**Title: A survey based analysis of the current medical teaching methodology and trends in medical research practice in India.**

**Author 1:**

Dr Supreeth Nekkanti

Email id: [drsupreethn@gmail.com](mailto:drsupreethn@gmail.com)

ORCID Id: 0000-0002-0652-5540

**Author 2:**

Ms Sagarika Manjunath

Email id: [riku\_manjunath@yahoo.in](mailto:riku_manjunath@yahoo.in)

**Author 3:**

Dr Arun Mahtani

Email id: [arunum24@gmail.com](mailto:arunum24@gmail.com)

**Author 4:**

Dr Archana Meka

Email id : [drarchana2410@gmail.com](mailto:drarchana2410@gmail.com)

**Author 5:**

Dr Tanushree Rao

Email id: [dr.tanushreerao@gmail.com](mailto:dr.tanushreerao@gmail.com)

**Abstract:**

**Introduction:**  The spine of a good healthcare system is the medical education received by its doctors. As medicine is evolving, the same can be inferred regarding the delivery of medical education. This study was conducted among 541 students in a prestigious medical college in India. The aim of the study was to find out lapses in our current medical education system and steps to improve it.

**Method:**A total of 541 medical students were included in this study. The only inclusion criteria being that they should be in their 2nd year MBBS or above. A questionnaire of 20 questions was given to each student and they were asked to mark the answers they felt was most appropriate. The questionnaire dealt with issues faced in our current education system regarding teaching methodology, clinical postings, research, evidence based medicine and steps to improve the healthcare system. Data was collected, analysed and statistically evaluated using Microsoft Excel and SPS version 21.0.

**Results:**  Majority of the students felt that classroom strength should not be more than a hundred students. They felt that more innovative teaching methods and discussions should be included. Students laid emphasis on research, clinical skills training and evidence based medicine. They felt that the healthcare system also needs tweaking in terms of funding and practicing evidence based medicine to be on par with healthcare systems across the world.

**Conclusion:** The results in this study resonates with the results of various other studies regarding delivery of medical education, it also takes into account the holistic approach of improving medical education and healthcare rather than focussing on one single aspect.

**Introduction:-**

Medical education and health care in India are facing serious challenges with regards to the content and standard of education. The Government of India recognizes health for all as a national goal and looks to produce competent physicians of first contact in trying to achieve this goal.[1] There is a serious concern in the current medical education system due to the lack of evidence based teaching.[2] The Indian population not only requires more doctors but also a good quality of doctors. Focus on the quality of teaching in medical colleges has led to increased use of student service to evaluate the current teaching practices. There has been an evolving trend among professors to shift the focus on teaching from exam oriented lectures towards clinical based discussions. A number of teaching methods are being employed to appeal to students with different learning styles. However the effectiveness of these methods cannot be confirmed without a student feedback in the form of student service. The authors would also like to stress the current study population includes students who differ in age, place, ethnicity, level of preparedness, learning style and preferences.

Imparting medical knowledge is one of the most important aspects in shaping our future doctors. A sound foundation in clinical skills and medical knowledge is the safest bet to produce good doctors. With the evolution in medicine over time, it is also essential to evolve our teaching methods to impart medical knowledge to students. Over the past few years, various studies in different medical institutions across India and the world have been conducted to provide an insight as to what would be the ideal methodology according to students, to efficiently grasp the material and skills being taught to them. [1, 2] This study aims to do the same and tries to strengthen the fact that a change in the teaching system is the need of the hour

**Objectives:-**

· To analyse the response of students towards favourable teaching modality.

· To identify the influencing qualities of a teacher as perceived by the medical students.

· To understand the opinion of students with regards to the current status of health care services in our country.

· To explore the interest of medical students towards research and its role in evidence based medicine.

**Methods:-** The present study was carried out on 541 MBBS students of JSS medical college, Mysore from 2nd year MBBS to the House surgeons. All the students were in the age group of 18 to 23 years. None of them were suffering from any major medical or psychiatric illness. A questionnaire was designed by the authors, which included 20 questions, the content of which included teaching methodology, aids for teaching, clinical research and its importance in health care. The students were assured about anonymity and confidentiality of the responses given. They were briefed about the questionnaire and asked to respond freely and fearlessly. They were also informed that the responses provided by them were for research and evaluation purpose only.

**Data collection**:- Each student was provided with a separate questionnaire and was asked to tick the appropriate answers. Students were also encouraged to offer a different response if they did not find any of the options appropriate. Only students from 2nd year MBBS to house surgeons were included due to the exposure to clinical postings in the hospital.

**Data analysis**:- Data was collected and tabulated in MS Excel. The statistics of this data was drawn using SPS version 21.0

**Results:**

We included 541 MBBS students in this study. Out of them, 213(39.4%) were male students and 327(60.6%) female students. (Table 1) Our study included 160 students from second year MBBS, 163 students from third year MBBS, 171 students from fourth year MBBS and 46 house surgeons. (Table 2)

In our analysis, 41.2% of the students thought that the ideal number of students in a class should be 50 to 100. 31.6% of them preferred class strength of less than 50 students. 64.5% of the students opined that the average class shouldn’t exceed 45 minutes. (Graph 1) Only 14.4% expressed that class duration of one hour was essential. Demonstration was opined to be the best way to conduct a class according to 54.6% of the students. Only 20.3% students found that chalk and blackboard form of teaching helped them in understanding concepts. A whooping 50.3% of the students preferred to clear their queries with their friends. 27.8% of them expressed an anxiety of ridicule if their doubts were expressed in front of the entire class. (Table 3)

About 66.67% of the students thought that medical research is important in a medical institute. About 6.85% expressed the contrary. (Graph 2, Table 3) 41.3% of them thought that the sixth term (third year MBBS) was an ideal time to start a medical research project given the relative free time they had. 32.77% thought that the third term (second year MBBS) was an ideal time to start a medical research project. 57.4% of them were interested in conducting a clinical research project, which definitely is a good number. 22.4% of them wanted to research on etiopathogenesis of the diseases. Around 20.18% of them wanted to research on drugs that would cure current non-treatable conditions like cancer, diabetes, hypertension. 57.23% of the students had no orientation on how to start a research project and that was why they hadn’t done a research project yet. 15.2% of them thought that the professors don’t encourage the students enough to conduct a research project. 14.25% of them thought that resources to conduct a research were limited or not accessible.

54% of the students were of the opinion that clinical skills were the most important skill to be acquired by a successful doctor. (Graph 3, Table 3) 36.2% expressed that a thorough theory knowledge was critical to become a successful medical practitioner. 40.1% of the students thought that the basic concepts were not taught to them during clinical postings. The postings included a mixed group of students from different semesters. The students from a lower term found it difficult to cope with concepts taught without the basics. 36.8% thought that clinical postings in some department were conducted without a patient and seemed more like a theory class. Around 48.1% of the students opined that exams should be based on multiple choice questionnaire patterns with an oral viva voce. 15.1% of the students expressed there was no need for exams at all. (Graph 3)

**Discussion:**

We conducted a questionnaire based survey on 541 medical students in a 1800 bedded tertiary care hospital in India. We attempted to perceive the awareness of students with regard to medical research. We tried to understand the shortcomings in the current teaching methodology and asked for inputs to improve the same. Teaching medical students is an art and its importance can’t be stressed enough. It is critical to have established teaching syllabus and protocols in place as it involves grooming the future doctors of the country. It is important to train doctors to inculcate the art of thinking like a scientist. Inventions and progress in medical sciences have been possible only due to original ideas and scientific thinking.

**Framework for Classroom Teaching:**

A student centric teaching system is the first and foremost step to improve the quality of medical education being imparted to students. In our study we found that 41.2% students preferred a class strength of 50-100 students only. The second best statistic being 31.6% for a class strength of less than 50 students. One reason that could substantiate this finding would be to improve the teacher to student ratio and by doing this, students can actively participate in discussions and as we know that active learning is the best possible way to grasp concepts and knowledge. Also, this allows students to look at topics/diseases from various angles through these discussions which provides a holistic knowledge base regarding the topic. This has also been shown in studies conducted by Pal, Ranabir et al [3].

Another aspect to be considered in classroom teaching is the timing of each class. 64.5% of the students believed that each classroom session should not exceed a time limit of more than 45 minutes. As we all know that attention span of a human being when sitting continuously does not exceed beyond 45 minutes, and hence it is ideal to limit each class session to the stipulated time so that students can efficiently grasp material being taught to them.

For active learning to take place, there has to be active teaching. It was often felt by the students that professors did not possess that flair of teaching, they would come, read off the PowerPoint take attendance and leave. Which points to the fact that, taking a class was just a formality and more importance was given to the percentages of classes attended rather than content learnt from each class. Our study points out the important fact that professors need to be more interactive while teaching, they need to engage students into the subject and should focus on demonstrations rather than age old PowerPoint presentations/usage of chalk and board. Our study shows that 54% of the students prefer demonstrations rather than the latter modes of teaching. On the contrary, various studies done earlier showed that powerpoint presentation was the preferred method of teaching but that too has faded in the recent times and this just proves to show that the teaching system needs to be continuously updated to be in sync with the current generation. The advent of case based learning and integrated teaching along with other innovative techniques also seem to have picked up pace in the recent years as seen in studies conducted by Joshi A, Ganjiwale J [4],who conducted an innovative teaching session in a medical college in the state of Gujarat in India. The teaching methodology was widely accepted by students and median score of ⅘ was awarded by the students as a feedback response.

R Datta, K Datta, MD Venkatesh [5]conducted a study in Armed Forces Medical College, Pune, India. He used an interactive response pad to aid teaching and he found that using this methodology of teaching, students were able to score about 8-10% higher in the immediate post test analysis and 15-18% higher in a test conducted 8-12 weeks later. B Zhao, DD Potter [6]conducted a study in the University of Iowa comparing lecture based learning with discussion based learning among third and fourth year undergraduate medical students. The study showed that students performed much better in the Practical Examinations conducted in the group that received discussion based learning as a methodology of teaching. However there was no difference in the MCQ examination that was conducted among the two groups post the study. PB Smits et al [7]conducted a study based on the difference between problem based learning and lecture based learning among postgraduate students in the Netherlands. They found out that both methods were favourable but problem based learning improved the performance of a postgraduate student. Das, Piyali et al. [8]conducted a study among first year medical students evaluating the effectiveness of clinical exposure in learning respiratory physiology. The study showed that students performed much better in the post test analysis when they received clinical exposure than students who did not. Also 92% of the students accepted this methodology of teaching. Mcmenamin P.G.[9]conducted a study which used body painting as a tool to understand anatomy. This method of teaching was well received by the students. At the end of the study, students preferred this method of teaching as it helped them understand anatomy better and also helped reducing apprehension of peer-peer examination.

Bharadwaj, Pankaj et al [10]conducted a study in a premier post graduate institution in North India which involved integrated teaching using case based learning to learn a certain topic. The sample was divided into two groups one that received the integrated teaching and the other that only received a didactic lecture. They found out that students retained and understood the topic much better who received the integrated based teaching. They enjoyed the “clinical visit” and felt that their queries were addressed much better in the interactive session. They also concluded that students performed much better when integrated teaching methodology was employed.

We all know that medicine is a very vast and complex field and for obvious reasons the subject matter being taught to us will always create doubts in our mind. The provision to provide clarity of concepts and subject matter does not seem to exist. Our study showed that more than half of the students would rather clear their queries with their peers rather than ask the teacher. The( about 28%) predominant reason being that they were scared that they would be ridiculed in the front of the entire class if their doubts turned out to be silly. This goes on to show us that a huge gaping hole still exists between the teacher and the student. Also, laughing at the naivety of a student's question just creates more division between the student and the teacher. It is ideal for a teacher, to embrace the fact that this is bound to happen and clear queries with utmost patience rather than making fun of the student.

**Framework for Clinical Postings:**

Starting from second year, an MBBS students’ day comprises of theory classes, clinical postings and practicals. Our study aimed to find out what would be the perfect balance to conduct all three in a single day. 46.5% of the students felt that clinical postings should be given utmost importance. They wanted to revise the time allotted to each component. They felt that acquiring clinical skills rather listening to theory classes is the most important aspect of becoming a good doctor, about 54% versus 36%. Conclusions drawn from our study showed that Clinical Postings should be allotted 4 hours whereas theory and practical classes should be allotted 2 hours and 1 hour respectively.

In our study, students also felt that an alteration in teaching methodology needs to be employed to make clinical postings more efficient. Since a clinical posting class comprises of a mixture of 2nd, 5th, 8th and 9th term students, it becomes difficult to conduct a class for students having such a varied background of knowledge. Our study proves that this form of teaching methodology employed is inefficient as about 40 % percent of the students felt that they weren't being taught the basics and the students from the lower terms found it difficult to cope with the material being taught to them.

A study conducted by I Zakarija Grkovic, VJ Simunovic [11] implemented the use of objective structured clinical examination (OSCE) for undergraduate students at the University of Split to assess clinical competencies. A similar model of assessment can be adopted for students of the lower terms instead of them directly handling real patients. This way their foundation will be stronger and once they reach the higher terms and have to deal with real patients they will be competent and confident to perform the desired clinical examination.

Students also felt that basic procedures should be taught earlier rather than waiting till they reach internship. About 33% percent of the students felt that basic procedural training should start from 6th term and should be allowed to perform on cadavers. 41.5% of the students felt that basic procedural training skills should be taught in 8th term on live patients under supervision. This pattern of results is in sync with the study conducted by I Zakarija Grkovic, VJ Simunovic.[12] Hence the lower term students can be taught skills on models and prepare them for the OSCE whereas the higher term students can be transitioned to demonstrate clinical skills on live patients.

**Framework for Research in Medical Education:**

Research, the biggest component of medical education that is absent in our system. A huge chunk of students ( about 67%) felt that research is an important aspect of medicine and should be included in our curriculum. Almost 58% of students were ready to carry out a research project. But the majority of them (75.43%) felt that they were not given enough guidance or encouragement on how to do so. A very few students (14.25%) felt that there were limitations in resources to carry out a research project.

A study conducted by Atul Kotwal [13] proves the same. With the right guidance and mentorship the students who submitted their ICMR projects found out that all their research projects were approved. This study was conducted in Armed Forces Medical College in India. The study was conducted by the Department of Community Medicine.

Farzaneh, Esmaeil et al [14]conducted a study to identify the restraining factors to conduct research among students in Ardabil University of Medical Sciences in Iran. Among students, the biggest factor was access to a credible information source and lack of domination of the english language. Among teachers, the biggest hindrance was administrative barrier and preoccupation with work. However, in our study we did not find any of the aforementioned factors in relation with students.

Another study conducted by Ashrafi-rizi, Hasan et al [15]revolved around the same issue which was barriers among students in conducting a research project in Isfahan University of Medical Sciences in Iran. The results of this study was similar to ours. The students felt that they lacked knowledge regarding carrying out a research project or publishing an article in a journal, but they also faced problems regarding economic, social, cultural and organizational aspects which is not faced by us in our country. They proposed to conduct more workshops regarding research methodologies, proposal writing and article writing and also called out to all the administrators to provide guidance to students willing to carry out a research project. This model can also be adopted by us and will help students gain in depth knowledge and orientation towards research. Another model which will be useful is the mentorship program for students similar to the one conducted by Atul Kotwal. [13]

**Framework for Conducting Examinations:**

Assessing the competency of medical knowledge has always proved to be a herculean task. Our study tried to understand the needs of the medical students on how they would like to be tested. About 48.1% of students felt that Multiple Choice Questions along with oral Viva Voce was the best way to gauge a medical student. The era of long essays and short essays has come to an end because students formulate answers very vaguely and length of the answers rather than content is given more importance. With MCQs student have to know the exact concept and there is no room for beating around the bush, it's either you know it or you don’t.

A study conducted among students at the University of Adelaide by EJ Palmer and PG Devit**t** wanted to understand the role of MCQs vs Modified Essay Questions (MEQs) in testing higher order cognitive skills. They found that there needs to be a well constructed peer reviewed MEQ in order to achieve this objective. They also found that MCQs can do the same much better and also stood the test of statistical and intellectual scrutiny when it involved a high stakes exit exam.

**Framework for the Future of Medical Education:**

In our study we went beyond the classroom and asked students what would be ideal for their future as a medical professional. We asked them to opine regarding the changes required to help the medical system be on par with the rest of the world. A majority (44.8%) of the students still preferred to stay back in the country and pursue their postgraduate education here because of the excellent patient load. Less than a third said that they would be going to other countries to pursue their higher studies.

48.1% of the students felt that Indian doctors go abroad because the health care services are much better and they are technologically more advanced compared to India.

40% of the students felt that evidence based medicine and clinical research is being given utmost importance in the west and they feel that it suits their way of practice and learning.

Majority of the students felt that the current system of education in our country should adopt evidence based medicine and give more importance to clinical research. They also felt that the system needs an influx of more funding from the government to improve health care facilities. If the medical system ever adopts these changes, the issues of brain drain will be laid to rest and our medical system can aim to become one of the best in the world.

**Conclusion:**

From the results obtained, we can conclude that students desire a change in the medical education system. They want the system to evolve and progress, their preference has shifted from the age old classroom based teaching to newer integrative methods and patient-based learning. They are eager to get hands on clinical patient based experience and feel that, this is the only methodology that is going to make them better clinicians. Majority of them are extremely interested in research but have no sense of direction as to how to go about it and implement it in their current curriculum. This sends a strong message to the administrators and professors that without proper guidance and mentorship the students cannot excel in research based activities and projects. Finally, we can conclude that a significant changes in the current education system is required to ensure a more efficient training process of medical students.

**References**:

* [1]Vision2015-Medical council of India. Available at www.mciindia.org/tools/

announcement/MCI\_booklet.pdf. Accessed on 14 Dec 2011.

* [2] Sybille K L. Evaluation of Teaching and Learning Strategies. Med Educ Online [serial online] 2001;6:4.
* [3] Pal, Ranabir et al. “Assessment of Impact of Small Group Teaching Among Students in Community Medicine.” Indian Journal of Community Medicine : Official Publication of Indian Association of Preventive & Social Medicine 37.3 (2012): 170–173.
* [4] Joshi A, Ganjiwale J. Evaluation of Students’ Perceptions Towards An Innovative Teaching-Learning Method During Pharmacology Revision Classes: Autobiography of Drugs. Journal of Clinical and Diagnostic Research : JCDR. 2015;9(7):FC01-FC04. doi:10.7860/JCDR/2015/12775.6153.
* [5] Datta R, Datta K, Venkatesh MD. Evaluation of interactive teaching for undergraduate medical students using a classroom interactive response system in India. Medical Journal, Armed Forces India. 2015;71(3):239-245. doi:10.1016/j.mjafi.2015.04.007.
* [6] Zhao, Beiqun, and Donald D. Potter. "Comparison of lecture-based learning vs discussion-based learning in undergraduate medical students." Journal of surgical education 73.2 (2016): 250-257.
* [7] Smits 2003 Article In A Periodical 2003 VL 29 Scandinavian Journal of Work, Environment & Health 280-287 Smits PaulB de Buisonjé Cathelijn D Verbeek Jos H van Dijk Frank J Metz Jaap C ten Cate Olle J Problem-based learning versus lecture-based learning in postgraduate medical education
* [8] DAS P, BISWAS S, SINGH R, MUKHERJEE S, GHOSHAL S, PRAMANIK D. Effectiveness of early clinical exposure in learning respiratory physiology among the newly entrant MBBS students . Journal of Advances in Medical Education & Professionalism. 2017;5(1):6-10.
* [9] McMenamin, Paul G. "Body painting as a tool in clinical anatomy teaching." Anatomical sciences education 1.4 (2008): 139-144.
* [10] Bhardwaj P, Bhardwaj N, Mahdi F, Srivastava JP, Gupta U. Integrated teaching program using case-based learning. International Journal of Applied and Basic Medical Research. 2015;5(Suppl 1):S24-S28. doi:10.4103/2229-516X.162262.
* [11] Zakarija-Grković, Irena, & Vladimir J. Šimunović. "Introduction and preparation of an objective structured clinical examination in family medicine for undergraduate students at the University of Split." Acta Medica Academica [Online], 41.1 (2012): 68-74.
* [12] Kotwal A. Innovations in teaching/learning methods for medical students: Research with mentoring. Indian J Public Health 2013;57:144-6
* [13] Farzaneh, Esmaeil, Firouz Amani, Yasamin Molavi Taleghani, Afshin Fathi, Fariba Kahnamouei-aghdam, & Ghasem Fatthzadeh-Ardalani. "Research barriers from the viewpoint of faculty members and students of Ardabil University of Medical Sciences, Iran, 2014." International Journal of Research in Medical Sciences [Online], 4.6 (2016): 1926-1932.
* [14] Ashrafi-rizi H, Fateme Z, Khorasgani ZG, Kazempour Z, Imani ST. Barriers to Research Activities from the Perspective of the Students of Isfahan University of Medical Sciences. Acta Informatica Medica. 2015;23(3):155-159. doi:10.5455/aim.2015.23.155-159.
* [15] Palmer, Edward J., and Peter G. Devitt. "Assessment of higher order cognitive skills in undergraduate education: modified essay or multiple choice questions? Research paper." BMC Medical Education 7.1 (2007): 49.