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REHABILITATION OF THE URBAN POOR SCHOOL CHILDREN IN INDIA

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ABSTRACT

BACKGROUND: The urban poor children are one of the neglected sections in India. There exists a high percentage of malnutrition and diarrhoea in the slum dwelling children. Musculoskeletal aches and pains developed at early ages of life could lead to chronic pains in adulthood. However, the musculoskeletal health of the slum children has seldom been studied, despite the fact that recent studies have emphasized a pressing need for musculoskeletal physiotherapy for the urban poor children in India.

AIM & OBJECTIVE: The primary objective of the current review paper is to look into the need and feasibility of community physiotherapy for musculoskeletal issues among slum dwelling school children in India. Secondarily, it is of interest to identify the gaps in the existing system and suggest solutions (if any).

METHODOLOGY: A thorough review was conducted using search engines like PubMed, Google Scholar, ScopeMed and JSTOR.

RESULTS: There are seldom studies on the musculoskeletal issues in urban poor school children. Faulty postures adopted by the children at school are the leading cause of pain. Community intervention programs by musculoskeletal physiotherapists need to be adopted for the urban poor children in India by holding workshops, and preventive health camps. Involvement of the school staff and parents is of utmost importance while planning such preventive intervention programs. More research needs to be done in this field.

CONCLUSIONS: There is a dire need to focus on the musculoskeletal health of urban poor slum children. A holistic approach to musculoskeletal care for the urban poor children in India could be effective in not only preventing the chronicity of musculoskeletal health problems but also aiding in healthy adulthood. While designing musculoskeletal physiotherapy programs for the underprivileged school children, special emphasis needs to be given to postural training and ergonomic assessments, apart from inculcating healthy habits in these children.

KEYWORDS: slum dwellers; exercises; aches and pains; orthopaedic pain; community physiotherapy

INTRODUCTION

There is substantial research looking at the micro ergonomics for school children, mainly focusing on effective designs for school furniture[1]. However, suggesting effective "micro ergonomics" is not sufficient all by itself and exercise intervention programs for school children are equally important[2]. "Addressing ergonomic issues will ensure that children, the future productive generation contributing to economic growth and development of a country, are provided with opportunities in a healthy environment" Page 5545, 3. While there are lot of studies looking at the ergonomic assessment and exercise interventions in school children from western countries[4], there has been seldom comprehensive research on ergonomics in school children in India.

The urban poor children are one of the neglected sections in developing countries like India. Earlier studies have shown that there exists a high percentage of malnutrition and diarrhoea in the slum dwelling children[5]. However, the musculoskeletal health of these children has seldom been studied, despite the fact that recent studies have emphasized on a pressing need for musculoskeletal physiotherapy for the urban poor children in India[6-8].

AIMS & OBJECTIVES

The primary objective of the current review paper is to look into the need and feasibility of community physiotherapy for musculoskeletal issues among slum dwelling school children in India. Secondarily, it is of interest to identify the gaps in the existing system and suggest probable solutions (if any).

METHODOLOGY

A thorough review was conducted using search engines like PubMed, Google Scholar, ScopeMed and JSTOR. The key words that were used in the above mentioned search engines were musculoskeletal pain (or orthopaedic pain), slum dwellers (or urban poor), India, and school children.

Inclusion criteria

Only those studies that had all the key words were included. There were two key words with alternate meanings- if either one was present, the study was included.

RESULTS

There were six studies that have looked at the musculoskeletal pain in urban poor school children [see Table 1].

Table 1. Studies on school children in India

Author and year	Location	Sample Size	Tool for data collection	Results	Socio-economic category
Rajan P. and Koti A., 2013 [6]	Vadodara, India	39 (28 male students)	Pictorial ergonomic grading questionnaire checked for validity and reliability	Girl students demonstrated worse ergonomics than male students. In addition, the presence of musculoskeletal pain was higher in girl students.	Urban poor
Rajan P. and Koti A., 2013 [7]	Pune and Vadodara, India	64 (Vadodara: n=32: 9 females ; Pune : n=32: 10 females)	Tool developed in [6]	Students who underwent an ergonomic training workshop (Vadodara) demonstrate better ergonomics with school activities like reading and lifting book/s, maintaining good postures during sitting and use of computer, as compared to students who were not given ergonomic training (Pune). There was greater presence of musculoskeletal pain in students from Pune as compared to those from Vadodara.	Urban Poor
Rajan P. and Koti A., 2013 [8]	Pune, India	65 (29 male students)	Tool developed in [6]	More than 50% of the students demonstrated bad ergonomics with regular school activities like reading and lifting book/s and bad postures while sitting and using computer at school. Close to 65% of the students who demonstrated bad ergonomics also reported presence of musculoskeletal pain.	Urban poor
Kumar U et al, 2011 [9]	Mangalore, India	1500 school children (810 male students)	Pre shaded Manikin question; Visual Analogue Scale; Low Back Pain Symptom Characteristics questionnaire; The modified Hanover Low back pain disability Questionnaire	The prevalence of musculoskeletal pain is higher in girl students. There is high prevalence of back pain in school children in general.	Well-to-do
Iyer, 2001 [10]	India and America	248 Indian and 103 American schoolchildren	Jackson Strength Tester; Skinfold Caliper, the Borg Pain Scale	Presence of musculoskeletal pain in both groups was reported and majorly attributed to the use of heavy backpacks.	Well-to-do

DISCUSSION

The objective of the current review paper was to look into the need and feasibility of community physiotherapy for musculoskeletal issues among slum dwelling school children in India. Through the review, it was found that only six studies have looked at the musculoskeletal of school children in India and seldom research on urban poor children. This is one of the major gaps in research on urban poor school going children. It has been seen that aches and pains developed at younger ages lead to chronic health problems during adulthood, which is the phase of active contribution to the society. It is thus important to identify these problems as early as is possible and prevent chronicity of conditions.

NEED FOR MUSCULOSKELETAL PHYSIOTHERAPY IN URBAN POOR CHILDREN

Musculoskeletal pain has been reported in urban poor female school children as early as 12 years of age[6]. The slum children are frequently involved in domestic labour in addition to attending school. Thus, the musculoskeletal joints tend to get stressed due to excessive burden on weak (growing) joints and also the bad postures and ergonomics during school activities. This dual effect further hastens the process of development of musculoskeletal aches and pains at young ages.

Early diagnosis can help to prevent chronicity of pain. Chronic conditions are not only difficult to treat but also costly[12]. In a country like India, it is thus important to focus on preventive strategies, especially in a less privileged population like urban poor school children.

FEASIBILITY OF MUSCULOSKELETAL PHYSIOTHERAPY IN URBAN POOR CHILDREN

There is lack of quality health care services in India. In addition, it was suggested by Yeravdekar et al (2013) that in order to strengthen the health care system in the country, emphasis on early prevention and more investment in developing the capacities of preventive medical professionals and preventive medicine is required. In the extensive research work done by Rajan and Koti since 2012, it can be said that devising cost effective preventive strategies in musculoskeletal health for urban poor children is feasible.

Certain interventions have proved effective in urban poor school children rehabilitation like conducting ergonomic workshop and focus group discussions with children[6-8]. It is of utmost importance to design cost effective health care strategies that could reach large masses at low costs. Community based physiotherapy has been shown to be effective in this regard[11]. A team of physiotherapy specialists (community as well musculoskeletal physiotherapists) needs to be put in place which can reach the target population to diagnose musculoskeletal health problems as early as is possible. This approach has been pilot tested and has been proven to be effective[6]. However, such interventions need to be cost effective.

LIMITATIONS

The study was not funded due to which paid search engines were not included in the current review. It is highly likely that all the relevant papers addressing the musculoskeletal issues of urban poor children in India have not been accessed due to the above reason.

FUTURE RECOMMENDATIONS

A team of physiotherapy specialists (community as well musculoskeletal physiotherapists) could go into the community to reach the target population and diagnose musculoskeletal health problems in this cohort. However, given the resource limitations in India, there is dearth of such interventions that use cost effective methods to rehabilitate slum communities.

CONCLUSIONS

In conclusion, it can be said that there is a dire need to study the musculoskeletal health in urban poor slum children. A holistic approach to musculoskeletal care for the urban poor children in India could be effective in not only preventing the chronicity of musculoskeletal health problems but also aiding in the formation of a strong youth who, in fact, are the pillars of future India. While designing musculoskeletal physiotherapy programs for the underprivileged school children, special emphasis needs to be given to postural training and ergonomic assessments, apart from inculcating healthy habits in these children. Involvement of the school staff and parents is of utmost importance while planning such preventive intervention programs.

CONFLICT OF INTEREST/DECLARATION

This review paper was presented at the International Conference on Convergence of Science, Engineering & Management in Education and Research-A Global Perspective II Edition, Bangalore, India in September 2013.

CLINICAL APPLICATION

Community physiotherapy to address the musculoskeletal health issues among urban poor children in India needs urgent attention. A good referral system needs to be established in the existing primary health care system so that the urban poor school children can lead a healthy pain-free life.

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PHYSIOTHERAPY SERVICES AND ITS IMPACT ON THE QUALITY OF LIFE IN BREAST CANCER PATIENTS: REVIEW IN ASSAM

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ABSTRACT

The study is based on the Physiotherapy interventions in the Breast cancer patients in North-east India based on the samples, population studied and treatment plans in Dr. B. Borooah Cancer Institute, Guwahati, Assam. The main objective of the study was to make the people of India especially north-east India to be aware regarding the Breast cancer and promotion of importance and rule of Physiotherapy treatment in the Breast cancer rehabilitation process.

The results suggest that the pressing need arises for the existence of a differentiated care system with the purpose to cater for the particular needs of the patients and their families. It is desirable that the physiotherapist working in oncology has a broad knowledge of other clinical areas, such as neurology, the musculoskeletal and cardiopulmonary systems and in rehabilitation and kinesiotherapy in general, as well as in services along the entire spectrum of patient care. In conclusion, our meta-analysis indicated that the addition of MLD to compression and exercise therapy for the treatment of lymphedema after axillary lymph-node dissection for breast cancer is unlikely to produce a significant reduction in the volume of the affected arm.

KEYWORDS: Breast cancer, North-east India, Role of physiotherapist, MLD

INTRODUCTION

Cancer is a group of diseases that cause cells in the body to change and grow out of contro[1]. Most types of cancer cells eventually form a lump or mass called a tumor, and are named after the part of the body where the tumor originates.

The north-eastern part of India has the highest incidence of cancer in the country, according to the latest report of the Indian Council of Medical Research (ICMR). In men, age-adjusted incidence rate of all types of cancers is the highest in Aizawl district of Mizoram followed by East Khasi Hills (Meghalaya) and Mizoram state. In women, the highest incidence is in Aizawl district followed by Kamrup urban district (Assam) and Mizoram state. ICMR's "Three Year Report of Population Based Cancer Registries 2009-2011" has used data collected over three years from the 25 population-based cancer registries (PBCRs) in the country. (Age-adjusted rate is derived statistically and allows comparison between communities with different age structures.)

In terms of crude rate (ratio of affected people per 100,000 population), the highest rate of cancer has been seen in Aizawl district of Mizoram—168.2 men and 149.5 women per 100,000 population—followed by Thiruvananthapuram in Kerala with 143.5 men and 144.3 women per 100,000 people. Amongst the only two rural cancer registries in the country, Ahmedabad in Gujarat has higher number of men suffering from cancer than in Barshi, Maharashtra.

The data shows that 56.8 men per 100,000 people are affected in Ahmedabad compared to 48.5 in Barshi. Barshi has higher cancer incidence among women with 59 cases per 100,000 people compared to 46.1 in Ahmedabad. Data from different PBCRs show that the most common cancers in men are that of the lung, mouth, oesophagus, stomach and nasopharynx. The most common cancers in women are that of breast, cervix, uterus, oesophagus and lung.

There is an extensive use of pesticides in tea gardens in North-East which can lead to widespread occupational and environmental exposures. According to the study conducted by IARC, 50% of the pesticide found to possess carcinogenic potential. (http://www.icmr.nic.in/annual/2004-05/icpo/cancer_neregion.pdf)

High incidence of certain cancers like cancer of breast with higher serum DDE levels have been reported from North-East districts by ICMR. The incidence of breast cancer in Aizawl district was 36.2/ 100,000 which is higher than that reported by any of the population based cancer registry of NCRP. The present study is designed to investigate the link between exposure to pesticides and genetic variation including polymorphism/mutations associated with ethnic variation.

Though cases of breast cancer are on the rise in Assam, doctors say there is very little awareness about the disease among the people here. The disease also affects men, but the percentage is less (less than 1% of all breast cancer)

According to the data provided by Dr. B. Borooah Cancer Institute (BBCI), about 311 cases of breast cancer among women have been treated in the hospital during 2011-12, while only 10 such cases in males have been treated.

According to the data, around 15.3% women suffer from the disease while in men the figure is around 0.35%. Assistant professor-cum-in-charge, Department of preventive oncology, BBCI, Dr. Shabana Bhagawati said, "With rapid urbanization, the incident of breast cancer is increasing. Early detection of the disease and treatment can save many lives which is possible only through awareness.

"But, it is seen that awareness among the people is very low. Moreover, there are many people who are aware of the disease but take the matter very lightly. All throughout the year, screening camps are organized in the hospital and other places, but very few people attend the camp. We also provide counseling to the people."

She said nowadays cases of breast cancer among men are also increasing, though the percentage of men suffering from the disease is still very less. But, breast cancer in man is more dangerous, she added. "Breast self-examination is a technique that people can try at home. The signs of the disease are preens of lumps or thickening in the breast or armpit, discharge from the nipple, discolouration or change in texture of the skin overlaying the breast and change in the direction of the nipple," she said. The risk of breast cancer increases due to many factors some of which are age, family history of breast cancer, early age at menarche, first pregnancy after 30 years, having no children, women who have not breast fed their children, late menopause, dietary factors, alcohol consumption, obesity and hormonal treatment.

During a recently-organized month-long breast cancer awareness campaign, the theme of which was 'Lets defeat breast cancer, we are stronger together,' lots of awareness campaigns and public meetings, talks, screening, counseling, community awareness, IEC distribution and sensitization programmes have been carried out by the hospital. Moreover, an exhibition on cancer was recently organized in the hospital. (http://timesofindia.indiatimes.com/city/guwahati/Breast-cancer-on-rise-in-Assam/articleshow/25905148.cms)

Development of breast cancer involves genetic, hormonal and environmental factors. Two major genes known to confer susceptibility are BRCA 1 and BRCA 2, explain only 5-10% of the total incidence. The other genes which are related to endogenous hormone exposure and also plausible candidates for susceptibility include estrogen receptor, progesterone receptor and vitamin D receptor which are members of nuclear receptor super family. ICPO will, therefore, perform the mutation and polymorphism studies of ER, CYP17, AR, Vitamin D Receptor, BRCA1, BRCA2, p53, p16, Her2-Neu to establish any propensity of occurrence of certain mutation in ethnic groups which renders the North-East populations.

The incidence of breast cancer increases with age, doubling about every 10 years until the menopause, when the rate of increase slows dramatically. Compared with lung cancer, the incidence of breast cancer is higher at younger ages. In some countries there is a flattening of the age-incidence curve after the menopause.

Age adjusted incidence and mortality for breast cancer varies by up to a factor of five between countries. The difference between Far Eastern and Western countries is diminishing but is still about fivefold. Studies of migrants from Japan to Hawaii show that the rates of breast cancer in migrants assume the rate in the host country within one or two generations, indicating that environmental factors are of greater importance than genetic factors[2].

Breast cancer begins in the breast tissue that is made up of glands for milk production, called lobules, and the ducts that connect the lobules to the nipple. The remainder of the breast is made up of fatty, connective, and lymphatic tissues. Breast cancer typically is detected either during a screening examination, before symptoms have developed, or after symptoms have developed, when a woman feels a lump. Most masses seen on a mammogram and most breast lumps turn out to be benign; that is, they are not cancerous, do not grow uncontrollably or spread, and are not life-threatening. When cancer is suspected based on clinical breast exam or breast imaging, microscopic analysis of breast tissue is necessary for a definitive diagnosis and to determine the extent of spread (in situ or invasive) and characterize the pattern of the disease. The tissue for microscopic analysis can be obtained via a needle or surgical biopsy. Selection of the type of biopsy is based on individual patient clinical factors, availability of particular biopsy devices, and resources[3].

Ductal carcinoma in situ (DCIS) is a spectrum of abnormal breast changes that start in the cells lining the breast ducts. DCIS is considered a noninvasive form of breast cancer because the abnormal cells have not grown beyond the layer of cells where they originated. It is the most common type of in situ breast cancer, accounting for about 83% of in situ cases diagnosed during 2006-2010. DCIS may or may not progress to invasive cancer;

in fact, some of these tumors grow so slowly that even without treatment they would not affect a woman's health. Studies suggest that about one-third, and possibly more, of DCIS cases will progress to invasive cancer if left untreated. Identifying subtypes of DCIS that are most likely to recur or progress to invasive cancer is an active area of research[4].

Most breast cancers are invasive, or infiltrating. These cancers have broken through the ductal or glandular walls where they originated and grown into surrounding breast tissue.

The prognosis (forecast or outcome) of invasive breast cancer is strongly influenced by the stage of the disease – that is, the extent or spread of the cancer when it is first diagnosed. There are two main staging systems for cancer. The TNM classification of tumors uses information on tumor size and how far it has spread within the breast (T), the extent of spread to the nearby lymph nodes (N), and the presence or absence of distant metastases (spread to distant organs) (M)[6].

Once the T, N, and M are determined, a stage of 0, I, II, III, or IV is assigned, with stage 0 being in situ, stage I being early stage invasive cancer, and stage IV being the most advanced disease. The TNM staging system is commonly used in clinical settings. The Surveillance, Epidemiology, and End Results (SEER) Summary Stage system is more simplified and is commonly used in reporting cancer registry data and for public health research and planning[6].

Treatment decisions are made by the patient and the physician after consideration of the optimal treatment available for the stage and biological characteristics of the cancer, the patient's age and preferences, and the risks and benefits associated with each treatment protocol. Most women with breast cancer will have some type of surgery. Surgery is often combined with other treatments such as radiation therapy, chemotherapy, hormone therapy, and/or targeted therapy and Physical therapy rehabilitation.

The primary goals of breast cancer surgery are to remove the cancer from the breast and to determine the stage of disease. Surgical treatment for breast cancer involves breast-conserving surgery (BCS) or mastectomy. With BCS (also known as partial mastectomy, quadrantectomy, and lumpectomy), only cancerous tissue plus a rim of normal tissue are removed. Simple or total mastectomy includes removal of the entire breast. Modified radical mastectomy includes removal of the entire breast and lymph nodes under the arm, but does not include removal of the underlyingchest wall muscle, as with a radical mastectomy.

Radical mastectomy is rarely used because in most cases removal of the underlying chest muscles is not needed to remove all of the cancer[7].

Infection, including redness and/or swelling of the incision with pus or foul-smelling drainage, perhaps with fever. Antibiotics can be used to treat post-surgical infections.

Lymphedema, swelling of the arm and/or hand on the side of the surgery due to the removal of the lymph nodes under the arm. Lymphedema often goes away on its own, but sometimes requires treatment. Treatment is usually provided by physical-therapists and includes:

- Manually draining the fluid.
- Caring for the skin.
- Exercising the arm.
- Wearing compression bandages to keep the swelling from recurring.

Seroma, the accumulation of fluid in the location of the surgery. Most of the time the fluid is absorbed by the body. However, the area may be drained, using a needle, if it does not go away on its own[1].

Other complications may include stiffness of the shoulder and possible numbness or altered sensation in the upper arm or armpit.

REVIEW OF LITERATURE

Robyn C. Box et al: The physiotherapy intervention programme for the Treatment Group women included principles for lymphoedema risk minimisation and early management of this condition when it was identified. These strategies appear to reduce the development of secondary lymphoedema and alter its progression in comparison to the Control Group women. Monitoring of these women is continuing and will determine if these benefits are maintained over a longer period for women with early lymphoedema after breast cancer surgery[8].

Angelique F. Vitug, MD, Lisa A. Newman stated that the breast is a relatively clean organ comprised of skin, fatty tissue, and mammary glandular elements that have no direct connection to any major body cavity or visceral structures. In the absence of concurrent major reconstruction, breast surgery generally is not accompanied by large-scale fluid shifts, infectious complications, or hemorrhage. Thus, most breast operations are categorized as low-morbidity procedures. Because the breast is the site of the most common cancer afflicting American women, however, a variety of complications can occur in association with diagnostic and multidisciplinary management

procedures. Some of these complications are related to the breast itself, and others are associated with axillary staging procedures[9].

Aitken DR. stated that impaired shoulder function is a well-known and frequently seen sequela to the treatment of early breast cancer. It is usually ascribed to the surgical trauma and scarring caused by the axillary dissection in combination with the fibrosing effect of adjuvant radiation therapy.

Box and colleagues evaluated an intervention to minimise postoperative lymphoedema in 65 women and stated that a physiotherapy management care plan, including exercise strategies that were not described in the paper, and progressive educational strategies may reduce the occurrence of secondary lymphoedema two years after surgery[10].

ROLE OF PHYSIOTHERAPY

The results suggest that the pressing need arises for the existence of a differentiated care system with the purpose to cater for the particular needs of the patients and their families. It is desirable that the physiotherapist working in oncology has a broad knowledge of other clinical areas, such as neurology, the musculoskeletal and cardiopulmonary systems and in rehabilitation and kinesiotherapy in general, as well as in services along the entire spectrum of patient care. There is also a considerable role for the physiotherapists in the evaluation of the clinical conditions and management of the patients, as well as in assisting people's return to work and normal life following treatment[11].

The team instructed physiotherapy was found to improve the shoulder function significantly in patients treated surgically for breast cancer. The effect of the treatment was influenced by the type of surgery performed, and in mastectomised patients, also by the application of radiation therapy. Compromised shoulder function is a less frequent and less severe side effect to breast conserving therapy as compared to modified radical mastectomy.

A physical treatment program combining MLD, skin care, exercise, compression bandaging, and sleeve or stocking compression is recognized as providing optimal lymphedema management[12].

This study shows improvement of shoulder function following physiotherapy instituted several years postoperatively. Several factors are believed to be of importance in the development of decreased shoulder mobility. The age of the patient, the extent of axillary dissection, the surgery on the breast as well as the nature of adjuvant treatment are some of the factors most frequently discussed. The mastectomised patients were shown to benefit largely from the physiotherapy treatment. However, the effect of the physiotherapy seemed to be influenced by the application of radiotherapy.

The application of additional physiotherapy during radiotherapy or shortly after, encourage the patients to use the shoulder in full scale. The extension of the scar tissue and the muscles reduces the firm attachment of the skin to the underlying tissue and reduces the shortening of the muscles. Hence, the shoulder mobility is improved.

Early physiotherapy with an educational strategy after surgery for breast cancer that involved dissection of axillary lymph nodes was associated with a lower risk of secondary lymphoedema than the educational strategy.

This study included manual lymph drainage, which is a special method involving gentle massage to improve the lymph circulation, especially subcutaneous circulation, to stimulate the initial lymphatics, and to stretch the lymph vessels, consequently improving the removal of interstitial fluid. Manual lymph drainage encourages and improves resorption without increasing filtration. It has been shown to be effective in the treatment of lymphoedema because it improves the removal of fluid from interstitial space. We therefore think that the implementation of manual lymph drainage after surgery for breast cancer in the early physiotherapy group could have contributed to the better results in that group. This, together with early physiotherapy for other effects of breast cancer surgery, and related to the onset of secondary lymphoedema, could explain the effectiveness of early physiotherapy in the prevention of secondary lymphoedema in women who have had surgery for breast cancer with axillary lymph node dissection—at least during the first year after surgery.

CONCLUSIONS

Team instructed physiotherapy improves the shoulder function in patients surgically treated for breast cancer. The effect of the treatment is influenced by the type of surgery performed and by the application of radiation therapy in mastectomised patients. Compromised shoulder function is a less frequent and less severe side effect to breast conserving therapy as compared to modified radical mastectomy.

Epidemiological researches have put in evidence the benefits of physical activity in relation to the risk of cancer. Moreover, the physical activity

has been considered as a modifiable lifestyle risk factor that has the potential to reduce the risk of the majority of the types of diseases, as the cancer.

In conclusion, our meta-analysis indicated that the addition of MLD to compression and exercise therapy for the treatment of lymphedema after axillary lymph-node dissection for breast cancer is unlikely to produce a significant reduction in the volume of the affected arm. We found no significant difference in the incidence of lymphedema in patients treated with or without MLD. Overall, the methodological quality of the studies that we reviewed was poor. Based on the results of our meta-analysis, we cannot recommend the addition of MLD to compression therapy for patients with breast-cancer-related lymphedema.

A physical treatment program combining MLD, skin care, exercise, compression bandaging, and sleeve or stocking compression is recognized as providing optimal lymphedema management.

Early physiotherapy could help to prevent and reduce secondary lymphoedema in patients after breast cancer surgery involving dissection of axillary lymph nodes, at least for one year after surgery. This result emphasises the role of physiotherapy in the awareness, prevention, early diagnosis, and treatment of secondary lymphoedema.

Secondary lymphoedema is a chronic condition, which has negative effects on the quality of life of patients. The increase in risk factors associated with secondary lymphoedema, such as ageing populations and the growing prevalence of obesity along with the gradual improvement in rates of survival from cancer, suggest that secondary lymphoedema will remain a challenge. Further studies are needed to clarify whether early physiotherapy after breast cancer surgery can remain effective in preventing secondary lymphoedema in the longer term.

Secondary lymphoedema is a common complication of breast cancer surgery. As far as local are aware, only few study has examined the effect of exercise and specific recommendations about self-care to minimise the onset of secondary lymphoedema. In addition, several studies on the effectiveness of early rehabilitation after breast surgery reported data on lymphoedema as secondary end points.

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A CROSS SECTIONAL STUDY TO CALCULATE THE MULTIPLE REPETITION MAXIMUM (RM) FOR LOW AND MEDIUM RESISTANCE THERA-BANDS IN NORMALS IN THE AGE GROUP OF 18 TO 25 YEARS

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ABSTRACT

BACKGROUND: The Thera-Band Academy recommends to use Multiple Repetition Maximum (RM) to dose the exercise intensity (ability to complete prescribed number of repetitions). Multiple RM has high reliability with elastic resistance (Newsam et al 2005).

METHOD: Each individual was made to perform the Biceps Curl and Knee Extension for the testing the Multiple Repetition Maximum(RM) in the Upper Limb and Lower Limb respectively on the dominant side using Yellow, Red, Green and Blue Thera-Bands.

RESULTS: 1)The Multiple Repetition Maximum (RM) found in the dominant Upper Limb was 30, 17, 12 and 8 and in the dominant Lower Limb 64, 52, 42 and 30 with Yellow, Red, Green and Blue Thera-Bands respectively in Females. 2)The Multiple Repetition Maximum (RM) found in the dominant Upper Limb was 46, 30, 22 and 13 and in the dominant Lower Limb 95, 69, 53 and 40 with Yellow, Red, Green and Blue Thera-Bands respectively in Males.

IMPLICATIONS – The baseline values of Multiple Repetition Maximum for the Upper Limbs and Lower Limbs got from this study, will help for planning of proper treatment suitable for the Indian population. The Thera-Band Academy suggests performing 8-12 Repetitions for exercise prescription.

CONCLUSION: 1)The Multiple Repetition Maximum found in the Upper Limb is lower than that of the Lower Limb. This finding was consistent with all the colours (Yellow, Red, Green and Blue) of Thera-Bands used in this study. 2)Males performed more Multiple Repetition Maximum as compared to females. 3)As compared to the foreign population, Indians performed more Multiple Repetition Maximum.

KEYWORDS: Multiple Repetition Maximum, Low and Medium resistance Thera-Bands, Upper Limb, Lower Limb.

INTRODUCTION

Resistance exercise, also referred as resistance training is any form of active exercise in which dynamic or static muscle contraction is resisted by an outside force applied manually or mechanically[1]. There are 3 traditional modes of resistance training: Isometric, Isotonic, and Isokinetic. These can be given by using free weights, soft weights, dumbbells etc[2].

Elastic resistance is a unique mode of resistance. Elastic resistance has unique properties compared to the 3 traditional modes, in that the resistance increases as the band is stretched; therefore, elastic resistance should be considered its own mode of resistance training. Thera-Bands are available in 8 colour-coded levels of resistance namely tan, yellow, red, green, blue, black, silver and golden[2]. The Thera-Band Academy recommends to use Multiple Repetition Maximum (RM) to dose the exercise intensity (ability to complete prescribed number of repetitions). Multiple RM has high reliability with elastic resistance (Newsam et al 2005)[2].

With Thera-Band resistive exercise systems, measuring progress and achieving goals for fitness or therapy is easier than ever before. Different resistance levels are determined by thickness of the band. The Thera-Band Progressive Resistance System is designed with colour-coded levels increasing in difficulty from tan (Extra Thin) to gold (Max). This comprehensive system provides positive reinforcement and feedback for gauging results[2].

Thera-Band resistive exercise systems cost much less than other exercise equipment sold with claims of achieving similar results, plus they are portable and versatile with virtually unlimited uses. Thera-Band exercise bands are highly regarded and used throughout the world[2].

AIMS & OBJECTIVES

AIM: To find out the Multiple Repetition Maximum (RM) for Low and Medium resistance Thera-Bands in Normals in the age group of 18 to 25 years.

OBJECTIVES:

1)To find out the Multiple Repetition Maximum of individuals on the dominant side for the Upper Limb with low and medium resistance Thera-Bands i.e. Yellow, Red, Green and Blue Thera-Bands.

2)To find out the Multiple Repetition Maximum of individuals on the dominant side for the Lower Limb with low and medium resistance Thera-Bands i.e Yellow, Red, Green and Blue Thera-Bands.

METHODOLOGY

Type of study: Cross Sectional, Observational, Single-centre

Place of study: Tertiary Healthcare Centre

Sample Size: 60

Sampling method: The study was conducted in Medical and Physiotherapy students in the age group of 18-25 years. A total of 120 subjects were screened as per the inclusion and exclusion criteria, and 60 students were selected who fitted the inclusion criteria of the study. Remaining 60 students who were not included in the study as they did not fit in the BMI criteria or they were involved in gyming/ other physical activities which could alter the results of the study.

Materials used:

Yellow, Red, Green & Blue Thera-Bands, Chair with a backrest

Inclusion Criteria:

- Normal young adults who are lightly active in the age group of 18 to 25 years.
- Individuals not engaged in any other strength training or fitness program.
- Individuals with BMI in the normal range i.e 18-25 kg/m2.

Exclusion criteria:

Patients, otherwise meeting the inclusion criteria, were ineligible in case of any of the following criteria:

- No known Musculoskeletal, Neurological or Cardio-Respiratory disorder.
- No known significant medical or surgical history.
- Individuals with a BMI>25 kg/m2.
- People who are not able to comprehend commands regarding the usage of Thera-Bands.

Techniques

1) Subject Selection was done considering the Inclusion and Exclusion Criteria.
2) The subjects were explained the need of the study and the procedure of the test.
3) Formal informed consent was taken from the subjects.
4) Each subject's height, weight were measured and BMI was calculated.
5) The starting length of the band is equal to the length of the limb to be tested[1].
   For the Upper Limb, the measurements were taken from the Olecranon Process of the Ulna on the dominant side to the tip of the third finger. For the Lower Limb, the measurement was taken from the Lateral Tibial Condyle to the foot placed flat on the ground.
6) Subjects were made to take part in a 5 minute warm up consisting of active shoulder and knee exercises. This also included pendular exercises and general active stretching of the shoulder and knee joint musculature.
7) Each individual was made to perform the Biceps Curl and Knee Extension for the testing the Multiple Repetition Maximum in the upper limb and lower limb respectively on the dominant side.

Procedure for the biceps curl

1) Subjects were made to stand with the feet parallel and shoulder width apart, place the band underneath the foot of the side being tested.
2) The band was held between the thumb and the index finger of the subject on the dominant side.
3) Starting position-arms were kept straight and on the side of the body, palms facing forward.
4) Subjects were slowly asked to curl the arm up to shoulder level.
5) Subjects were instructed not to bend at the wrist during the movement or perform the repetitions in the mid-prone position.
6) Subjects were asked to perform as many repetitions of biceps curls until any trick movement set in or until fatigue sets in[5,6].

FIGURE 1: SUBJECT PERFORMING BICEPS CURL WITH THERA-BANDS

Procedure for the leg extension

1) The subjects were made to sit in a chair (of an appropriate height) with a back rest.
2) One end of the band was tied around the leg of the chair and the other end was tied at the ankle of the dominant side to be tested.
3) Starting position- sitting with thigh supported and knees bend at 90 degrees.
4) The subject was asked to extend the knee and slowly come back to the starting position.
5) Subjects were asked to perform as many repetitions of knee extension until any trick movement set in or until fatigue sets in [5,6].

FIGURE 2: SUBJECT PERFORMING KNEE EXTENSION WITH THERA-BANDS

Each individual was first tested for Biceps curl and quadriceps extension first with the yellow elastic band on the first day. The consequent testings were conducted on day 4, 7 and 10 with Red, Green and Blue Thera-Bands respectively. A note of the repetition maximum should be made and documented.

The 48 hours of gap was given to avoid Delayed Onset of Muscle Soreness[1].

Subjects were also given ice application in the non testing days to further reduce any possible soreness occurring in the muscle.

RESULTS

TABLE 1: PERCENTAGE OF TOTAL SUBJECTS AND GENDER WISE DISTRIBUTION

	No of Subjects	Percentage Wise Distribution
Males	30	50
Females	30	50
Total	60	100

TABLE 2: MEAN OF THE MULTIPLE REPETITION MAXIMUM (RM) - FEMALES

Multiple Repetition Maximum (RM)	Yellow		Red		Green		Blue	
	UL	LL	UL	LL	UL	LL	UL	LL
Mean	30	64	17	52	12	42	8	30

TABLE 3: MEAN OF THE MULTIPLE REPETITION MAXIMUM (RM) - MALES

Multiple Repetition Maximum (RM)	Yellow		Red		Green		Blue	
	UL	LL	UL	LL	UL	LL	UL	LL
Mean	46	95	30	69	22	53	13	40

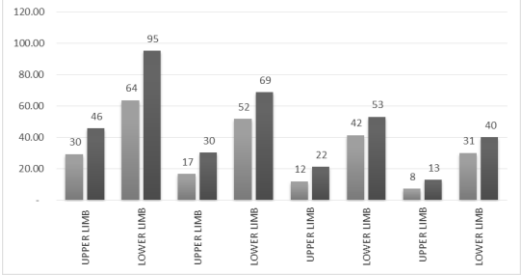

FIGURE 3: MEAN OF MULTIPLE REPETITION MAXIMUM (RM) IN MALES AND FEMALES

DISCUSSION

1) Strength Training and Endurance Training can be administered with the help of weight cuffs, soft weights, machines etc.
2) Thera-Bands are becoming very popular nowadays and being used extensively in rehabilitation.
3) Hence, calculating the Multiple Repetition Maximum (RM) becomes extremely important.
4) Depending on the goal of the training program, the number of repetitions for the exercise and the type of muscle to be trained should be decided.
5) Traditionally 8-12 repetitions are given for each of the exercises that are being performed[2].

Muscles tested in this study are Biceps Brachii from the Upper Limb and Quadriceps from the Lower Limb. Biceps is predominantly a mobiliser muscle, requiring to meet high load functional activities and Quadriceps being mainly a postural muscle, mainly involved for weight bearing.

Analysis of multiple repetition maximums found in the study

The following table shows the values of Multiple Repetition Maximums found out in this study

TABLE 4: MULTIPLE RMS

		Females	Males
	Multiple RM	Mean	Mean
Yellow	Upper limb	29.53	46.03
	Lower limb	63.9	95.3
Red	Upper limb	16.93	30.46
	Lower limb	51.7	69
Green	Upper limb	12.13	21.53
	Lower limb	41.63	53.3
Blue	Upper limb	7.5	13
	Lower limb	30.23	40.3

Comparison of multiple repetition maximum (RM) in upper limb vs. lower limb:

It was seen that the Upper Limb performed less Multiple Repetition Maximums as compared to the Lower Limb. This could be attributed to the fact that the Upper Limb and Lower Limb have different functions.

Upper limb mainly requires mobility for most of the functions and good upper limb strength to bear high load functional activities. Most of the upper limb muscles consist of type II fibers i.e. fast twitch muscle fibers, required for producing quick and powerful contractions.

The Lower Limb muscles are highly resistant to fatigue mainly consisting of type I slow twitch fibers), thus being able to perform high endurance activities like walking, running, cycling, jumping, weight bearing activities etc[4].

Comparisons of multiple repetition maximums (RM) found in males and females:

From the study done, it was seen that females performed less Multiple Repetition Maximums as compared to males (especially in the values found out in the Upper Limb).

However, there wasn't significant difference between the Multiple Repetition Maximums of the Lower Limb.

The following physiological differences between the two genders attributes to these findings:

- LEAN BODY MASS (LBM): LBM is more in males as compared to females. Hence, males are more muscular as compared to females
- FAT PERCENTAGE: In females, body fat percentage is more (23-25%) as compared to males i.e. 15%.
- FAT DISTRIBUTION: Females typically demonstrate lower body density, whereas males have more fat deposition in the abdominal and upper regions of the body.

Females have been found to be 43 to 63% weaker as compared to males in upper body strength and only 25 to 30% weaker in lower body strength. The possible explanations for these different findings in upper and lower body strength are as follows:

Females have a higher percentage of LBM in the lower body. Females use the muscle mass in their lower body as compared to the upper body muscle mass, particularly as compared to males.

Hence, while planning out an exercise protocol, even for females, we can directly start with a Thera-Band of higher resistance for the Lower Limbs as our study results show that Indian population can tolerate higher Repetition Maximums with higher resistance bands.

Comparison of multiple repetition maximums (RM) found in the Indian population with the foreign population:

Most of the studies conducted have been conducted on the foreign population. Thus, comparing the values as given by the Thera-Band Academy, Indians were able to perform more Multiple Repetition Maximums. This is because of the fact that, there exists PHYSIOLOGICAL VARIATION BETWEEN INDIAN AND FOREIGN POPULATION:

- PHYSICAL ACTIVITY: Indians usually have a higher level of physical activity.
- The PHYSICAL ENDURANCE of Indians in general occasions exceeds that of the whites.
- Indians easily sustains prolonged walking or running.
- Due to better facilities, increased use of vehicles instead of walking, white collar jobs, and hence lower levels of physical activity, could be the reason for less Multiple Repetition Maximums found in the foreign population.
- EFFECTS OF CLIMATE/ENVIRONMENT ON PHYSICAL FITNESS: Climate and environment alter the physiologic responses of the cardio-respiratory and thermoregulatory

systems of the individual. The exercise response is better in countries with a cooler climate as compared to countries with extremes of temperature. Hence, due to the tropical nature of India, this could affect the participation in exercise programs. But this could vary according to the socioeconomic status and occupation of the population.

- OTHER DIFFERENCES: Height, Weight, BMI, diet, lifestyle, predominant occupation etc.

Hence, these could be the reasons that can be pointed out for lower values of lower Multiple Repetition Maximum in foreign population.

LIMITATIONS OF THE STUDY

1. Only a small sample size could be taken.
2. The study was conducted only in one centre.

SUGGESTIONS

Further studies can be done with a larger sample size.

The Multiple Repetition Maximum can be calculated across the different regions of India, to see the regional variations of Multiple Repetition Maximum.

CONCLUSION

- The Multiple Repetition Maximum found in the Upper Limb is lower than that of the Lower Limb. This finding was consistent with all the colours of Thera-Bands.
- Males performed more Multiple Repetition Maximum as compared to females.
- As compared to the foreign population, Indians performed more Multiple Repetition Maximum.

CLINICAL APPLICATION

The baseline mean values of Multiple Repetition Maximum got from this study, will help for proper planning of treatment, tailor made according to the Indian population.

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TO STUDY THE EFFECT OF EMPTY CAN VS FULL CAN EXERCISE IN CHRONIC SUPRASPINATUS TENDONITIS- A COMPARATIVE STUDY

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ABSTRACT

Background: The Supraspinatus has a primary role for the initiation of abduction and its tendonitis can cause a considerable functional restriction. This study focuses on finding most effective exercise for treating chronic cases.

Objectives: To compare efficacy of Empty Can & Full Can Exercise in treating Chronic Supraspinatus Tendonitis.

Study Design: Comparative Study.

Method: 18 patients, aged 25-45years, both male & female having chronic Supraspinatus Tendonitis were selected for the study. They were divided into 3 groups-

Group1: Received Conventional Exercises

Group2: Received Empty Can + Conventional Exercises

Group3: Received Full Can + Conventional Exercises

They received treatment for 3 weeks. Visual Analogue Scale (VAS), Shoulder Pain and Disability Index (SPADI) & Supraspinatus strength were taken Pre & Post Treatment. Thereby data analysis was done using appropriate tests.

Results: There was significant improvement ($p<0.05$) in VAS & SPADI in group3 compared to group2.

Conclusion: Full can exercise is more effective compared to Empty can exercise.

KEYWORDS: Empty Can Exercise, Full Can Exercise, Chronic Supraspinatus Tendonitis, VAS, SPADI, Supraspinatus Strength.

INTRODUCTION

Shoulder disorders are the third most common musculoskeletal condition. The human shoulder is an intricate system of bones, joints, connective tissues and muscles that place the arm and hand in a position that allows them to function. It derives its stability from a group of four small muscles (known as the rotator cuff) and another five muscles that stabilize the scapula (shoulder blade) and guide the entire shoulder joint along the rib cage during arm motions. The four rotator cuff muscles (supraspinatus, infraspinatus, teres minor and subscapularis) work in concert to allow the arm relatively free movement in numerous positions while pulling humeral head (the ball) downward and inward within the glenoid fossa (socket)[1]**.** Thus provide stability and mobility to the shoulder joint. This supraspinatus tendon is positioned between the humeral head and the acromion bone which provides a roof above the ball and socket joint. In its role as a dynamic stabilizer of the shoulder joint, supraspinatus, as part of the rotator cuff group, functions to prevent the deltoid from superiorly translating the humeral head during abduction. Rathban *et al.,* stated that with the arm in the 90 degree abducted position, with weak Supraspinatus, Teres Minor, Infraspinatus (or pain/reflex inhibition) the deltoid overpowers the lower rotator cuff muscles, causes superior translation and causes a compression on the bursal side of the supraspinatus causing the "wringing out" effect.

The most common tendon involved in tendonitis is the Supraspinatus tendon. Supraspinatus tendonitis is inflammation of the tendon of Supraspinatus muscle. The causes of supraspinatus tendonitis can be primary impingement, which is a result of increased subacromial loading, and secondary impingement, which is a result of rotator cuff overload and muscle imbalance. It is often seen in the general population and a predisposing factor is resistive overuse[1]**.** It is typically seen in people aged 25-60 yrs. The Supraspinatus muscle stabilizes the shoulder, externally rotates and helps abduct the arm.

Patients with Supraspinatus Tendonitis show weakness in the shoulder and arm. Weakness and dysfunction of these muscles leads to elevation of the humeral head during arm abduction which causes compression of the tissues under the acromion process. Edema and hemorrhage of the supraspinatus tendon occur which can eventually lead to the tendon degeneration and rupture. The muscles that should be strengthen to correct biomechanics of the shoulder that cause supraspinatus tendonitis are external and internal rotators, deltoid, and scapular stabilizers

(rhomboids, trapezius, serratus anterior, latissimus dorsi) Few risk factors for Supraspinatus tendonitis are chronic wear and tear of the supraspinatus tendon as it passes under the acromion and anatomical factors such as the shape of the acromion or a tight subacromial space due to a thickened ligament.

The problems that patient with Supraspinatus Tendonitis complain of [2]

- Pain when moving arm when lifting up high & Lying on affected Shoulder at night
- Inflammation
- Decreased ROM
- Decreased Strength, Function

On inspection: Localized swelling, Muscle Atrophy, Tenderness below Acromion & over Greater Tuberosity, Painful Arc between 60º and 120º of shoulder abduction, progressive Sub-deltoid aching aggravated by abduction, elevation & overhead activity.

Conservative treatment is generally in form of ice-packs, N-SAIDS, Deep friction massage and Manual Therapy.

However repetitive strain over supraspinatus by microtrauma causes persistence of symptoms and becomes chronic.

The Empty Can has long been a staple in physical therapy circles when it comes to shoulder rehabilitation. Dr Frank Jobe, a well-known shoulder specialist, was the first to come up with this exercise. Since then it has become widely known as an isolation exercise for the supraspinatus. While few of the recent researches have come up with the idea of Full Can Exercise. So it was necessary to find out which of the above is better.

NEED OF THE STUDY

This study focuses on finding most effective exercise out of Empty can and Full can exercise for treating chronic cases.

AIMS & OBJECTIVES

- To study effect of Empty Can + Conventional exercises in Chronic Supraspinatus Tendonitis.
- To study effect of Full Can + Conventional exercises in Chronic Supraspinatus Tendonitis.
- To compare the effect of Empty Can exercise & Full Can Exercise in Chronic Supraspinatus Tendonitis.

METHODOLOGY

1) MATERIALS

- Consent Form
- Plinth
- BASELINE Push-Pull Dynamometer
- SPADI
- VAS
- Dumbbell
- Pen
- Camera

2) SAMPLE SIZE: 18

3) STUDY DESIGN: Comparative Study

4) STUDY SETTING: OPD of Government Physiotherapy College, Civil Hospital, Ahmedabad

5) SAMPLING DESIGN: Convenience sampling

6) INCLUSION CRITERIA

- Patients willing to participate in the study
- Age group:25-45yrs
- Both males & females selected
- Patient who were able to comprehend the commands
- Supraspinatus Tendonitis > 3 months as diagnosed by medical expert.
- Painful arc of movement between 60º–120º.
- Tenderness over Greater Tuberosity of Humerus

7) EXCLUSION CRITERIA

- History of cervical &/or thoracic pathology
- Previous neck or shoulder surgery
- Presence of shoulder instability
- History of disease of Elbow, Wrist & Hand
- History of spinal or upper limb fracture

TECHNIQUE

Prior to the study, all patients were explained about the procedure & written informed consent taken. 18 patients having Chronic Supraspinatus Tendonitis were taken as per selection criteria. Through convenience sampling, they were divided into 3 groups.

- **Group1:** Received Conventional Therapy
- **Group2:** Received Conventional Therapy + Empty Can Exercise
- **Group3:** Received Conventional Therapy + Full Can Exercise

For 3 weeks duration; 5times/week

No. of patients in each group = **6.**

Visual Analogue Scale (VAS), Shoulder Pain and Disability Index (SPADI) and Supraspinatus Strength were taken Pre and Post treatment. Thereafter data analysis was done using appropriate statistical tests.

Outcome Measures:

1)**VAS** is a pain measurement scale where the patient was asked to place a mark on 10cm horizontal line to indicate how much severe the pain was. Left end represents no pain and right end represents severe, unbearable pain.
2)**SPADI** assesses pain and routine functional skills. It has subscales of pain and disability during various activities. The patient is asked to circle the number which describes his problem best. Total score out of 130 was calculated and converted into percentage.
3)**Supraspinatus Strength**[3, 4, 5] was measured using BASELINE Push-Pull Dynamometer (Figure1). All movements tested with the dynamometer demonstrated excellent reliability for the interrater trial ($\rho = 0.79$-0.92). The dynamometer was the most reliable and discriminatory means for assessing strength (lb/Kg) of the rotator cuff in symptomatic subjects. The subject was asked to build to a maximum contraction over a 1- to 2-second period and to hold the maximum effort against applied resistance for a further 4 to 5 seconds. The recorded measure reflected the maximum isometric value. The patient's shoulder in a sitting/standing position was put in 30° abduction and 90° flexion. The resistance was applied just above the elbow. The patient was asked to resist the force applied with the dynamometer. All measurements in this study were taken in pounds.

FIGURE1: BASELINE PUSH-PULL DYNAMOMETER

TREATMENT PROTOCOL

- 5 times/wk
- 10 repetitions-1 set
- 50-60% of 10 RM of uninvolved limb

Conventional Therapy:

- Pectoralis Minor Stretching-30secs hold for 3 times
- Sitting Shoulder Flexion with dumbbell
- Sitting Shoulder Abduction with dumbbell
- Side-lying Shoulder External Rotation with dumbbell
- Prone Arm Abduction with dumbbell
- Prone Arm Elevation with dumbbell
- Prone Row with dumbbell

Empty Can Exercise: [6]

The empty can exercise, in which subjects abducted their arm to 90° in the scapular plane with internal rotation such that patient's thumb down towards the floor with a dumbbell. Empty can exercise is completed from a range of motion of 0º-90º in scapular plane and then back down to starting position.

Full Can Exercise: [6]

The full can exercise, in which subjects abducted their arm to 90° in the scapular plane with external rotation such that patient's thumb up with a dumbbell. Full can exercise is completed from a range of motion of 0º-90º in scapular plane and then back down to starting position.

RESULTS

- Data analysis done using Paired t-test within the groups & Unpaired t-test between the groups in Microsoft Excel 2007.
- Gender Distribution-Group1: 4male, 2female; Group2: 3male, 3female; Group3: 3male, 3female.
- Mean Age in years- Group1: 32.16 ± 4.95; Group2: 34.16 ± 5.63; Group3: 32.33 ± 5.4.

TABLE 1: COMPARISON OF VAS WITHIN THE GROUPS

	Pre-treatment	Post-treatment	t-value	p-value
Group1	7.66 ± 0.81	3.71 ± 0.77	2.36	>0.05
Group2	6.5 ± 1.04	5.2 ± 0.97	0.001	>0.05
Group3	6.66 ± 1.21	3.5 ± 1.04	7.44	<0.001

TABLE 2: COMPARISON OF SPADI WITHIN THE GROUPS

	Pre-treatment	Post-treatment	t-value	p-value
Group1	48.71 ± 2.9	33.19 ± 1.64	3.44	<0.05
Group2	48.2 ± 4.55	42.17 ± 4.97	0.0002	>0.05
Group3	47.56 ± 3.27	32.53 ± 2.54	3.36	<0.05

TABLE 3: COMPARISON OF SUPRASPINATUS STRENGTH WITHIN THE GROUPS

	Pre-treatment	Post-treatment	t-value	p-value
Group1	5.33 ± 1.96	6.38 ± 3.18	0.04	>0.05
Group2	5.16 ± 1.72	11.98 ± 2.56	3.45	<0.05
Group3	5.75 ± 2.09	12 ± 2.52	3.2	<0.05

TABLE 4: COMPARISON OF MEAN DIFFERENCE BETWEEN GROUP1 & GROUP2

	Group1	Group2	t-value	p-value
VAS	3.95	1.3	1.004	>0.05
SPADI	15.51	6.02	1.91	>0.05
Supraspinatus Strength	1.5	6.81	3.20	<0.05

TABLE 5: COMPARISON OF MEAN DIFFERENCE BETWEEN GROUP1 & GROUP3

	Group1	Group3	t-value	p-value
VAS	3.95	3.16	0.03	>0.05
SPADI	15.51	15.12	0.69	>0.05
Supraspinatus Strength	1.5	6.25	5.81	<0.05

TABLE 6: COMPARISON OF MEAN DIFFERENCE BETWEEN GROUP2 & GROUP3

	Group2	Group3	t-value	p-value
VAS	1.3	3.16	2.44	<0.05
SPADI	6.02	15.12	2.43	<0.05
Supraspinatus Strength	6.81	6.25	0.41	>0.05

DISCUSSION

This study shows that Full can exercise should be given to the patient along with conventional therapy. It causes reduction in pain, improves function and supraspinatus strength. The Supraspinatus, have distinct anterior & posterior sub-regions, is most commonly considered an abductor of humerus, but has also been shown to induce Humeral rotation. (Gates et al; 2010) [7] In scapular plane, the anterior sub-region of supraspinatus acts as both internal & external rotator depending on initial position. The posterior sub-region either acts as external rotator or doesn't induce rotation.

Takeda *et al*; 2002, conducted a study to find the most effective strengthening exercise for Supraspinatus by MRI evaluation & found both Empty Can & Full Can Exercise were equally effective in activating Supraspinatus[6].

Celik [3]*et al* studied muscle strength and pain in Subacromial Impingement Syndrome (SIS) on 20 patients aged 32-60yrs and found that there exists a relation between them. He found weakness in supraspinatus, anterior deltoid, serratus anterior, middle trapezius, which states that these muscles must be evaluated and strengthened to avoid sub-acromial impingement. It has been postulated that the pain might be responsible for the muscle weakness with reflex inhibition, resulting in SIS, while muscle weakness itself might also be the primary cause of SIS, resulting in pain.

With Empty Can Exercise, there is increase in Scapular internal rotation & anterior tipping, which decrease the volume of Supraspinatus Outlet (Thigpen CA, *et.al.* AJSM, 2005)[8]. There was also statistically significant activity of Middle Deltoid on EMG analysis (Reinhold, MM, *et.al.* 2007). Thus strong pull of Deltoid pulls the Humerus head superiorly, overpowers Supraspinatus & Rotator Cuff muscles that act to depress & stabilize head of Humerus & thereby creates Forced Impingement.

Full Can Exercise is appropriate for selective strengthening of Supraspinatus & it maintains the subacromial space also. On EMG analysis, Full Can Exercise produces much less activity of Deltoid. This allows the Humerus to stay in Glenoid Fossa in neutral position. As well, by not forcefully internally rotating humerus, it doesn't recreate impingement in subacromion space.

Thus the best way to isolate the supraspinatus muscle for strengthening is Full can exercise. If a muscle cannot function in an isolated muscle pattern, there is no way it can function normally in a functional pattern. It is important to develop isolated muscle function before progression to more complex multi-planar functional exercises. It provides the patient with a firm base to build on.

CONCLUSION

Full can exercise when given along with conventional exercise have been found to be most effective in reducing pain, improving function & increase supraspinatus strength. It is found that when there is pain, there is reflex inhibition of muscle, leading to its weakness. So, while treating such cases isolated strengthening must be focused.

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EFFICACY OF INTENSIVE SPIROMETER FOR THE MANAGEMENT OF PULMONARY REHABILITATION

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ABSTRACT

Objective: The objective of the present study was to probe changes in psychological, physiological, and behavioral—performance variables as a function of pulmonary exercise rehabilitation. Study Design and Participants: Forty patients diagnosed with chronic obstructive pulmonary disease (COPD) were recruited for participation in a 12-week outpatient pulmonary rehabilitation program. Measures: Measures included 6-min walking distance (exercise tolerance), 6-min walking distance self-efficacy, overall quality of life, dyspnea, fatigue, and emotional function. Results: Results revealed significant improvements over the course of the program in each of these measures, regardless of disease severity. In addition, improvements in exercise tolerance were significantly associated with increases in self-efficacy, which, in turn, were significantly related to improved quality of life. Conclusions: The results support the tenets of social—cognitive theory and suggest that participation in an outpatient pulmonary rehabilitation program can provide both physiological and psychological benefits for individuals with COPD.

INTRODUCTION

A key recommendation in the treatment of chronic obstructive pulmonary disease (COPD) is the use of pulmonary rehabilitation programme (PRPs)[1] focusing on self-management techniques. These have been found to improve COPD patients' dyspnoea and health related quality of life. Chronic obstructive pulmonary disease (COPD) has become one of the most prevalent chronic diseases in America today[2]. Pulmonary rehabilitation has been defined as "an art of medical practice wherein an individually tailored, multidisciplinary program is formulated which, through accurate diagnosis, therapy, emotional support, and education, stabilizes or reverses both the physio- and psychopathology of pulmonary diseases and attempts to return the patient to the highest possible functional capacity allowed by his pulmonary handicap and overall life situation"[1].

COPD patient's belief about his or her capability (termed self-efficacy) to overcome the many obstacles (e.g., transportation and financial difficulty) and aversive experiences often associated with exercise (e.g., pain, muscle soreness, and fear) will probably dictate the level of effort and persistence displayed in a rehabilitation program. It was hypothesized that significant improvements would emerge in participants' (a) overall CRQ scores (quality of life); (b) perceptions of dyspnea, fatigue, emotional function, and mastery; (c) exercise tolerance, as assessed by a 6-min walking distance test; and (d) self-efficacy for performing the walking test. It was also hypothesized that changes in exercise tolerance would predict changes in self-efficacy, which, in turn, would predict changes in overall CRQ score (quality of life).

METHOD

PARTICIPANT CHARACTERISTICS

Forty Caucasian men (n = 11) and women (n = 29) diagnosed with COPD and ranging from 33 to 83 years of age (M = 66.78, SD = 10.23) volunteered to be participants in the present study. Only those individuals who had previously taken part in a pulmonary program were excluded. Commonly reported disease-related diagnoses included pneumonia (45%; n = 18), cystic fibrosis (68%; n = 27), and chronic bronchitis (40%; n = 16). In addition, 25% (n = 10) of the participants were dependent on supplemental oxygen.

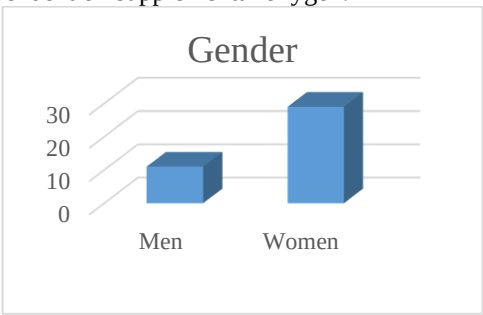

DIAGRAM 1: THIS PAR DIAGRAM SHOWS PARTICIPANTS GENDER

This graph represents gender of participants involved in this study which is men consists of 11 and women 29.

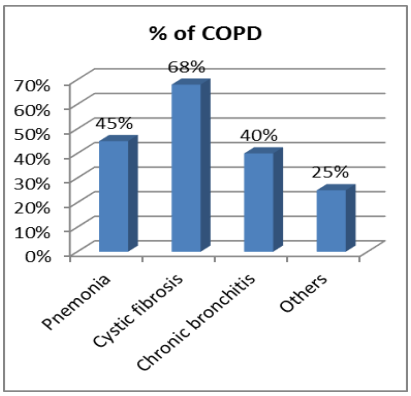

DIAGRAM 2: DIFFERENT PERCENTAGE OF COPD

This graphic represents shows that percentage of COPD which consists of Pnemonia (45%), Cystic fibrosis (68%),Chronic bronchitis (40%)and Others (25%).

A spirometric examination was performed to determine participants' degree of disease severity. Based on the results of this exam, forced expiratory volume in 1 s (percentage predicted; FEV_1%) and FEV_1 divided by percentage of forced vital capacity (FVC%) were calculated and used to classify participants into one of three different COPD impairment categories (mild, moderate, or severe). Nationally accepted criteria for categorizing impairment or severity of pulmonary function were used in the present study.

Measures Quality of life.

Quality of life was assessed via the CRQ, a 20-item instrument consisting of four subscales (dyspnea, fatigue, emotional function, and mastery) and culminating in an overall quality of life score. As a means of measuring dyspnea, participants were instructed to choose 5 activities (from a 25-item recall list provided or self-generated, or both) that had most caused them to experience shortness of breath over the course of the previous 6 weeks. Participants were then asked to rate the degree of dyspnea experienced while engaging in the listed activities during the previous 6 weeks on a scale ranging from 1 (extreme shortness of breath) to 7 (no shortness of breath). The remaining questions were standardized along a 7-point Likert scale, with slightly different anchors used for each subscale. The possible score ranges were 5—35 for dyspnea, 4—28 for fatigue, 7—49 for emotional function, and 4—28 for mastery.

Although the CRQ was constructed for use as an interview tool, the instrument was adapted into a self-administered pencil-and-paper format for the purpose of this study. Specifically, preprogram and postprogram alphas were 0.79 and0 .79 for dyspnea, 0.92 and 0.82 for emotional function, .88 and 0.76 for mastery, and 0.86 and 0.80 for fatigue.

Six-minute walk distance self-efficacy.

As a means of assessing participants' efficacy expectations for the 6-min walking distance test, a 20-item scale was constructed according to the recommendations put forth by[4]. The levels ranged from 100 to 2,000 ft (30.5 to 609.6 m) and were separated into 100-ft intervals. Participants were asked to rate the strength of their expectation to walk the indicated distances in 6 min. Each distance was assessed on a 100-point probability scale ranging in 10-point intervals from 0% (little or no confidence) to 100% (high confidence). Preprogram and postprogram alpha coefficients for this scale were extremely high (.98 and .96, respectively).

Six-minute walk distance test.

Exercise tolerance was assessed via the 6-min walking distance test developed by [5] .This assessment provides a measure of the total distance (in feet) the participant is capable of traveling in 6 min. The test has been used extensively in pulmonary rehabilitation as a measure of exercise performance and has been shown to correlate very highly with the 12-min test[5].

Procedure

After approval from the university institutional review board had been received, (a) a participant consent form, (b) a 10-item demographic survey, (c) a cover letter, (d) a letter to the director outlining the goals and nature of the study, (e) a pulmonary function test and outcome data sheet, (f) a preprogram questionnaire packet, (g) a postprogram questionnaire packet, and (h) two self-addressed stamped envelopes for every participant in their program.

The pulmonary rehabilitation therapists were asked to give each participant regarding Intervention strategy procedure, within the first week of starting the program, an envelope that contained all of the forms needed to complete the study. For the first week, participants read and signed the consent form, performed the 6-min walking distance test, and completed the demographic survey, self-efficacy scale, and CRQ. Before completing the questionnaires, each participant received feedback concerning his or her score on the walking test to provide a point of

reference when completing the self-efficacy scale. After they had completed the forms, participants placed them in the envelope and returned them to the pulmonary therapist. During the last week of the program, participants performed the second walking test and, once again, completed the CRQ and self-efficacy questionnaires. At this time, participants were afforded the opportunity to view responses on the previous administration, as suggested by the authors of the scale. The total time required for data collection was 4 months. This time frame allowed approximately 1 month for participant recruitment into the study and 3 months (12 weeks) to assess the impact of the program.

Outpatient Pulmonary Rehabilitation Program

The programs included in this study which consisted of 3 to 6 patients. Participants met for approximately 60 to 90 min three times per week (e.g., Monday, Wednesday, and Friday). The rehabilitation interventions incorporated both pulmonary education and exercise reconditioning. Pulmonary education consisted of nutritional counseling, breathing retraining (e.g., pursed-lip and diaphragmatic techniques), energy conservation, medication administration (e.g., metered dose inhalers), stress management, relaxation training, dyspnea control, and oxygen equipment operation and maintenance. The educational component was ongoing throughout the programs and was presented in the form of weekly lectures and discussions, audio and visual tapes, and individualized counseling sessions. Exercise reconditioning, which lasted 45 to 60 min per session, included supervised treadmill walking, stationary bicycle and arm ergometry, recumbent stepping, rowing, and upper-body resistance exercises accomplished via wall pulleys, hand weights, and therabands. Exercise prescriptions (frequency, intensity, and duration) were individually designed for each patient based on his or her preadmission pulmonary function testing and graded treadmill or bicycle exercise testing results.

RESULTS

A series of 3 × 2 (Disease Severity × Time) repeated measures analysis of variance (ANOVA) procedures was initially conducted to investigate preprogram to postprogram changes in the variables of interest as a function of disease severity and age. The significance level established for each test was $p < .007$ (.05/7). Results of these analyses indicated that none of the dependent variables were differentially affected over the course of the program when participants' levels of disease severity or age were taken into account.

Repeated measures ANOVAs were used in investigating preprogram to postprogram changes in the variables of interest; Once again, the significance level established for each test was $p < .007$. The results indicated that dyspnea, $F(1, 39) = 55.64$, $p < .0001$; emotional function, $F(1, 39) = 31.51$, $p < .0001$; fatigue, $F(1, 39) = 77.93$, $p < .0001$; 6-min walk distance self-efficacy, $F(1, 39) = 12.50$, $p < .0001$; 6-min walk distance, $F(1, 39) = 66.54$, $p < .0001$; and total quality of life, $F(1, 39) = 74.57$, $p < .0001$, all demonstrated significant improvements over the course of the program. The mastery dimension was the only variable that failed to improve after the 12-week intervention.

Preprogram to post program effect sizes were calculated to determine the direction and degree to which the intervention was responsible for changes in the variables of interest (Table 1) Higher effect sizes are indicative of a greater impact of the program, with positive coefficients corresponding to increases and negative values associated with decreases in the variables of interest. The magnitudes of the effect sizes were interpreted according to the guidelines proposed by [6], who suggested rough standards of 0.2 (small effect), 0.5 (medium effect), and 0.8 (large effect) against which to evaluate an effect size. Accordingly, large positive effect sizes were calculated for exercise tolerance, total CRQ (quality of life) score, dyspnea, emotional function, and fatigue, whereas a moderate positive effect size was computed for self-efficacy. In addition, a small negative effect size was calculated for the mastery dimension.

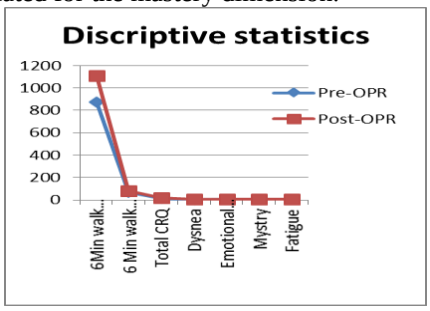

DIAGRAM 3: DISCRIPTIVE STATISTICS PRE OPR AND POST OPR

This graphical represents shows that mean of Pre and Post outpatient pulmonary rehabilitation Which consists of 6 minutes' walk distance (873.05-1110.32), 6 minute walk self-efficacy (70.21-80.30) Total CRQ(14.98-17.94) Dyspnea (2.98-4.26)Emotional function (4.30-4.89) Mastery (4.21-

4.16) and Fatigue(3.48-4.63)

Table 1. Descriptive Statistics and Effect Sizes for Exercise Tolerance, Self-Efficacy, and Quality of Life Measures

	Pre-OPR		Post-OPR		Change[a]		Effect
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	size
6-min walking distance (ft)	873.05	311.22	1,110.32	301.24	237.27	183.97[b]	0.77
6-min walking distance self-efficacy	70.21	25.24	80.10	16.60	9.89	17.69[b]	0.47
Total CRQ	14.98	2.87	17.94	2.32	2.96	2.17[b]	1.14
Dyspnea	2.98	1.16	4.26	1.06	1.28	1.08[b]	1.15
Emotional function	4.30	0.97	4.89	0.61	0.59	0.66[b]	0.75
Mastery	4.21	0.62	4.16	0.50	−0.05	0.65	−0.09
Fatigue	3.48	1.02	4.63	0.85	1.15	0.82[b]	1.23

Note. Higher scores indicate improved quality of life. OPR = outpatient pulmonary rehabilitation; CRQ = Chronic Respiratory Disease Questionnaire.

[a] Post-OPR value minus pre-OPR value. [b]Preprogram–postprogram mean significant at $p < .0001$.

Standardized residuals are obtained by regressing post program scores on preprogram scores[7]. Results of the hierarchical multiple regression analyses indicated that, when preprogram self-efficacy was statistically controlled, the change in exercise tolerance scores (residual) accounted for significant variation in postprogram self-efficacy ($R^2 = .078$, $p < .01$). Furthermore, when preprogram quality of life was statistically controlled, the change in self-efficacy (residual) accounted for significant variation in postprogram quality of life ($R^2 = .054$, $p < .05$). The positive beta coefficients indicate that improvements in exercise tolerance scores were associated with increases in self-efficacy, which, in turn, were associated with increases in quality of life.

DISCUSSION

The primary purpose of the present study was to assess the impact of a 12-week exercise rehabilitation program on changes in overall quality of life, dyspnea, fatigue, emotional function, mastery, exercise tolerance, and self-efficacy in 40 men and women with COPD. The secondary purpose was to assess the predictive relationships among changes in 6-min walking distance scores, 6-min walking distance self-efficacy, and overall CRQ scores (quality of life).

As hypothesized, significant improvements emerged in overall CRQ scores (quality of life), dyspnea, fatigue, emotional function, and exercise tolerance. Because the subscales all demonstrated improvements of at least 0.5 from preintervention to postintervention (except in the case of the mastery dimension). Repeated measures ANOVAs were all significant, and effect sizes were large and in a positive direction for all variables except mastery. Furthermore, results revealed a 20% improvement in overall CRQ scores after completion of the 12-week program. This finding supports previous research reporting as much as a 36% increase in quality of life after participation in an outpatient pulmonary rehabilitation program[5].

It is likely that the improved levels of dyspnea reported in the present study were the result of physiological improvements (e.g., decreased breathing rate, improved oxygen saturations, and increased tidal volume) derived from the exercise intervention.

The results of the present study support this hypothesis. Although these studies failed to offer an explanation for enhanced emotional function[4], social—cognitive framework predicts that enhanced perceptions of mastery or self-efficacy will result in a concomitant improvement in mood or emotional function. In support of this, previous researchers have suggested that the provision of opportunities to demonstrate mastery exercise experiences may be influential in improving one's positive mood state and decreasing negative mood states. From a social support standpoint, the opportunity to interact with participants who share similar medical problems may also serve to improve emotional function.

Contrary to our hypothesis, the mean response on the subscale actually showed a 0.05 decrease from preprogram to postprogram. In retrospect, however, it is perhaps not surprising that inconsistent findings would emerge from this subscale. Specifically, we do not believe that the dimension being measured is truly representative of one's perceived control over COPD, as proposed by the authors of the CRQ. Instead, the subscale appears to be multidimensional in nature, assessing components of mastery—perceived control as well as aspects of emotional well-being. Evidence to support this proposition is provided by post hoc analyses we conducted, as well as at least one prior investigation conducted by the authors of the CRQ. First, a nonsignificant relationship ($r = .18$) was demonstrated between changes in the mastery dimension of the CRQ and changes in exercise mastery (self-efficacy). Second, a modest correlation was found between the CRQ dimensions of emotional function and mastery $r = .26$). The validity of the mastery subscale as a measure of perceived control over disease remains in question. With this in mind, researchers using the CRQ in

future studies should consider including a task-specific measure of mastery (self-efficacy).

The present study documented a significant improvement in self-efficacy as a function of the intervention, a finding supported extensively in the COPD literature[3,4]. With regard to the present study, all four of these sources may have, to some degree, facilitated improvements in self-efficacy. Specifically, past performance accomplishments were derived from the participants' previous experiences not only with the 6-min walking distance test but also with exposure to the target behavior (e.g., walking). This source of efficacy is particularly important for COPD patients because many of them are elderly and spend a significant portion of their spare time alone. In support of our hypothesis, a significant improvement was obtained in exercise tolerance scores from preintervention to postintervention. In the present study, all 40 patients were able to walk longer distances on their postprogram walking test, with improvements ranging from 70 to 700 ft (21.3 to 213.4 m).

Also confirming our hypotheses, a significant predictive relationship was demonstrated between preprogram and postprogram changes in exercise tolerance and self-efficacy. Similar results were obtained when assessing the relationship between changes in self-efficacy and quality of life. These findings support the tenets of social—cognitive theory in that performance accomplishments predicted improvements in task-specific self-efficacy, which was, in turn, predictive of quality of life.

The lack of an attention control group must be identified as a potential limitation of the present study. Future research must attempt to include a control group to delineate the various possible mechanisms operating in the rehabilitation setting. In addition, it would be of interest to compare changes in quality of life, exercise tolerance, and self-efficacy among participants who continue to exercise in an outpatient pulmonary rehabilitation program and those who elect to exercise in the privacy of their home. Taken together, the findings of the present study support the inclusion of exercise in a comprehensive rehabilitation program for COPD patients and suggest that the significant improvements in physical and psychological well-being that may be garnered from exercise are not limited to the "young" or those with mild forms of the disease.

ETHICAL CLEARANCE CERTIFICATE

As this study involving human subjects the ethical clearance has been obtained from the ethical committee of as per the ethical guidelines for Biomedical Research on Human subjects, 2001 ICMR, and New Delhi.

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CORRELATION BETWEEN BALANCE AND BODY MASS INDEX IN SCHOOL GOING CHILDREN

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ABSTRACT

Background and Purpose: School age children are expected to function independently within their environment when performing basic activities of daily living. Adipose tissue accumulation and increase in body mass is believed to alter body balance and can be a major contributing factor concerning falls among teenagers and adult persons. The purpose of this study was to investigate the relationship between BMI and balance in school going children.

Subjects: Five hundred school going children with the age in the range 7 to 12 years were randomly selected for the study.

Methods: Participants were assessed for height and weight for calculating their body mass index (BMI). Balance was assessed with Pediatric balance scale (PBS) and Timed up & go test (TUG). Correlational analysis was done for BMI, PBS and TUG.

Results: Analysis showed there is moderately negative correlation between BMI and PBS and moderately positive correlation between BMI and TUG. The components from PBS such as placing the alternate foot on the stool and reaching forward with outstretched arm are more affected in children with increased BMI.

Discussion and Conclusion: The children with increased BMI were found with difficulty in making the adjustments in response to external disturbances in the orthostatic position and increased postural instability, which suggests that, increase in the BMI affects the balance in school going children.

KEYWORDS: Physical activity, Balance, Body Mass Index, Pediatric Balance Scale, Timed Up and Go Test, Obesity

INTRODUCTION

According to WHO, obesity is defined as an abnormal or excessive fat accumulation that may impair health. The clinical definition of obesity is a body mass index (BMI) of 30 or higher. Obesity is a condition describing excess body weight in the form of fat. Increasing prevalence of childhood obesity and overweight is a global trend and is of concern as overweight or obese children are at a higher risk of experiencing a range of health problems in the immediate, short and long term[1].

Health problems of overweight and obese children include social isolation and potential psychological dysfunction. Such children are also at a greater risk of co-morbidities than their lean counterparts. Overweight and obese children are more likely to develop certain gastrointestinal, cardiovascular, endocrine and orthopedic problems than their lean peers that may be exacerbated in the long term. Data from the longitudinal Bogalusa Heart Study suggest that, in the long term, cardiovascular disease risk factor increases greatly over time in overweight and obese children[2]. In short, remaining obese from childhood through adolescence and into adulthood places the individual at a higher risk of associated morbidities. Two main anthropometric indicators of physical growth in children and adolescents are body height and weight. Routine assessment of height and weight in youngsters and comparison with normative data provide key information about physical maturation and nutritional status, including level of overweight. Similarly, such information provides a means of simple comparison between children of the same chronological age[3]. One of the defining features of childhood obesity is early physical maturation. The ratio of height and weight, the Body Mass Index (BMI), provides another means of categorizing level of overweight and physical status[2].

Dramatic increase in the prevalence of childhood obesity within the last decade has changed the view on childhood obesity and the condition is now seen as one of the top 10 global health problems (WHO, 1998). In various countries, including India, there is evidence that physical activity among youth has declined in recent decades and the corresponding increase in obesity prevalence may be the direct result of this decline. An Australian study comparing physical activity in 10 to 12 years old children from 1985 to 1997 also reported a decrease in physical activity[4]. Physical activity should be an integral part of normal growth and development for all young people. Early in life, particularly in infancy and early childhood, physical activity has an important role in physical, mental

and psychosocial development of the child. Most importantly, self-initiated informal play should be stressed, as the opportunity for the young child to experience a wide range of physical activities is likely to provide the greatest chance of developing the set of motor skills needed for the participation in later lifestyle and/or sports activities[5].

Balance control is very necessary to accomplish common activities of daily living such as sitting, standing and walking. Balance impairments negatively affect function, leading to disability. These impairments often restrict activity levels, especially in children, as they are very active and involved in playful activities[6,7]. This may also produce abnormal compensatory motor behavior. To avoid these consequences and advance the functional status of the patient, the therapist should understand both the demands that various environments and functional tasks place on postural control systems and impairments that may diminish the ability of those systems to respond adequately[3]. There are certain studies carried out in adult population suggesting change in balance as there is change in BMI.

OBJECTIVE

The purpose of this study was to find correlation between balance and body mass index (BMI) in school going children

METHODOLOGY

Correlational study was carried out at two different schools at including both boys and girls with 7 to 12 yrs population. Aim of the study was explained to the teachers, students and parents at schools. After taking their consent, 500 children were screened for height and weight. BMI was calculated on the basis of the data as per formula: BMI = Weight (Kg) / Height^2 (m) Pediatric Balance Scale and Timed up and go test was performed by each child. Resting respiratory rate was documented. The Pediatric balance Scale was administered to all subjects.

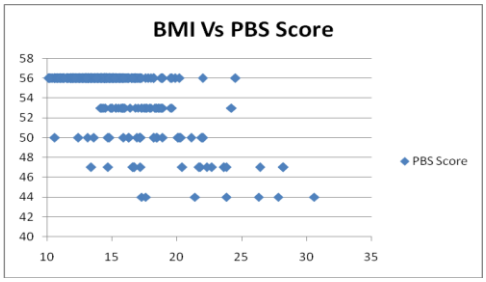
Demonstration of the task was given to the children. If the child was unable to complete the task based on their ability to understand the directions, second practice trial was given. Each was scored utilizing 0 to 4 scales. According to the protocol for scoring, the child's performance was scored, based upon the lowest criteria, which describes the child's best performance. If on the first trial a child received maximal score of 4, additional trials were not administered. Several items required the child to maintain a given position for a specific time. Progressively more points were deduced if the time or distance requirements were not met. The child was asked to perform the activity, three trials were given and the highest score was considered for scoring. PBS score was documented according to the child's performance. Rest was given to the children to attain resting respiratory rate back. Then Timed Up and Go test was performed in children. It was carried out with the help of adjustable height stool, keeping hip and knee angle with 90 degrees with feet touching to the ground. The child was asked to perform following activities: Get up from the chair, Walk a three meter distance, Come back towards the chair, Sit on the chair. The time required to perform the above task was calculated with the help of stopwatch.

DATA ANALYSIS AND RESULTS

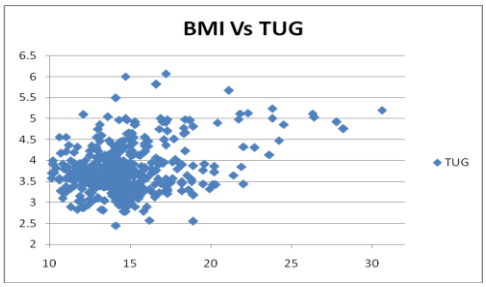
Data was analysed with Pearson's correlation coefficient.

TABLE 1: DEMOGRAPHIC PRESENTATION OF GENDER IN 7 TO 12 YEARS OF SCHOOL GOING CHILDREN

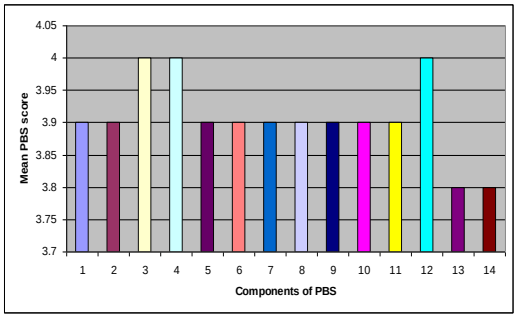
Gender	Total (500)
Boys	278
Girls	222



GRAPH 1: CORRELATION-REGRESSION ANALYSIS TESTED FOR BMI VS PBS



GRAPH 2: CORRELATION-REGRESSION ANALYSIS TESTED FOR BMI VS TUG



GRAPH 3: MEAN SCORE OF THE COMPONENTS OF PBS

The r and p values for BMI to PBS is r = -0.6569 and p = 0.000 respectively, which shows that there is moderately negative correlation between BMI and PBS. Whereas r and p values are for BMI to TUG is r = 0.3339 and p = 0.000 respectively, which shows that there is moderately positive correlation between BMI and TUG. At PBS; 4, 13th and 14th components (i.e.) placing the alternate foot on the stool and reaching forward with outstretched arm are more affected in children with increased BMI.

DISCUSSION

Hill (1991) affirmed that excess weight and low level of physical activity increase postural instability. Increase in BMI reduces the ability to make the adjustments in response to external disturbances in the orthostatic position, increasing postural instability. Accumulation of fat tissue can reduce and contribute towards falls. Obesity causes alterations in gait associated with risk of falls. Spyropolous (1999) suggested that walking speed, step length, step frequency is significantly lower in obese. Obese individuals walk slowly, take smaller strides and remain in double support for longer time in order to maintain balance. Deviation from obese gait pattern would result in instability and loss of balance. Obesity has impaired muscle strength, a strongly rated risk factor for falls. Obese subjects have higher prevalence of falls and ambulatory stumbling. Excessive weight results in abnormal mechanics such as impaired gait, balance, strength, identifying strong risk of falls.

CONCLUSION

Increase in BMI in pediatric population may decrease their balance.

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DYNAMIC BALANCE STATUS AMONG STROKE SURVIVORS-A COMPARATIVE STUDY WITH AGE, SEX MATCHED POPULATION USING BERG BALANCE SCALE

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ABSTRACT

OBJECTIVES: To find out the dynamic status of balance among stroke survivors using Berg balance scale. To compare the dynamic balance of stroke survivors with age, sex matched population. To compare the dynamic balance status between Ischemic vs. Heamorrahgic & Right vs. Left side of stroke survivors.

STUDY DESIGN: Cross-sectional study.

PARTICIPANTS: 30 stroke survivors and 30 age, sex matched people.

METHODOLOGY: 30 stroke survivors and 30 age, sex matched people were selected and screened for dynamic balance status using Berg Balance Scale (BBS). The balance status between the stroke survivors and control population was compared using Paired't' test.

RESULTS: Out of 30 stroke patients 11 had high risk of fall, 13 had moderate risk, while 6 had mild risk of fall. On the other hand in Age, Sex matched population all the 30 people had mild risk of fall. Thus the difference in Berg Balance Score of the two studied population is statistically significant. Further, in Stroke survivors, side affected is found to be significantly related to BBS while, type of stroke is found to be non-significant.

CONCLUSION: Dynamic status of the balance of stroke survivors is affected when assessed with Berg Balance Scale. Hence, it is concluded that stroke survivors are more prone for falls than the age, sex matched population.

KEYWORDS: Balance, Stroke, Berg Balance Scale.

INTRODUCTION

Following a stroke, people are at high risk of falls (1.3–6.5 falls/ person/year)[1,2], with the highest rates occurring upon discharge from hospital. Falls can lead to serious consequences that can affect everyday life. The risk of falling in stroke survivors is double compared to age matched population without stroke[3,4]. Falls are more frequent and more likely to result in injury among stroke survivors than among the general older population[5].The BBS is a psychometrically sound measure of balance impairment for use in post stroke assessment6. So far, no study tried to find out the dynamic balance status of stroke population compared with age, sex matched population using Berg Balance Scale. Hence, this study tries to compare the dynamic balance status among stroke survivors compared with age, sex matched population.

MATERIALS AND METHODS

SAMPLING: Random sampling.

STUDY SETTING: Community.

MATERIALS: Questionnaire & Berg Balance Scale.

INCLUSION CRITERIA:

- Medically stable hemiplegics of both sides & sex with duration of 6 months to 2 years.
- Willing, Co-operative subjects without any neurological deficit (except stroke for study group) for both groups.
- Not taking alcohol, sedatives, antihistamines and other CNS Depressants.
- Residing within a radius of 7 Kilometer from the Hospital.

METHODOLGY

This is a descriptive cross sectional study with 30 stroke subjects randomly picked from stroke patients admitted in Rajah Muthiah Medical college Hospital during January 2011 to January 2012 from the medical database. 30 age; sex matched apparently normal subjects from the community of stroke survivors were also studied. Both the subjects were selected according to the inclusion criteria. All types of stroke were included in this

study. The BBS is a 14-item scale that quantitatively assesses balance and risk for falls in older community-dwelling adults as well as stroke survivors through direct observation of their performance6. Hence, along with demographic data like age, sex, and co – morbidities, Berg Balance Score was also taken for both study and control group. Type of stroke and side affected were also noted for study group.

The data so collected were statistically analyzed using SYSTAT 12 to know the effect of BBS on stroke in comparison with normal population.

ANALYSIS OF DATA

TABLE 1: DISTRIBUTION OF DYNAMIC BALANCE STATUS BY GROUPWISE

BBS	CONTROLLED POPULATION (N=30)		STROKE SURVIVORS (N=30)	
	No.	%	No.	%
0-20 High risk	0	Nil	11	36.7%
21-40 Moderate risk	0	Nil	13	43.3%
41-56 Mild risk	30	100%	06	20%

TABLE 2: DISTRIBUTION OF CO-MORBIDITIES BY GROUPWISE

Variable	Controlled Population	Stroke Survivors	Mcnemar's Chi-Square Value	P-Value
Co-Morbidities			6.167	0.405 (NS)*
Nil	11	15		
Diabetes Mellitus	11	5		
Hypertension	4	8		
Both	4	2		

NS*=Non-Significant

TABLE 3: MEAN AND STANDARD DEVIATION OF BBS BY GROUPWISE

Variable	No Of Persons	Mean (SD)	Paired T-Test Value	P-Value
Stroke Survivors	30	30.30(11.274)	9.835	<0.001(S)*
Controlled	30	50.90(2.295)		

S*=Significant

TABLE 4: MEAN AND STANDARD DEVIATION OF BBS BY TYPE OF STROKE

Variable	No.Of Persons	Mean	Standard Deviation	Independent T- Test Value	P-Value
Ischemic	24	30.37	11.66	.07	0.941(Ns)*
Hemorrhage	6	30.00	10.56		

NS*=Non Significant

TABLE 5: MEAN AND STANDARD DEVIATION OF BBS BY SIDE AFFECTED

Variable	No. of Persons	Mean	Standard Deviation	Independent T- Test Value	P-Value
Right	16	34.5	11.6	2.38	0.026(S)*
Left	14	25.5	8.9		

S*=Significant

RESULTS

Out of 30 stroke survivors studied using Berg Balance Scale, 36.7 % were found to be in high risk, 43.3% with moderate risk and 20% with mild risk. While in 30 normal age, sex matched population, 100% of subjects have mild risk according to BBS.

Co – morbidities is divided into four categories, nil, diabetes mellitus, hypertension and both. McNemar's Chi square value of co-morbidities is 6.16 and p value is 0.40. Hence, it was found as non-significant which infers both the group has similar co – morbidities.

Controlled population mean is 50.3 and for stroke survivors it is 30.3. Standard Deviation is 2.2 for controlled population and 11.2 stroke survivors. Paired T test Score of BBS for controlled population vs. stroke survivors is 9.835, while the P value is <0.001. Hence it is highly significant.

Ischemic type of stroke survivors mean is 30.37 and 30.0 for hemorrhage stroke. Standard Deviation for Ischemic stroke is 11.66 and 10.56 for Hemorrhage stroke survivors. Independent T test for Ischemic vs. Hemorrhage is 0.07, and P – value is 0.941 denotes non significance.

Right side mean is 34.5 and for left side it is 25.5. Independent T- Test Score of Right Side affected vs. Left Side affected is 2.38, P – value is .026 denotes significance.

DISCUSSION

Falls after stroke can result in hip fractures[7,8] soft tissue injuries[9] and increased immobility, leading to greater disability[10]. Thus balance impairments may reduce individual's confidence in their mobility and restrict their participation in activities[11]. The main aim of this study is to find out the dynamic balance status among stroke survivors using BBS.

Thirty stroke survivors and thirty age and gender matched population were included in this study. Twenty four were male and six were females in either group. Age of the studied population is between 41 to 60 years (Mean Age 55). Among stroke survivors twenty four were ischemic and six were hemorrhage. Sixteen were right sided and

fourteen were left sided. Among age and gender matched population the subjects were chosen without any major neurological conditions. Unique feature of this study is that the age and gender were matched with stroke survivors to know the difference in dynamic status of balance. More over Chi-square distribution of both groups for co-morbidities was found to be non-significant. This shows that both groups having similar co-morbidities.

BBS is used to assess both the static and dynamic balance. BBS tests the challenges of balance while sitting, standing, or stepping and has been shown to have acceptable internal consistency, test–retest reliability, and responsiveness[11]. BBS is stratified in to three groups, viz., 0-20 as high risk of falls, 21-40 as moderate risk, and 41-56 as mild risk. In this study, 100% of the normal population comes under mild risk, compared to 15 % of fall rate among geriatric population[12]. This may be due to the studied population under the age of 60. In stroke survivors, 36.7% with high risk and 43.7% with moderate risk and 20% with mild risk were found. This shows that 80% of the stroke survivors are moderate to high risk of falling.

Investigators found fall risk of 21–57% among stroke survivors which is significantly higher than age- matched controls[13,14,15]. But in one study by Lisa A. Simpson et.al.[16] the age is not significance with berg balance scale and this may be due to the studied population mean age is 67 in comparison to the mean age of our study which is 55.

In stroke survivors, reductions in muscle strength and range of movement, abnormal muscle tone and loss of motor coordination and sensory organization along with cognitive disturbances can contribute to balance disturbances to varying degrees[17].

More over Tina Baetens et al and other author describes the risk factors for balance loss due to disease-related balance and gait deficits, increased dependency in activities of daily living (ADL) and decreased transfer ability, as well as disease-related mental factors such as depression and cognitive deficits. Quadriceps strength, spasticity and neglect are the other contributing potential factors[13,19,20].

To the best knowledge of the investigator, there is lack of studies in assessing the dynamic balance status in relation to type of stroke and side affected. Poorer balance (Berg Balance Scale) was associated with greater falls for both stroke and age and sex matched population. More over the study also reveals balance function can predict falls for both people with stroke and age and sex matched controls[16]. In this study, it was found as significant in side affected and non-significant in type of stroke. Rapport LJ et al found perceptual deficit as measured by the Rey-Osterreith Complex Figure and general inattention as measured by Digit Span were associated with falls of the right CVA and more over the literature also suggests that impulsivity may act as an important mediating factor in determining individual risk for fall[20].

Hence, these results suggest that the fall risk among stroke survivors is significantly higher than age, sex matched population.

The limitations of this study were

- Small sample size especially in comparing type of stroke.
- Only one group with age ranging from 41 to 60 and duration ranging from 6 months to 2 years.

CONCLUSION

Dynamic status of the balance of stroke survivors is affected when assessed with Berg Balance Scale. Hence, it is concluded that stroke survivors are more prone for falls than the age, sex matched population.

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EFFECT OF MCKENZIE TECHNIQUE VERSUS NEURAL MOBILIZATION IN CHRONIC LOW BACK WITH RADICULOPATHY – A RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Purpose: To study the effectiveness of McKenzie Technique and Neural Mobilization in chronic low back with radiculopathy on pain, spinal mobility and disability.

Relevance: Radiculopathy also known as nerve root pain which arise from disc herniation or spinal stenosis or post operative scarring, it radiates down the leg in a dermatomal pattern, the unilateral leg pain is often described by the patient as worse than the back pain.. McKenzie technique and neural mobilization techniques are the forms of manual therapy that are used in an effort to reduce radiating pain and improve range of motion. Efficient and effective management of acute low back pain is necessary hence to study the effectiveness of either technique in managing chronic low back with radiculopathy was the objective of this research report.

Participants: 40 subjects with chronic low back with radiculopathy were recruited from OPD of Physiotherapy of KLES Dr Prabhakar Kore Hospital and MRC & KLES Ayurved Hospital, Belgaum.

Methods: Subjects were randomly grouped into 2 group´s viz. Group A (TENS + traction and McKenzie technique) & Group B (TENS + traction and neural mobilization technique). The outcome measures were visual analogue scale (VAS), spinal flexion and extension ROM by Schobers method, and disability level in terms of Modified Oswestry Disability Questionnaire (MODQ).

Results: Within group's comparison showed significant result for Pain, extension range of motion and MODQ score and Between group's comparison showed significant result for Pain, extension range of motion and MODQ score with p = 0.001, 0.004 and 0.008 respectively indicating effectiveness of McKenzie technique

Conclusions: The results of this study showed that along with TENS +Traction, McKenzie Technique is significant in decreasing pain, improving functional ability and increasing spinal extension in chronic low back with radiculopathy.

KEYWORDS: Chronic Low Back Pain; McKenzie Technique; Neural Mobilization Technique; Radiculopathy

INTRODUCTION

Low back pain is one of the most common medical problems and causes a significant amount of disability and incapacity in different countries[1].

Low back pain is an ache or discomfort in the area of lower part of the back and spinal column. It is characterized by a range of symptoms which includes pain, muscle tension or stiffness and is localized between the shoulder blades and folds of the buttocks with or without spreading to the legs. Low back pain (LBP) is commonly categorized into acute, subacute and chronic. It is often self-limiting so many resolve with or without treatment[2]. It represents a particularly costly sociomedical problem due to the expenditure associated with repeated treatments, long-term absence from work and need for social support[3]. Low back pain is defined as chronic after 3 months because most of normal connective tissue heals within 6-12 weeks unless pathoanatomic instability persists. The intervertebral disc is the common cause of back pain and the most common cause of radiculopathy[4].

Radiculopathy also known as nerve root pain which arise from disc herniation or spinal stenosis or post operative scarring, it radiates down the leg in a dermatomal pattern, the unilateral leg pain is often described by the patient as worse than the back pain[5]. In approximately 90% of the cases of radiculopathy is caused by herniated disc with associated nerve root compression but lumbar stenosis and less frequently tumors are the possible causes[6]. Chronic low back pain with radiculopathy occurs in approximately 3-5% of the population, and men and women are affected equally, although men are most commonly affected in their 40s and women are affected commonly between ages 50-60, of those who have this condition, 10-25% develop symptoms that persists for more than 6 weeks. It has been estimated that this involves less than 5% of all those who have back pain, some studies give higher estimates[7]. An accurate diagnosis of the causes of the LBP and treatment objectives plays a role in the determination of the type of physical therapy to be employed for LBP. Several treatment modalities have been recognized to date. There are various interventions available for this which includes

Transcutaneous Electrical nerve stimulation, Traction, Therapeutic ultrasound, Thermotherapy, EMG Biofeedback, Spinal manipulations, Neural mobilizations, Exercises and various other manual therapy techniques. McKenzie technique and neural mobilization are one of the manual therapy techniques used in spine care programs in an effort to decrease pain and to improve range of motion and activities of daily living.

An increasingly popular conceptual system is that of Robin McKenzie of New Zealand, who believes that the principal cause of back pain is disc disease manifested by abnormal mechanics resulting from the consequences of migration of the intact nucleus within the disc, not frank herniation[8]. McKenzie describes a postural syndrome characterized by mechanical deformation of the soft tissues as a result of prolonged postural stress that can lead to pain and a dysfunction syndrome that features pathologically involved muscles, ligaments, fascia, facet joints, and the intervertebral disc. McKenzie advocates position and movement patterns, flexion or extension that best relieve the patient's symptoms. McKenzie describes the phenomenon called "centralization" of pain whereby distal symptoms moves proximally, towards the midline of the spine, and are abolished by certain movements[9]. Butler recommends that neural mobilization technique (NMT) is another form of manual therapy similar to joint mobilization[10].

Low back pain with radiculopathy is a common clinical problem that mainly involves L5 and S1 nerve roots. In the field of physiotherapy there is a growing interest towards developing an evidence based practice of common procedures used in the physiotherapy treatment programs. McKenzie technique utilizes back extension exercise for the management of lumbosacral radiculopathy. Neural mobilization is another effective technique in management of low back pain with radiculopathy. But very little has been published in the literature. Hence this study is to determine the effectiveness of two forms of manual therapy interventions that is McKenzie technique and Neural mobilization technique (NMT) in participants with chronic low back pain with radiculopathy on pain, movements and functional ability.

METHODS

DESIGN AND SUBJECTS

The study was a Randomized Clinical Trial. The study sample included subjects with chronic low back with radiculopathy. Non Probability Convenience method was used and random allocation of subjects into 2 groups done by using envelope method. Subjects were recruited form physiotherapy OPD of KLES Dr. Prabhakar Kore Hospital and MRC, Belgaum and KLES Ayurved Hospital and Research Centre, Shahpur, Belgaum.

Both male and female Subjects with the diagnosis of chronic low back with radiculopathy were included if they met the following criteria: 1.LBP and symptoms extending distal to the gluteal region on lower extremity. 2. Patients age between 25-60 years. 3. The centralization phenomenon, determined by using active movements testing has to be present. 4. Symptoms more than 3 months. 5. Subjects who were willing to participate in the study was be recruited. Subjects were excluded if 1.Patients with inflammatory, infections, metabolic diseases of spine and malignancy. 2. Patients with history of vertebral fracture. 3. Pregnancy.4. History of spinal surgery. 5. Patients with neurological defects such as altered sensation, muscles weakness, altered deep tendon reflexes.6.Cardiovascular disorders and psychological pain.

Ethical clearance was obtained from Ethical Committee, KLEU Institute of Physiotherapy before commencing the study. Informed consent was taken from the subjects.

OUTCOME MEASURES

The outcomes were assessed pre intervention on day 1 and post assessment on day 8. VAS (visual analogue Scale) was used to measure pain. ROM (range of motion) was measured using Schober's method. Disability score was measured by using Modified Oswestry Disability Questionnaire.

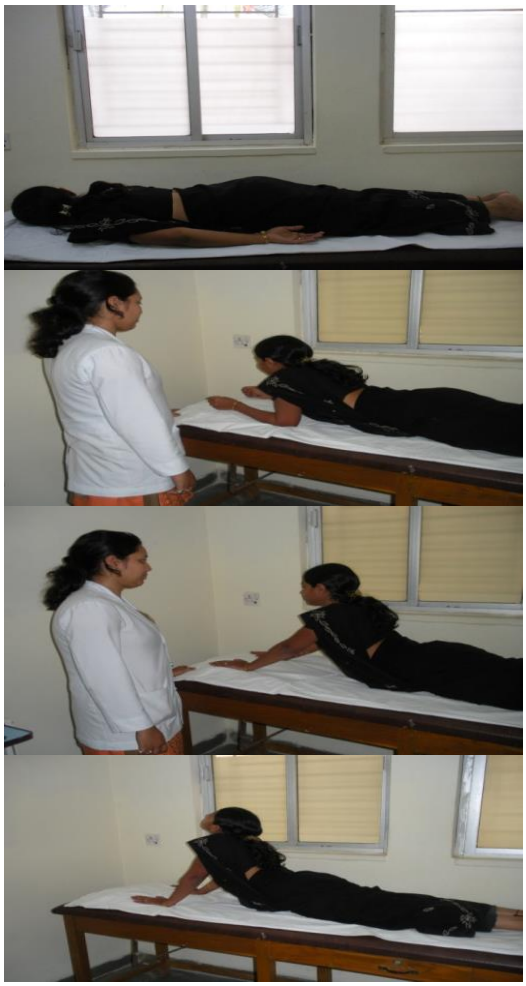
Procedure

The procedure was explained to the subjects. Subjects diagnosed of chronic low back with radiculopathy were screened and included in the study. Group A participants received treatment of TENS for 30 minutes and traction for 20 minutes followed by McKenzie technique. Group B participants received treatment of TENS for 30 minutes and traction for 20 minutes followed by neural mobilization technique. Both group received 8 sessions of therapy at one session per day. Prior to the manual therapy techniques TENS was given for 30 min 1 session/day and Traction was applied for 20 minutes.

McKenzie Technique

The participant lies on abdomen on the treatment couch. The goal was to produce

centralization of symptoms. The activity was a sagittal extension forces rapidly progressing through to patient overpressure to gain full range. Extension exercises were progressed as tolerated starting with static prone positioning, if any symptoms were recorded. Next stage was lying prone in extension (prone on elbows). The next progression is extension in lying (prone on hands with elbow extension). Last step was extension in lying with patient overpressure. In this stage the patient sags her hips and breaths out fully to gain maximal extension to complete the reductive process. A subject who tolerated the complete exercise program performed 3 sets of 10 repetitions of repeated end range extension in prone position.



Neural Mobilization Technique

The participant is in supine lying and the leg was lifted upward as a solid lever, while maintaining the knee extension. The leg was raised past 35° in order to take up the slack in the nerve. Sciatic nerve is completely stretched at 70°. For additional sensitization hip adduction was added to straight leg rising. The intervention consists of gentle short duration (1 second) and large amplitude passive movements were performed at 'feather edge' of patients' neural symptoms in on/off fashion. A mild degree of discomfort was permitted during 'on' phase which must be completely abate when the tension was withdrawn (off phase). 30 seconds of on/off mobilization of 3 repetitions was performed.

RESULTS

The statistical analysis was done using SPSS software. Inter group analysis was done by students unpaired t test and intra group comparison was done using students paired t test.

Total of 40 subjects were screened and then randomly allocated into 2 groups.

The demographics details of the subjects are given in table 1. The groups were homogenous in terms of mean age, gender, affected side.

TABLE 1: DEMOGRAPHIC PROFILE

	GROUPA (n = 20)	GROUPB (n = 20)		p value
Mean Age	50.7±8.37	49.1±8.47	0.600	0.552
Mean BMI	22.68±1.74	22.87±1.71	0.362	0.719
Gender			X21= 0.400	p= 0.527
Males	9	11		
Female	11	9		
Affected side			X21= 0.417	p=0.519
Right	13	11		
Left	7	9		

Within group analysis showed significant differences in outcome measures ($p < 0.001$) for both groups and values are given in table 2.

Between group's comparison showed significant result for Pain, extension range of motion and MODQ score with $p = 0.001$, 0.004 and 0.008 respectively indicating effectiveness of McKenzie technique. (Table no 3)

TABLE 2: WITHIN GROUP COMPARISON

	Pre	Post	Diff	Paired t	*p*
Group A 1	6.37±1.82	1.67±0.59	5.05±1.60	14.090	<0.001*
Group B 1	7.3±1.54	2.61±0.92	4.69±1.12	18.609	<0.001*
Group A 2	36.9±13.1	15.5±6.50	21.4±11.01	16.837	<0.001*
Group B 2	29.5±6.80	10.5±4.41	18.9±5.03	8.715	<0.001*
Group A 3	1.7±0.40	3.5±0.55	1.83±0.61	13.367	<0.001*
Group B 3	1.6±0.39	3.6±0.45	1.97±0.64	13.764	<0.001*
Group A 4	2.5±0.45	4.6±0.39	2.1±0.67	13.883	<0.001*
Group B 4	2.3±0.45	4.3±0.39	2.0±0.49	18.264	<0.001*

1. VAS, 2 MODQ score, 3.Spinal Flexion ROM, 4.Spinal Extension RO

TABLE 3: BETWEEN GROUP COMPARISONS

		Unpaired t	p
1	Group A Vs Group B	3.806	0.001*
2	Group A Vs Group B	2.816	0.008*
3	Group A Vs Group B	0.658	0.514
4	Group A Vs Group B	3.044	0.004*

DISCUSSION

The result from statistical analysis of the present study showed that along with TENS +Traction, McKenzie Technique is effective in decreasing pain, improving functional ability and increasing spinal extension in chronic low back with radiculopathy.

Within groups comparison showed significant reduction in VAS scores, but between group analyses showed McKenzie group showed more reduction in pain. In the present study both the groups were given TENS. This reduction of pain can be due to the application of TENS and this coincides with the study by Fried T et al[11]. The McKenzie group showed more reduction of pain. The centralization effect of McKenzie technique may contribute to the reduction of pain. Centralization of pain is a phenomenon initially observed by Robin McKenzie in 1956[9]. A study was done to find the effectiveness of McKenzie exercises in patients with lumbar radiculopathy; thirty four patients were recruited into two groups of one with McKenzie and one with joint mobilization. McKenzie group demonstrated significantly greater improvements in pain and function after three sessions[12]. Similarly studies done by Goldby[13], Nwuga[14] support the result of this study.

Within groups comparison showed significant reduction in MODQ scores, but between group analyses showed McKenzie group showed more reduction in MODQ scores. In the present study both the groups were given Traction. This reduction of MODQ can be due to the application of Traction and this coincides with the study by Frtiz et al which was done on 64 subjects with LBP and signs of nerve root compression were randomized to receive a 6 week extension oriented exercise with or without mechanical traction during the first 2 weeks, comparisons conducted for change in pain, disability and fear- avoidance beliefs. The group received traction showed greater improvements in disability (mean difference in Oswestry change 7.2 points) and Fear-Avoidance Beliefs Questionnaire change 2.6 points after 2 weeks[15]. A randomized clinical trial was done to examine the effectiveness of an extension oriented treatment approach (EOTA) in a subgroup of patients with low back pain with similar patients who received a lumbar spine strengthening exercise program. Subjects undergone 8 sessions and completed a home exercise program for 4 weeks. Subjects who received an EOTA experienced significantly greater improvements in disability than subjects who received an alternative trunk strengthening program (p=.02)[16].

Within group's comparison showed significant increase in spinal flexion ROM, but between group analyses was not significant for either group. Both are equally effective for increasing spinal flexion ROM. A study conducted using McKenzie technique and placebo-Like "mini back school" showed a very few recurrences of pain with McKenzie technique compared to "mini back school"(p<.oo1), lumbar spine range of motion, initially it was same for both the groups, but after 3 weeks the McKenzie group scored better for spinal flexion, extension, side flexion. This study supports the use of McKenzie technique to increase the lumbar spine ROM and in reduction of pain[9].

Within group's comparison showed significant increase in spinal extension ROM, but between group analyses showed McKenzie group showed more significant increase in spinal extension ROM. McKenzie describes the phenomenon called "centralization" of pain whereby distal symptoms moves proximally, towards the midline of the spine, and are abolished by certain movements[9].

The McKenzie technique is a more passive form of spinal manipulation in which patient produces the motion, position and forces that improve the condition[5]. McKenzie back extension is a progression form lying prone to prone on hand with over pressure. These back extensions exercises from prone lying is assumed to have a greater effect in moving the disc content anteriorly away from spinal nerves pathway. This movement is believed to reduce radicular symptoms of patient with derangement and also doing repeated extension exercise will help in maintaining and improving spinal extension[17].

CONCLUSION

The results of this study showed that along with TENS +Traction, McKenzie Technique is significant in decreasing pain, improving functional ability and increasing spinal extension in chronic low back with radiculopathy.

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CONFLICT OF INTEREST

No conflicts of interest were reported for this study.

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REHABILITATION NEEDS ASSESSMENT AMONG STROKE PATIENTS IN TERTIARY HOSPITAL OF ANDHRA PRADESH

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ABSTRACT

Stroke (Cerebrovascular accident) is the leading cause of death and disability worldwide. It is a disease that predominantly occurs in the middle-aged and the elderly. The Indian Council of Medical Research (ICMR) estimated that in 2004, stroke contributed 41% of deaths and 72% of disability adjusted life years (DALY) amongst the non-communicable diseases in India. Given the epidemic proportion of stroke and the burden of disability imposed by the condition in India, the rehabilitation needs of the stroke survivors in India has to be identified and addressed. Hence we undertook a study to assess the rehabilitation needs of the hospitalized stroke survivors in Hyderabad, a metropolitan city in India.

Aim: To assess the rehabilitation needs of the stroke survivors admitted in a tertiary hospital.

Method: Twenty stroke survivors were recruited for the study from Osmania general hospital in Hyderabad, Andhra Pradesh. A semi-structured rehabilitation needs assessment questionnaire was developed and used to identify the rehabilitation needs among the stroke survivors admitted in the hospital.

Result: All study participants had physical disability and only 65% among them expressed need for physiotherapy services. Difficulty in performing activities of daily living was identified among 80% of the study participants and 50% within this group felt that the nurses could help them with their basic activities of daily living. Participants who had communication difficulties were 70% and among them, only 20% expressed their need for services from a speech therapist. Psychological problems following stroke was identified among 30% of the study participants and all of them expressed their need to meet a professional counselor to discuss their psychological problems.

KEYWORDS- Stroke, Cerebrovascular accident (CVA), Rehabilitation, Felt needs, Semi-Structured Questionnaire

INTRODUCTION

Globally, stroke is the second most common cause of death and the third most common cause of disability[1]. In India, the Indian Council of Medical Research (ICMR) indicated that stroke contributed to 41% of deaths and 72% of disability adjusted life years (DALYs) amongst non-communicable diseases[2]. As one of the low middle income country (LMIC), stroke is an important public health problem in India and the prevalence of stroke in the elderly has been shown to be high (18-32% of all stroke cases) in India compared to high-income countries[3,4].

Stroke affects an individual in many ways and the clinical presentation of stroke is much varied. According to World Health Organization the most common symptom of stroke is sudden weakness or numbness of the face, arm or leg, most often on one side of the body. Other symptoms include confusion, difficulty speaking or understanding speech; difficulty seeing with one or both eyes; difficulty walking, dizziness, loss of balance or coordination; severe headache with no known cause; fainting or unconsciousness[5].

Given the diverse effects of stroke, enabling the stroke survivors and their families to manage the post-stroke disability through a multi-disciplinary stroke rehabilitation service becomes important and essential. The WHO defines rehabilitation as the combination and coordination of medical, social, educational and vocational resources aimed at optimizing a person's functional independence[6]. The stroke survivors require rehabilitation services to help them resume their previous activities and roles in their own environment, but only some of them receive these services[7]. The importance of assessing rehabilitation needs is to better understand the needs of stroke survivors and to improve the provision of rehabilitation services for them. Rehabilitation needs according to Bradshaw's taxonomy used by Pineault and Daveluy[8,9] are of four types: normative needs, perceived needs, expressed needs and comparative needs. Normative needs are those that agree with norms, as defined by health professionals. Perceived needs are those perceived by individuals. They become expressed needs, once articulated. Generalization of evaluated needs in a population results in comparative needs. The needs are also found to depend on factors related to an individual experiencing disability due to a health

condition such as stroke in this instance and his/her environment- especially factors related to service providers, service provision, availability of services, accessibility and affordability of these services[10]. According to the International Classification of Functioning disability and health (ICF), Rehabilitation or disability related needs depends on the patient's personal capabilities and the environment in which he experiences disability. Visualizing the concepts of ICF in an Indian situation, the environment plays major role on the felt needs of the stroke survivors or people with disabilities in general. Unlike developed countries, existence of several architectural barriers, availability of rehabilitation workforce and services, access and affordability to these rehabilitation services in India is very limited[11]. Hence we assessed the rehabilitation needs of the stroke survivors in a tertiary hospital where some kind of rehabilitation services were available and explored the needs of the stroke survivors in this hospital[11].

STUDY METHODS

Patients admitted in tertiary (Osmania General) hospital and diagnosed for stroke through CT scan and confirmed by a neurologist were approached for the study. Osmania General Hospital is a government of Andhra Pradesh managed tertiary hospital, one of the oldest hospitals in India. The hospital has a bed capacity of 1168 which is split into 363 super specialty beds, 160 emergency beds and 685 general beds. People from various parts of the state and also from other neighboring states sought this hospital for treatment. The rehabilitation team in the hospital included doctors (neurologists), physiotherapists (PT) and nurses. Other rehabilitation professionals like occupation therapists (OT), specialized rehabilitation nurses or speech therapist and their services were not available in this hospital. .

Inclusion Criteria

- Stroke survivors aged above 18 years of age.
- Diagnosed by neurologist as stroke with confirmation by CT scan.
- In-patients admitted between10th April 2013 to 29th May 2013.
- Those who provided consent to participate in the study.

Since there was no readily available standardised tool for assessing the rehabilitation needs of stroke survivors, a Semi-Structured questionnaire was prepared by the investigators and was piloted on three study participants and changes were made accordingly before using this new tool in the study. Semi-structured questionnaire was used to collect information on rehabilitation needs. Questions pertaining to socio-demographic profile, time taken for diagnosis, provision of information on stroke and rehabilitation and patients understanding, assistance required for performing their activities of daily living (ADLs) tasks, services received in the hospital and further services they needed to cope with stroke were included in the tool. All the information was collected by one investigator using semi-structured questionnaire from a total of 20 study participants who were purposively selected.

Ethical approval for the study was obtained from the Institutional Ethics Committee of the Indian Institute of Public Health, Hyderabad.

Analysis of data was done using Microsoft excel for quantitative data and data were aggregated and grouped using framework approach for qualitative data analysis.

RESULTS

Twenty study participants (n=20) interviewed were diagnosed by neurologist as stroke with confirmation by CT scan. 75% (15) were over 50 years of age and 25% (5) were below 50 years of age. These study participants were diagnosed of stroke at various points in time with majority of study participants diagnosed within 24 hours of the onset of symptoms 85% (17). Two study participants diagnosed within one week of stroke and only one patient diagnosed after a week following the episode of stroke due to delay in the referral. These study participants hailed from various parts of Andhra Pradesh.

TABLE-1: SOCIO-DEMOGRAPHIC PROFILE OF THE STUDY PARTICIPANTS

Study participants Characteristics		Percentages (Numbers)
Age	<50 Years	25 % (5)
	>50 Years	75 % (15)
Gender	Male	75% (15)
	Female	25 % (5)
Education	Illiterate	65 % (13)
	<5th Class	10 % (2)
	5-9th Class	15 % (3)
	>=10th Class	10 % (2)
Occupation	None	50 % (10)
	Agriculture (Farmer)	5 % (1)
	Class four worker	45 % (9)
Type of Disability	Physical	100% (20)
	Communication	70% (14)
	ADL	80% (16)
	Psychological	30% (6)
Time taken for Diagnosis	Within 24 Hrs.	85% (17)
	Within one week	10% (2)
	More than one week	5% (1)

The socio-demographic profile of the study participants are depicted in Table 1. Disability experienced by the participants as defined by the ICF were assessed and grouped for the analysis into 4 types - physical disability, communication disability, disability in performing Activities of Daily Living (ADL) and psychological disability..

REHABILITATION NEEDS

All study participants had physical disability and only 65% among them expressed need for physiotherapy services. Difficulty in performing activities of daily living was identified among 80% of the study participants and 50% within this group felt that the staff nurses in the hospital could help them with their basic activities of daily living. Study participants who had communication difficulties were 70% and among them, only 20% expressed their need for services from a speech therapist. Psychological problems following stroke was identified among 30% of the study participants and all of them expressed their need to meet a professional counselor to discuss their psychological problems.

Rehabilitation needs were grouped into four categories in line with type of disability. They were physical needs, communication needs, Activities of Daily living (ADL) needs and psychological needs. Among the participants interviewed in the study, 75% of the male participants and 25% of the female participants experienced physical disability. Among them, 65% expressed their need for physiotherapy services to manage their physical disability. Communication disability (speech) was identified in 50% of the male participants and 20% of the female participants in the study. Among the participants identified to have communication difficulty, 25% of them expressed their need for speech therapy services to overcome their communication difficulties. Nearly 55% of the male participants and 25% of the female participants were identified to have problems in performing their activities of daily living (ADL) independently. Among these participants with ADL problems, 50% of them needed nursing assistance in performing their basic activities of daily living and 10% of them reported the need for consultation with dietician,. Psychological problems were identified in 30% of the study participants and everyone (30%) with this problem expressed their need for psychological services.

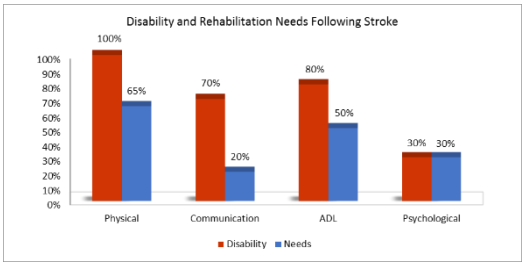

FIGURE-1: TYPES OF DISABILITY AND REHABILITATION NEEDS FOLLOWING STROKE.

DISABILITY AND REHABILITATION NEEDS FOLLOWING STROKE

From the qualitative data collected four major themes were identified which are described below-

Physiotherapy Services-

65% (13) study participants felt that physiotherapy and exercise play a major role in faster recovery. All the study participants expressed need for receiving physiotherapist consultation and regular exercise at home following discharge. One of the participants expressed his/her physical need as-

"I need physiotherapist assistance for exercises at home after discharge"

Daily Living (Bladder-bowel, Swallowing and Diet)-

Nursing assistance for performing activities of daily living (ADLs) was expressed as a need by about 40% of the study participants. Even in the hospital setting, the stroke survivors felt that those needs weren't met by the staff nurses. When a question was asked about the need for assistance in performing his/her basic activities of daily living (ADL's), one participant replied -

"I want nursing staff assistance in regular dressing of bed sores and should help in feeding"

The need for consultation from a dietician for whatever food or nutrition a stroke survivor should take was expressed by almost 10% (2) of the interviewed study participants. The participants felt that this would enable them to have faster recovery. One participant while speaking about this mentioned

"I want a dietician consultation so that I know which food I should take to manage my condition"

Communication-

Among the participants who had difficulties to communicate as a result of stroke,

20% (4) of them felt that they need a speech therapist consultation and advice. They felt that it will help them in verbal communication and will also increase their confidence. When a question was asked about communication needs and expressing their feelings to their loved ones, one of the study participants answered "I need help from a speech therapist to share my feelings with my wife"

Psychological Support-

Psychological support was expressed to be an important need by 30% (6) study participants. Participants wanted to know in greater detail about their problem and the long term consequences of stroke on these issues. When a participant was questioned about how he/she felt about themselves and their family he/she replied.

"I need support from a professional counsellor to share my feelings"

DISCUSSION

This study shows that the rehabilitation needs of hospitalised stroke survivors remains substantially unmet in a tertiary health facility located in urban India. Given the diverse effect of the condition, a stroke survivor experiences various kinds of disability. Findings from this study shows that the rehabilitation needs for managing physical disability following stroke is of utmost priority for the stroke survivors. About 70% of the stroke survivors felt that they need services to manage their physical disability. This is followed by services to support the stroke survivors learn to carry out basic activities of daily living independently. 30% of the stroke survivors have expressed the need for support to share their feelings and receiving psychological counselling services. These findings shows the substantial needs that are unmet among stroke survivors admitted in hospital, where a physiotherapist led rehabilitation services were available. The findings reflect that the needs of the stroke survivors are diverse and it requires professionals from specialised rehabilitation disciplines to work together as a team and ensure that the needs are met. Study findings also suggest that the rehabilitation team should be adequately staffed to manage the patients admitted for rehabilitation in any health facility.

Most of the study participants were not aware of the term 'rehabilitation' and the services available for their stroke problems. The study participants expressed the need for information that would help them become aware of their condition (stroke) and its consequences. They expressed the need for supportive care in the hospital ward and had desire to recover as early as possible with less complication. They intended to get back to their family and social roles as early as they can and their family expected the bread winner surviving a stroke to live normal life as before. The study participants expressed their need for professional support and advice on managing their basic ADL, physical disability especially positioning techniques to prevent tightness and contractures and counselling services to prepare them for a good recovery and purposeful life after stroke. This explains the high level of expectations and the lack of awareness among stroke survivors even in hospital setting. Educating the stroke survivors and their family about the condition and the ways to manage it would be of utmost importance for rehabilitation professional involved in stroke management[12, 13].

The recent study by Hare et al.[14] shows that provision of information about stroke and the importance of continuum of rehab care to the stroke survivors and their family is inevitable when these survivors seek hospital care. Appropriate strategies are required for addressing these needs[15,16].

Stroke rehabilitation services in India is mainly centered on physiotherapists[17]. There were 32800 physiotherapists registered in Indian Association of physiotherapists till 2011, 3000 occupational therapists registered in Indian Association of Occupational therapists till 2011, and currently, 1700 speech therapists registered in Indian Association of speech therapists and 500 speech therapists registered in Rehabilitation Council of India. However, very few centers have an organized in-hospital and outpatient rehabilitation facilities in the country[17]. Rehabilitation services are not easily available to the majority of the population in India[18]. Specific studies on rehabilitation needs are still rare[15,17] especially in developing countries like India and this was one of the few studies assessing rehabilitation needs among stroke survivors in the hospital.

In India, we don't have reliable data on magnitude and incidence of stroke to plan appropriate stroke rehabilitation services and allocate resources[5]. Recently in 2012 stroke registry website and National Stroke Registry Programme was launched by Indian Council of Medical Research (ICMR). This is a step in the right direction for stroke management in India and services for stroke survivors such as rehabilitation can be planned based on need of stroke survivors and demand from the community.

CONCLUSION

Stroke rehabilitation program should be designed taking into consideration the felt/expressed need of the stroke survivors and their family as recommended in the ICF[11]. Tertiary hospital should be geared with comprehensive rehabilitation team to address the varied needs of stroke survivors. A better understanding of rehabilitation needs of stroke survivors will help improve the development of efficient rehabilitation strategies and effective provision of stroke management services and help in planning services to address unmet rehabilitation needs of the stroke survivors.

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A STUDY TO ANALYSE THE EFFICACY OF TRUNK CONTROL EXERCISES PERFORMED ON UNSTABLE SURFACE VERSUS TRUNK CONTROL EXERCISE PERFORMED ON STABLE SURFACE ON PAIN AND DISABILITY IN PATIENTS WITH CHRONIC LOW BACK PAIN

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ABSTRACT

Objective: The purpose of the study was designed to analyse the effect of trunk control exercise performed on an unstable surface on pain and disability in patients with chronic low back pain. Design: Pre test and Post test Experimental Study Design. Setting: Outpatient Department of Physiotherapy, K.G Hospital, Coimbatore, India. Study Duration: The total duration: Six months, each patient receives treatment for six weeks. Sample: Simple random sampling method: Total of 30 patients, 15 in each group. Interventions: Group A: subjects received the unstable trunk control exercises using a Swiss ball (85 cm), Group B: subjects received the stable surface trunk control exercises using plinth. For both groups, session began with a period of 5 minutes of stationary bicycle and followed by low resistance exercises for 10 minutes administered for all subjects. All patients received maximum of 28 treatment session. Measurements: Primary outcomes were Pain and Functional Disability, Pain was assessed using Visual Analogue Scale and whereas Functional Disability was assessed using Oswestry disability index for Back. Conclusion: Thus the study concluded that trunk control exercise performed on unstable surface help to reducing pain and disability in patients with chronic low back pain.

KEYWORDS: Chronic Low Back Pain, Swiss Ball, Oswestry Disability Index (ODI), VAS

INTRODUCTION

Low back pain is one of the main causes of functional disorders[1]. It is estimated that 85–90 percent of the adult population experience low back pain at least once in their lifetimes[2]**.** One of the major causes of low back pain is a problem with spinal stability and control. Low back pain patients have less spinal stability compared with control subjects because of increasing of body sway[3]**.** This problem is attributable to the inability to control the deep muscles, such as the transversus abdominis and the multifidus that play important roles in maintaining spinal stability[4], and damaged proprioceptive sensory tissues of the lumbar spine and the trunk. **[5]**

Low back pain (LBP) may affect motor control of trunk muscles that regulates spinal movements and stability[6]. The lumbopelvic stabilization model is an active approach to low back pain, as proposed by Waddel, based on a motor control exercises program[7]. Core stability exercises (CSEs) in LBP rehabilitation have become popular due to observed changes in abdominal muscle activation patterns in the presence of LBP. Delayed feed-forward activation of deep abdominal muscles in response to postural perturbations induced by rapid shoulder flexion has been observed in chronic and recurrent LBP patients. **[8-10]** therefore deep trunk muscles contribute to stabilization of the spine, **[11]** it is hypothesized that a deficit in feed-forward activation increases the susceptibility of injury to spinal structures. CSE, consisting of low-load exercises emphasizing voluntary and isolated control of deep trunk muscles, are assumed to help restore trunk muscle deficits in LBP[12,13].

Stabilization exercise program has become the most popular treatment method in spinal rehabilitation since it has shown its effectiveness in some aspects related to pain and disability. However, some studies have reported that specific exercise program reduces pain and disability in chronic but not in acute low back pain, although it can be helpful in the treatment of acute low back pain by reducing recurrence rate[14,15]. The capacity of the stabilizing system of the spine to maintain the intervertebral neutral zones within the physiological limits so that there is no neurological dysfunction, no major deformity, and no incapacitating pain"[16]. Therefore, an unstable spinal segment might not be able to maintain the correct vertebral alignment. The excessive movement in an unstable spine may either stretch or compress pain sensitive structures, leading to inflammation[17-19].

Trunk control exercises are prescribed to improve low back pain patients' spinal stability. It is

well known that trunk control exercises improve spinal stability through the activation of the abdominal muscles and the paravertebral muscles. [20] T trunk control exercises are mostly performed on hard, stable surfaces for the stability of patients with low back pain[21]**.** However, recently, it has been reported by Duncan[22] that trunk control exercises performed on unstable surfaces are an efficient method of improving dynamic stability, as they activate motor control strategies that improve sensorimotor feedback and activate the trunk muscles. The aim of the present study was to investigate the effect of trunk control exercises performed on an unstable surface on pain and disability in patients with Chronic Low Back pain.

METHODOLOGY

The study was conducted in K.G Hospital, Coimbatore, Tamilnadu both inpatient and outpatient Physiotherapy department after approval from the institutional ethical committee. A clear explanation about the study was given to all the patients and they were included following suitable inclusion and exclusion criteria. Subjects who were included in the study had age group between 25 -40 years irrelevant of their sex with Chronic Low back pain for at least 12 weeks, Patient with core muscle weakness of below 4(MRC Grading), Pain more than three months without radiating to leg and Patients is otherwise medically fit to perform physical training. Patients with past histories of surgery on the Spine or the lower extremities, structural disorders such as bone fractures, spondylolisthesis, and spinal disc herniation, Back pain attributed to any specific pathology: Eg: tumour, infection or fracture, Osteoporosis, Inflammatory disorder, Radicular syndrome and Patient with cardiac and renal dysfunction were excluded from the study.

30 subjects with, Chronic Low Back Pain was selected by simple random sampling method. A computer generated randomized table of numbers were created prior to the beginning of the study and was utilized to determine the randomization scheme. Assessment was done with Oswestry disability index for Back and visual analogue Scale for Functional Disability and Pain respectively. A consent letter was obtained from each subject and then subjects were divided into 2 groups, 15 subjects in each group.

Group A: subjects received the unstable trunk control exercises using a Swiss ball (85 cm). The trunk control exercises were performed in sitting position on a Swiss ball. The exercises began with passive exercises and were gradually switched to active-assistive exercises, and finally, active exercises. The trunk control exercise program was based on a method proposed by Verheyden et al. and was performed as follows: Trunk flexion, Trunk extension/back extension, Lateral trunk flexion, Trunk rotation.

Group B: subjects received the stable surface trunk control exercises using plinth. The trunk control exercises were performed in lying position on a plinth. The exercises began with passive exercises and were gradually switched to active-assistive exercises, and finally, active exercises. Same kinds of exercise are followed in plinth also and the exercises are follows: Trunk flexion, Trunk extension/back extension, Lateral trunk flexion, Trunk rotation.

For both groups, session began with a period of 5 minutes of stationary bicycle and followed by low resistance exercises for 10 minutes administered for all subjects. Low resistance exercises mainly focused on lumbopelvic muscles. For both treatment groups, the patients received maximum of 28 treatment session. Each consists of 15 minutes if warm up exercises and 45 minutes of trunk control exercises.

DATA ANALYSIS

The Independent variables were Unstable Surface Trunk Control Exercise and Stable Surface Trunk Control Exercise and dependent variable were Functional Disability and Pain. Analyses were performed using the SPSS statistical software package. Paired‘t’ test were used for the measurement of pre-test and post-test values of group A and B. Unpaired ‘t’ test were used to compare the post-test values of Group A and B. probability values of less than 0.05 were considered significant.

RESULTS

TABLE 1: OSWESTRY DISABILITY INDEX FOR FUNCTIONAL DISABILITY PAIRED ‘T’ TEST OF GROUP A AND B – (UNSTABLE TRUNK CONTROL EXERCISES)

GROUP A					
S.NO	ODI	MEAN	S.D	MEAN DIFFERENCE	‘t’ VALUE
1	Pre test	65.6	3.72		
2	Post test	16.4	2.75	49.2	39.5
GROUP B					
S.NO	ODI	MEAN	S.D	MEAN DIFFERENCE	‘t’ VALUE
1	Pre test	66.5	2.59		
2	Post test	48.6	3.31	17.9	19.2

Group A: Using paired‘t’ test with 14 degrees of freedom and 5% as a level of

significance, the table 't' value is 2.145 which was lesser than the calculated 't' value 39.5. The result showed that there was significant effect of unstable trunk control exercises on Functional Disability in patients with chronic low back pain.

Group B: Using paired't' test with 14 degrees of freedom and 5% as a level of significance, the table 't' value is 2.145 which was lesser than the calculated 't' value 19.2. The result showed that there was significant effect of unstable trunk control exercises on Functional Disability in patients with chronic low back pain.

TABLE 2: UNPAIRED 'T' TEST- OSWESTRY DISABILITY INDEX POST-TEST VALUES OF GROUP A VS GROUP B

S.NO	ODI	MEAN	S.D	MEAN DIFFERENCE	't' VALUE
1	Post test	16.4	2.75		
2	Post test	48.7	3.31	32.3	29.9

Oswestry Disability Index (ODI) Post-test values of group A and B in analysed by unpaired 't' test. The calculate 't' value is 29.9, which is greater than the table 't' value is 2.048 at 5% level of significance and 28 degrees of freedom. This test showed that there was significant reduction of disability in Group A than Group B.

TABLE 3: VISUAL ANALOGUE SCALE FOR PAIN (VAS) PAIRED 'T' TEST OF GROUP A AND B– (UNSTABLE TRUNK CONTROL EXERCISE)

GROUP A					
S.NO	VAS	MEAN	S.D	MEAN DIFFERENCE	't' VALUE
1	Pre test	6.33	0.61		
2	Post test	1.07	0.79	5.26	17.5
GROUP B					
S.NO	VAS	MEAN	S.D	MEAN DIFFERENCE	't' VALUE
1	Pre test	6.53	0.51		
2	Post test	4.87	0.74	1.66	13.2

Group A: Using paired't' test with 14 degrees of freedom and 5% as a level of significance, the table 't' value is 2.145 which was lesser than the calculated 't' value 17.5. The result showed that there was significant effect of unstable trunk control exercises on pain in patients with chronic low back pain.

Group B: Using paired't' test with 14 degrees of freedom and 5% as a level of significance, the table 't' value is 2.145 which was lesser than the calculated 't' value 13.2. The result showed that there was significant effect of unstable trunk control exercises on pain in patients with chronic low back pain.

TABLE 4: UNPAIRED 'T' TEST- VISUAL ANALOGUE SCALE POST-TEST VALUES OF GROUP A VS GROUP B

S.NO	ODI	MEAN	S.D	MEAN DIFFERENCE	't' VALUE
1	Post test	1.07	2.75		
2	Post test	4.87	3.31	3.8	13.3

Visual Analogue Scale (VAS) Post-test values of group A and B analysed by unpaired 't' test. The calculate 't' value is 13.3, which is greater than the table 't' value is 2.048 at 5% level of significance and 28 degrees of freedom. This test showed that there was significant reduction of pain in Group A than Group B.

DISCUSSION

The purpose of the study is to find out the effect of trunk control exercises performed on unstable surface on pain and disability in patient with chronic low back pain.

The low back pain is one of the commonest conditions among the working population. The common causes for low back pain are performance of repetitive task, maintenance of poor posture for long duration. It is estimated that 85 – 90 percent of adult population experience low back pain at least once in their lifetimes (Boro CM et al., 2004). One of the major cause of low back pain is a problem with spinal stability and control. Low back pain patients have less spinal stability with subjects because of increasing of body sway (Panjabi MM et al., 2003). The problem is attributed to the inability to control the deep muscle such as the transverse abdominis and the multifidus that play important role in maintaining the spinal stability (Debuse D et al., 2013) and damaged proprioceptive sensors tissue of the lumbar spine and the trunk (Brumagne S et al., 2000).

The pathophysiology of the low back pain was explained by Kirkaldy Wills, 1998. He states that following a minor trauma of emotional disturbance, there will be a facilitation of chronic neuromuscular responses. This response facilitates chronic neuromuscular changes such as fibrosis, weakness, limited extensibility and altered requirement patterns. Management of low back pain is costly and there is a large increasing proportion of health care expenditure without evidence of corresponding improvement outcomes (Frymoye, 1988).

Traditional therapy protocol for the management of chronic low back pain is the prescription of global exercises and manual therapy techniques. Various forms of exercises are used in the management of chronic low back pain. Trunk

control exercises are prescribed to improve low back pain patients spinal stability. It is well known that trunk control trunk control exercise improve spinal stability through the activation of the abdominal muscles and the paravertebral muscle (Koumantakis GA et al 2005).

The trunk control exercise performed on unstable surface or an efficient method of improving dynamic stability as they activate motor control strategies that improve sensorimotor feedback and activate the trunk muscles. The trunk control exercises performed on unstable surface reduce the degree of sway of low back pain patients. The detoriation of low back pain patient proprioceptive senses in the lumbar spine or trunk loads to the in accurate judgement of the centre of mass in the process of sensory integration, the increasing sway of the centre of mass to improve the spinal stability (Fejer R et al., 2011). The appropriate stimulator of the proprioceptive senses in the lumbar spine and the trunk is crucial to improve the spinal stability (Cordo P et al 2000). The trunk control exercises are known to be effective at stimulation the proprioceptive sense in the lumbar spine or trunk (Lee AS, 2010). The study focused to find out the effect of trunk control exercises performed on unstable surface on pain and disability in patients with chronic low back pain. The Group A subjects under gone trunk control exercises performed on unstable surface were found to have a greater reduction in pain and disability when compared with Group B who were treated with trunk control exercises performed on stable surface.

The statistical data were analysed and were found out that trunk control exercises performed on unstable surface was very effective in reducing in pain and disability in patients with chronic low back pain. Based on the data, this study accepts alternate hypothesis and reject the null hypothesis.

LIMITATIONS

The study was done for a short duration, long-term study need for further exploration. Follow up can be done to find out long term results in further studies. Outcome measures such as Pain can also be measured by numerical pain rating scale (NPRS). Functional disability can also be measured by Roland Morris disability questionnaire. There is no strict protocol followed in the study. Certain factors like climate condition, nutrition, time of testing, psychological factors, regular activities of daily living could not be controlled during the testing period.

RECOMMENDATIONS

Study recommends use of manual therapy techniques in the management of low back pain. Study recommends use of other parameter like kinesiophobia etc. Long term follow up of exercises have to be found. Similar study can be done with use of application of various other modalities in the management of chronic low back pain

CONCLUSION

Thus the study concluded that trunk control exercise performed on an unstable surface help to reducing pain and disability in patients with chronic low back pain.

CLINICAL APPLICATION

Low back pain (LBP) was known as an ancient curse is now known as modern international epidemic and has a ubiquitous distribution. Low back pain is the commonest reason individuals visit hospital next to the cold**.** Tremendous costs are associated with low back pain including lost productivity and income from the work, health expenses, rehabilitation and surgical interventions, and costs of disabling pain and limited daily function. These findings highlight the importance of carefully screening all patients with CLBP for the presence of Pain and Disability, so that a variety of interventional strategies to improve their functional performance in an efficient approach.

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COMPARISON OF EFFECTS OF MILL'S MANEUVER AND STODDARD'S MANEUVER FOR THE TREATMENT OF CHRONIC LATERAL EPICONDYLITIS

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ABSTRACT

Study objectives: The purpose of this study is to compare the effects of Mill's Maneuver and Stoddard's Maneuver in the reduction of pain, improving functional status and grip strength in subjects with lateral epicondylitis.

Design: A comparative study

Setting: Participants were selected from Midnapore Medical College & Hospital.

Subjects: A total of 30 subjects were recruited for the study on the basis of inclusion and exclusion criteria after signing the informed consent form.

Measurements: Grip strength

Outcomes: Pain measured by Visual Analogue Scale (ICC = 0.97) , Grip Strength by Hand Held dynamometer, Functional Status measured by Patient Rated Tennis Elbow Evaluation (ICC = 0.89).

Results: The result of present study indicates that both the groups showed significant improvement in terms of pain, and functional performance in patients with tennis elbow. But group A showed better results as compared to group B.

Conclusions: The present study provided evidence to support the use of Mill's maneuver and Stoddard's maneuver in relieving pain, improving grip strength and improve functional performance in subject with chronic lateral epicondylitis. In addition, results supported that Mill's maneuver was more effective than Stoddard's maneuver in reducing pain and functional performance.

KEYWORDS: Chronic Lateral Epicondylitis, Mill's & Stoddard's Maneuver, Grip Strength, VAS, PRTEE

INTRODUCTION

The name lateral epicondylitis name came to exist when Mr. Runge who first distinguished lateral epicondylitis from writer's cramp in 1873. It was named lawn tennis arm by "Morries" shortly thereafter[1]. The wrist extensor muscle mainly (ECRB) is subject to force overload by repetitive intrinsic concentric muscle contraction. The recreational athlete may subject the elbow to additional stress during his or her daily activities or occupation. Carpentry work, excessive computer keyboard time, weight lifting, needlework, cooking, gardening, playing the piano or video games, or any activity involving large amounts of wrist action or stabilization will contribute to tissue overload with compromised tissue reparability[2].

Most patients with lateral epicondylitis are between the ages of 30 and 55 years, and many have poorly conditioned muscles. Ninety-five percent of tennis elbow occurs in non-tennis players. 10 to 50% of regular tennis players experience tennis elbow symptoms of varying degree some time in their tennis lives. Often a history of repetitive flexion-extension or pronation-supination activity and overuse is obtained (e.g., twisting a screw driver, lifting heavy luggage with the palm down). Tightly gripping a heavy briefcase is a very common cause. Raking leaves, baseball, golfing, gardening, and bowling can also cause lateral epicondylitis[3].

There is localized pain and tenderness, specifically at the origin of the extensor carpi radialis brevis just anterior and distal to the lateral epicondyle. In severe cases the pain may radiate distally into the forearm, presenting as a constant ache in this region with intermittent bouts of sharp pain when aggravated by activity[4].

Mill's manipulation, which is reported to be in widespread use, is a small-amplitude high-velocity thrust performed at the end of elbow extension while the wrist and hand are held flexed. It targets the common extensor tendon and a view to freeing scar tissue[5]. The aim of this technique, again without properly designed controlled studies to prove this, is to elongate the scar tissue by rupturing adhesions within the teno-osseous junction, making the area mobile and pain free[6].

Stoddard's suggests that a sharp varus thrust by adduction of the forearm is more effective. Stoddard uses adduction gapping of the forearm on

the arm performed by a varus maneuver which Stoddard feels separates adhesions binding the extensor digitorum communis to the radial collateral ligament. A varus thrust (by Stoddard's maneuver) at the elbow act primarily on the capsular structures causing gapping and restoring joint play[7].

MATERIAL AND METHOD

Sample: Convenient sampling technique which is randomly assigned into two groups, Group A and Group B. No. of Subject: 30 subjects were taken. Source of Data Collection from Midnapore Medical College & Hospital (West Bengal).

Design Experimental study

Inclusion Criteria

- Subject presenting with lateral epicondylitis diagnosis will be confirmed by Cozen test, Maudsleys test and Mill's test.
- Subject with age of 20 – 50 years of both genders.
- Pain with gripping.
- Pain with resisted wrist extension.
- Tenderness on palpation over the lateral epicondyle.
- Suffering from tennis elbow more than 1 month.

Exclusion Criteria

- Cervical spondylitis with radiating pain on lateral elbow.
- Arthritis of elbow joint.
- Radio humeral bursitis.
- Capsulitis.
- Lateral collateral ligament sprain.
- Elbow deformities as increased carrying angle.
- Radial head subluxation.
- Previous trauma to the elbow region.
- Previous surgery to the elbow region.
- Peripheral nerve entrapment.
- Corticosteroid injection within 6 months.
- Presence of any restriction of motion at the elbow joint.

Instrumentation

- Hand Held Dynamometer. (Fig: 1)
- TENS. (Fig: 2)
- Inch Tape. (Fig: 3)

OUTCOME MEASURES

- Pain: Visual Analogue Scale Score (ICC = 0.97).
- Grip Strength: Hand Held dynamometer.
- Functional Status: Patient Rated Tennis Elbow Evaluation (ICC = 0.89).

FIG 1: HAND HELD DYNAMOMETER

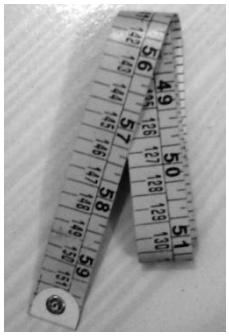

FIG 2: INCH TAPE

FIG 3: TENS

PROTOCOL

Subjects fulfilling the inclusion and exclusion criteria were asked to fill the consent form and then subjects were randomly allocated to Group A and Group B, with 15 subjects in each group.

Pre-treatment assessment of pain, grip strength and functional status were recorded for both the groups. Visual Analogue Scale, Hand Held Dynamometer and Patient Rated Tennis Elbow Evaluation Questionnaire were used to measure

pain, pain free grip strength and functional status respectively. Therapy was started the day after the measurements taken.

Group A received Mill's Maneuver with TENS and Stretching Exercise.

Group B received Stoddard's Maneuver with TENS and Stretching Exercise.

Both maneuvers were given 2 times/day 5days/week for 2 weeks.

PROCEDURE

Mill's Manipulation Treatment Procedure (Fig: 4)

Preparation of subjects

Patients are position comfortably on a chair in an upright position. Briefly explain the entire procedure to patient. Ask patient to relax his / her and forearm throughout the procedure.

Subject's position

Patients are position comfortably in the seating position with the affected extremity in 90◦ of abduction with internal rotation enough so that the olecranon faced up.

Technique

The therapist stabilized the patient's wrist in full flexion and pronation with one hand, while other hand is placed over the olecranon[6]. While assuming full wrist flexion and pronation position, the therapist should apply a high-velocity low-amplitude thrust at the end range of elbow extension.

This part of the maneuver is repeated 2 times/ day.

Stoddard's Manipulation Treatment Procedure (Fig: 5)

Subject's position

The patient is supine, the shoulder 90° abducted.

Therapist position

The therapist sitting on the plinth next to the affected side. The therapist's forearm rests on the anterior aspect of the patient's affected arm with the fingers palpating the elbow. The therapist then locates the fibers of the middle portion of the extensor digitorum communis tendon.

Technique

This is done by resisting finger extension while palpating "the insertion of these fibres into the radial collateral ligament." Once the fibers are found, the therapist's index finger remains over them. The therapist's other hand moves the patient's forearm into different degrees of supination and pronation while palpating until a maximal sense of tension is felt in the extensor digitorum communis. Stoddard found most tension just short of full supination. While the therapist's index finger remains on the site of maximal tension, adduction gapping of the forearm on the arm is performed by a varus maneuver which feels separates adhesions binding the extensor digitorum communis to the radial collateral ligament[7].

This part of the maneuver is repeated 2 times/day.

Stretching Procedure (Fig: 6)

Static stretching is performed in the seating position with elbow extension, forearm pronation, and wrist flexion with ulnar deviation. According to the subjects tolerance stretch force was applied. Duration of 30 seconds and is performed 2 times[8].

TENS Application Procedure (Fig: 7)

Patient position - Seating position and forearm rest on the table.

Electrode Placement - 2-pad placement, Place electrode pads over proximal forearm and over the extensor muscle group. Treatment Parameters are Frequency: 100-150 Hz, Pulse Width: 100 & 500 ms, Intensity: 12-30 mA and Treatment Time: 10 min[9].

Grip strength measurement procedure (Fig: 8)

Measurement was taken by Hand Held Dynamometer, subject in sitting elbow flexed at 90 degree with forearm in neutral position[10, 11].

FIG 4: MILL'S MANIPULATION

FIG 5: STODDARD'S MANIPULATION

FIG 6: TENS APPLICATION

FIG 7: STRETCHING EXERCISES

FIG 8: HAND HELD DYNAMOMETER FOR GRIP STRENGTH MEASUREMENT

DATA ANALYSIS

Statistics are performed by using SPSS 16. Independent sample test and paired t-test was performed to analyze the significance. Results are obtained by using 0.05 level of significance.

RESULTS

The t-test for paired samples was used for group A and group B for grip strength. As seen from the table and figure mean and standard deviation of group A for grip strength were pre (33.267 – 10.1099) and post (53.2 – 14.6102) with p value 0.000.

Mean and standard deviation of pre and post of group B for grip strength were (30.867 – 9.84063) and (44.2 – 11.7607) with p value 0.000.

Statistical analysis showed significant difference within the groups.

TABLE 1: WITHIN GROUP ANALYSIS FOR GRIP STRENGTH

	PRE	POST	T	P
GROUP A	33.267 (10.1099)	53.2 (14.6102)	-13.69	.000
GROUP B	30.867 (9.84063)	44.2 (11.7607)	-16.86	.000

The t-test for paired samples was used for group A and group B for VAS. As seen from the table and figure mean and standard deviation of group A for VAS were pre (7.5333 – 0.63994) and post (2.6 – 0.63246) with p value 0.000.

Mean and standard deviation of pre and post of group B for VAS were (7.8 – 0.67612) and (3.4 – 0.91026) with p value 0.000.

Statistical analysis showed significant difference within the groups.

TABLE 2: WITHIN GROUP ANALYSIS FOR VAS

	PRE	POST	T	P
GROUP A	7.5333 (0.63994)	2.6 (0.63246)	27.151	.000
GROUP B	7.8 (0.67612)	3.4 (0.91026)	23.129	.000

The t-test for paired samples was used for group A and group B for PRTEE. As seen from the table and figure mean and standard deviation of group A for PRTEE were pre (51.033 – 5.74912) and post (19.367 – 3.9527) with p value 0.000.

Mean and standard deviation of pre and post of group B for PRTEE were (50.167 – 5.00951) and (23.4 – 2.5439) with p value 0.000.

Statistical analysis showed significant difference within the groups.

TABLE 3: WITHIN GROUP ANALYSIS FOR PRTEE

	PRE	POST	T	P
GROUP A	51.033 (5.74912)	19.367 (3.9527)	25.116	.000
GROUP B	50.167 (5.00951)	23.4 (2.5439)	27.364	.000

The t-test for unpaired samples was used between pre and post test of the grip strength for the group A and group B. As seen from the table 4 and figure mean pre grip strength of group A was 33.267 – 10.1099 and for group B was 30.867 – 9.84063. Statistical analysis showed no significant difference between the groups P=0.515 (> 0.05).

Mean post grip strength of group A was 53.2 – 14.6102 and for group B was 44.2 – 11.7607. Statistical analysis showed no significant difference between the groups P= 0.074 (> 0.05). Analysis shows that there was no significant improvement of grip strength from pre to post in both groups at the end of 2nd week.

TABLE 4: BETWEEN GROUP ANALYSIS FOR GRIP STRENGTH

	GROUP A	GROUP B	T	P
PRE	33.267 (10.1099)	30.867 (9.84063)	.659	.515
POST	53.2 (14.6102)	44.2 (11.7607)	1.858	.074

The t-test for unpaired samples was used between pre and post test of the VAS for group A and group B. As seen from the table 5 and figure mean pre VAS of group A was 7.5333 – 0.63994 and for group B was 7.8 – 0.67612. Statistical analysis showed no significant difference between the groups P=0.277(> 0.05).

Mean post VAS of group A was 2.6 – 0.63246 and for group B was 3.4 – 0.91026. Statistical analysis showed a significant difference between the groups P=0.009 (> 0.05).

Analysis shows that there was a significant reduction in pain score from pre to post in both groups at the end of 2nd week. However at the end of second week group A showed significantly greater improvement than group B.

TABLE 5: BETWEEN GROUP ANALYSIS FOR VAS

	GROUP A	GROUP B	T	P
PRE	7.5333 (0.63994)	7.8 (0.67612)	-1.109	.277
POST	2.6 (0.63246)	3.4 (0.91026)	-2.795	.009

The t-test for unpaired samples was used between pre and post test of PRTEE for group A and group B.

As seen from the table 6 and figure mean pre PRTEE score of group A was (51.033 – 5.74912) and for group B was 50.167 – 5.00951. Statistical analysis showed no significant difference between the groups P=0.663(> 0.05).

Mean post PRTEE score of group A was 19.367 – 3.9527 and for group B was 23.4 – 2.5439. Statistical analysis showed a significant difference between the groups P=0.002(> 0.05).

Analysis shows that there was a significant improvement of functional score from pre to post in both groups at the end of 2nd week. However at the end of second week group A showed significantly greater improvement than group B.

TABLE 6: BETWEEN GROUP ANALYSIS FOR PRTEE

	GROUP A	GROUP B	T	P
PRE	51.033 (5.74912)	50.167 (5.00951)	.440	.663
POST	19.367 (3.9527)	23.4 (2.5439)	-3.323	.002

The t-test for unpaired samples was used between pre and post test of the PRTEE for the group A and group B.

As seen from the table 7 and figure there was no significant difference between group analysis for age and muscle girth.

TABLE 7: BETWEEN GROUP ANALYSIS FOR AGE AND MUSCLE GIRTH

	GROUP A	GROUP B	T	P
PRE	37 (6.71884)	33 (4.73588)	1.885	.071
POST	26.4 (2.5856)	24.933 (2.40436)	1.609	.119

DISCUSSION

The present clinical trial was conducted to compare the effectiveness of Mill's Maneuver and Stoddard's Maneuver with a common treatment of TENS and Stretching exercise in subjects with chronic Lateral Epicondylitis. Results of this study were focused on pain relief where Pain assessment was done by visual analogue scale (VAS)**,** improvement of grip strength, grip strength was measured with the help of hand held dynamometer, and reduction in function activity impairment scores based on Patient rated forearm evaluation questionnaire for lateral epicondylitis. It was noticed that there was improvement in all the above parameters in both groups.

Pain and Function

Results revealed that both groups showed significant reduction in pain and increase in function as measured by VAS scores and PRTEE questionnaire at the end of 2nd week. However Mills proved to be more effective in reducing pain and increasing function in contrast to Stoddard's between the groups.

Reduction in pain and increase in function may have occurred due to both the neurophysiological as well as biomechanical effects of applied maneuvers. In mills the intention is to pull apart the two edges of the tear and thus relieve the painful scar lying between them from tension imitating the mechanism of spontaneous recovery. This allows the self-perpetuating post traumatic inflammation to subside and healing with permanent lengthening. Hence forth the intact part of the tendon takes all the strain, thus affording protection against the recurrences that are sometimes a problem when steroids are used. The method is that described by Mills in 1928. His intention was to shift the annular ligament which he regarded as out of place in fact it applies the greatest possible stretch to the extensor carpi radials muscles and is carried out with a sharp jerk which tends to open up the tear in the tendon and abolish tension on the tender scar by converting a tear shaped like a V into separation of the torn surface, i.e. a U.

Increased stress on the ECRB may indirectly through its partial origin from the radial collateral ligament transmit stress to this ligament.

In contrast Stoddard uses adduction gapping of the forearm on the arm performed by a varus maneuver which Stoddard feels separates adhesions binding the extensor digitorum communis to the radial collateral ligament.

A review of the literature has failed to find support for Stoddard's belief that this muscle originates from the radial collateral ligament. Rather, the extensor carpi radialis brevis and supinator are reported to blend with this ligament[12].

The manipulation has done in extension with pronation (Mill's maneuver) have the greatest chance of affecting the contractile elements, by contrast a varus thrust (by Stoddard's maneuver) at the elbow act primarily on the capsular structures causing gapping and restoring joint play[15].

Wrist flexion also tends to increase tension in the radial nerve because of its position on the dorsum of the wrist. The radial nerve innervates the lateral forearm extensors and also gives rise to the lower lateral cutaneous nerve of the arm and the posterior cutaneous nerve of the forearm which supply the skin over the postero lateral aspect of the elbow. (Warwick and Williams 1973).

These may be the reasons why mills maneuver proved to be more effective in reducing pain and consequently increase function compared to Stoddard's maneuver.

Grip strength

Post intervention change in grip strength was not significantly different between two groups.

Tim Noteboom et al,[14] in his study mentioned that chronic symptoms are commonly associated with inadequate muscle power and endurance.

It was claimed that the tendon strengthening by stimulating mechanoreceptors in tenacities to produce collagen, which is the key cellular mechanism that determines recovery from tendon injuries. Strengthening may improve collagen alignment of the tendon and stimulate cross linkage formation both of which improve the tensile strength of tendon[15].

Both the maneuvers used in our study (Mills & Stoddard's) have primary effect on the biomechanical aspect of the elbow joint, while not affecting either the strength or endurance of the muscles around the elbow, this may explain why both maneuvers were equally effective. Within group increase in grip strength may be explained due to lengthening and reduction in pain achieved by stretching and TENS in both groups.

From the present study it can be concluded both the groups showed significant improvement in terms of pain, and functional performance in patients with tennis elbow. But group A showed better results as compared to group B.

LIMITATIONS

Sample size was small, Duration of the study was short, Subjects could not be followed up for longer period of time, to see long term benefit, and Occupation relevance was not compared.

FUTURE STUDY

Studies with longer duration are recommended with longer follow-up period to assess long term benefits, Conduct future similar study with large number of patients, Develop future research with long duration of treatment, Similar studies can be conducted using other tools of measurement, Similar studies can be conducted using strengthening protocol for increasing grip strength.

CONCLUSION

The present study provided evidence to support the use of Mill's maneuver and Stoddard's maneuver in relieving pain, improving grip strength and improve functional performance in subject with chronic lateral epicondylitis. In addition, results supported that Mill's maneuver was more effective than Stoddard's maneuver in reducing pain and improving functional performance.

CLINICAL SIGNIFICANCE

Mill's maneuver proved to be better treatment option in the treatment of chronic lateral epicondylitis. So it could be used as treatment option for chronic lateral epicondylitis for relieving pain in short span of time.

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A RANDOMIZED CONTROLLED TRIAL TO INVESTIGATE THE EFFECT OF MULLIGAN'S MWM AND CONVENTIONAL THERAPY IN STAGE II ADHESIVE CAPSULITIS

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ABSTRACT

Background and Objectives: Frozen Shoulder is a painful shoulder condition with insidious onset that was associated with stiffness and difficulty sleeping on the affected side. Mulligan's technique for peripheral joints combines sustained manual application of "gliding" force to joint, repositioning bone positional faults. The aim of the study is to find out and compare the effect of MWM and Conventional Therapy in reducing pain, improving the shoulder range of motion and function in stage 2 of adhesive capsulitis.

Materials and Method: The present randomized controlled trial was conducted among 30 participants who included both male and female symptomatic individuals from the age group of 40 years and above with stage 2 of Adhesive Capsulitis. Participants were randomly assigned into two groups of 15 each. Physical therapy treatment protocol which included Mulligan's MWM and conventional therapy and conventional therapy alone was given for 15 days. The outcome measures recorded were pre and post 15th day of intervention using visual analogue scale, shoulder range of motion of flexion, abduction, External rotation and functional evaluation by Disability of Arm Shoulder Hand.

Result: In the present study, within group analysis showed that pain relief, improved range of motion and reduced disability was statistically significant in both groups (p< 0.01) whereas the between group analysis revealed that Group B (Mulligan's mobilization) showed better outcomes as compared to Group A (Conventional Therapy) in reducing pain, improving range of motion and function.

Conclusion: Hence, it can be concluded that Mulligan's MWM is more effective in treatment of Adhesive Capsulitis than Conventional therapy.

KEYWORDS: Pain, Stage II Adhesive Capsulitis and Mulligan's Mobilization with Movement and Function.

INTRODUCTION

Frozen shoulder is also referred to as Adhesive capsulitis and is characterized by pain and loss of motion of the shoulder joint. The exact cause of frozen shoulder is unknown, even though it has been found to affect somewhere between 2% to 5% of people during their lifetime[1].

Adhesive capsulitis is generally related to shortening, thickening (or) fibrosis of joint capsule surrounding shoulder joint. Ligamentous tightness of shoulder decreases the volume of capsule, limits the joint range of motion.

A cross sectional study conducted in 1951 on prevalence of frozen shoulder Herzog from North England, Gordon from Canada, Stulter from Germany ,and Dasgupta from India etc found that on average the prevalence in females are more than males and age group between 40-60 years[2].

The authors concluded that muscle relaxation achieved by superficial heating, thus indirectly causes reduction of resistance in muscles, which stretches within and around the muscle leads to increasing the shoulder ROM[3].

TENS by definition covers the complete range of transcutaneously applied currents used for nerve excitation although the term is often used with a more restrictive intent, namely to describe the kind of pulses produced by portable stimulators used to treat pain[4].

Resisted exercises typically include strengthening of the scapular stabilizers and Rotator cuff, should give progressively with an appropriate intervention[5].

Mulligan's MWM technique for peripheral joints combines a sustained application of manual "gliding" force to a joint, by correcting positional faults with concurrent (osteo-kinematics) motion of joint. MWMs provide a passive pain-free end-range corrective joint glide with an active movement. It superimposes accessory movement on the patient's active physiological movement with the aim of overriding the obstruction and re-establishing correct alignment[6,7]. The Previous studies have shown that Mulligan's technique and passive stretching both are effective in reducing pain and restoring range of motion and function for adhesive capsulitis of the shoulder[8] but there are limited

studies done to evaluate Mulligan's MWM and Conventional Therapy in stage 2 Adhesive Capsulitis. Therefore, the purpose of the present study was to find out effectiveness of Mulligan's MWM with Conventional Therapy and Conventional Therapy alone.

METHODS

In this study 30 subjects were recruited with stage II Adhesive Capsulitis from 15 March 2013 to 30 January 2014. The Inclusion criteria were A) Subjects diagnosed with stage 2 Adhesive Capsulitis. B) Age group 40 years and above. C) Adhesive Capsulitis subjects with limited Range of motion of shoulder abduction, external rotation and flexion. D) Subjects with bilateral and/or unilateral adhesive Capsulitis. E) Subjects who are willing to participate in the study. The Exclusion criteria were A) Subjects with Rotator cuff tears and other shoulder ligament injuries. B) History of any arthritis related to shoulder. C) Malignancy. D) Peri-arthritis shoulder secondary to fracture, dislocation, Reflex sympathetic dystrophy, neurological disorder. The study was carried out in KLES Dr. Prabhakar Kore Hospital and MRC, Belgaum, Karnataka. The study was approved by Institutional Ethics Committee on Human subjects.

FIG 1: TREATMENT WITH "MWM" FOR SHOULDER FLEXION AND ABDUCTION IN SITTING POSITION

FIG 2: TREATMENT WITH "MWM" FOR SHOULDER EXTERNAL ROTATION IN SUPINE

OUTCOME MEASURES

Outcome measures were Visual Analogue Scale (VAS), Shoulder Range of Motion and Disability of Arm Shoulder Hand (DASH). Pain intensity was measured by asking the patient to point on a 10 cm line marked with numbers 0 to 10 was used, where 0 symbolizes no pain and 10 as maximum pain. Active Shoulder Abduction, External Rotation and flexion ROM measurement was taken both pre and post session of intervention with the help of universal goniometer. The functional index designed to determine the symptoms and limitations that participant was experiencing while performing daily activities. This scale consists of 30 items in the form of activities of daily living with each item scoring from 0 to 4, where 0 is no difficulty in performing that activity and 4 is unable to do that activity. This was used to monitor the patient over time and to determine the effectiveness of an intervention. The readings were taken both pre and post 15th day of intervention for all the outcomes.

INTERVENTIONS

The participants were randomly allocated into two groups:

Group A received Conventional Therapy; Group B received Mulligan's MWM and Conventional Therapy. Conventional Therapy Protocol Includes Hot Moist Pack, TENS and Shoulder Mobility Exercises. These treatment protocols were given one session per day for 15 days. Whereas, treatment given for Mulligan's MWM was 3 sets of 10 repetitions with dosage of overall 15 sessions.

RESULTS

The results of this study were analyzed in terms of pain relief indicated by decrease in visual analogue scale scores, Active ROM of shoulder Abduction, External Rotation and Flexion which was measured by using Universal goniometer and Variations in functional disability of Shoulder was recorded by Disability of arm shoulder hand questionnaire (DASH).

STATISTICAL ANALYSIS

Statistical analysis of the present study was done manually as well as by using SPSS software version 10 so as to verify the results. Various statistical measures such as mean, standard deviation and tests of significance such as paired "t" test for within group and unpaired "t" test for

between group variables with independent mean were used. Probability values less than 0.05 were considered statistically significant and probability values less than 0.001 were considered highly significant.

TABLE 1: DEMOGRAPHIC DATA

Characteristics	Group A	Group B	*P*- value
Gender (M,F)	(10,5)	(8,7)	
Side Affected (Lt, Rt)	(8,7)	(13,2)	
Mean Age group	52.73±5.42	54.20±6.52	0.48
BMI	25.87±3.60	25.98±3.35	0.35
Duration of Symptoms (months)	4.80±2.51	4.73±2.22	0.30

Demographic Profile-(Table 1)

The mean age of the participants in group A was 52.73±5.42 years and group B was 54.20±6.52 years. There was no significant difference between the mean ages of the participants in between the groups.

In the present study there were 18 males and 12 females. The gender ratios of participants in group A was 10 males and 5 females (66.67% and 33.33) and participants in group B was 8 males and 7 females (53.33% and 46.67%). The participants affected with left shoulder were 8 (55.33%) and 7 (46.67%) with right side involvement in group A, 13 (86.67%) with left side involvement and 2 (13.33%) with right involvement in group B respectively.

The mean onset of duration of symptoms in group A was 4.80±2.51 months and in group B was 4.73±2.22 months. The mean BMI of participants in group A was 25.87±3.60 kg/m^2 and in group B was 25.98±3.35 kg/$m^{2.}$

Outcome measures (Table 2)

Visual Analogue Scale (cms) score

In group A the mean VAS score on pre intervention was 7.02±1.08 cms and post intervention was 2.44±1.18 cms and in group B day 1 score was 7.16±0.86 cms and post intervention was 1.40±1.47 cms. There was a statistically significant reduction in overall VAS score of both the groups from day 1 to day 15.

On comparing between the group A and group B, values of VAS scores on pre intervention to 15th day of intervention was statistically significant with the p value (p = 0.02).

TABLE 2: INTER GROUP COMPARISON OF OUTCOME MEASURES OF BOTH GROUPS.

	Pre intervention (*p*-value)	Post intervention(*p*-value)	Mean *p* value
VAS Score	0.53	0.02*	0.02*
DASH Score	0.97	0.10	0.18
Flexion	0.88	0.00*	0.01*
Abduction	0.95	0.01*	0.00*
External Rotation	0.99	0.35	0.08

*shows statistical significant difference

Disability of arm shoulder hand

In group A the mean DASH score on pre intervention was 72.13±14.68 and post intervention 24.73±12.38 and in group B pre intervention score 70.93±13.38 and post intervention 15.13±12.22. There was no statistically significant reduction in overall DASH score of both the groups but clinically there was significant difference from day 1(p=0.73) to day 15 (p=0.08). Pair wise comparison of both the groups did not show any significant reduction in DASH scores.

Shoulder Active Flexion ROM

In group A the mean Active Flexion on the day 1 was 102.53±13.51 and post intervention was 147.87±15.86 and group B the score on pre intervention was 105.20±15.65 and post intervention was 166.40±12.96.

Pair wise comparison between the groups, group A and group B showed significant improvement of Active Flexion range.

Shoulder Active Abduction ROM

In group A the mean value of pre intervention for Active Shoulder Abduction was 88.60±16.66 and post intervention was 138.13±13.91, In group B pre score was 87.00±9.5 and post intervention was 158.13±17.02.

In comparison between groups, Active range of motion was significantly improved in both groups.

Shoulder Active External Rotation(ER) ROM

In this study mean of within group comparison of pre intervention and post 15th intervention values were taken. In group A the mean Active ER score on pre intervention was 23.13±11.43 and post intervention was 45.07±8.77. In group B the mean Active ER score on pre intervention was 23.33±14.32 and post intervention was 52.07±13.26.

Pair wise comparison of both the groups did not showed any statistical significant improvement in Active ER range.

DISCUSSION

The present study conducted was a Randomized controlled trial to compare the effectiveness of mulligan's MWM with Conventional Therapy and Conventional Therapy alone in participants with stage II Adhesive capsulitis.

In present study age distribution and anthropometric variables (Height, Weight, and BMI) showed no statistical significant difference in

groups which represents the homogeneity of participants.

In both the groups common conventional therapy given for treatment of Adhesive Capsulitis was Hot moist pack, Transcutaneous Electrical Nerve Stimulation and Shoulder mobility exercises for a period of 15 sessions.

The mean age in both groups was almost similar, group A 52.7± 5.4 and group B 54.2±6.5. But the most common age group that were between 50 to 56 years. The results of mean age group of present study supports a systematic review, by Nicholas and Lewis, in which nine studies conducted on shoulder Adhesive Capsulitis were affected between the age group of 47 years to 56 years with little variations[9].

The present study did not show any correlation between the BMI and Adhesive capsulitis which is consistent with study done by Perttu E T Arkkila et al[10], in which they found no association found between the shoulder capsulitis and BMI.

The results of the Pain reduction in Mulligan's MWM group (group B) was also found to be in line with the study done by Deepak and Mahendra (2012)[11] who studied treatment of chronic lateral epicondylitis on 40 subjects for a period of 3 weeks. Results exhibited significant reduction of pain in manual therapy group when compared to conventional group. Present study also confirmed that MWM technique is capable of producing hypoalgesic effect by the end of third week.

In Conventional group (group A) the mean value of baseline and post intervention showed statistical significant reduction in quality of pain on VAS score. Reduction in pain is achieved by application of hot moist pack was consistent with study done by Rabkin et al on physiological effect of local heat include analgesia, increase in metabolic activity; reduction in muscular spasm is excitation of nociceptive nerve endings, reduction in viscosity, increase in extensibility of collagen, stimulation of sensory receptors, increase in local circulation and relief of pain[12].

Comparison on the basis of percentage of each group the DASH score showed significant improvement in the disability of shoulder. Conventional group (group A) it showed 65% and MWM group (group B) showed 78% improvement. But the mean P value showed drastic change from pretest to post intervention within both the groups. The results of the present study is supported by the previous literatures done by several authors on manual therapy interventions when combined with physical therapy (Exercises, stretching's and modalities) which have shown to be better effective in terms of pain, ROM and function because of analgesic effect seen by Mulligan's technique.

LIMITATIONS

First limitation of the study was less sample size. Secondly, duration of study was short. Third, no blinding of evaluators was done.

CONCLUSION

The present randomized clinical trial provided evidence to support the use of interventions in the form of Conventional therapy and Mulligan's MWM are useful in by reducing pain, improving range of motion and functional ability in terms of DASH in subjects with stage 2 Adhesive Capsulitis. Hence, it can be concluded that Mulligan's MWM is more effective in treatment of Adhesive Capsulitis than Conventional therapy.

SCOPE FOR FURTHER STUDY

Studies with larger sample size and with longer follow up periods are recommended. Studies with all the shoulder range of motions to be included in determining the consistent outcomes. Studies can be extended by comparing with other treatment modalities.

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EFFECT OF MODIFIED ELBOW BRACE OVER CUSTOM MADE ELBOW BINDER ON PAIN, HAND FUNCTIONS IN PATIENTS WITH TENNIS ELBOW

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ABSTRACT

Background and purpose: Lack of knowledge and professional skills among Physiotherapists in decision making for a right orthosis for pain relief and improving hand functions in patients with tennis elbow. Understanding the biomechanical mechanism behind the orthotic principles will help Physiotherapist in finding the better solution for improving functions in patients with tennis elbow.

Methods: Pre test-post test experimental design, which intended to find out the effectiveness of the modified elbow brace over custom made elbow binder in reducing pain and improving grip strength and hand function among subjects with tennis elbow was implemented. A sample consists of 30 adult population with lateral epicondylitis (15 male & 15 female) participated in the study. All the subjects who were assessed by Orthopaedic surgeon and referred to physiotherapy department for further management. The subjects who met eligibility criteria included in this study. The allocated patients were assigned to groups 1 or 2. Group 1 received the modified elbow brace wrapped around 5cm below lateral epicondyle maintaining pressure 40mmHg (6). Group 2 received the custom made elbow binder applied at same level. Subjects were advised to wear the orthotic device as much as possible for (2 weeks) during most of daily activities at home and work place. No restriction in providing activity was given. A baseline assessment was made at the level of pain and hand function was documented before application of modified elbow brace and custom made elbow binder. Before starting the intervention approach the consent permission was taken. The present study included age between group 20 to 60 years with diagnosis of lateral epicondylitis with less than 3 months duration and recurrence of symptoms after initial treatment. The subjects who able to understand English language and able to complete PRTEE of mentioned exercise in English and history of functional limitation due to pain and impaired hand function. The study excluded history of previous physiotherapeutic intervention, elbow surgery, bilateral lateral epicondylitis, neurologic and rheumatic disorder to the lower arm and wrist apart from lateral epicondylitis, muscular, neural and bony injuries to lower arm and wrist, fractures of upper limb and ligament injury to elbow and wrist.

Result and conclusion: The experimental group reveled shows significantly better results in this study (P = 0.045) than the control group. The modified elbow brace with a pressure maintained 40mmHg was highly beneficial for patients with tennis elbow due to its biomechanical reasons by diverging the forces or load on the painful site of elbow. Thus reducing pain and improving function in daily life than the custom made elbow binder.

INTRODUCTION

Tennis elbow or lateral epicondylitis, is frequently reported condition characterized by pain over the lateral epicondyle of humerus and aggravation of the pain on resisted dorsiflexion of wrist. The incidence in general practice is approximately between four and seven per 1000 patients per year with an annual incidence of 1-3% in the general population[1]. Although the symptoms of patients with a tennis elbow are rather similar, the etiology is not uniformly explained[10]. The suggested causes can be classified into four groups; tendinopathy, intra-articular lesions, compression of the radial nerve and cervical radiculopathy[18]. Tendinopathy is most of the mentioned, and is characterized by a lesion of the common extensor tendon with or without inflammation. The lesions, which may cause the pain, results from overload of the extensors in the wrist[2]. Pain is localized to the lateral epicondyle but may radiating up and down. The upper limb grip is impaired due to the pain and this may restrict daily activities. Tenderness over the epicondyle is usual although other nearby sites may sometimes be maximally tenders. Pain will increase on resisting wrist dorsiflexion with the elbow in extension, and symptoms may also be precipitated by extending the elbow with the wrist palmer flexed and by extending the middle finger against resistance[3].

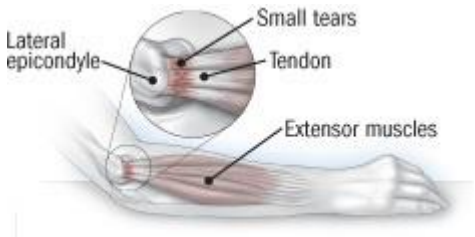
The range of movement of the elbow is usually normal but loss of a few degree of extension is found in some severe and chronic cases. Exclusion of other condition producing elbow pain is necessary, especially referred pain from the cervical spine, and arthritis of the elbow usually

obvious, X ray of the elbow may be helpful to exclude joint diseases and may occasionally show lateral soft tissue calcification. A systematic review reveals that there is insufficient evidence either to benefit and a lack of impact effect of LASER therapy, electrotherapy and exercise and mobilization therapy. Orthotics is another widely used option. The rational for application of orthosis is to rest the wrist extensor muscle to allow healing of the muscle and tendon. Other treatments such as acupuncture, surgery and Cyriax physiotherapy seem not to be effective[4].

It has been suggested that counterforce bracing broadens the area of applied stress to the common extensor tendon origin by providing dispersive pressure around the area of inflammation. In effect, this artificially produces a second, wider muscle origin thereby decreasing the stress on the muscle attachment at the lateral epicondyle[9].

Lateral counterforce bracing may provide immediate effects on pain, grip strength and hand function, among patients with tennis elbow. There have been various studies comparing the effect of elbow bracing in tennis elbow and stated there is no effect in elbow bracing, few other studies introduced a dynamic forearm brace to be effective by arresting the action of common extensor muscles during gripping activities. But this may lead to brace induced weakness of the muscle[7].

Recent studies reveals effect of elbow cuff with pressure maintained 40 mm Hg showed better results in pain reduction and improvement in grip strength measured in normal subjects and same reasons may be the cause of failure of the other studies[8] which failed to prove the effectiveness of elbow bracing in patients with lateral epicondylitis. With reference to this study and also considering the lack of research to prove the right orthosis with its biomechanical implications to support patients with tennis elbow in their functional activities and pain reduction. A study has been designed to see the effect of modified elbow brace over custom made elbow binder in pain reduction and betterment in functional activities in patients with lateral epicondylitis[5,6].



STATEMENT OF QUESTION

Is there any significant effect of modified elbow bracing over custom made elbow binder in reducing pain and improving grip strength and hand functions in patients with tennis elbow.

RESEARCH HYPOTHESIS

Alternate hypothesis-There will be a significant effect of modified elbow bracing over custom made elbow binder in reducing pain and improving grip strength and hand function in patients with tennis elbow.

OPERATIONAL DEFINITION

1. Lateral epicondylitis: - A syndrome of pain in wrist extensor muscles at or near the lateral epicondyle origin or pain directly over the lateral epicondyle.
2. Elbow brace: - Modalities available for protecting the muscle from further injury, to improve muscle function, to alleviate pain, to restore functional movement in affected patients.

LIMITATIONS OF THE STUDY

- The sample size was small.
- Considerations on the circumference of the elbow cuff was not given.
- A control group of placebo effect was ignored.
- Control on the subjects wearing the braces at home was not possible.
- The outcome measures were subjective.

METHODOLOGY

This chapter deals with the methodology implemented to conduct the following study.

DESIGN

The study consist of pre test-post test with experimental design, which intended to find out the effectiveness of the modified elbow brace over custom made elbow binder in reducing pain and improving grip strength and hand function among patients with tennis elbow.

SAMPLE

The total sample was 50 have been taken in daily register. Among 50 subjects 30 subjects only who met eligibility criteria. A sample of consists of 30 adult {15male and 15 female} took part in the study. All the subjects who were assessed met eligibility criteria of the study. The patients were assigned to groups 1or 2. Group 1 received the modified elbow brace wrapped around 5cm below

lateral epicondyle maintaining pressure 40 mm Hg[6]. Group 2 received the custom made elbow binder applied at same level. Subjects were advised to wear the orthotic device as much as possible for (two weeks) during most of the daily activities at home and work place. No restriction in providing activities was given. A baseline evaluation of pain, and hand function was documented before application of modified elbow brace and custom made elbow binder.

OBJECTIVE OF THE STUDY

1. To investigate the specific effect of modified elbow brace on pain, hand functions in patients with tennis elbow.

2. To investigate the specific effect of custom made elbow binder on pain, hand functions in patients with Tennis Elbow.

INCLUSION CRITERIA

- Subjects age between 20 to 60 years.
- Physicians' diagnosis of lateral epicondylitis with <3 months duration and recurrence of symptoms after initial treatment.
- Ability to complete PRTEE of mentioned exercise in English.
- History of functional limitation due to pain and impaired hand function.

EXCLUSIONCRITERIA

- History of any physiotherapeutic intervention after physicians' diagnosis.
- Patients with history of elbow surgery.
- History of corticoid injection after diagnosis.
- History of bilateral lateral epicondylitis.
- History of neurologic and rheumatic disorder to the lower arm and wrist apart from lateral epicondylitis.
- History of muscular, neural and bony injuries to the lower arm and wrist.
- Fractures of upper limb.
- Ligament injury to elbow and wrist.

INSTRUMENTS CALIBRATED

- Modified elbow brace to maintain 40 mm Hg pressure gradient.
- Custom made elbow binder.
- PRTEE questionnaire

PROTOCOL

The subjects who were introduced into the study, followed by signing of the informed consent approval form. General baseline assessment regarding {pain, elbow girth etc}, the clinical history and function limitation was documented. The anthropometric measurement was recorded on subject assessment form. Patients were allocated randomly to either group A as treatment group got calibrated modified elbow brace to maintain 40 mmHg pressure gradients. Group B as control group obtained custom made elbow binder without any controlled pressure gradient.

Patients were instructed and encouraged to use the brace through the day and no restriction in provoking activities was given .For the entire data collection procedure the subjects were referred by subject number and not by name to maintain the confidentiality of the subject. Data was collected and documented in the data collection form.

PROCEDURE

Baseline level of pain and impaired hand function was documented using PRTEE scale. After 2 week of post intervention, level of pain and hand function will be further evaluated using through the same scale.

VARIABLE

Dependent variable:

- Score of pain and hand function impairment on PRTEE scale.
- Independent variable
- Modified elbow brace.
- Custom made brace.

DATA ANALYSIS

Analysis has been performed using SPSS software version 11. Paired T test was used to find out the difference between pre intervention and post intervention group. The scores of pain and hand function were recorded and the level of significance was set at $p < 0.05$.

RESULTS

A total of 30 subjects were included in the study to find out the significant effect of modified elbow brace and custom made elbow binder on pain, hand function in patients with tennis elbow. The sample consists of two groups. The data revealed that results of Group A are more significant than the Group B. The following section documents the observations and results obtained after statistical analysis which shows that modified elbow brace is better than custom made elbow binder with significantly reducing pain and improving hand function in patients with tennis elbow.

Demographic information of subjects

30 subjects (22 males and 8 females) in the age group of 25-60 years with the mean (Standard Deviation) age of 46.60 (5.938).

Comparison between pre-test and post-test scores PRTEE within group A (modified elbow brace)

The data revealed a highly significant (p=0.045) difference between the pre-test and post-test scores of PRTEE within group A.

Comparison between pre-test and post-test scores PRTEE within group B (custom made elbow binder)

The data revealed no significant (p=0.417) difference between the pre-test and post- test scores of PRTEE within group B.

TABLE 1: SHOWING NO. PARTICIPANTS INVOLVED IN BOTH GENDER

Gender	Male	Female
Group A	11	11
Group B	4	4

TABLE 2: SHOWING NO. PARTICIPANTS IN DIFFERENT AGE GROUPS

Age	No. Participants
25-30	6
30-40	6
40-50	3

TABLE 3: PRE-TEST AND POST-TEST DIFFERENCE WITHIN GROUP A

	Mean	N	SD	t	Significance
Pre-test	63.13	15	6.357	10.22	0.045(S)
Post-test	56.47	15	6.022		

TABLE 4: PRE-TEST AND POST-TEST DIFFERENCE WITHIN GROUP B

	Mean	N	SD	t	Significance
Pre-test	62.933	15	4.57	-0.837	0.417(NS)
Post-test	64.26	15	5.81		

DISCUSSION

Despite the various treatment options extending for patients with Tennis elbow which includes surgical and non-surgical, the bio-mechanical view of relieving the pressure at extensor carpi radialis brevis had significantly shows reducing pain and functional aspects of the patient with tennis elbow. This procedure can be implemented by applying a pressure of 40 mm Hg through a cuff inflated just 5 cm below the origin of muscle which results in force reduction at the extensor carpi radialis brevis origin thereby preventing further damage at musculotendinous junction and also relieving pain during functional activities [6]. Although many theories exist regarding the mechanism of action, two theories are referred most commonly. The first theory is the constriction of forearm musculature and inhibition of full muscle contraction by inhibiting muscle expansion and thereby reduces tension at the musculotendinous unit prominent to the band. The second theory is the inhibition of support band as an area of direct compression area over the extensor carpi radialis brevis muscle belly, creating a compression adhesion or secondary origin thereby unloading the true origin at the lateral epicondyle. Other investigators proposed additional benefits of minimizing exaggerated tendon movement, decreasing the force contribution by muscle fibers proximal to the band dispersing stress away from the pathological area by broadening the area of common extensor muscle origin, or direct potential stress overloads to healthy tissues and possibly the band itself. Whichever the case the band likely has combined effect as placebo, self-reminder, constriction to prevent overuse, and creator of a secondary origin[5].

The greater force reduction {up to 38%} with high of pressure 200 mm Hg likely is explained through the compressive mechanism of action. As the compression increases and the normal gliding showed between muscle units, subcutaneous tissue of skin is diminished. This force will be dissipated to the compressing band. This may create complications. Potential complication related to excessive pressure include venous congestion and edema transient and/or interosseous nerve syndrome and soft tissue necrosis. On the other hand consider the support band applied loosely {no pressure} resulting no effect.

Thus a band is applied to a safe pressure so that increases to a greater pressure during activity would allow a compromise between safety and our results showed between the two group shows experience that modified elbow brace showed at significant reduction in pain and improvement, in functional activity {P=0.045} than the group B who were using custom made elbow brace .Hence this goes in hand to hand with the Parent studies on normal subjects. The present study conclude that the fore arm support band with pressure maintain 40 mm Hg appears to provide a mechanical inhibition of force transference to the ECRB origin during activity the load the ECRB tendon distally. The force reduction caused by forearm support band is proportional to the pressure application and can also be assumed the percentage of force reduction caused by forearm band and is inversely proportionally the load applied to the ECRB tendon distally.

Relevance to clinical practice

The results revealed from this study would have direct relevance and apply this intervention strategy in daily clinical practice during handling of tennis elbow patients. As per the study the modified

elbow brace with enabling a fixed pressure of 40 mm Hg over the common extensor origin proves beneficial to the patients by reducing pain and improving hand function in daily activities, which solves the major problem of the patients with tennis elbow. Hence the results of this study will help the clinical practitioner in focusing their interest on the biomechanical aspects of cuff over elbow in relieving pain more in future.

FUTURE RESEARCH

- Future researches should examine more number of sample with a documented evidence is needed with objective outcome measures.
- The circumference of the various elbow supportive braces existing and used by the population should be compared for better outcome of results.
- The effect of constant and varying load at the wrist level with and without elbow brace in tennis elbow patients can also be investigate.
- The effect of the same brace can be compared between genders, obese and patients, with different elbow girth measurements, athletes.

CONCLUSION

The results of this present study indicates that the modified elbow brace with a pressure maintained 40 mm hg significantly highly beneficial for patients with tennis elbow due to its bio-mechanical reasons in reducing their pain and improving their hand functions in daily life than the custom made elbow binder .

STATEMENT

I have read the above information and understand the request for disclosure. The details are accurate to the best of my knowledge.

SOURCE OF FUNDING

This study utilized by the scholar self-source of money.

ETHICAL CLEARANCE CERTIFICATE

As this study involving human subjects the ethical clearance has been obtained from the ethical committee of as per the ethical guidelines for Biomedical Research on Human subjects, 2001 ICMR, and New Delhi.

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RESEARCH REPORT: EFFECT OF GLOBAL POSTURAL RE-EDUCATION ON REPOSITIONING SENSE AND DISABILITY IN LOW BACK PAIN

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ABSTRACT

STUDY OBJECTIVES: Effect of Global Postural Re-Education on Repositioning Sense and Disability in Non-Specific Low Back Pain. DESIGN: An Experimental Study. SETTING: All the Subjects were included from various hospitals and health centres in Dehradun. METHODS: A total of 33 subjects were recruited for the study on the basis of inclusion and exclusion criteria after signing the informed consent form. The subjects were divided into two Groups [A= Global Postural Re-Education Program (Experimental Group) & B=Continuous Ultrasound Therapy (Control Group). OUTCOME MEASURE: Roland Morris Questionnaire for Disability (RMDQ) and Tape method measurement for lumbar spine Repositioning Error (LSRE). RESULT: The result of the study shows that GPR and Ultrasound both show significant effect on disability scores and on repositioning error in eyes open condition but Ultrasound shows non-significant on repositioning error in eyes closed condition. However GPR (Group A) is significantly more effective than Ultrasound (Group B) in correcting disability and repositioning error. CONCLUSION: The present study demonstrates that GPR intervention in subjects with non-specific low back pain induces a greater improvement on repositioning error and disability as compared to conventional Ultrasound Therapy.

KEYWORDS: Disability, Global Postural Re-education, Non-Specific Low Back Pain, Repositioning Sense, Ultrasound.

INTRODUCTION

Low back pain (LBP) is a serious public health issue[1]. Back pain is the most common cause of disability of persons under the age of 45 and the second most common reason for office visits to primary care physicians[1]. Nonspecific Low Back Pain is characterized by the absence of structural change; that is, there is no disc space reduction, nerve root compression, bone or joint injuries, marked scoliosis or lordosis that may lead to back pain[2]. Patients with low back pain are reported to be present with impaired spine reposition sense and altered postural control[3]. Poor reposition sense has been shown to be related to musculoskeletal injury in several joints, including ankle and knee[4]. Low back disorders have also been associated with changes in trunk position sense[4].

Cheryl M Petersen et al reported that proprioception describes the sensation generated within the body which contribute to an awareness of the relative orientation of body parts, both at rest and in motion[4]. The proprioceptive system is dependent upon simultaneous activity in a number of types of mechanoreceptor afferent neurons[4]. Intact proprioception is essential for movement control[5]. Venkata K. Gade et al depicted that, a decrease in proprioceptive feedback leads to inefficient muscle responses, leading to increased risk of injury and low back pain[6]. Impaired proprioception is due to an altered paraspinal muscle spindle afferents or flawed central processing of the sensory input and delayed muscle reflex response to sudden trunk loading and poorer postural control in patients with LBP[7]. Proprioceptive impairments, reflected by poor joint sense, have been identified in numerous soft tissues injuries[8].

Position sense is intrinsic to the coordination of the torso musculature and the stability of the spine. The ability to accurately sense and control spinal curvature may be an important factor in control of low back disorders. It is the ability to accurately sense and control spinal curvature and is particularly important in feedback control of spinal stability. Position sense can be thought of as the first part of a feedback mechanism that provides motor control and stabilization to the lumbar spine. Increased reposition error can be represented as increased detection threshold, this would result in a decreased stability of the system.[9] Position sense describes those sensations generated within the body which contribute to an awareness of the relative orientation of body parts both in rest and in motion. Mechanoreceptors provide information for reflex regulation of muscle for awareness of position sense and have been isolated in most spinal tissues[4]. According to Sara E. Wilson spinal reposition sense is influenced by many factors such as motion, trunk position, and loading[9].

Global Postural Re-education (GPR) is a physical therapy method developed in France by Philippe-Emmanuel Souchard. This therapeutic

approach is based on an integrated idea of the muscular system as formed by muscle chains, which can face shortening resulting from constitutional, behavioral, and psychological factors. The aim of GPR is to stretch the shortened muscles using the creep property of viscoelastic tissue and to enhance contraction of the antagonist muscles, thus avoiding postural asymmetry[10]. According to Ana Claudia Violino Cunha et al GPR was found effective in reading pain and improving range of motion[11]. Marlene Aparecida Moreno et al depicted that GPR is practiced in physical therapy to achieve postural corrections[12]. Rosana M. Teodori et al added that GPR given to women with patellofemoral syndrome showed decrease in pain that was attributed to the overload of proprioceptive stimuli[13]. GPR is effective for treating some musculoskeletal diseases and disorders such as ankylosing spondylitis, LBP and lumbar disc herniation[14]. Further GPR was more effective than analytic stretching and mobilizing exercises in improving clinical and functional measures[10].

METHODS

An experimental study was conducted on total of 33 subjects who were included from various hospitals and health centres in Dehradun on the inclusion and exclusion criteria and they were divided into 2 groups after informed consent was informed. Group A (Global Postural Re-education n=18), and Group B (Continuous Ultrasound n=15). Pre intervention readings of disability using Roland Morris Disability Questionnaire and readings of repositioning error using Tape method were carried out for each patient. For both the group interventions was given twice a week for 5 weeks. Post intervention reading was calculated in the same manner as pre intervention after the end of 5 weeks.

For measuring disability Roland Morris Disability Questionnaire was used. It consists of 24 dichotomous questions to be answered with yes or no. If patient answered yes 1 point was allotted and if he/she answered no then 0 points were allotted. The higher the score the more severe the disability associated with low back pain. RMDQ is highly reliable. (Reliability is r = 0.91).

The repositioning error was measured by tape method which is a highly reliable method[5]. As the previous studies indicate that Repositioning Error is profoundly present in lumbar flexion[15] so flexion was considered to check the error. The subjects were marked with the help of skin marker at C7 and S2 and the distance between them was measured. The subjects were asked to stand upright in front of the mirror with the feet apart from each other about shoulder's width and with the arms near the body in front of the mirror. Subjects were requested to actively move slowly to the extremes of lumbar flexion. The subjects were told to hold this position for 5 seconds and then return to neutral. Then the subjects were brought to lumbar spine 5 cm flexion from initial position and were instructed to perceive and learn the target position for 30 seconds in front of mirror. The subjects were instructed to repeat the movement and achieve target position in both eyes closed and eyes open. The target position was accepted as 0cm and deviation was recorded as (-) undershooting and (+) overshooting.

Protocol for Group A (Global Postural Re-education): The GPR method included lying, sitting, and standing posture to be held for 15 to 20 minutes each. The frequency was twice weekly for five weeks. The exercises were conducted in one to one supervision[10]. The patient lied in supine position with the upper limbs abducted about 30 degree and the forearm supine. Hips were flexed, abducted, and laterally rotated, with foot soles touching each other. Manual traction was applied to neck in order to align the dorsal and cervical curves of the spinal column, whereas sacral traction was used in order to straighten the lumbar spine. The patients were instructed to spread their hips from the initial position, maintaining the foot soles together in alignment with the body axis. The physical therapist used verbal commands and manual contact to maintain the alignment and for necessary postural corrections, with the aim of optimizing the stretching and discouraging compensatory movements. The progression was in the direction of extension of the lower limbs and adduction of upper limbs.

The initial position was lying with the hip flexed and progression consisted of increasing hip flexion, knee extension, and dorsiflexion of the ankle. The standing posture with flexion of the trunk were followed by progression from an upright posture to a bending forward position, while keeping the occiput, the thoracic spine, and the sacrum aligned. Both the lying posture with extension of the legs and the lying posture with flexion of the legs were performed in all patients, whereas the standing posture with flexion of the trunk were performed if allowed by the patient's cooperation, fatigue and pain. In all cases, the total duration of the session was the same.

Protocol for Group B (Continuous Ultrasound): The subject was asked to lie prone with the therapist standing on the side of the patient. The patients received continuous ultrasound at a frequency of 1 MHz and with intensity of 1.5 W/cm^2. Slow circular movements were applied

by the transducer head over the paravertebral low back region. The duration of ultrasound application was estimated for each patient using grey's formula[16].

Total treatment time = planned local exposure time × (tissue area / effective radiating area)

For this study, the average local exposure time was planned to be one minute and the effective radiating area of the transducer head was 5 cm^2. Subjects in this group received 10 sessions of treatment during a period of 5 weeks. Average time taken was 10-20 minutes per session.

DATA ANALYSIS

Data analysis was done using SPSS 16.0 version. Paired t-test was applied to compare the pre and post intervention readings of repositioning error and disability within the group. Independent t-test was done to compare the pre and post intervention readings of repositioning error and disability between the groups. The statistical significance was set at 95% confidence interval with p value < 0.05 was considered significant.

RESULTS

Data was analysed for 30 participants: 15 in each Group A & Group B.

TABLE 1.1 DESCRIPTIVE ANALYSIS OF THE DEMOGRAPHIC DATA

	GROUP A		GROUP B	
VARIBLES	MEAN	SD	MEAN	SD
AGE	24.533	3.136	24.067	2.737
HEIGHT	172.07	6.922	171.00	5.196
WEIGHT	67.800	8.427	66.067	4.317

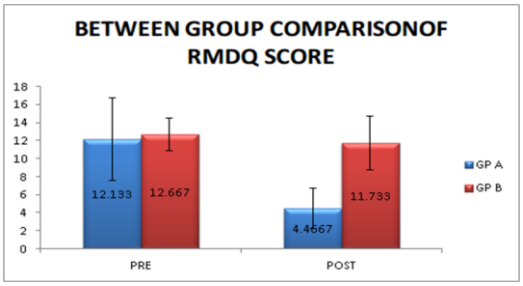

FIGURE 1: BETWEEN GROUP COMPARISON OF RMDQ SCORE

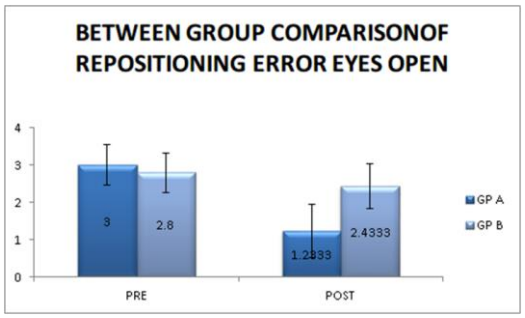

FIGURE 2: BETWEEN GROUP COMPARISON OF REPOSITIONING ERROR EYES OPEN

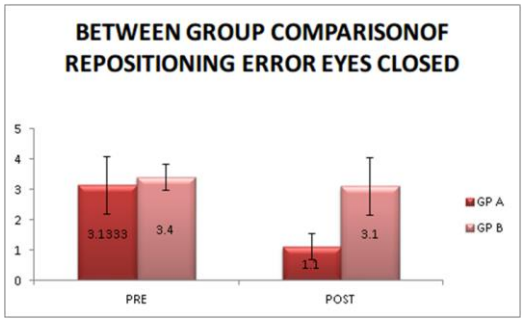

FIGURE 3: BETWEEN GROUP COMPARISON OF REPOSITIONING ERROR EYES CLOSED

The result of the study shows that GPR and Ultrasound both show significant effect on disability scores and on repositioning error in eyes open condition but Ultrasound shows non-significant on repositioning error in eyes closed condition. However GPR (Group A) is significantly more effective than Ultrasound (Group B) in correcting disability and repositioning error.

DISCUSSION

In the present study GPR was given in patients with low back pain and its effect on repositioning error was checked. The study included two Groups- Group A (Experimental Group) and Group B (Controlled Group). In Group A Global Postural Re-education was given and in Group B Ultrasound was given. The results showed that the GPR (Group A) had better improvement in comparison with US (Group B) when repositioning error and disability were measured. Both the groups were treated for five weeks for two times per week.

According to Philippe-Emmanuel GPR is a therapeutic approach which is based on an integrated idea of a muscular system formed by muscles chain, which can face shortening resulting from constitutional, behavioural, and psychological factors, so the aim of GPR is to stretch the shortened

muscle using the creep property of viscoelastic tissue and to enhance contraction of antagonist muscle thus avoiding postural asymmetry[10]. In this study the result showed the levels of disability measured by RMDQ decreases more in GPR group than US group after comparing pre and post intervention readings, although both groups showed significant difference between pre and post intervention readings. The results depicting that there is a positive effect of GPR on disability in non-specific low back pain. A possible explanation to this lies in the role of GPR in reducing pain and increasing range of motion, which together may have led to perceived well- being and thus to the report of decreased disability.

In support to our study GPR was earlier found effective in decreasing pain levels in patients with low back ache, as concluded by Bonetti.et.al.[10] It was also found to have positive effect on electromyography activity along with pain in patients with TMJ disorders stated by Maluf et al.[13] More recently, a RCT on female subjects with chronic neck pain showed that conventional static stretching and GPR were equally effective in relieving pain and improving both range of motion and quality of life[10].

As we know Repositioning error measurement is often used in spinal proprioception evaluation[5]. According to Sara E.Wilson spinal position sense may play a role in the biomechanics, injury and rehabilitation of low back pain[4]. Patients with low back pain have a less refined position sense than healthy individuals, possibly because of an altered paraspinal muscle spindle afference and central processing of this sensory input[17]. Increased repositioning error can be represented as an increased detection threshold, this would result in a decreased stability of the system[4]. The result of the present study depict that GPR proved to be more effective in correcting repositioning error as compared to US. Although US was also found to have significant effect in correcting the repositioning error. This could be explained on the basis of a study done by Ebadi et al[18] who concluded that US was significantly effective in increasing function, decreasing pain and increasing range of motion in patients with LBA.

In the present study GPR were found to have significant effect on repositioning error. As depicted by George A. Koumantakis et al[19] poor proprioception has been hypothesized to be significant contributing factor for LBA. Possible role of GPR in enhancing proprioception in lumbar spine could be a significant explanation for current results. According to Jacek Cholewicki et al[7] compression of the soft tissue around the joint receptors and increased stimulation of skin afferents may enhance proprioception. Proprioceptive receptors have been located in lumbar ligaments and facets joint capsules although muscles are considered to have majority of proprioceptors units[20]. Brumagne et al[17] added that muscle spindles have a positive role in proprioception. The results of the present study could be due to continuous stretch caused by posterior ligaments and soft tissue structures creating a reflex response providing proprioceptive feedback mechanism. In support to our explanation Sara E Wilson and Granata[4] added that prolonged stretch of spinal ligaments can affect the reflexive activity.

In this study repositioning error was measured in both eyes opened and eyes closed in both Group A and Group B. The result showed significant difference in both Group A and Group B in eyes opened. It was also found that GPR group showed better result i.e decrease in the repositioning error than US group when we compared the pre and post intervention readings of both groups. Both opened and closed eyes testing was considered to check the proprioceptor system. According to Daniela Cristina et al[21] at eyes closed the body is under the orientation of only proprioceptor system while with eyes open visual system system also plays a role[22]. In our study we used open eyes to check the efficacy of GPR on repositioning error which proved to be significant. The impact of GPR was made more strong as when the vision was suppressed, the action of proprioceptors was enhanced and the results proved that even with eyes closed repositioning error significantly decreased, when GPR was administered. However US showed non-significant improvement in eyes closed tests.

According to Rosana M. Teodori[13] the GPR method is based on the global stretching of antigravity muscles and the stretching of muscles that are organised on muscles kinetic chain[13]. Marlene Aparecida Moreno et al added in their research article that when the length of the muscle fibre is chronically altered, the numbers of sarcomeres adjust to compensate the change. This change will reflect in functional capacity of muscle. In one study it was reported that the generation of tension in the skeletal muscle, as determined by evaluating the length-tension relationship, is directly correlated with the degree to which actin and myosin filaments are superimposed, less superimposition of these filaments in the muscle at rest translating to greater capacity of the muscle of greater tension[12]. This can explain the result of our study as in present study we attempt to apply stretching techniques designed to improve length-tension relationship along with contraction of

antagonist muscles, thereby improving muscle performance and postural symmetry. Maduri, M.S & Wilson[15] depicted that decrease in the alteration of trunk muscle alignment leads to decrease in repositioning error. In addition to that Ravi Shankar Reddy et al[23] added that lumbar extensor muscle endurance affects the proprioception in patients with LBA. In the present study we could also state that manual contact of the therapist could have an important role in tactile and proprioceptive stimulation, facilitating the perception of movements and postures that need to be corrected during the stretch[13].

During the intervention period three patients were dropout from the GPR exercises as they were not able to hold the position correctly and easily got fatigued, this could be one significant limitation of GPR. However other all subjects of GPR group showed enthusiasm because after completing the protocol they can do GPR by themselves as a home programme. The strength of this study was presence of randomization so, there was no bias between the two groups. So, on the basis of this study we could say that GPR had a positive effect on repositioning sense and disability in non-specific low back pain and thus GPR decreases repositioning error and disability level. Thus GPR can be considered as an important approach in management of patient with non-specific low back pain, with repositioning error and disability.

CONCLUSION

The present study demonstrates that GPR intervention in subjects with non-specific low back pain induces a greater improvement on repositioning error and disability as compared to conventional Ultrasound Therapy. So, GPR is better choice of treatment in decreasing disability and repositioning error than Ultrasound.

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TO STUDY THE MOVEMENT CONTROL TESTS IN NON SPECIFIC LOW BACK PAIN AND HEALTHY INDIVIDUALS – AN OBSERVATIONAL STUDY

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ABSTRACT

BACKGROUND: Movement Impairment Syndromes are important to physiotherapist when we consider detection of faulty movements or kinesiopathology. Reliable observations of variation in Movement Control (MC) of patients with low back pain is important. However there is limited evidence of difference between movement patterns in patients with Low Back Pain (LBP) & individuals without Low Back Pain. AIM & OBJECTIVES: The study aimed at determining the difference in a test battery score of 6 tests for Movement Control of lumbar spine in Nonspecific Low Back Pain (NSLBP) & healthy individuals without LBP. Method: 100 people- 50 with Chronic NSLBP and 50 healthy individuals without any episode of LBP were selected for the study. Inclusion criteria: Willingness to participate in study, able to follow command, age- 18 to 30 years, NSLBP referred and diagnosed by an Orthopaedic Surgeon. Exclusion criteria: H/O acute trauma to lower limbs or back, serious illness, Positive neurological findings. Performance of subjects in both groups on six MC tests resulting in score of 0-6 positive tests was recorded by a 2nd investigator. The 6 tests were Waiter's bow, sitting knee extension, rocking on four, dorsal pelvic tilt, one leg stance, and prone active knee extension. ANALYSIS & RESULTS: The no of positive test out of 6 in both groups compared by MANN WHITNEY U TEST (95% CI) showed significant difference between both groups. CONCLUSION: it can be concluded that there is a significant difference between healthy & NSLBP group in ability to control movements of low back.

INTRODUCTION

According to evidence based guidelines upto 90% of all Low Back Pain (LBP) is classified as NONSPECIFIC LOW BACK PAIN (NSLBP). In medical sense the cause of back pain is not clear. Waddell has described NSLBP as simple back pain, mechanical in nature, pain situated in lumbosacral region, buttocks, and thighs[1]. Several authors suggest that because NSLBP is a benign problem emphasis should be on clinical test and assessment.

Movement Impairment syndromes are important for physiotherapists when we consider the detection of faulty movement or kinesiopathology[2]. It can be hypothesized that impaired Movement Control (MC) and a lack of awareness of maladaptive movement patterns perpetuates LBP. Physiotherapists make clinical decisions based on the observation of MC. O'SULLIVAN describes back pain patients with reduced MC and excessive movement as pain provocateurs[3].

According to Sackett[4] phase 1 of diagnostic research compares test result in patients and control individuals. Ideally the healthy person should test negative and affected persons positive. Because LBP is a multidimensional problem, not all patients have problem with MC. On the other hand if both NSLBP & healthy subjects have impaired MC the importance of impaired MC would be limited and diagnosing MC would not be worthwhile.

However there is a limited evidence of difference between movement patterns in subjects with NSLBP & healthy individuals without LBP. Reliable observations of variations in MC of the low back in LBP patients is important. The reliability of movement control tests has been evaluated[5]. A test battery of 6 tests of assessing MC of lumbar spine was made out of 10 tests.

AIM & OBJECTIVES

The aim of the study was to determine the difference in Movement Control of lumbar spine between subjects with NSLBP & healthy individuals without LBP. The objective was to compare the no of positive tests out of a test battery of 6 MC tests between healthy and NSLBP subjects.

METHOD

Study Design: Observational Study
Study Setting: Outpatient department of Govt. Physiotherapy College, Civil hospital, Ahmedabad.
Study Duration: 6 months
Sample Size: 100
Materials: Record Sheet, Ruler.

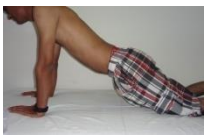
Inclusion criteria: Willingness to participate in study, able to follow commands, age- 18 to 30 years, NSLBP referred and diagnosed by an Orthopaedic Surgeon.

Exclusion criteria: H/O acute trauma to lower limbs or back, serious illness, Positive neurological findings.

PROCEDURE

The patients with NSLBP referred to the department were screened for selection criteria. 50 patients were thus selected for the study after screening 67 patients. Ethical approval for the study was given by the Institution prior. The subjects in the control group were the healthy volunteers who did not had complain of LBP at that time or 3 months prior to testing and were age between 18-30 years.

A test battery of 6 MC test was made. Subjects in both groups received standardized instructions on how to perform the test. 3 trials of each test was permitted. Order of test remained the same always (standing, sitting, quadruped, prone) the performance of the subjects on the test resulted in score of 0-6 positive test was done by 2nd investigator who was blinded to the subject group. The six MC test are shown below:

TEST	CORRECT	INCORRECT
1. Waiter's Bow Forward bending of hips without movement of low back		
2. Dorsal pelvic Tilt Dorsal active anterior tilt of pelvis in standing. Thoracic spine remains in neutral & lumbar spine moves in flexion		
3. One leg Stance From normal standing to one leg standing: measurement of movement of belly button. Distance of transfer is symmetrical not more than 2 cm difference.		
4. Sitting Knee Extension upright sitting with neutral lumbar lordosis; extension of knee without flexion of low back		
5. Quadruped Position Rocking pelvis forward & backwards keeping low back in neutral	 	 
6. Prone lying active knee flexion Prone knee flexion atleast 90 without movement of low back & pelvis		

Waiters bow, Sitting knee extension, Rocking on four, assess flexion control of lumbar spine. In these where hip flexion is expected while lumbar spine is stabilized were positive if flexion of spine occurs with hip. Similarly extension control of spine is assessed by Dorsal pelvic tilt, Rocking on four backwards,& Prone knee bending where extension of hip should occur while lumbar spine is stabilized. While lateral flexion and rotation control is assessed by One leg stance where lateral weight shift Abuction & Adduction in hip should occur in hips while lumbar spine maintains neutral position.

DATA ANALYSIS

The baseline data of patients as age & gender were taken. Data was analyzed with SPSS version 16 for windows. The MANN WHITNEY U TEST was used to compare the mean no of positive tests in the two groups. Confidence interval (CI) was set at 95 % ($p<0.05$)

RESULTS

The age and gender distribution of patients in both group is listed in table 1. The between group analysis showed statistically significant difference between the groups. ($p<0.001$)

TABLE 1: AGE & GENDER DISTRIBUTION

	Subjects		Age	
	Male	Female	Mean	SD
Group 1 (NSLBP)	23	27	23.7	3.6
Group 2 (Healthy)	28	22	25.3	2.8

TABLE 2: COMPARISON OF MEAN NO OF POSITIVE TESTS

	Mean±SD	U value	P value
Group 1	2.45±1.14	121.5	<0.001
Group 2	0.27±0.48		

Thus there is statistical significant difference in MC tests of lumbar spine between NSLBP & those without LBP. ($p<0.001$)

DISCUSSION

This study demonstrates a clear difference between patients with NSLBP & those without LBP in their ability to actively control movements of low back. Patients with NSLBP have significantly more no of positive tests than those without LBP. It is debatable whether a dysfunction in the MC is a subgroup of LBP itself. It might also form a part of diagnosis or clinical instability. Cook[6] has established the clinical pattern of instability of low back where the most important physical findings were poor co-ordination, proprioception & control of active movements which links it directly to this study. The order of test sequence was strictly followed as it is assumed to mimic clinical practice procedure in routine. However the influence of patient performance on subsequent tests on changing the order of testing is not known.

The differences in test instruction procedures by the assessor can affect the test results. The examiner to examiner view of a single test to be said positive varies, while here only one blind assessor have done the tests for both groups. However blinding becomes difficult because in spite of blinding clinicians are likely to identify patients based on the observation of pain related behavior.

As far no gold is available for MC of the low back so it is impossible to determine the sensitivity & specificity of the test battery being used. A gold standard for checking the stabilization of lumbar spine during test can be functional X rays, functional MRI or other devices. In this study the focus was only to examine whether the subjects could control the neutral position of the low back during the test. In addition to impaired MC, neuromechanosensitivity (test 4) or muscle length (test 6) may have influenced test performance.

The only difference between the groups was whether the subjects had LBP or not. This study demonstrates that there is a difference between subjects with & without LBP which is a first step in validation process of developing diagnostic tests. One might state the observed differences could be because LBP patients may have prior experiences of the test been examined for their back pain complaints while the non LBP were totally new to the procedure. However if this have been the case then it can be argued that then those having most experience should have performed the test better due to previous learning while here it is not so.

LBP is a multidimensional problem and consequently impaired MC alone cannot be expected to explain back pain. Thus this cannot be translated in to diagnostic action but adds to our biological insight into mechanisms of disease and may serve later research into treatment as well as diagnosis.

CONCLUSION

This study demonstrates a significant difference between subjects with LBP & subjects without LBP regarding their ability to actively

control movements of the low back. The subjects with NSLBP have significant impaired MC.

CLINICAL PEARL

It becomes essential to evaluate NSLBP patients on MC of lumbar spine as it may be that excessive movement or inefficient stabilization of the low back in them be the probable cause of back pain. The aim of the therapeutic intervention for such group then should be spinal stabilization exercises.

FUTURE RECOMMENDATIONS

Future study should compare the test results depending on duration of LBP: acute, subacute or chronic. Also future studies should correlate the lumbar spine range of motion & mean no of positive tests in NSLBP. Further studies are needed for comparison with a gold standard.

CONFLICT OF INTEREST

The authors had no conflict of interest.

FUNDING

The study was not funded by any Company or Person. It was carried out in the Government Institute.

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THE EFFECT OF USING SMART PHONE ON BONE DENSITY OF THE HAND AMONG STUDENTS OF UNIVERSITY OF DAMMAM

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ABSTRACT

Background: Hand pain is considered a major problem in Using of Smart Phone.it is popular way that young adults and teens prefer to communicate between them, because it easier and faster but it comes at a price. It was found that using of smart phone may increase risk hand pain. As it's become a serious problem in Physical Therapy field. The purpose of the study is to investigate prevalence of hand pain result from using smart phone and to measures the radiations emission from smart phones and bone density among students Methods: hand Pain Questionnaire was distributed to the students in Dammam University. Assessment sheet was completed to whom complaining from hand pain and bone density will measure. Then the prevalence of hand pain and measurement will calculated. Collected data treated statistically by SPSS software and results will discuss. The most important results of this study is the prevalence of osteoporosis among the students, males students has high percentage of osteoporosis than females students with high risk of fracture.

KEYWORDS: hand pain, smart phone and bone density

INTRODUCTION

Hand pain is considered a major problem in Using of Smart Phone.it is popular way that young adults and teens prefer to communicate between them, because it easier and faster but it comes at a price. It was found that using of smart phone may increase risk hand pain. As it's become a serious problem in Physical Therapy filedStrategies for identifying and evaluating those at high risk; the use of bone mineral density and biochemical markers in diagnosis and assessing response to management; recommendations regarding nutrition and physical activity; and the selection of pharmacologic therapy for the prevention and management of osteoporosis in men and women and for osteoporosis resulting from glucocorticoid treatment.

There is ongoing discussion whether the mobile phone radiation causes any health effects. There is continuously ongoing controversy whether the users of mobile phones should be concerned about:- the health safety of the radiation emitted by these devices, whether the safety standards are adequate and, ,whether continuation of research in this area is scientifically justified. The reliability and sufficiency of science behind the safety standards[1]. Health Research Policy and Systems. Mobile phone radiation health risk controversy: the reliability and sufficiency of science behind the safety standards. Those who used cell phones had decreased bone mineral content (BMC) and bone mineral density (BMD) at the right outside top of the thigh bone near the area where the cell phone would be worn on the belt. The differences in this area between the left and right was considerably associated to the estimated hours carry a cell phone. Both BMC and BMD are markers for bone strength. Even though this was a small study it does bring to light the possibility that long term exposure to electromagnetic radiation from cell phones could negatively impact bone mineralization trapezius muscle activity Mobile cell phones are a source of nonionizing electromagnetic radiation in the radio frequency range. For these frequencies, there is local, no uniform energy absorption by the human body. Cell phone use is continually growing and any remarked effect on bone mineral density.

Ergonomics researchers are starting to wonder whether it's putting the younger generation at risk factor or some overuse injuries[3]. Mobile phones cause the symptoms in perceived stress, symptoms of depression and sleep disturbances first carpometacarpal joint (CMCJ) arthritis and with a history of excessive mobile phone use and active texting with mobile phone more than 3 years[6]. Repetitive thumb movements and perceived a not having enough rest breaks were risk factors for osteoarthritis of the Thumb[3]. The extended intensive use of mobile phones could expose the thumbs and fingers to operational stresses beyond their intended

function which may generate pain and musculoskeletal disorders in the thumbs and the associated joints, forearm and relatively low The extended intensive use of mobile phones and other devices for Information and Communication Technology (ICT) could expose the thumbs and fingers to operational stresses beyond their intended function which may generate pain and musculoskeletal disorders in the thumbs and the associated joints the thumb, forearm and trapezius muscle activity during SMS messaging was relatively low. Relative to sitting, entering an SMS while standing increased trapezius muscle activity. Females, compared to males, typically had higher muscle activity levels and they tended to work in greater thumb abduction, to move their thumbs with higher velocity the effect of participants' varying thumb sizes in relation to the experience of using mobile phone keypads for thumb length and circumferenc[4]. Static magnetic field may affect theoretical the cardiovascular system by direct or indirect influencing cellular function cardiac rhythm, cardiac pump performance, vascular resistance and tissues perfusion. Human studies of these are limited in their extend in the methodology, particularly in the sham exposure and effective blinding of both subject and researchers[5]. The additional information which has become available on carcinogenic and other nonthermal effects of radiofrequency and microwave radiation frequencies in the last years does not justify a revision of exposure limits set by the Commission on the basis of the conclusions of the 1998 opinion of the Steering Scientific Committee[6]. In particular, in humans, no evidence of carcinogenicity in either children or adults has resulted from epidemiological studies the size of some of which was very large, although the period of observation was not long enough for a definitive statement). A relatively large series of laboratory studies has not provided evidence of genotoxicity[8]. Subjective symptoms affecting some individuals possibly exists, but not enough information is available on: the levels of exposure producing such effect, on the features underlying individual susceptibility, on the possible biological mechanisms or the prevalence of susceptible individuals in different populations. Thus, current knowledge is insufficient for the implementation of measures aimed at the identification and protection of a highly sensitive sub-group of the population.

Heart and blood pressure: With the exception of a well designed but small study (which therefore requires confirmation in larger and independent investigations) reporting early effects on blood pressure in volunteers exposed to a conventional GSM digital mobile phone position close to the head, available findings provide no consistent evidence of an effect of mobile phones on the heart and circulation.

Nervous system: In the absence of heating, evidence for changes in neuronal excitability, neurotransmitter function and innate and learned behavior, and for changes in the blood-brain barrier has been inconsistent and unconvincing. Extrapolation from laboratory studies in rats to humans is problematic because of the differences in the pattern of RF energy deposition between rodents and humans. Furthermore, in contrast to humans, rats have the capacity to perceive RF as sounds, which is likely to influence their reactivity. Some studies have suggested an effect on membrane proteins, and on the flux of calcium and other ions across the membrane of neurons and EEG rhythms but these are not reproducible.

Neurobehavioral effects and effects on driving: Relevance of experimental studies to man is uncertain because of interspecies differences in the perception of intense pulsed RF fields. Studies on the acute effects of mobile phones on human volunteers have shown some neurobehavioral changes (such so-called neurobehavioral effects are mostly reporting of subjective malaise), the mechanism of which might include a localized heating effect. The interaction between electromagnetic fields and drugs has not been adequately investigated.

There is evidence of damage to cell tissue and DNA, and it has been linked to brain tumors, cancer, suppressed immune function, depression, miscarriage, Alzheimer's disease, and numerous other serious illnesses[10] Strategies for identifying and evaluating those at high risk; the use of bone mineral density and biochemical markers in diagnosis and assessing response to management; recommendations regarding nutrition and physical activity; and the selection of pharmacologic therapy for the prevention and management of osteoporosis in men and women and for osteoporosis resulting from glucocorticoid treatment[11].

METHODS

Pain Questionnaire will distributed to the students of Dammam University. To investigate whom complaining from hand pain. Then the prevalence of hand pain among the students will calculated. Assessment sheet for whom complaining from hand pain

Digilert 100 Handheld Digital/Radiation Alert® Detector

The Digilert 100 measures alpha, beta, gamma, and x-rays. Its digital display shows readings in your choice of counts per minute (CPM) or mR/hr, or in accumulated counts. A red LED flashes and beeper sounds with each count detected and when the radiation reaches a user set alert level.

Specifications

Detector

Halogen-quenched GM tube with mica end window. Mica window density 1.5-2.0 mg/cm2. Effective window diameter is .360 inch. Side wall is .012 inch thick.

Display

Detects beta at 150 keV with typical 75% detection efficiency. -Detects gamma and x-rays down to 10 keV typical through the window, 40 keV minimum through the case. Normal background is 5-20 CPM.

DEXA device for measuring bone density of students complain from hands pain, the measurements will be in radiology department of King Fahd teaching hospital in Al-Khbour. Both hands will measured to compare between them.

A Bone Mineral Density (BMD) test can help your physician confirm a diagnosis of Osteoporosis. This is a low dose X-Ray that checks a part of your body such as your hand, foot, spine or hip for signs of bone thinning and mineral loss. It is a helpful aid for evaluating the probability of a fracture and whether or not any preventative treatment is needed. There is no prep for the Bone Density test except to remove any jewelry. You will lie on a cushioned table while the scanner passes over your body

DEXA is an abbreviation for "**D**ual **E**nergy **X**-ray **A**bsorptiometry". This is a special x-ray procedure that determines the strength of your bones. Bone strength is assessed by measuring the bone density so a DEXA scanner is sometimes called a "bone densitometer." Other means of assessing bone strength are also available but a DEXA scan is currently the most accurate method and it uses the lowest amount of radiation (a standard chest x-ray. This test is so accurate that your follow up DEXA scan can be used to monitor your treatment to learn if your plan is working.

PDXA (Peripheral Dual Energy X-ray Absorptiometry). This test measures bone of your wrist, heel or finger. SXA (single Energy X-ray Absorptiometry) measures the density of bone in your wrist or the heel of one foot.

QCT (Quantitative Computed Tomography) is frequently used to measure the density of wrist.

SPA (Single Photon Absorptiometry) measures the density of the bones in your wrist.

The Questioners and assessment data will collected and results of measurements from the participants students and statistical analysis will done and discuss.

Anticipated outcome

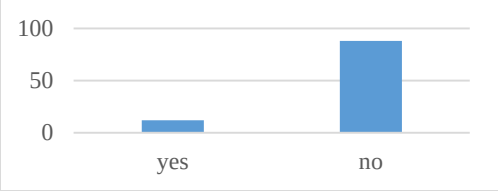
Through our searching and reviewing about the hand pain, we found that it could be there a relationship between the hand Pain problems and the using the smart phones. Our main outcome is to find the medical problem that facing the students but our main concern will be the hand pain which associated with many factor such as duration of using the smart phones and the levels of the radiations from these smart phones. To achieve our objective we have designed a Questionnaire to measure hand pain and validity was done. Measurements of bone density will done for all the students complaining of the hand.

RESULTS

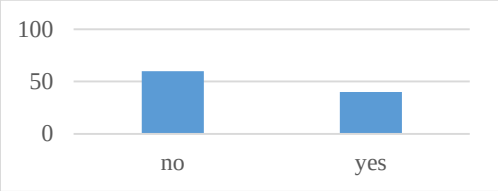
The study showed that a heights percentage of the students compiling from osteoporosis (22)

students out of (43) with percent 51.16%, there are positive correlation between the using of smart phone and decreasing of bone density at wrist joint .The participant with T score less than -2.5 with high risk of fracture, The participant with T score less than -2.5 indicated osteoporosis. 16 males students out of 20 students has osteoporosis with percent 80% while 6 females students out of 23 has osteopenia with percent 26%.

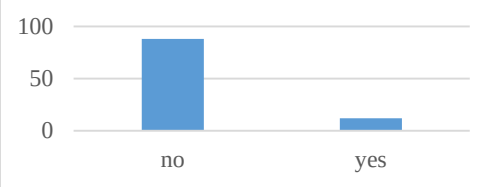
Complain from headache



Feel any pain on hand from using mobile



Medical history

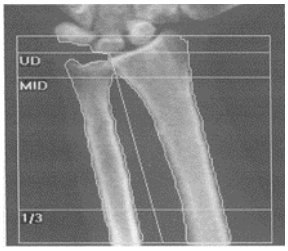


CORRELATION	P-VALUE	Strong or weak
HAND PAIN by TIME SPENT	0.003	strong
HAND PAIN by TOUCH FINGER	0.014	Strong
NEGATIVE EFFECT by USAGE DRIVING	0.001	strong
HAND PAIN by USAGE DRIVING	0.026	STRONG

Result from non-ionizing radiation

NO	Type of phone	Conversion from cpm to ghz	Count per minute	Limit in ghz	Biological effect
1	Samsung	0.266666667	16	1	Heating of body tissue

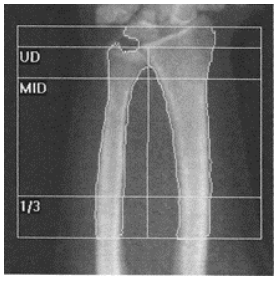
Pictures shown from DEXA of forearm



Normal in left forearm

Radius	Area (cm^2)	BMC (g)	BMD (g/cm^2)	T - score	Z - score
UD	4.64	2.83	0.609	1.0	1.0
MID	14.39	9.95	0.691	-0.3	-0.3
1/3	3.47	2.59	0.746	-1.3	-1.3
Total	**22.50**	**15.36**	**0.683**	**-0.1**	**-0.1**

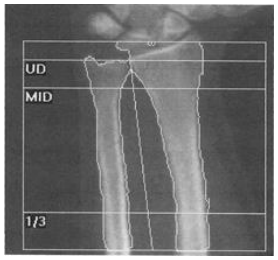
Pictures shown from DEXA of forearm



Osteopenia in left forearm

Radius	Area (cm^2)	BMC (g)	BMD (g/cm^2)	T - score	Z - score
UD	3.75	1.83	0.487	-1.0	-1.0
MID	8.43	5.44	0.645	-1.2	-1.1
1/3	2.59	1.97	0.758	-1.1	-1.1
Total	**14.77**	**9.23**	**0.625**	**-1.2**	**-1.2**

Pictures shown from DEXA of forearm



Osteoporosis in left forearm

Radius	Area (cm^2)	BMC (g)	BMD (g/cm^2)	T - score	Z - score
UD	4.11	1.67	0.407	-2.3	-2.3
MID	9.89	6.01	0.608	-1.8	-1.8
1/3	2.73	1.99	0.730	-1.6	-1.6
Total	**16.74**	**9.68**	**0.578**	**-2.1**	**-2.1**

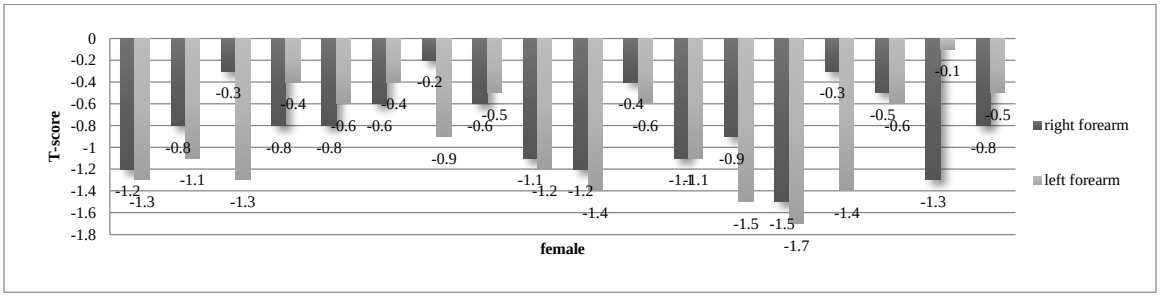
Statistical description of LT and RT forearm for Male

ForearmLT or RT	Mean	SD MIN	Min range	MAX range	Range
LT	-1.9	1.3	-4.7	-0.1	-4.6
RT	-1.8	1.1	0.4	-0.3	-3.7

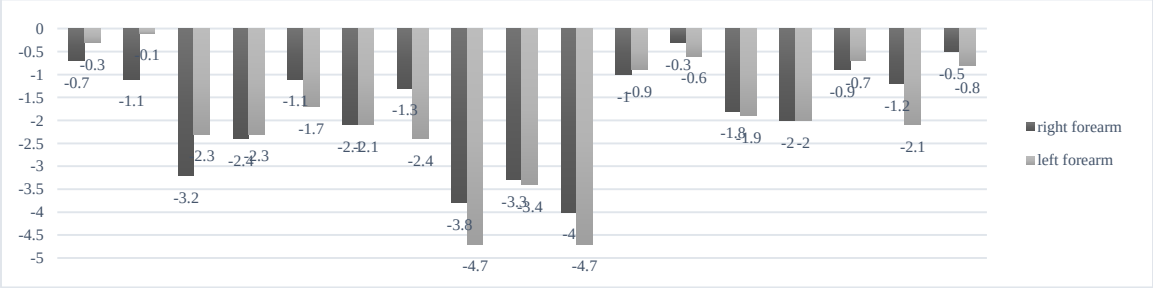
Statistical description of LT and RT forearm for female

Forear LT or RT	mean	SD MIN	Min range	MAX range	Range
LT	-0.7	0.70	-1.7	0.9	2.6

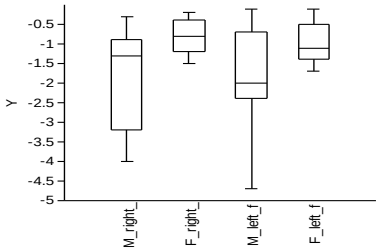
Graph showing statistical Description of LT and RT forearm



Graph showing statistical Description of LT and RT forearm



Comparison of median values among male and female (RT & LT) exposed to osteoporosis



Correlation between male & female in osteoporosis

Comparison	Correlation	P-value
Male LT & RT	0.9	<0.05
Female LT & RT	0.22	>0.05

Male LT&RT **strong** correlation p<0.05 significance
Female LT& RT **weak** correlation p>0.05 insignificance

DISCUSSION

This study has several limitations. Some of them are inherent to cross-sectional studies and to those performed with convenient samples. In addition, exposure to electromagnetic radiation from mobile cell phones was not physically measured. The estimated cumulative time of exposure was calculated according to each user's report. To the best of my knowledge, this is the first time that significant differences in BMD and BMC associated with the use of mobile cellular phones have been documented. The results of this study is confirmed with many study of the literatures.

CONCLUSION

The prevalence of hand pain as result of using the smart phones was emphasized in the students of Dammam university, the most important results of this study is the prevalence of osteoporosis among the students, males students has high percentage of osteoporosis than females students with high risk of fracture**.** Further researches on large number of students is needed to help us to understand more about this serious problem and its broader outcomes and impacts.

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