

## **A comparative study of interactive and conventional teaching methods in pharmacology for better clinical application**

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### **ABSTRACT**

**Background:** Pharmacology forms the basis of practice of medicine yet most students perceive it as a difficult subject. It is necessary that a student gains knowledge and retains the gained knowledge for better application in the future. But the method employed now is more passive with less emphasis on clinical application.

**Methods:** The study population was the second year MBBS students of Terna Medical College, Navi Mumbai. The students were randomly divided into two groups; a didactic and an interactive lecture session were conducted on two days. A pre validated questionnaire, pre-test and post-test were employed in the study. The data of pre and post-test were analysed using paired t-test and descriptive analysis for the questionnaire.

**Results:** The difference in short term learning outcomes between both the didactic and interactive lecture sessions was not statistically significant ( $p=0.53$ ). The students showed a positive reaction to interactive sessions. 70 (95.89%) agreed that interactive sessions has increased their understanding of the topic better. 70 (95.89%) students responded that interactive teaching has increased their ability to apply knowledge therapeutically.

**Conclusions:** In the present study it was observed that though there was not much statistically significant improvement in the immediate understanding, the perception of students towards interactive teaching methods is good.

**Keywords:** Interactive lectures, Large group teaching, Clinical reasoning

### **INTRODUCTION**

Lecture is considered as one the oldest method of teaching and learning in all types of education including medical science. There is a concern that conventional models of teaching medical students are becoming outdated and do not encourage lifelong learning. Undergraduate medical education, as with any other education programme needs ongoing improvement to meet changing demands of health of the population.<sup>1</sup> There is a need for introduction of student centric methods for better clinical reasoning and development of required skills. Active learning is any learning activity

engaged in by students in a classroom other than listening passively to an instructor's lecture.<sup>2</sup> According to Jennifer et al, there is no necessity for complete abandonment of lecturing. The article emphasizes that the lecture is a very efficient way to present information, but that using lecture as the sole mode of instruction presents problems for both the instructor and the students.<sup>2</sup> A lecture may be considered worthwhile today only if it aims at arousing students' curiosity, motivating them to learn, and guiding them into creative thinking, or, in short, if it accomplishes more than what any book can.<sup>3</sup> Adult learners are more difficult to teach and they only learn if they like the lecture or speech. So, lectures should be made interesting or attractive.<sup>4</sup> Interactive lecturing

can be interpreted in a number of different ways. For some, interactive lecturing involves a two-way interaction between the presenter and the participants. For others, it refers to increased discussion among the participants.<sup>5</sup> Pharmacology is considered as a difficult subject to remember and therefore, less interesting to the students. There is less scope and enthusiasm as well for participation by the students in lectures. Pharmacology subject forms the basis of practice of medicine. Therefore it is necessary that a student gains knowledge and retains the gained knowledge for better application in the future. Interactive lecture is a method with distinct advantage over the conventional teacher-centered didactic method in promoting a long-term retention of information, providing contextual learning and development of generic skills and attitudes. Discussion in class is one of the common methods employed to promote active learning.<sup>6</sup> Interactive teaching should also be in such a way that the structure of the timetable is not disturbed and extra hours are not necessary for the same. There are many methods which are employed to increase students' interaction in a class. Hackathorn and colleagues used interactive lecture cues, such as prompting students to link the material to personal stories, and found that it was an effective way of increasing students' depth of learning.<sup>7</sup> The current study aims at introducing interactive lecture methods and compare with conventional teaching methods in pharmacology for undergraduate students and its impact on clinical reasoning and better understanding of the topic. Student learning was assessed during the study by administering therapeutic problems and questions on concepts of pharmacology.

## METHODS

After Institutional Ethics Committee approval, a comparative study between interactive and conventional teaching methods was conducted on second year medical students in the subject of Pharmacology in Terna Medical College, Navi Mumbai in December 2018. The lectures were conducted after obtaining a proper informed consent from the students. A total of 73 students participated in both the sessions. Topics chosen for the two sessions were (1) coagulants and anticoagulants, (2) thrombolytics and antiplatelet drugs and management of myocardial infarction. The students were divided into two groups and the topic coagulants and anticoagulants was taken as a didactic lecture by two faculty members. It was ensured that the power point slides and the lecture material were the same for both the groups. The next lecture on thrombolytics and antiplatelet drugs and management of myocardial infarction (MI), was an interactive session. The types of interaction used were quiz consisting of application based questions and discussion among students and faculty. The students were asked to turn to their neighbors and discuss the problem and instructor was correcting and providing information wherever required. The interactive session was taken by the same faculty after crossing over the groups.

A pretest consisting of application based questions on mechanism of action, drug of choice, drug monitoring, adverse drug reaction, contraindications and treatment of toxicity pertaining to the topic of lecture was used. A prevalidated case scenario seeking a descriptive response to expected drug interaction and its management, management of a case and prevention of complications was also part of the test. This was administered before and after both didactic and interactive lecture sessions. For each of the questions, answers were either marked as completely correct or completely wrong. Blank answers were graded incorrect. The case was graded as completely correct only if all the parts were correct. No partial grading was given. These helped in assessment of impact of the lectures. Validation of the pretests and post tests and the questionnaire was done by the senior faculty of the department.

At the end of lectures students' perception of the teaching methods used was obtained using a prevalidated questionnaire consisting of 11 questions relating to their perception, preference and attitude towards the lectures with an open ended question seeking their suggestions.

## Statistical analysis

The data obtained from students who were not present for both the sessions was excluded from the study. Data entry was done in Excel spread sheet. Pre and posttest data was analyzed using paired t-test for the learning outcomes. Descriptive analysis was used for the questionnaire with students' responses to the teaching methods.

## RESULTS

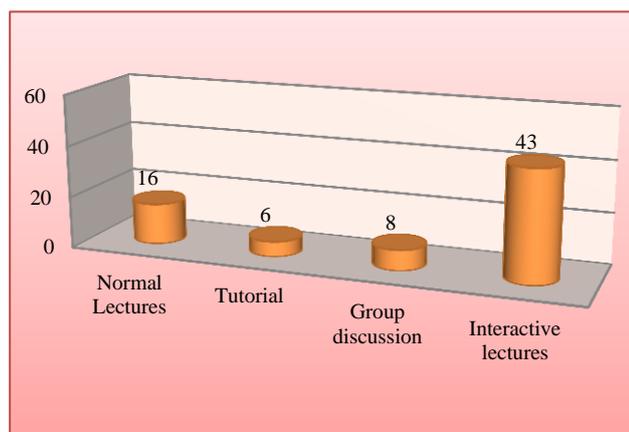
The short term learning outcomes conducted after every intervention showed significant difference in the immediate understanding and comprehension of the students.

**Table 1: Statistical analysis of the scores of pre-test and post-test of both lecture sessions.**

Topic	N	Mean	SD	SEM
<b>Coagulants and anticoagulants (topic 1 ) improvement</b>	73	0.33	0.29	0.034
<b>Thrombolytics, antiplatelet drugs and management of MI (topic 2) improvement</b>	73	0.36	0.33	0.039

Comparison between post-test of topic one and topic two with P value 0.53 is statistically not significant. At the end of both pre-test and the post-test a case scenario was given to the students. Out of 73 students, for topic 1 (coagulants and anticoagulants) only 13 (17.8%) attempted the question in pre-test and 39 (53.425%) answered it correctly in post-test. For topic 2 (thrombolytics, antiplatelet drugs and management of

MI), only 12 (16.44%) attempted the question, while in the post-test 59 (80.82%) answered it correctly.



**Figure 1: Perception of students about effective method of teaching.**

All 73 students returned the completed questionnaires. In the open suggestions most of the students had written that they prefer interactive lectures. Some students said they prefer chalk and board to power point presentations. One student responded that it reduces confidence in interactive sessions when others answer.

**Table 2: Descriptive analysis of student responses in questionnaire (n=73).**

Question	Number of students and their responses	
	Yes	No
	N (%)	N (%)
Interactive teaching has increased your understanding of the topic better when compared to lectures	70 (95.89)	3 (4.11)
Interactive teaching promotes retention of knowledge	72 (98.63)	1 (1.37)
Interactive teaching has increased your ability to apply therapeutically	70 (95.89)	3 (4.11)
Interactive teaching has increased your self-confidence and attitude towards self directed learning	65 (89.04)	8 (10.96)
This exercise can be regularly incorporated in the curriculum	64 (87.67)	9 (12.33)
Interactive teaching reduces the amount of time needed for self-study when compared with lectures	59 (80.82)	14 (19.18)

**Table 3: Descriptive analysis of the student preference to a mode of lecture presentation.**

Mode of lecture	Number of students
	N (%)
Normal lectures using chalk and board	12 (16.44)
Normal lectures with overhead projector	10 (13.70)
Normal lectures with power point presentation	8 (10.96)
Interactive lectures with discussion in the class	43 (58.90)
Seminars	0

### DISCUSSION

The present study was conducted, to evaluate the effectiveness of interactive sessions in the clinical application of knowledge by the students as well as a better understanding of the topic. Different methods of interactivity like a short quiz at the end of the session, discussion among students and faculty regarding the topic of that day were used. It is actually an established fact that interactivity improves the students' attention, knowledge and retention. In a study by Savkar et al they conducted small group discussions following three didactic lectures. They found that there was significant enhancement of knowledge among the students following the didactic lectures as well as small group discussions ( $p < 0.005$ ).<sup>8</sup> A cross sectional study was conducted on 150 MBBS second professional students by Gupta et al by introducing interactive lectures in large group teaching in pharmacology. They had used different methods of interactivity in the same lecture like a short quiz, at the start of the session, think pair and share, a case based scenario, and role play. A 12 item questionnaire was administered to all the students regarding their perceptions on interactive teaching in endocrine pharmacology. The overall presentation on the scale of (1-10) of the sessions was rated above 7 by 64.2% of students. Between 5 and 7 was rated by 29.8% of the students whereas 6% rated it below 5. They found that interaction during lectures helps to break the monotony, increases attention span, promotes active learning and helps students to retain better.<sup>9</sup>

In the current study the students had shown a positive response towards an interactive session, however, there was no statistically significant difference in the improvement scores of the posttest after the sessions. The perception of students towards interactive lectures was good. In the 11item questionnaire administered to the students, 95.89% of the students felt that interactive teaching has increased their understanding of the topic better when compared to conventional lectures. 95.89% of the students agreed that interactive teaching has increased their therapeutical application of knowledge. 87.67% of

the students wanted this exercise to be regularly incorporated in the curriculum. In the question regarding the preferred mode of lecture presentation, 58.90% of the students wanted interactive sessions with discussion in class over a simple lecture with a power point presentation or chalk and board.

The advantages of didactic lectures like teaching multiple subtopics simultaneously to a large group of students, and that it is convenient and economical to the institute, cannot be overlooked. Thus, the better approach would be incorporation of interactivity into regular didactic lectures, thus optimizing the outcomes.

## CONCLUSION

In the present study it was observed that there was not much statistically significant improvement in the immediate understanding of the topic though the perception of students towards interactive teaching methods was good. The study could not prove interactive sessions to be significantly better than traditional methods.

### Limitations

Time constraint was a major limitation. Lectures consisting of larger topics cannot be turned into interactive sessions. More number of such sessions and more analysis are required for the confirmation of results.

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