

## **A Comparative study of Different Teaching Methodologies used for developing understanding of Cardiac Pharmacology in Undergraduate Medical Students**

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### **I. Introduction**

Pharmacology is rapidly evolving and expanding conquering many diseases in its stride. Though a backbone of modern medicine, it is perceived as dry and boring subject by many undergraduates. [1,2] Some of the reasons for this perception could be the vast nature of the subject and having to memorise some of the details of the drug. Traditional Pharmacology teaching includes didactic lectures with audiovisual aids, tutorials and seminars. Also animal experiments, prescription writing, and clinical problems solving included additionally. It is difficult to mend student perception with traditional methods of teaching, though some modification in teaching-learning methodology could be tried. Such attempts have been made all over India to make the teaching of pharmacology more interesting and relevant.[3]

The lecture is the most commonly used teaching learning method in medical education. There are serious concerns regarding the effectiveness of this traditional approach, most important being that students are passive listeners. Lectures can definitely be made interactive but extra time is then required to cover the topic which becomes the important limitation in this approach. A tutorial is another commonly used teaching learning method. More interactive and specific than a book or a lecture; a tutorial seeks to teach by example and supply the information to complete certain task.[4]

New educational technologies are appearing rapidly. It has been argued that teachers in higher education need to focus on how to facilitate student learning instead of focusing on what to teach.[5,6] Traditional lectures are gradually being augmented or replaced by other methods such as videotape, computer aided instruction, web-based teaching, case-based teaching, and small-group seminars etc.[7,8] Some advantages and disadvantages are present in each of these methods. There has been widespread increase in the interest in problem-based learning curriculum (PBL) though problems exist in its complete implementation.[8] Small group teaching is also very effective method of teaching in comparison to teaching the students in a large group. [9] Apart from increased in the number of faculty members required, this approach needs more infrastructural facilities as well.[10]

Keeping in view all these facts we decided to evaluate various teaching – learning methods to find out which method would best help student learning. Since student feedback had revealed that they find cardiac pharmacology difficult to understand and remember so, we decided to study students' understanding of cardiac pharmacology by teaching it with different methods.

### **II. Objectives**

To ascertain the impact of different teaching methods on understanding of cardiac Pharmacology. To explore the opinion of students about the teaching methods used.

### **III. Material & Methods**

This was a prospective interventional study carried out in the subject of Pharmacology at Bharati Vidyapeeth Deemed University medical college. Topics selected in Cardiovascular Pharmacology were 1) treatment of Congestive cardiac failure, 2)Hypertension 3) Angina pectoris and Myocardial infarction. Teaching methods evaluated were Tutorial (small group), Interactive seminar and Case study. All the students (153) attended lecture classes on these clinical conditions. Students were divided into six batches (A-F) of 25 students each except F which consist of 28. Each batch was exposed in rotation to all 3 teaching methods for different clinical conditions as depicted in table 1. Same faculty member continued for a particular teaching method for all the batches. MCQ test of 15 marks was conducted before and after the session to assess students' understanding of a topic. At the end of the study, students feedback was taken with the help of a questionnaire [11] to assess their perception about the activity and understanding of the subject. Questionnaire consisted of 20 items including two open ended questions, asking for student opinion on TL (teaching learning) method expected and done, study pattern, study material, TL method preferred most. Data was analyzed with Graph Pad Prism 6 statistical software and students paired 't' test was used for comparison of test score. Pre and post MCQ

test score was used to assess the effectiveness of learning and student perception of the activity from the feed back questionnaire. Students were encouraged to give their comments as well as suggestions that could help in achieving better learning. The free comments were analyzed by faculty members.

Table-1 Batch-wise distribution of students for different T-L methods

T-L Method Topics	Small group learning (Tutorial)	Seminar	Case presentation
	Batches		
CHF	A/D	B/E	C/F
HTN	B/E	C/F	A/D
Angina & MI	C/F	A/D	B/E

**Small group learning (Tutorial)** - For tutorials, students (25) were subdivided into two batches consisting of 12 & 13 students. F batch was divided into 14 students each. All sub-batch were asked to come prepared with the topic. During the session, there was discussion between the students and the teacher on the topic and how to write the answers to the questions. Difficulties of students were also solved during the session. Along with thorough discussion on the topic and difficulty solving, answers to question in question bank were also discussed.

**Seminar**-Two students from the batch presented the topic for the batch. One student was asked to present the aetiopathology, diagnosis and drugs available for the treatment of a particular condition. Second student was asked to present the pharmacotherapy. Presentation was followed by discussion covering aspects of the cardiovascular condition. All the students were encouraged by the coordinator to actively participate in it.

**Case presentation**- Two students from the batch going for case presentation were asked to see a real case chosen from patients admitted in the hospital and present it before the batch. One student described the case and the other commented on the treatment given, elaborating on the rationality of treatment. Discussion in the form of question-answers followed thereafter.

**Case (CHF)** - Mayabai Waghmare, a 74-year-old woman with a history of rheumatic fever at 25, presented with complaints of increasing shortness of breath ("dyspnea") upon exertion. She also noted that her ankle swelling was getting worse over the past two months. She had experienced decreased appetite, nausea, vomiting and tenderness in the right upper quadrant of the abdomen since 1 week. On physical examination, Mayabai's jugular veins were noticeably distended. Auscultation of the heart revealed a low-pitched, rumbling systolic murmur, heard best over the left upper sternal border. In addition, she had an extra, "S<sub>3</sub>" heart sound.

**Case (HTN)**- Mr. Navin Tripathi, 48 years, working as senior executive in a private firm reported to his family physician for the complaint of recurrent headache, occasional palpitations and restlessness for last two months. On examination, weight 78kg,height 5'9",TPR-N,BP-168/110. No systemic abnormality was detected. Investigations: Urine exam, Blood urea & creatinine, BSL-F &PP, ECG, X-ray chest and Lipid profile were within normal limits.

**Case (Angina)**- A 57 yr old construction foreman weighing 82 kg, was a heavy smoker. He came to his physician with a complaint of brief episodes of discomfort or little pain in chest with a feeling of heaviness. The problem was present for over a month & recurred 2-3 times last week. The discomfort occurred especially when he was at work and disappeared when he rested for a while. Pain in retrosternal area was often accompanied by diaphoresis, mild dyspnoea, fatigue and nausea. On examination, BP-130/85 mm of Hg, ECG-Normal, Hb-14.8 mg/dl, BSL- Fasting-96mg/dl,PP-130mg/dl. Lipid profile- Total Cholesterol-225mg/dl, HDL-35mg/dl,LDL-148mg/dl,TGs-210mg/dl, RS,CNS, Per Abdominal-NAD

#### IV. Results

**A] Pre –Post test score as measure of learning** (about Pharmacology as a subject and the interventional activity)

When pre & post MCQ test scores were compared, it was observed that tutorial was the most effective method for improvement of scores for all three topics; angina pectoris (p<0.05), CHF (p<0.001) & hypertension (p<0.001). Case study was less effective than tutorial, while Seminar (p<0.001) was only useful for understanding CHF and Hypertension (p<0.05). Thus, Tutorial was the most effective in ensuring learning cardiac pharmacology.

**B] Students Perception**

Interest in Pharmacology increased from 44% to 52% after participating in this activity. Order of preferred teaching method was Tutorials > Lectures > Case study > Seminars. 56% students use Text books & class notes for study. They were happy to use class notes instead of reading multiple books. 35% study only for tutorials, tests and exams. 66% Agreed that Pharmacology is required lifelong in medical career. 78% thought current weightage of this subject in the examination is satisfactory. 37% suggested that some lectures on

pharmacotherapy should be taught in III<sup>rd</sup> MBBS also. Other suggestion was to include Clinical cases in every teaching-learning activity.

Opinion about Pharmacology being interesting Before 44% & After 52% Order of preferences as most interesting teaching methods are Tutorials, Lectures, Demonstrations, Experiments, Case study and Seminars. 56% used by majority-Text books & class notes for study.35% study only during tutorials, tests and exams.66% Agreed that Pharmacology is required lifelong in medical career 78%think current weightage of this subject in exam is satisfactory.37% opine that few lectures on drug therapy should be taught in III<sup>rd</sup> MBBS. Reforms suggested-To Include Clinical Pharmacology. 80%students demanded for sessions of Clinical Pharmacology and Case studies.

Table-2 Opinion of students about teaching learning methods

Teaching learning aid	Videos& Audio, PPT(Y&N), Blackboard use, flow chart
Teaching learning method	Clinical application, Tutorial, Lecture, Seminar(Y& N), Practical
Teacher Quality	Good, Very good, Excellent, Demanding same teacher, approachability to teacher
Assessment	Test after every tutorial
Activity	Very good

Table-3 Suggestions of students about teaching learning methods

MCQ after each tutorial, SAQ test frequently ,
Show us checked exam papers
Mock viva
Practical revision
Reduce speed during lecture
Mail PPT of lectures to students
Provide ideal answers
Give less importance to attendance
Don't make batches according to marks

## V. Discussion:

Medical undergraduate education is undergoing major changes, with efforts towards making it more interesting. Thorough understanding of Pharmacology is necessary for effective and safe patient care. It serves as a foundation stone for clinical practice.[12] Multiplicity of drugs and a lot of similarities in their characteristics make the learning of pharmacology difficult and no common methods of teaching have been able to fix this problem so far [13] Traditional pharmacology teaching apparently does not prepare the students well for rational selection of drug therapy.[14] The purpose of this study was to determine the effectiveness of different teaching methods for cardiac pharmacology.

Although lecturing is one of the most widely used teaching methods in undergraduate teaching of pharmacology and seems to be appropriate method for providing information, it does not promote thinking and deep learning.[15] The didactic lecture method has been immensely criticised by various researchers in the past and has prompted many innovations in teaching pharmacology at different medical schools. [16,17] In the present study, all the students from the class got opportunity to attend the lectures of clinical conditions included in the study. After the lecture, they were exposed to other methods in small groups.

MCQ scores in the post test increased significantly in all groups participating in all 3 small group methods reflecting student understanding of the subject. Tutorials were observed to be most effective for all the topics included in the study as they involve active participation of all students. Students also enjoyed small group tutorials as reflected from answers to the questionnaire. Similar benefit was reported for tutorials by other researchers. [18]

It is common observation that only few students open up when teaching activity is taken for a large group. Students obtain increased understanding of the subject, develop greater ability to present information and develop ability to think critically. They are able to ask questions with confidence and get their doubts cleared. They develop personal rapport with the teacher. They are stimulated to study the subject more leading to better understanding. [19,20]

Case study was liked by most of the students since this method is basically used to develop critical thinking and problem-solving skills, as well as to present students with real-life situations [21] and helps to relate study of Pharmacology with patient care. Seminar was less accepted method by all as it gives chance only to selected representatives of the class.[22]

Feedback is defined as a response within a system that influences continuous activity or productivity of that system. [23]

## **VI. Students' remarks in the open ended questions-**

Most of the students demanded the use of video presentation as a teaching learning aid for better understanding of mechanism of action of drugs. They were equivocal about the power point presentations by teachers but requested to make the presentation available before the class as they could not match the speed of taking notes during teaching session. similar findings are encountered in various studies[24] There was uniform demand for adding clinical cases in all the teaching activities conducted.[25,26] Students' perceived seminar as the least interesting teaching method because only the presenters get an opportunity to express themselves while the remaining class is inactive. They also commented that seminars were not effective as the presenters spoke at different paces and enough understanding is not developed.[27,28] Teaching quality was rated good and above by the students who also felt that their teachers were easily approachable to them. To develop a good student-teacher rapport, students suggested being continuously taught by the same teaching faculty.

For the assessment of knowledge, students thought an MCQ test conducted after every tutorial, would definitely be beneficial for them to recollect cardiac Pharmacology. Few of them even requested for mock viva every fortnightly on the topics covered. To identify their mistakes made in theory examinations, students were curious to go through their assessed answer sheets. In our department, we divide the students in batches for tutorial classes according to performance in the first assessment. This pattern was inculcated with the aim of catering students with different understanding abilities and grasping power, but this was perceived to be discouraging to them. Overall, all the students appreciated the teaching pattern used in this study and opined it to be very useful for teaching Cardiac Pharmacology.

## **VII. Conclusion**

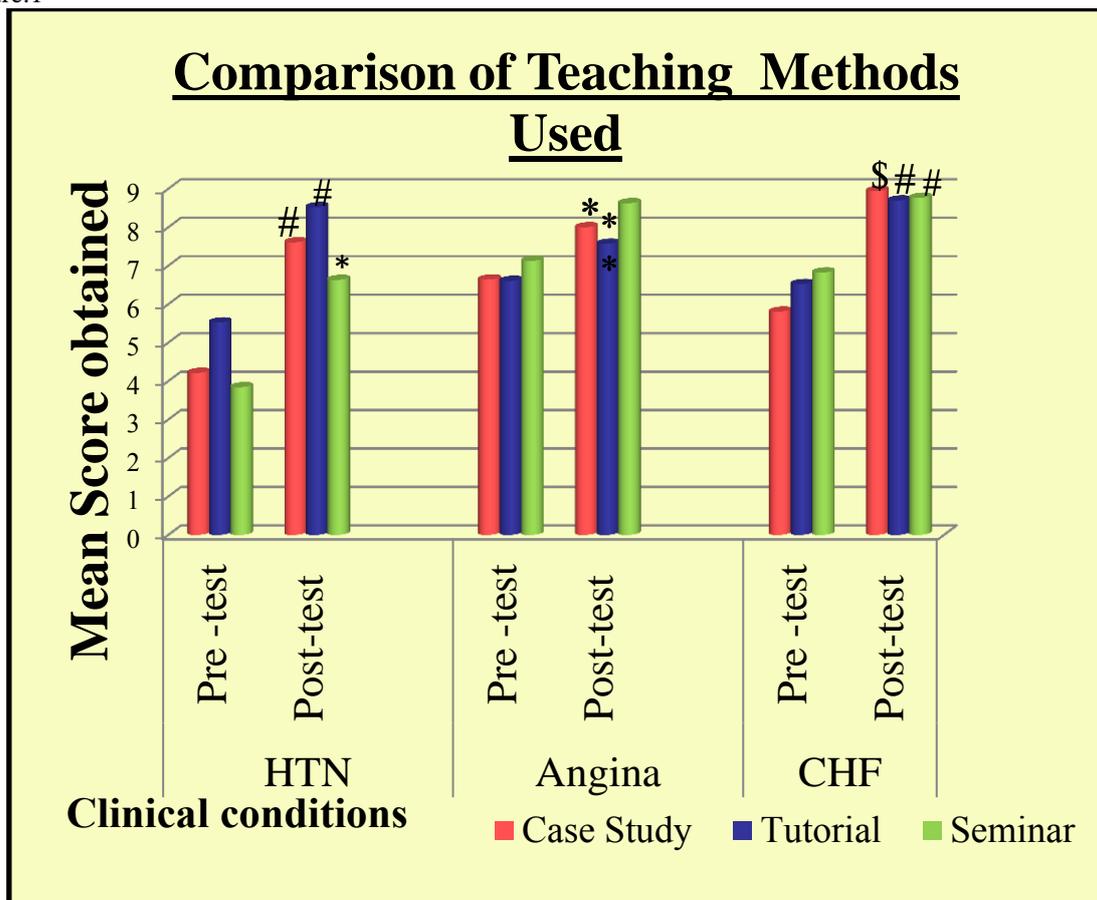
Though Tutorials ensured understanding as reflected in the test scores, students perceived case scenarios as the most interesting learning mode. Hence case scenarios should be included in all teaching learning sessions to help to generate interest & as it brings home the relevance of learning Pharmacology to patient care

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Figure:1



\*p<0.05, \$p<0.01 and # p<0.001