic symptoms, anxiety, and social dysfunction had significant relationships with marital status ($p = 0.01$), but no significant differences between mental health subscales and educational status, and working different shifts ($p > 0.05$).

Conclusion: There was a high prevalence of low mental health among ICU nurses. There was a significant relationship between mental health and marital status. Future interventions to identify and reduce occupational stress are needed to develop the comprehensive health program to enhance nurses' levels of mental health.

Keywords: mental disorders, ICU nurses, marital status, educational status

INTRODUCTION

The key to success in nursing care lies in the fact that the nurses must be sensitive enough to respond to even minimal changes in patients' health condition so that appropriate clinical assessment is done timely, accurately and expediently. This is possible only when affective states of nurses on duty are optimally aroused over different times of the day, which in turn thought to be conducive to enhance patients' safety.

It is becoming increasingly difficult to ignore the factors that are clearly important in stress induced by work, i.e., including long hours of working, the quality of the relationships between hospital workers, poor supervision, high workload, and poor work environment. The physical environment (including the factors like temperature, lighting, the levels of sound in hospitals etc.), in addition, has a great impacts on the levels of stress in the healthcare staff.¹ Occupational stress has a significant impact on workers' health and well-being, job satisfaction, their quality

of life and quality of family life, turnover, and absences from work.² In general, the prevalence of mental health problems among people was estimated to be 14 to 18%.³

Stress levels among professional nurses have increased due to the increased demands of clinical nursing in recent years. Previous studies have shown that there is an association of work demands and stress with adverse mental health like emotional exhaustion⁴, depressive disorder^{5,6} and fatigue^{7,8}, which found to result in sleep problems and absences from work due to sickness.⁴

Many nurses reported to experience high levels of occupational stress in their work environment. As an outcome of stressful workplaces and tasks, stress has effects on nursing behavior in hospital wards.^{3,1} However, the results of the General Health Questionnaire (GHQ) among 870 nurses working in various hospitals in the south of England indicated that about 27% of hospital workers were suffering from occupational stress and various mental health problems.³ Nurses in the intensive care unit are exposed to more traumatic events happening in their stressful working environment and reported to have experienced more stressful conditions than the nurses working in other wards of hospitals.⁹ Higher levels of stress result in increased turnover rates and burnout among this working group.

The prevalence of mental health problems (anxiety and depression) among nurses is high. Excessive workloads, organizational factors and job factors are found to be the important leading causes of mental health problem in nurses.^{10,11} However, far too little attention has been directed towards the determination of the prevalence of occupational stress and mental health problem in nurses working in ICUs. This study was intended to determine the prevalence of occupational stress and various mental health problems in ICU nurses working in private hospitals in Amravati city and to conclude the relationship between occupational stress and mental health.

MATERIAL AND METHODS

This cross-sectional study was conducted to determine the prevalence of mental health problems in various Private Hospitals in Amravati City.

Selection and Description of Participants

All registered female nurses employed in the private hospitals,

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Variables		Somatic symptoms	Anxiety	Social dysfunction	Depression
Marital status	Single	45.04	58.71	64.5	10.32
	Married	60.86	66.71	71.93	15.57
Education Levels	Diploma	53.57	61.89	69.03	12.79
	Bachelor's degree or higher	57.33	65.18	70.14	14.45

Table-1: Prevalence of mental disorder subscales (%) according to marital status and education levels

Occupational stress	Education Level	Mean	SD	p-value*
Somatic symptoms	Single	45.03	5.63	0.000
	Married	60.86	6.57	
Anxiety	Single	58.71	4.78	0.000
	Married	66.71	7.12	
Social dysfunction	Single	64.50	4.50	0.000
	Married	71.93	7.77	
Depression	Single	10.32	3.85	0.180
	Married	15.57	16.21	

Table-2: Prevalence of mental disorders among nurses as per their marital status (*Independent samples t-test; SD = standard deviation)

having intensive care units (ICU) of at least 3 beds to maximum possible number of beds in the Amravati city, were eligible to participate in this study. The nurses who had bachelor degree or were associate diploma holders of either nursing institutions or universities, and agreed to participate in this study, were included in the study. Any nurse with a qualification less than two years since completing their nursing program was excluded. The initial sample consisted of 80 female ICU nurses, 12 of whom did not complete the questionnaires.

Technical Information

The 28-item General Health Questionnaire (GHQ-28) was used to characterize the mental health status of the nurses in the ICU. Numerous studies have investigated reliability and validity of the GHQ-28 in various clinical populations. Test-retest reliability has found to be high (0.78 to 0.9)¹² and both, interobserver and intraobserver reliability, have been reported to be excellent (Cronbach's α 0.9–0.95). High internal consistency has also been reported. The GHQ-28 has been reported to correlate well with the Hospital Depression and Anxiety Scale (HADS)¹³ and also with the other measures of depression.¹²

This questionnaire has four subscales; each subscale consists of seven questions meant to evaluate anxiety, somatic symptoms, social dysfunction, and depression.¹⁴ Mental health -related stress was rated using a 5-point Likert scale.³ A high score suggests a severe mental disorder, and the lower score suggests no disorder. Demographical features, including age, education level, marital status and work experience, of the nurses in the ICU were collected with an appropriately designed form. The data for the study were collected using a questionnaire for the assessment of the mental health status among the nurses in the ICU. Ethical issues were considered. Written informed consent was taken.

STATISTICAL ANALYSIS

Statistical analysis was done using independent samples t-test as appropriate, by Statistical Package for the Social Sciences (SPSS) software, version 20. The results were considered

significant at the level of $\alpha = 0.05$.

RESULTS

The nurses in the present study were having the age ranging from 23 to 45 years, with an average of 28.99 years and with a standard deviation of ± 4.89 . About 82.24% of the nurses were holding Bachelor's degrees or a higher level degree, and about 17.64% of them were having a diploma-level education. The nurses who were married comprised 72.53% of the total number of participating nurses. 81% of the nurses had worked on rotating shifts, 10.29% had worked on permanent day shifts and 8.82% had worked on night shifts.

The most prevalent mental disorder in the nurses was found to be social dysfunction (69.96%), and the least prevalent mental disorder being the depression (14.18%). Among all the nurses, about 64.6% had anxiety symptom, those about 56.68% had somatic symptoms. In order to find out the relationships between marital status, mental disorders and education level, the score in each subscale were calculated and the independent samples t-test was applied. The results indicated that the prevalence in all subscales of mental health was greater in married nurses than in the nurses who were not married, and this difference was statistically significant ($p < 0.05$). No significant difference was found between education levels and the mental health disorder subscales.

Table-1 shows the prevalence of mental disorders and its subscales according to education levels and marital status. Nurses having diploma-level educations were found to have higher somatic symptoms (80%) than in the nurses having more advanced educational levels. However, the other mental disorders were greater in the nurses holding Bachelor's degrees or higher level degrees.

Table-2 All mental disorder subscales, except depression, were greater in nurses who were married than those who were singles.

DISCUSSION

This study was designed to study the prevalence of various mental health problems in nurses who work in ICU in various Private Hospitals in Amravati City. The results of the study indicated that the nurses on the fixed night shift schedule had much greater prevalence of somatic symptoms, anxiety, depression, and mental disorders than that in the nurses who worked the rotating shifts (Table-2). This finding was in agreement with previous findings of the study done among hospital nurses in Japan that showed a significant relationship ($p < 0.001$) between mental disorders and shift work in nurses.¹⁵ Assessment of mental disorders among nurses doing shift work in Shiraz, using the GHQ-28 questionnaire, showed that 45.4% of the reported nurses had experienced mental disorders. The highly prevalent mental disorders were anxiety (43.2%) and somatic symptoms (34.5%) and prevalence of depression and social dysfunction has been reported as 1.2% and 79.5% in

nurses who do shift work.¹⁶ This study produced results that confirm the important findings of a previous work in this field. The investigation done among the nurses in Tabriz's teaching hospitals, considering the relationship between occupational stress, general health and burnout, revealed that 37.3% of the nurses suffered from significant mental health disorders, 30.5% of the nurses from somatic symptoms, 62.7% of the nurses from anxiety, 3.9% of the nurses from social dysfunction, and 16.9% of the nurses from depression.¹⁷ This can be attributed to the heavy workload with less number of persons on duty, inadequate and poor quality of sleep, disputes among colleagues and also with the healthcare professionals and workplace violence.

The results also indicated that the prevalence of the mental health problem among married nurses was considerably greater than that in single/bachelor nurses working in the ICU (Table-1). The somatic symptom was noted to be the most prevalent mental disorder among married nurses (60.86% of the nurses). The results are consistent with the findings of other studies that found a significant difference between the nurses' marital status and depression and social dysfunction ($p < 0.01$).¹⁶ The results of another study showed that the schedule of shift work had a great impact on the levels of stress among workers.¹⁸ This can be attributed to relatively low socioeconomic status and professional burden.

Mental disorders in nurses working in ICU who experienced high levels of stress were far greater than those experiencing low levels of stress. This result is in agreement with the findings of a previous study that showed a strong relationship between the development of mental disorders and occupational stress among nurses.¹⁹ This may be due to disputes among colleagues and also with the healthcare professionals, poor nurse-patient relationship and workplace violence.

The factors that cause high prevalence of low mental health among nurses who work in the ICU must be identified and reduced and a comprehensive health program should be implemented in this field not only to reduce occupational stress but to enhance the level of nurses' mental health also, so as to improve the effectiveness and performance of the ICU.

Training programs to enhance communication skills and reduce stress could be beneficial in improving basic/intuitive communication strategies and also to promote safety as well as to improve health in the workplace.^{20,21} Also an another important ergonomic recommendation is that night work should be reduced as much as possible. Schedule planners should avoid permanent night shift and rapid change over from night to day on the same day or from morning to night. The number of consecutive working days should be limited to 5-7. Every shift system should consider some free weekend including at least two successive full days off. Schedule planners must consider the time of recovery and rest breaks. Schedule should ideally and preferably be regular and predictable.²²

CONCLUSION

This study highlighted the important findings that the prevalence of low mental health among nurses working in the ICU was high. There was a significant relationship between marital status, shift work and mental health and their subscales. These results can be a roadmap to establish policies for hospitals in promoting the health and welfare of their staff members. Future detailed

interventions are needed to develop a comprehensive and appropriate health program in this field to reduce occupational stress and improve the level of nurses' mental health.

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REFERENCES

1. Sahraian A, Davidi F, Bazrafshan A, Javadpour A. Occupational stress among hospital nurses: Comparison of internal, surgical, and psychiatric wards. *Int J Community Based Nurs Midwifery*. 2013;1:182-190.
2. Salih SZ, Abajobir AA. Work-Related stress and associated factors among nurses working in public hospitals of Adis Ababa, Ethiopia: A cross-sectional study. *Workplace Health Saf*. 2014;62:326-32.
3. Mark G, Smith A. Occupational stress, job characteristics, coping, and the mental health of nurses. *Br J Health Psychol*. 2012;17:505-21.
4. Sluiter JK, de Croon EM, Meijman TF, Frings-Dresen MH. Need for recovery from work related fatigue and its role in the development and prediction of subjective health complaints. *Occup Environ Med*. 2003;60 Suppl 1:i62-70.
5. Chen SW, Wang PC, Hsin PL, Oates A, Sun IW, Liu SI. Job stress models, depressive disorders and work performance of engineers in microelectronics industry. *Int Arch Occup Environ Health*. 2011;84:91-103.
6. Sakata Y, Wada K, Tsutsumi A, Ishikawa H, Aratake Y, Watanabe M, et al. Effort-reward imbalance and depression in Japanese medical residents. *J Occup Health*. 2008;50:498-504.
7. Sembajwe G, Wahrendorf M, Siegrist J, Sitta R, Zins M, Goldberg M, et al. Effects of job strain on fatigue: cross-sectional and prospective views of the job content questionnaire and effort-reward imbalance in the GAZEL cohort. *Occup Environ Med*. 2012;69:377-84.
8. Fang J, Kunavirkkul W, Olson K, Chontawan R, Kaewthummankul T. Factors influencing fatigue in Chinese nurses. *Nurs Health Sci*. 2008;10:291-9.
9. Mealer M, Jones J, Newman J, McFann KK, Rothbaum B, Moss M. The presence of resilience is associated with a healthier psychological profile in intensive care unit (ICU) nurses: results of a national survey. *Int J Nurs Stud*. 2012;49:292-9.
10. Zandi A, Sayari R, Ebadi A, Sanaianasab H. Frequency of depression, anxiety and stress in military Nurses. *Iranian Journal of Military Medicine*. 2011;13:103-8.
11. Thomas B. Management strategies to tackle stress in mental health nursing. *Ment Health Care*. 1997;1:15-7.
12. Robinson R, and Price T. Post-stroke depressive disorders: A follow-up study of 103 patients. *Stroke*. 1982;13:635-641.
13. Sakakibara B, Miller W, Orenczuk W, Wolfe D. A systematic review of depression and anxiety measures with individuals with spinal cord injury. *Spinal Cord*. 2009;47:841.
14. Goldberg DP, Hillier VF. A scaled version of the General Health Questionnaire. *Psychol Med*. 1979;9:139-45.
15. Suzuki K, Ohida T, Kaneita Y, Yokoyama E, Miyake T, Harano S, et al. Mental health status, shift work, and occupational accidents among hospital nurses in Japan. *J*

- Occup Health. 2004;46:448-54.
- 16. Ardekani ZZ, Kakooei H, Ayattollahi S, Choobineh A, Seraji GN. Prevalence of mental disorders among shift work hospital nurses in Shiraz, Iran. Pakistan J Biol Sci. 2008;11:1605-9.
 - 17. Rahmani F, Behshid M, Zamanzadeh V, Rahmani F. Relationship between general health, occupational stress and burnout in critical care nurses of Tabriz teaching hospitals. Iran Journal of Nursing. 2010;23:54-63.
 - 18. Adib-Hajbaghery M, Khamechian M, Alavi NM. Nurses' perception of occupational stress and its influencing factors: A qualitative study. Iran J Nurs Midwifery Res. 2012;17:352.
 - 19. Revicki DA, May HJ. Organizational characteristics, occupational stress, and mental health in nurses. Behav Med. 1989;15:30-6.
 - 20. Radtke JV, Tate JA, Happ MB. Nurses' perceptions of communication training in the ICU. Intensive Crit Care Nurs. 2012;28:16-25.
 - 21. Jafari MJ, Gharari M, Ghafari M, Omidi L, Kalantari S, Fardi GRA. The Influence of Safety Training on Safety Climate Factors in a Construction Site. Int J Occup Hyg. 2014;6:81-7.
 - 22. Knauth, P. Design of systems for shift-work. International Encyclopaedia of Ergonomics and Human Factors. Taylor Francis London. 2001;2:1210.

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lung disorders. Epidemiological studies have shown is associated with increased mortality from chronic There is evidence that reduced lung function

the life totally [2].

tend to promote physical inactivity which is disrupting become more stressful. The economic incentives also modern man has become physically inactive & mind has With the advent & advancements of technology, the

to be higher in industrialized countries [1].
7.33 per 1000 for women. The prevalence was observed (COPD) to be 9.33 per 1000 individuals for men and prevalence of chronic obstructive pulmonary disease

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INTRODUCTION

Keywords: Surya namaskar, spot jogging, respiratory parameters.

parameters.

Conclusion: Yoga can be equally effective or even better than spot jogging at improving various respiratory

groups was statistically significantly higher for IC and VC in surya namaskar group.

Result: The study showed that TV, IC, VC, FEV₁, MVV and PEF increased significantly in both surya namaskar and spot jogging group. But, it was found that difference between the mean values (pre and post) among the two

spironometer.

Method: The subjects were randomly divided into 2 groups of 20 each. Group I performed surya namaskar and FEV₁, MVV, and PEF) were recorded before and after six weeks of training in each group by computerized Group II performed spot jogging for 5 mins/day for duration of 6weeks. Respiratory parameters (TV, IC, VC,

heathy subjects and compare with each other.

Aim: To evaluate the effect of surya namaskar and spot jogging of similar duration on respiratory parameters of

with popular aerobic exercise like spot jogging in young healthy subjects.
benefits that surya namaskar can have on health. Hence, we proposed to compare the effect of Surya namaskar of the population can be yoga. One of the most probable cost effective ways of improving the respiratory health additive effects on one's health. One of the most probable cost effective ways of improving the respiratory health times, physical activity was very high & it was complicated with additional yogic practices which probably had very challenging for the human body to cope up with high stress & increasing pollution levels. In the ancient both the developed and developing countries. Changing life styles and modern industrial revolution has been

Background: Respiratory disorders pose a huge public health problem imposing a very high economic burden

ABSTRACT

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Comparative Study on the Effects of Surya Namaskar & Spot Jogging on Respiratory Parameters: A Pilot Study

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Table-3: Comparison of differences in the mean values of respiratory parameters of (pre & post) surya namaskar (Group I) and (pre & post) spot jogging (Group II)

Variables	Group I (n=20)	Group II (n=20)	p value
TV (ml)	78.0±69.6	44.3±75.9	0.152
IC (ml)	582.0±301.5	306.6±236.1	0.003
VC (ml)	811.0±402.8	407.5± 270.5	0.001
FEV ₁ (%)	2.3±2.3	2.0±3.3	0.720
MVV (L/min)	23.6±13.7	16.1±16.0	0.120
PEFR (L/min)	47.2±26.5	47.4±33.0	0.984

p value <0.05 is significant; >0.05 is not significant) by independent t test

DISCUSSION

Our study showed that respiratory parameters changed significantly in surya namaskar group as well as spot jogging group. Surya namaskar group showed a statistically significant increase in mean values of tidal volume, IC, VC, FEV₁, MVV and PEFR following practice of surya namaskar.

These findings are consistent with Bal et al., who have also reported a statistically significant improvement in tidal volume, IC and VC values in the group performing rope mallakhamb along with asanas over the group not performing asanas [11].

Bhutkar et al., in their study found a statistically significant increase in VC, MVV after 6 months of practice of surya namaskar in MBBS students. Sasi et al., also showed a statistically significant increase in PEFR values following 45 days daily practice of surya namaskar on healthy school students. Khanam et al., also found an increase in PEFR values in asthma patients after practice of different yoga asanas twice a day for seven days; but it was found to be statistically insignificant^[7,12,13].

Chanavirut et al., reported a statistically significant increase in FEV₁, while a statistically insignificant increase in tidal volume after 6 weeks practice of five positions of hatha yoga on healthy subjects [12,14]. Trans et al., observed a statistically insignificant increase in values of FEV₁ following practice of hatha yoga by healthy subjects [15].

In our study the group performing spot jogging also showed a statistically significant increase in tidal

volume, IC, VC, FEV₁, MVV and PEFR following 6 weeks of spot jogging.

White et al., also reported that there was a significant increase in VC after 12 weeks exercise program in young and middle aged non-obese women [16]. Moodi et al., in a clinical trial on 60 subjects (14-18 years), performing stationary bicycle and roping in different groups, found a significant increase in VC and FEV₁ after aerobic exercise training in both groups [17]. Porszasz et al., showed that after 7 weeks of exercise training (high intensity cycle ergometer) by COPD patients, when compared with pre training parameters, a statistically significant increase in IC was observed [18]. This increase in FEV₁ is similar to the study done by Farid et al., who reported an increase in FEV₁ and PEFR values after eight weeks of aerobic exercise in asthmatic patients [19].

In a population based cohort study by Jakes et al., consisting of 12,238 men and women aged 45-47 years found that physical activity is associated with higher levels of FEV₁ [5]. Hallstrand et al., in their study reported a statistically significant increase in MVV values, but an insignificant increase in FEV₁ values after aerobic conditioning in asthmatic patients [20].

Our study reported a very highly significant ($p<0.001$) increase in tidal volume, IC, VC and MVV in surya namaskar group while only significant ($p<0.05$) improvement in spot jogging group. On comparing surya namaskar group with spot jogging group for the difference between the mean values (pre and post); the increase in IC and VC were found to be significantly ($p<0.05$) more in surya namaskar group while the

- De Gody et al., compared maximum inspiratory pressure and FEV₁, in yoga and aerobic exercise group; they reported a statistically insignificant improvement in absolute variation in maximal inspiratory pressure and FEV₁. However, the maximum inspiratory pressure and FEV₁, in yoga and sedentary workers, they found that yogis have a statistically significant higher FEV₁ of yogis, athletes and sedentary workers. They Prakash et al., in their study compared PEF and PEFR as compared to sedentary workers [22]. In conclusion, results from our study and other studies comparing the effects of yoga and aerobic exercise seem to indicate that, in both healthy and diseased population, yoga may be equally effective or even better than aerobic exercise at improving various respiratory parameters. However, a few studies have reported insignificant change in the respiratory parameters before and after the intervention. Since there are conflicting results, larger number of studies are needed with more number of subjects for validation of results.
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- Conflict of Interest:** None
- Ethical Clearance:** Permission was taken from Pragati Chhabra, Geetanjali Sharma, Anjali T Kannaan. Prevalence of respiratory disease and associated factors in an urban area of Delhi, Indian Journal of Community Medicine. 2008; 33(4):229-232.
- Gal DL, Santos AC, Barros H. Leisure-time versus Full-day Energy Expenditure: A Cross-sectional Study of Sedentariism in a Portuguese Urban Population. BMC Public Health. 2005; 5:16.
- Freeman JV, Dewey FE, Hadley DM, Myers J, Frolicher VE. Autonomic Nervous System Interaction with the Cardiovascular System during Exercise. Progress in Cardiovascular Diseases.
12. Bhutkar PM, Bhutkar MV, Taware GB, Dajiad V, Doddamani BR. Effect of Surya Namaskar Practice on Cardiorespiratory Fitness Parameters: a Pilot Study. Al Amman J Medicine Science. 2008; 2010; 2: 70 - 3.
11. Bal BS, Singh K. Effects of 4-week rope Mallakhamb Training on Respiratory Indices in Adolescents Girls. Biomedical Human Kinetics. 2004; 48(2):184-90.
10. Shima B, Ray US, Pathak A, Selvarumthy W. Energy Cost and Cardiorespiratory Changes During the Practice of Surya Namaskar. Indian Journal of Physical Pharmacol. 2007; 7:40.
9. Haggis M, Moore W and Rundle A. Does Practicing Hatha Yoga Satisfy Recommendations for Maintaining Health and Alternative Medicine. BMC Complementary and Alternative Medicine. 2004; 4(1):1093/ejam/neqd046.
8. Ray US, Pathak A, Tomer OS. Hatha Yoga Practices: Energy Expenditure, Respiratory Changes and Intensity of Exercise. Evidence-Based Complementary and Alternative Medicine. 1996; 40(4):318-24.
7. Khanam AA, Sachdeva U, Guleria R and Deepak KK. Study of Pulmonary Function of Asthma Patients after Yoga Training. Indian J Physiol Pharmacol. 2005; 49(3):313-8.
6. Madanmohan, Udupa K, Bhavanani AB, Vijayalakshmi P and Surendran A. Effect of Slow and Fast Pranayams on Reaction Time and Cardiorespiratory Variables. Indian J Physiol Pharmacol. 2002; 156(2):139-47.
5. Lubben RE et al. Physical Inactivity is Associated with Lower Forced Expiratory Volume in Lakes RW, Day NE, Patel B, Khaw KT, Oakes S, J Epidemiol. 2007 Aug; 39(8):1423-34.
4. Haskell WL, Lee IM, Pate RR, Powell KE, Blair SN, Franklin BA et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Med Sci Sports Exerc. 2007 Aug; 39(8):1423-34.
3. De Gody et al., compared maximum inspiratory pressure in tidal volume, MVV, FEV₁ and PEFR was not found to be statistically significant.
- 2006; 48(5):342-62.

REFERENCES

- 1(2):126-9.
13. Sasi Kumar A, Sivapriya DV, Shyamala Thirumeni. Effect of Suryanamsakar on Cardio Vascular and Respiratory Parameters in School Students. Recent Research in Science and Technology 2011; 3(10): 19-24.
 14. Chanavirut R, Khaidjapho K, Jaree P, Pongnaratorn P. Yogic Exercise Increases Chest Wall Expansion and Lung Volumes in Young Healthy Thais. Thai Journal of Physiological Studies. 2006; 19 (1): 1-7.
 15. Tran MD, Holly RG, Lashbrook J, Amsterdam EA. Effects of Hatha Yoga Practice on the Health-Related Aspects of Physical Fitness. Prev Cardiol. 2001; 4(4):165-170.
 16. White GM, Young RJ. Effect of a Twelve Week Exercise Programme on Cardio-respiratory and Body Composition Variables in Non-obese Young and Middle-aged Females. Br J Sports Med. 1978 March; 12(1): 27-32.
 17. Moodi H, Ghiasi F, Afshar M, Akbari A, Harti H, Moodi M et al. The Effect of One Kind of Plyometric and Aerobic Exercises on Chest Expansion and Respiratory Volumes in High School Students. Journal of Shahrekord University of Medical Sciences 2009; 11(2):30-38.
 18. Porszasz J, Emtner M, Goto S, Somfai A, Wenzel BJ, Casaburi R. Exercise Training Decreases Ventilatory Requirements and Hyperinflation at Submaximal Intensity in Patients with COPD. Chest. 2005; 128(4):333-34.
 19. Farid R, Azad FJ, Atri AE, Rahimi MB, Khaleghi A, Talaee-Khoei M et al. Effect of Aerobic Exercise Training on Pulmonary Function and Tolerance of Activity in Asthmatic Patients. Iran J Allergy Asthma Immunol. 2005; 4(3):133-8.
 20. Hallstrand TS Bates PW and Schoene RB. Aerobic Conditioning in Mild Asthma Decreases the Hyperpnea of Exercise and Improves Exercise and Ventilatory Capacity. Chest. 2000; 118: 1460-1469.
 21. de Godoy DV, Bringhenti RL, Severa A, de Gasperi R, Poli LV. Yoga versus Aerobic Activity: Effects on Spirometry Results and Maximal Inspiratory Pressure. J Bras Pneumol. 2006; 32(2): 130-5.
 22. Prakash S, Meshram S, Ramtekkar U. Athletes, Yogis and Individuals with Sedentary Lifestyles: Do their Lung Functions Differ? Indian J Physiol Pharmacol. 2007 Jan-Mar; 51(1):76-80.

DEPARTMENT OF PHYSIOLOGY

List of publications for last Three Year

International - 6

1. Jyothi Vybhavi V S, Shivakumar Veeraiah, Girija B: Characterization of auditory acuity in different phases of menstrual cycle. IJSR Vol 5 Jan 2016
2. Harshali Rankhambe, Swapnil Bhirange, Snehal Chaware: Prevalence of low mental health among nurses in medical intensive care units. IJCMR Aug 2016
3. Puneeth M, Venkatesh S. A Comparative study of Pulmonary Function Tests in Obese and Non Obese Adolescents. International Journal of Physiology. Jan –June 2017; 5(1): 72-76.
4. Priyanka singh, Yogesh M K , Jamuna B L, Nishitha L mendonca: Comparative study on the effects of surya Namaskar & spot jogging on respiratory parameters: A Pilot study. International Journal of Physiology. Jan –June 2017; 5(1): 139-144.
5. Priyanka singh, Yogesh M K , Nishitha L mendonca, Jamuna B L; Surya Namaskara versus spot jogging- effects on cardiovascular & HRV parameters in young Adults: A pilot study. International Journal of Physiology. July –Dec 2017; 5(2): 218-223.
6. Rashmi. S. and Dr. Prashanth Kumar. "A Study on the Effect of Haemoglobin Concentration on Audio Reaction time", International Journal of Current Research, 9,(06), 53072-53076.June -2017

National- 2

1. Integrating Ethics into the Physiology curriculum: a scale-up study in three medical colleges in Karnataka, South India. Savitha d, Geetha s, Suma bhaskar, Taniya anto, Sejil tv, Vineetha vittal, Santu ghosh, Prashanth kumar (2017)
2. Lavanya Shekar, Chinmay Ajit Suryavanshi, Kirtana Raghuram Nayak. Effect of alpha and gamma binaural beats on reaction time and short-term memory.National Journal of Physiology, Pharmacy and Pharmacology 2018; Vol. 8(6).

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RESEARCH ARTICLE

Effect of alpha and gamma binaural beats on reaction time and short-term memory

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ABSTRACT

Background: Binaural beats, a kind of cortical entrainment, are an auditory illusion that occurs when two sinusoidal waves at slightly different frequencies are presented separately to each ear. Binaural beats influence behavior and cognition through the process of cognitive or neural entrainment. Different types of binaural beats, based on their electroencephalogram frequencies, have shown to have varied effects on various domains of cognition. **Aims and Objectives:** The aims of this study were to compare the effects of alpha and gamma binaural beats on auditory reaction time (ART), visual reaction time (VRT), and short-term memory. **Materials and Methods:** The study was conducted on 40 individuals (20 males and 20 females) with age ranging between 22 and 30 years. The study was conducted in 3 different sessions. In each session, ART, VRT, and short-term memory were assessed. In the first session, the individuals were assessed without any intervention. In one session, they were presented with alpha binaural beats (10 Hz), and in another session, they were presented with gamma binaural beats (40 Hz). **Results:** The results of our study showed a statistically significant decrease in ART and VRT after entrainment with alpha and gamma binaural beats. Memory scores although improved were not statistically significant. **Conclusions:** This study provides evidence that entrainment by binaural beats in the alpha and gamma frequency range can enhance attention. The binaural entrainment may have useful applications in conditions where there exist attention deficits and in tasks that require continuous attention.

KEY WORDS: Binaural Beats; Reaction Time; Short-term Memory

INTRODUCTION

Cortical or brainwave entrainment is an external modulation of cortical frequencies to match the frequency of the visual or auditory stimuli. Binaural beats, a kind of cortical entrainment, are an auditory illusion that occurs when two sinusoidal waves at slightly different frequencies are presented separately to each ear.^[1] For example, if the left ear

receives a pure tone of 400 Hz, and the right ear receives a pure tone of 410 Hz simultaneously, the listener experiences a modulated wave of 10 Hz. Binaural beats are created by the brain's processing of these two separate auditory signals at the level of the olfactory nuclei in the ventral part of the pons reticular formation. Brain electrical activity is mainly composed of rhythmical oscillations at characteristic electroencephalogram (EEG) frequencies. These rhythms are associated with various physiological functions. The very low-frequency auditory stimulation using binaural beats probably can elicit an entrainment of EEG frequencies. Thus, there should be an increase in cortical wave activity at 10 Hz, if a person is entrained by binaural beats at 10 Hz.^[2,3]

Binaural beats have been shown to reduce anxiety, reduce pain, and affect various aspects of cognition.^[4] Binaural beats

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in the beta frequency have shown to improve vigilance and memory.^[2,5] In contrast, a study by Crespo *et al.* showed no significant effect of binaural beats on attention. However, the frequency of binaural beats used was not mentioned.^[6]

Conventionally, cortical alpha rhythm is associated with low information processing. However, there is now evidence suggesting that alpha rhythm may play a role in cognitive processing and may be considered as an index of neural efficiency.^[7,8] Increase in alpha power using EEG biofeedback showed improved attention. Binaural alpha entrainment has shown to reduce pain.^[9] While entrainment by binaural auditory beats in the alpha frequency has also been shown to enhance creativity, cognition, memory, and an improvement in intelligence tests and achievement tests in learning disabled boys.^[10-13]

The gamma-band activity has been shown to involve in a variety of functions such as attention, memory, and consciousness. Current literature suggests that entrainment by gamma beats promotes cognitive flexibility, modulates visual attention, and enhances creativity.^[10,14,15]

Studies suggest that entrainment by binaural beats can affect various domains of cognition, although in India studies about the effects of binaural beats are sparse. A study by Gupta *et al.* showed that a 3-min stimulation by alpha binaural beats helped the participants to attain a meditative state more efficiently, while a study by Kalyan and Kaushal showed improvement in memory after entrainment by alpha binaural beats.^[16,17] A comparative study by Chouhan *et al.* showed that entrainment by beta binaural beats improved attention and memory as effectively as by visual stimuli in a brain-computer interface system.^[18]

Literature suggests that cortical alpha and gamma bands are involved in various cognitive processes. While few studies have been done on alpha and gamma binaural beats entrainment on attention and memory, the present study was designed to explore and compare the effects of alpha and gamma patterns of binaural-beat stimulation on cognition. There are various domains of cognition, and in our study, we have concentrated on memory and attention. Memory is concerned with learning and to recall information while attention deals with the ability to focus awareness on a given task or stimulus. Reaction time defined as the time interval between the presentation of the stimulus and the appropriate voluntary response in an individual. Reaction time tests assess the cognitive domain involving attention and speed of information processing. In our study, we have used auditory reaction time (ART) and visual reaction time (VRT) to assess attention. To the best knowledge of the authors, this is the first kind of a study in India to compare the effects of different types of binaural beats on cognition.

Objective of the Study

The objective of this study is to compare the effects of alpha and gamma binaural beats on ART, VR, and short-term memory.

MATERIALS AND METHODS

Design

This was a comparative interventional study.

Participants

The study was performed in the Department of Physiology, Kasturba Medical College, Manipal. The study was conducted after getting the approval from the Institutional Ethics Committee. A total of 40 participants were recruited in this study after getting their written consent. This group had a mean age of 23 years with a range from 22 to 30 years. The group contained 20 females and 20 males. Participants were asked to refrain from any caffeinated food items for at least 4 h before testing and to get an average night's sleep. Compliance was confirmed by self-report and by asking their duration of sleep.

Inclusion Criteria

Participants were required to be in good health, with normal hearing and vision (corrected or uncorrected), from the age group 20–30 years.

Exclusion Criteria

Participants should be free from any acute illness or use of medications. Participants with smoking habits and history of alcohol consumption were excluded.

Methods

The participants were explained about the test procedure and were asked to report for three sessions conducted on alternate days. In one session, they were presented with alpha binaural beats (10 Hz), and in another session, they were presented with gamma binaural beats (40 Hz). The first experimental session was intended for training and to provide a stable level of performance for the two subsequent test sessions. The control recording with a constant tone of 340 Hz was presented during the first session. The order of alpha and gamma presentations was counterbalanced across subjects. Auditory stimuli were presented with the help of headphones while the participant was seated comfortably in a chair.

ART, VRT, and the short-term memory of the individuals were assessed after each session. The reaction time tests and memory test were assessed with the help of Superlab (V5)

software. The tests were conducted in a quiet and dimly lit room. For recording the ART, the individuals were instructed to press the spacebar key as soon as they hear the auditory stimulus (beep sound of 1000 Hz). For recording the VRT, the individuals were instructed to press the spacebar key as soon as they see the visual stimulus- colored circles. For recording the memory scores, the individuals were presented with a list of numbers on the screen. The subjects were asked to memorise them. After a memory maintenance period of 30 s, a “probe” number was presented, and the participants were asked to identify whether the following number was present in the stimulus group of numbers or not. They were instructed to press the “/” key if the number was present in the stimulus group and “z” key if the number was not present in the stimulus group. Practice trials were given to make the subject conversant with the tests.

Statistical Analysis

Descriptive and inferential statistical analysis was performed using SPSS version 15. Repeated measures ANOVA was conducted to analyze the effect of Binaural beats on ART, VRT, and short-term memory of the individuals. Significance was assessed at 5% level of significance.

RESULTS

In the present study, 40 participants, 20 males and 20 females, were recruited in this study. The mean age of participants was 23 years with a range from 22 to 30 years.

ART

The mean ART was reduced in the individuals after listening to alpha and gamma binaural beats as compared to after listening to a constant tone [Table 1]. A repeated measures ANOVA with a Greenhouse-Geisser correction showed that there was a statistically significant difference in the ART before and after listening to binaural beat ($F[2,76] = 8.264, P = 0.003$). A pairwise comparison revealed that there was a statistically significant difference between the constant tone and alpha binaural beats ($P = 0.038$) and between the constant tone and gamma binaural beats ($P = 0.009$). However, there was no statistically significant difference between alpha and gamma binaural beats ($P = 0.147$) on ART.

VRT

The mean VRT was reduced in the participants after listening to alpha and gamma binaural beats as compared to a constant tone [Table 2]. A repeated measures ANOVA with a Huynh-Feldt correction showed that there was a statistically significant difference in the VRT before and after listening to binaural beats ($F[2,76] = 28.892, P < 0.001$). A pairwise comparison revealed that there was a statistically

significant difference between alpha binaural beats and constant tone ($P < 0.001$) and between the constant tone and gamma binaural beats ($P < 0.001$). However, there was no statistically significant difference between alpha and gamma binaural beats ($P = 0.809$) on VRT.

Short-term Memory

The participants showed an improvement in their mean memory scores after listening to alpha and gamma binaural beats as compared to a constant tone [Table 3]. However, a repeated measures ANOVA showed that there was a no statistically significant difference in the memory scores before and after listening to binaural beats ($F[2,76] = 2.995, (P = 0.56)$).

DISCUSSION

Binaural beats are considered to be brainstem responses to auditory stimuli that occur when two slightly different pure tones are presented, one to each ear. Cortical entrainment using different frequencies of binaural beats has shown to improve cognition and help in improving anxiety and disorders of attention. The present study was conducted to compare the effects of alpha and gamma binaural beats on ART, VR, and short-term memory. The results of our study showed a statistically significant decrease in ART and VRT

Table 1: The mean and SD of ART of the participants among three different sessions

ART (n=40)	Mean (ms)±SD
Constant tone	288.56±54.12
Alpha binaural beats	264.99±27.59
Gamma binaural beats	255.29±31.24

SD: Standard deviation, ART: Auditory reaction time

Table 2: The mean and SD of VRT of the participants among three different sessions

VRT (n=40)	Mean±SD
Constant tone	310.68±39.16
Alpha binaural beats	269.70±21.60
Gamma binaural beats	264.07±21.11

VRT: Visual reaction time, SD: Standard deviation

Table 3: The mean score and standard deviation of short-term memory test for the participants among three different sessions

Short-term memory test (n=40)	Mean score±SD
Constant	28.17±1.83
Alpha binaural beats	28.85±0.97
Gamma binaural beats	28.92±2.09

SD: Standard deviation

after entrainment with alpha and gamma binaural beats. Memory scores although improved were not statistically significant.

The results of our study corroborated the findings of McMurray, which found a significant improvement in attention and working memory in older adults after 2-min entrainment with the binaural beats of 7 and 11 Hz.^[19] Although the exact mechanism of how the binaural beat entrainment works are not known, there are several possible explanations for this observation. If sustained binaural beat frequencies resonate throughout the brain through the “frequency following response” (FFR), this can cause alterations in levels of arousal through activation of the reticular-thalamic activating system. This entrainment can also be measured in the cerebral cortex by EEG. The amplitude of alpha-band activity in the human EEG is enhanced during cognitive tasks, such as mental calculation and working memory. Moreover, recent data suggest an active role for alpha band synchrony in the mechanisms of attention and consciousness.^[20] Gamma frequency band synchrony is observed during the working memory retention period and conscious perception, and increase activity in the gamma frequency band is associated with enhanced attention.^[15,20] As the frequency of the binaural beat can be selected to produce EEG-associated states, entrainment by alpha and gamma beats should increase the alpha and gamma band activity. Various EEG studies on binaural beats support this plausibility.^[21,22] The FFR is supported by a recent study by Jirakittayakorn and Wongsawat, which showed that gamma beat entrainment improved working memory and EEG findings showed enhanced gamma oscillations in temporal, frontal, and central regions. The authors suggested that these areas were involved in sensory integration.^[23] In the present study, we could not find any statistically significant difference between the alpha and gamma binaural beats on reaction time and memory. In a study on the effect of binaural beats on creativity by Reedijk *et al.*, alpha and gamma condition had the same degree of impact on creativity.^[10] The authors suggested that the binaural beats irrespective of alpha or gamma band produce a general pattern of neural phase locking instead of a particular neural phase synchronization.

The observations in the present study may have various implications. If binaural beat auditory entrainment can influence attention and memory, then such entrainment may have useful applications in conditions where there is a deficit of attention or in tasks which require continuous sustained attention. A pilot study by Kennel *et al.* has shown to reduce symptoms of inattention in children with ADHD.^[24] Binaural beats entrainment has the advantage that it does not require exhaustive training or practice for its successful application.

Limitations

Further studies with simultaneous recording of EEG and functional magnetic resonance imaging need to be undertaken

to correlate the effects of binaural beats with underlying mechanisms leading to entrainment.

CONCLUSION

This study provides evidence that entrainment by binaural beats in the alpha and gamma frequency range can enhance attention. The entrainment by binaural beats also showed improvement in memory scores though it was not statistically significant.

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REFERENCES

1. Oster G. Auditory beats in the brain. *Sci Am* 1973;229:94-102.
2. Lane JD, Kasian SJ, Owens JE, Marsh GR. Binaural auditory beats affect vigilance performance and mood. *Physiol Behav* 1998;63:249-52.
3. Becher AK, Höhne M, Axmacher N, Chaieb L, Elger CE, Fell J, *et al.* Intracranial electroencephalography power and phase synchronization changes during monaural and binaural beat stimulation. *Eur J Neurosci* 2015;41:254-63.
4. Chaieb L, Wilpert EC, Reber TP, Fell J. Auditory beat stimulation and its effects on cognition and mood states. *Front Psychiatry* 2015;6:70.
5. Beauchene C, Abaid N, Moran R, Diana RA, Leonessa A. The effect of binaural beats on verbal working memory and cortical connectivity. *J Neural Eng* 2017;14:026014.
6. Crespo A, Recuero M, Galvez G, Begona A. Effect of binaural stimulation on attention and EEG. *Arch Acoust* 2013;38:517-28.
7. Klimesch W, Sauseng P, Hanslmayr S. EEG alpha oscillations: The inhibition-timing hypothesis. *Brain Res Rev* 2007;53:63-88.
8. Vernon D, Peryer G, Louch J, Shaw M. Tracking EEG changes in response to alpha and beta binaural beats. *Int J Psychophysiol* 2014;93:134-9.
9. Ecsy K, Jones AK, Brown CA. Alpha-range visual and auditory stimulation reduces the perception of pain. *Eur J Pain* 2017;21:562-72.
10. Reedijk SA, Bolders A, Hommel B. The impact of binaural beats on creativity. *Front Hum Neurosci* 2013;7:786.
11. Cruceanu VD, Rotarescu VS. Alpha brainwave entrainment as a cognitive performance activator. *Cogn Brain Behav* 2013;3:249-61.
12. Carter J, Russell H. A pilot investigation of auditory and visual entrainment of brain wave activity in learning disabled boys. *Tex Res* 1993;4:65-75.
13. Kraus J, Porubanová M. The effect of binaural beats on working memory capacity. *Stud Psychol* 2015;57:135.

14. Hommel B, Sellaro R, Fischer R, Borg S, Colzato LS. High-frequency binaural beats increase cognitive flexibility: Evidence from dual-task crosstalk. *Front Psychol* 2016;7:1287.
15. Colzato LS, Barone H, Sellaro R, Hommel B. More attentional focusing through binaural beats: Evidence from the global-local task. *Psychol Res* 2017;81:271-7.
16. Gupta A, Ramdinmawii E, Mittal VK. Significance of Alpha Brainwaves in Meditation Examined from the Study of Binaural Beats. In: 2016 International Conference on Signal Processing and Communication (ICSC). 2016. p. 484-489.
17. Kalyan R, Kaushal B. Binaural entrainment and its effects on memory. *Int J Sci Res Sci Eng Technol* 2016;2:896-9.
18. Chouhan T, Panse T, Smitha KG, Vinod AP. A Comparative Study on the Effect of Audio and Visual Stimuli for Enhancing Attention and Memory in Brain Computer Interface System. In: 2015 IEEE International Conference on Systems, Man, and Cybernetics; 2015. p. 3104-3109.
19. McMurray JC, Jetha SS, Katz GS, Kemtes KA. Improving memory and attention on two standardized tasks with auditory binaural beats. *Arch Clin Neuropsychol* 2006;21:516.
20. Palva S, Palva JM. New vistas for α -frequency band oscillations. *Trends Neurosci* 2007;30:150-8.
21. Kasprzak C. Influence of binaural beats on EEG signal. *Acta Phys Pol A* 2011;119:986-90.
22. Rosenfeld JP, Reinhart AM, Srivastava S. The effects of alpha (10-Hz) and beta (22-Hz) "entrainment" stimulation on the alpha and beta EEG bands: Individual differences are critical to prediction of effects. *Appl Psychophysiol Biofeedback* 1997;22:3-20.
23. Jirakittayakorn N, Wongsawat Y. Brain responses to 40-hz binaural beat and effects on emotion and memory. *Int J Psychophysiol* 2017;120:96-107.
24. Kennel S, Taylor AG, Lyon D, Bourguignon C. Pilot feasibility study of binaural auditory beats for reducing symptoms of inattention in children and adolescents with attention-deficit/hyperactivity disorder. *J Pediatr Nurs* 2010;25:3-11.

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RESEARCH ARTICLE

A STUDY ON THE EFFECT OF HAEMOGLOBIN CONCENTRATION ON AUDIO-VISUAL REACTION TIME

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ABSTRACT

The present study was conducted to compare Auditory Reaction Time (ART) and Visual Reaction Time (VRT) in normal and anemic female subjects and also to correlate the same with the haemoglobin (Hb) concentration. Female students of age group 18-20 years were recruited. After haemoglobin estimation subjects with Hb<12g% were assigned as group I (n=30) and subjects with Hb≥12g% were assigned as group II (n=30). ART and VRT were assessed by making use of an in-house built device PC 1000. Data was analysed employing unpaired student's "t" test using SPSS version 16 and significance value was fixed at p <0.05. The results showed highly significant prolonged ART and VRT in anemic individuals (p =0.001) and a negative correlation between ART and Hb; also VRT and Hb. Thus it can be concluded that with decreased haemoglobin concentration the ART and VRT are prolonged and that early correction of anemia can prevent ill effects.

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INTRODUCTION

The World Health Organization defines anemia as the level of haemoglobin less than 13g% in males and less than 12g% in females (Johnston, 1975). Anemia is a condition characterized by the deficiency of haemoglobin or decreased level of red blood cells associated with decreased oxygen carrying capacity of the blood (Guyton, 2006). In many low and middle income countries including India, anemia is one of the commonest and severe public health issues leading to morbidity in children and reproductive age women (Beard, 2001). The World Health Organization statistics states that about 1.6 - 2 billion people are anaemic worldwide (Benoist, 2014). According to the National Family Health Survey (NFHS)-(III), more than 50% of the women in India have anemia amongst which 39 % are mildly anemic, 15 % moderately anemic and 2% severely anemic (National Family Health Survey, 2014). Adolescent girls, who constitute a considerable segment of Indian population form a vulnerable group and are at a greater risk. Adolescence is the shaping period of life when maximum amount of physical, psychological and behavioural changes take place.

Thus this is a vulnerable phase for the development of nutritional anemia (Chaudhary, 2008). They are particularly prone to iron deficiency anemia because of increased demand of iron for synthesis of haemoglobin. This is to make up the loss of iron during menstruation (Beard, 2000). In addition there is also a mismatch between their high metabolic demands and poor dietary intake (Agarwal, 2003). Abu Rayhan al-Biruni, a Persian scientist was the first person to explain the concept of reaction time (RT) and the first scientist to measure reaction time (RT) in the laboratory was Donders in the year 1868 (Chandra, 2010). Reaction time is the time interval between the presentation of a stimulus and the appearance of appropriate swift voluntary response by the subject (Teichner, 1954). It involves stimulus processing, decision making, attention and response programming (Asmita, 2010). Normal auditory reaction time is 100-200 msec and normal visual reaction time is 200-400 msec (Jain, 2012). Our study group being college-age individuals mean RT is about 160 milliseconds to detect an auditory stimulus, and approximately 190 milliseconds to detect visual stimulus (Kosinski, 2008 and Taoka, 1989). Reaction time evaluates the processing speed of central nervous system (CNS) and assesses the coordination between the sensory and motor systems. Its measurement includes 1) the latency in sensory neural code traversing peripheral and central pathways, 2) perceptive and cognitive processing, and 3) a motor signal traversing both

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central and peripheral neuronal structures. The motor signal also includes the latency in the end effectors activation (muscle activation) (Botwinik, 1966). Reaction time has physiological significance and is a simple and non - invasive test for peripheral as well as central neural structures. It is a measure of function of sensorimotor association (Shenvi, 1994). The audio-visual reaction time is found to be prolonged with decreasing haemoglobin levels and the reason has been attributed to the decreased neuronal conduction caused due to reduced levels of iron in anemia (Mishra, 2012). Iron has been implicated in the myelination and the development of various neurotransmitter systems in the brain (Beard, 2003). Iron deficiency is one of the commonest causes for developing anemia amongst other causes (WHO, 2007). Reaction time plays a significant role in everyday activities like driving, operating machines, various forms of sports etc. The purpose of this study is to find if there is any relation between haemoglobin levels and audio-visual reaction time. Since such studies are very few in India, this study will help to fill the lacuna in this regard.

MATERIALS AND METHODS

Subjects: Sixty healthy female students in the age group of 18-20 years of Rajarajeswari Medical College and Hospital, Bangalore, meeting the requisite inclusion and exclusion parameters were enrolled in the study. Haemoglobin estimation was done by Haemocue Hb 301+ analyser. After haemoglobin estimation subjects with $Hb < 12\text{g\%}$ were assigned as group I ($N=30$) forming study group and subjects with $Hb \geq 12\text{g\%}$ were assigned as group II ($N=30$) forming the control group. Exclusion criteria were female students who have neural disease, muscle disease, uncorrected hearing impairment, visual impairment, alcohol abuse, psychiatric disorders, sleep disorders, and girls receiving iron supplementation or blood transfusion in the past 1 month, interfering medication, thyroid disorders.

Methodology

The study was done in the department of Physiology, Rajarajeswari Medical College between January 2015 and June 2015 after obtaining ethical approval from the Institutional Ethical committee. Individual consents were obtained from all the participants. A detailed history was taken to rule out other comorbid conditions if any. Anthropometric variables included measurements of weight, height and BMI. Height was measured without shoes using stadiometer (Prestige Ltd, India) and weight was recorded with light clothes using a standard weighing machine (Krups Ltd India) to the nearest 0.1Kg. Body mass index was calculated by Quetelet's index that is $BMI = \text{weight (Kg)} / \text{height (m}^2)$. Haemoglobin estimation was done by Haemocue Hb 301+ analyser using standard procedure protocol (Morris, 2007). After haemoglobin estimation subjects with $Hb < 12\text{g\%}$ were assigned as group I ($N=30$) forming study group and subjects with $Hb \geq 12\text{g\%}$ were assigned as group II ($N=30$) forming the control group.

The study was conducted between 10am and 12 noon in a quiet secluded room with good ambience. The subject was made to feel relaxed and comfortable and was instructed to use her dominant hand for response. In both, the subjects and controls auditory and visual reaction time was assessed by making use of an in-house built add on device called PC 1000. PC 1000 is a thousand Hz square wave oscillator with least count of

1/1000 second which has a soft key for start and stop function (Niruba, 2011). This instrument has two components (A&B) connected to each other. The A component has a START button and is used by the investigator. The B component has a STOP button and given to the subject to record their response. This B component also has a RED LED light for recording visual reaction time which glows every time when the stimulus is given. Red light has a long time representation in retina and hence red light was used. The component B is also connected to a headphone which gives the stimulus of a high frequency (1000Hz) beep sound for recording auditory reaction time. These two components are connected to a Personal computer which has audacity software installed in it. Audacity software records the reaction time in 0.001sec accuracy in wave format. Visual reaction time: After giving proper instructions to the individual, the examiner presses the start button in component A. This component is not seen by the subject as they are separated by a cardboard placed between component A and B, when the stimulus is given. Red LED light in component B glows when the stimulus is given and the subject is asked to give response as quickly as possible by pressing the stop button when they see this.

Auditory reaction time

Examiner presses the start button (A) which will be out of the view of the subject, and the subject is instructed to press the stop button (B) as soon as she hears the high frequency beep sound (1000 hertz's tone) through the headphone connected to it. The subject was asked to respond by pressing the response switch by index finger of the dominant hand. For each subject the lowest reading was taken as the value for the reaction time task. The recording was taken five times consecutively and the least value among the five was taken as the final value. This recorded data was stored in separate files and analysed using audacity software version 1.3 Beta (Devanand, 2014).

Statistical Analysis

The data collected was analysed and expressed as Mean \pm SD. Student's t test was applied for the statistical analysis using SPSS software version 16.0 and significance value was set at $p < 0.05$. Correlation between haemoglobin and reaction time was done using Pearson's correlation.

RESULTS

There was no statistically significant difference in the anthropometric parameters between group I and group II. Hence they were comparable for the study (Table 1).

Table 1. Age and anthropometric parameters between Group I and Group II

Parameters	Group I (n = 30) Mean \pm SD	Group II (n = 30) Mean \pm SD
Age (years)	18.17 \pm 0.46	18.23 \pm 0.43 [#]
Height (m)	1.58 \pm 0.03	1.59 \pm 0.03 [#]
Weight (kg)	58.1 \pm 3.2	57.5 \pm 4.0 [#]
BMI (kg/m^2)	23.68 \pm 0.9	23.19 \pm 1.4 [#]

- Statistically not significant ($p > 0.05$),

* - statistically significant ($p < 0.05$),

** - highly significant

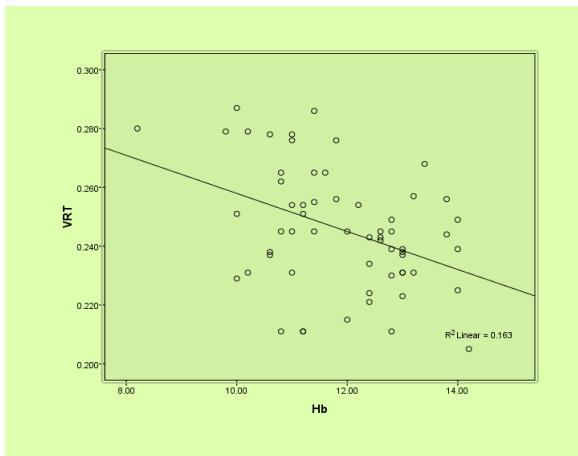
The mean haemoglobin level was $10.80 \pm 0.72 \text{ g\%}$ in group I ($Hb < 12$) and was $12.97 \pm 0.60 \text{ g\%}$ in group II ($Hb \geq 12$). Observation shows delayed auditory and visual

reaction time in Group II. We found a negative correlation between the levels of haemoglobin and the both auditory and visual reaction time.

Table 2. Comparing the Hb levels(g%) with VRT (msec) and ART (msec)

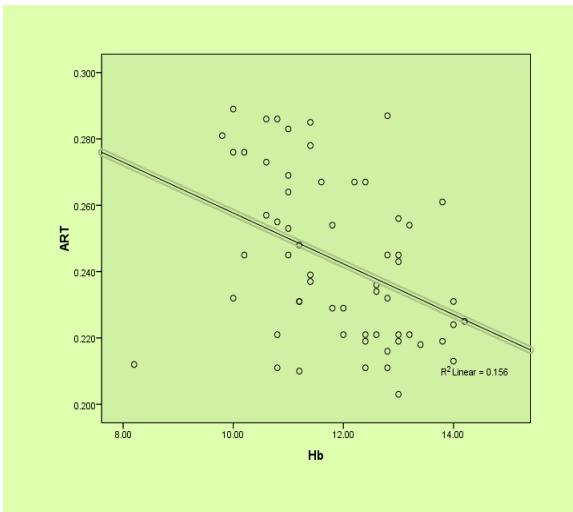
Parameters	GROUP I (Hb < 12g%) (n = 30)	GROUP II (Hb ≥ 12g%) (n = 30)	Statistical significance (p Value)
Hb (g%)	10.8 ± 0.7	12.9 ± 0.6 **	0.001
Visual Reaction Time ± SD (msec)	0.254 ± 0.22	0.237 ± 0.14 **	0.001
Auditory Reaction Time ± SD (msec)	0.250 ± 0.13	0.236 ± 0.18 **	0.001

- Statistically not significant (p >0.05), * - statistically significant (p<0.05), ** - highly significant



Graph 1. Showing negative correlation between Hb and VRT

As seen in the above graph as the Haemoglobin (Hb) levels decrease there is a rise in the Visual Reaction Time(VRT) indicating that lower Hb levels cause prolonged VRT.



Graph 2. Showing negative correlation between Hb and ART

The above graph shows a negative correlation between Haemoglobin levels and Auditory Reaction Time (ART), as the levels of Hb decreases the ART gets prolonged.

DISCUSSION

Anemia is defined as a decrease in blood haemoglobin concentration and has shown to be a major public health issue that affects low and middle income countries. Although the

most unwavering indicator of anemia at the population level is blood haemoglobin concentration, measurements of this alone do not determine the cause of anemia. Anemia may result from a variable number of causes like nutritional deficiencies (folate, vitamin A and vitamin B12), parasitic infections, acute and chronic inflammation, inherited or acquired disorders that have an effect on haemoglobin synthesis, red blood cell production or red blood cell survival, but the most significant contributor globally is iron deficiency (WHO, 2007 and Stevens *et al.*, 2013). Studies done on adolescent girls have shown that decreased concentration of haemoglobin results in a number of symptoms such as weakness, general fatigue and also has adverse effects on immune system (Agarwal, 2003). Anemia resulting from iron deficiency has adverse effects on cognitive and motor development, associated with fatigue and low productivity (Stoltzfus, 2004; Balarajan, 2011; Tolentino, 2007). The finding of this study indicates that the decreased haemoglobin levels have a significant impact on the audio-visual reaction time; this is in accordance with the results of Mishra *et al* study (Mishra, 2012). The delay in response is profound in anaemic individuals compared to their normal counterparts. Longitudinal studies have shown that iron deficiency in infancy is related to poorer cognition in early childhood and if uncorrected continues to adulthood as well (Grantham, 2001). A detailed review written by Sachdev HPS and Gera T on iron supplementation in infants and children aged less than 5 years states that supplementation of iron in these children led to improvements in their cognition and motor development (Sachdev, 2006). Adolescence, being the determining growing phase in life is more prone to major nutritional deficiency. Many factors contribute to anemia in adolescent girls like low iron intake, poor iron absorption, high metabolic demands for iron during menstruation and growth spurts. And due to this the pubescent girls are at a higher risk of developing anemia (Mishra, 2012).

Infants having iron deficiency anemia show lower cognitive, motor, social, emotional and neurophysiologic development when compared to infants with normal haemoglobin concentration. Human and monkey infants with neonatal iron deficiency have shown poorer outcome with respect to physical and mental growth in their early developmental years. With respect to CNS iron deficiency is associated with 1) hypomyelination of neurons, 2) effects on the dopaminergic system and 3) deficiency of enzymes involved in the development of parts of the brain important for cognitive function and memory (Lozoff, 2006). In context to reaction time specifically, the central conduction time was found to be prolonged in infants with anemia when compared with non anaemic children. The Katasaras E *et al* study states that the prolonged central conduction time might be due to changes in myelination that have been reported in iron deficient infants. Thus in anaemic children central conduction time was prolonged and also longer latencies in visual evoked potentials were recorded (Katasaras, 2004). Two commonly reasoned mechanisms for delayed reaction time in anaemic individuals are the effects on the dopaminergic system and effects on myelination (Grantham, 2001). Current medical reviews indicate that signalling through the dopamine pathways originating in the ventral tegmental area is strongly positively correlated with improvements in (i.e., reduced) reaction time. Dopaminergic drugs like amphetamine have been shown to expedite responses during interval timing, while dopamine antagonists (specifically, for D2-type receptors) produce the opposite effect (Parker, 2013). Iron levels play a

prominent role in neuronal functioning and it is also noted that the dopaminergic system is sensitive to serum iron concentration (Beard, 2001). Mechanism behind the attention to environmental information is dependent on rate of dopamine clearance from the interstitial space and that this proposes that iron status may affect behaviour and response through dopamine metabolism (Breitmeyer, 1994).

Conclusion and Summary

From the above discussion it is evident that, iron deficiency causing changes in the Central Nervous System (CNS) which results in a prolonged audiovisual reaction time. The important implication of the study is that the deficiency of iron could be correctable cause of delayed reaction time. And it can be concluded saying, it is advisable to detect and correct anemia at the early stages is a must and awareness in this regard is mandatory. Limitations of the study include the limited sample size and assessment of serum iron levels. Further studies however, with a bigger sample size and assessment of serum iron levels will help to prove the above point. A follow up of the anemic individuals and recording audiovisual reaction time after correcting anemia will prove to be more efficient.

REFERENCES

- Agarwal KN, Gomber S. Anemia prophylaxis in adolescent school girls by weekly or daily iron folate supplementation. *Indian Pediatrics* 2003;40:296-301.
- Agarwal, K.N., Gomber, S. 2003. Anemia prophylaxis in adolescent school girls by weekly or daily iron folate supplementation. *Indian Pediatrics*, 40:296-301.
- Asmita, S.N., Pushpa, A.P. 2010. A study of auditory reaction time in different phases of normal menstrual cycle. *Indian J Physiol Pharmacol*, 54:386-390.
- Balarajan Y, Ramakrishnan U, Ozaltin E, Shankar AH, Subramanian SV. Anaemia in low-income and middle-income countries. *Lancet* 2011;378:2123–35.
- Beard J, Stoltzfus R. Iron-deficiency anemia: reexamining the nature and magnitude of the public health problem. *J Nutr*. 2001;131:563S–703S.
- Beard J. Iron biology in immune function, muscle metabolism and neuronal function. *J Nutr* 2001;131:568-580.
- Beard J. Iron Deficiency Alters Brain Development and Functioning. *J Nutr* 2003;133:1468S–1472S.
- Beard, J.L. Iron requirements in adolescent females. *J Nutr* 2000;130(2S Suppl):440S-442S.
- Benoist BD, McLean E, Egli I, Cogswell M. Eds. WHO, WHO global database on anaemia 2008. http://whqlibdoc.who.int/publications/2008/9789241596657_eng.pdf. Retrieved on July February 6th, 2014.
- Botwinik J, Thompson LW. Premotor and motor components of reaction time. *J Exp Psychol* 1966;71:9–15.
- Breitmeyer BG, Breier JI. Effects of background colour on reaction time to stimuli varying in size and contrast: inferences about human M channels. *Vision research* 1994; 34(8): 1039-1045.
- Chandra AM, Ghosh S, Barman S, Iqbal R, Sadhu N. Effect of exercise and heat- load on simple reaction time of university students. *Int J Occup Saf Ergon* 2010; 16(4):497-505.
- Chaudhary, S.M., Dhage, V.R. A Study of Anemia Among Adolescent Females in the Urban Area of Nagpur. *Indian J Community Med* 2008;33(4):243-245.
- Devanand V, Balasubramanian K, Chithrapavai SU. Effect of Visual Reaction Time on Refractive Errors- A Comparative Study. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 2014;5(4):951-954.
- Grantham S, McGregor S, Ani C. A review of studies on the effects of iron deficiency anemia on cognitive development in children. *J Nutr* 2001;131:649-668.
- Guyton AC, Hall JE. *Textbook of Medical Physiology*. 11th ed. Philadelphia, Pennsylvania: Elsevier; 2006:426-427.
- Jain, A.K. 2012. Manual of practical physiology for MBBS. In: Ch. 23. Reaction Time (Visual and Auditory) and Reflex Time. 4th ed. New Delhi: *Avichal Publishing Company*. 2012:277-9.
- Johnston JB, Gibson SB, Seftel MD. Chronic lymphocytic leukemia In: Greer JP, Foerster J, Lukens JN, Paraskevas F, Rodgers GM, Glader B, (eds). *Wintrobe Clinical Hematology*.7th edition, Philadelphia, LEA and Febiger, 1975;114-115.
- Katasaras E, Adam E, Dewey KG. Effect of iron supplementation on cognition in Greek preschoolers. *Europ J Clin Nutr* 2004;58:1532-1542.
- Kosinski, R.J. A literature review on reaction time, Clemson University 2008.
- Lozoff B, Georgieff MK. Iron deficiency and brain development. *Seminars in Pediatric Neurology* 2006;13:158-165.
- Mishra NV, Sonwade TD. A Comparative study Of Audio-Visual Reaction Time in Anemic and Non-Anemic Adolescent Girls. *International Journal of Basic and Applied Physiology*. 2012;1(1):79-82.
- Morris LD, Osei-Bimpong A, McKeown D, Roper D, Lewis SM. Evaluation of the utility of the HemoCue 301 haemoglobinometer for blood donor screening. *Vox Sanguinis*, 2007;93:64–69.
- National Family Health Survey (NFHS-3), 2005-2006, <http://www.nfhsindia.org/pdf/India.pdf>, last accessed on February 4th, 2014.
- Niruba R, Maruthy KN .Assessment of Auditory and Visual Reaction Time in Type 2 Diabetics –A Case Control Study. *Al Ameen J Med Sci*. 2011;4(3):274 -279.
- Parker KL, Lamichhane D, Caetano MS, Narayanan NS. Executive dysfunction in Parkinson's disease and timing deficits. *Front. Integr. Neurosci* 2013;7:75.
- Sachdev HPS, Gera T. Effect of iron supplementation on physical growth in children: systemic review of randomized control trial. *Public health nutrition* 2006; 9:904-920.
- Shenvi D, Balasubramanian P. A comparative study of visual and auditory reaction times in males and females. *Indian J Physiol Pharmacol*. 1994;38:229–31.
- Stevens GA *et al*. Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: a systematic analysis of population-representative data. *Lancet Glob Health* 2013;1(1):e16–25.
- Stoltzfus RJ, Mullany L, Black RE. Iron deficiency anaemia. In: Ezzati M, Lopez Ad, Rodgers A, Murray CJL, eds. *Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors*. Geneva, World Health Organization 2004;163– 210 (<http://www.who.int/publications/cra/chapters/volume1/0163-0210.pdf?ua=1>; accessed 20 May 2015).

- Taoka, George T. Brake Reaction Times of Unalerted Drivers. ITE Journal 1989;59(3):19–21.
- Teichner WH. Recent studies of simple reaction time. *Psychol Bull.* 1954;51:128–49.
- Tolentino K, Friedman JF. An update on anemia in less developed countries. *Am J Trop Med Hyg* 2007;77:44–51.
- WHO. Assessing the iron status of populations: report of a joint World Health Organization/ Centers for Disease Control and Prevention technical consultation on the assessment of iron status at the population level, 2nd ed. Geneva, World Health Organization, 2007. Available at http://www.who.int/nutrition/publications/micronutrients/a_naemia_iron_deficiency/9789241596107.pdf.

ARTICLE

Integrating Ethics into the Physiology curriculum: a scale-up study in three medical colleges in Karnataka, South India

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Abstract

A published pilot study showed the feasibility of integrating ethics into physiology in a single medical college. However, questions were raised about feasibility of scale-up and acceptance across different colleges. To assess feasibility of integrating ethics into Physiology, first year MBBS students of three medical colleges ($n=449$, College A=149; 59M, 90F; College B=150; 78M, 72F; College C=150; 48M, 102F) were exposed to the integrated ethics programme. Triggers related to theory or practicals were included. Faculty volunteers conducted the sessions with feedback from observers and students. Students across three colleges felt that the programme was relevant (92%-98%), effectively integrated (86%-98%) [significantly greater number of College A students: ($p=0.003$)], seldom interfered with physiology teaching (59%-66%). Greater number of students from College C followed by College B and A opined to continue the integrated programme for future years ($p=0.004$). A scale-up study of integration of ethics programme across different colleges was perceived to be feasible by students and observers.

Introduction

Ethics is a part of the medical curriculum in many countries (1-4). Separate classes on ethics during the medical course

help develop thought processes on ethical dimensions of the medical profession. Integration of ethics into the curriculum is one step ahead (1,5) that makes ethics an indispensable part of the course and provides a continuous exposure and "lived-in experience" (6,7). According to an online survey (8), medical colleges in a very few countries have introduced integrated classroom teaching of ethics in the preclinical year (physiology), and at bed-side clinics (4,9). In India, the Medical Council of India (MCI) has placed emphasis on training in ethics, attitude and communication through the "Attitude and Communication Skills" (ATCOM) module (10,11), which is yet to be operationalised and faces challenges in practical application. Not many medical faculty are formally trained in ethics and few centres in the country provide such training (12-15). However, some believe that any experienced faculty member can stimulate the young minds of medical students to think about ethical issues in medical practice (7).

Further, during the preclinical year, the students are exposed to classroom teaching, practical classes and cadaveric dissection with hardly any interaction with patients. There have been some concerns that the preclinical year provides a dehumanising experience (16,17). Physiologists, who deal with the understanding of life processes and thereby experiment on animals and humans, are constantly confronted with ethical dilemmas (8,18,19).

One medical college involved in this study (coded in this paper as College A) has conducted for several decades formal, separate classes on ethics as a part of the medical course (20,21). Recently, a pilot study for an integrated ethics programme in the physiology course work was introduced at College A, which was well received by the students (7). They recognised the need to take ethical issues into consideration from the beginning of medical training and through future years. A state-level workshop was organised for physiologists with the aim of disseminating the idea of the pilot programme and identifying the challenges faced across various medical college settings (22). As an outcome of the workshop, two other medical colleges from the state (coded as College B, College C) collaborated with College A to introduce the programme at their institutions. Thus, a scale-up study of the integrated ethics programme into the physiology curriculum was conducted simultaneously at three medical institutions. The objectives were to assess the feasibility, relevance, benefits, merits and demerits of continuing the programme in future

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