COMPARISON OF EFFECTIVENESS OF TRADITIONAL AND INTERACTIVE LECTURE METHODS FOR TEACHING BIOCHEMISTRY AMONG FIRST YEAR MEDICAL STUDENTS IN GOVERNMENT MEDICAL COLLEGE, IDUKKI, KERALA

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ABSTRACT

BACKGROUND

Traditional lecture is the most common type of teaching learning method used in professional colleges of India. Interactive lecture seems to be an important and feasible teaching learning method to increase the effect of learning in medical education.

MATERIALS & METHODS

The study was performed from July 2015 to October 2015 among first year medical students in Government Medical College, Idukki. All fifty first year MBBS students of 2014 batch were divided into group A and group B by simple random method. Two topics of translation were taken to both groups by two different lecture methods. The first topic was taught by interactive lecture to group A and traditional lecture to group B on the first day. Pre-test and post-test were done to assess gain in knowledge by two lecture methods. Second topic was taken to both groups on the second day by exchanging lecture methods. Their increase in knowledge was assessed by pre-test and post-test. On the second day, their feedback regarding perceptions and preferences were taken.

STATISTICAL ANALYSIS

Mean scores of pre and post-test were analysed by paired t test. Level of knowledge gained among two lecture methods was compared by independent t test and qualitative data on feedback was analysed using Chi square test.

RESULTS

The level of knowledge gained by interactive lectures was significantly higher than traditional lectures. Students agreed that interactive lectures motivated them for self-learning and increased their confidence regarding study materials. It also helped them in the recollection of lecture content and clearing doubt than traditional lectures.

CONCLUSIONS

Interactive lectures were accepted and considered to be more useful than traditional lectures for teaching biochemistry at Government Medical College, Idukki.

KEYWORDS

Brainstorming, Confusion techniques, Interactive lectures, Traditional lectures and open discussion.

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INTRODUCTION: The lecture is one of the important and oldest teaching learning methods used in the medical colleges of India. It is considered as the most cost effective learning method in comparison with other methods.[1] It is a proven method in which information is presented to either small or large group of students. Attention span studies have shown that students' attention decreases significantly after 10-15 minutes in traditional lectures.[2]

Information is given to students with minimum interaction between students and teachers in traditional lectures. It is a teacher centred and content oriented process and students are passive listeners. The aims, pace and direction of the lectures can be controlled by instructor in traditional lecture methods. The learning is done by memorizing without creative thinking and understanding of the learning objectives. Most of the teachers in professional colleges prefer traditional lectures because it is easy to conduct traditional lectures than interactive lectures.

Interactive lectures are teaching learning methods in which students are involved and stimulated by teacher-student interaction. Instead of mere memorization,

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understanding of learning objectives is emphasized in interactive lectures. Facilitation of long term memory is focused in interactive lectures. Interactive lectures also aid in improving student motivation. The interactive lectures make the learning interesting and exciting.

The interactive techniques that can be adopted in the class room include asking multiple choice questions to students, brainstorming, small group activities, role playing, problem solving, case based discussions, pre and post-test, quiz programs etc. The teacher student interaction can be improved by audio or video presentations. Recently interactive techniques like simulated patients and virtual patients have been introduced to increase active participation of students. Breaking up the lecture with these techniques resulted in creative thinking and arousal of the students in the classes.

Researches have shown that traditional lectures still predominate in university classrooms [3]. An Interactive lecture is an easy way for instructors to intellectually engage students in a lecture class of any size. Interactive lectures break the monotony and stimulate an interest resulting in improved attention.[4]

Researches comparing traditional and interactive lectures in medical education have shown inconclusive data regarding the knowledge gain and preference of lecture methods.[3-8] This study was planned to compare the effectiveness of interactive lecture and traditional lecture for teaching Biochemistry topics to first year medical students of Government Medical College, Idukki.

AIMS:

1. To compare the level of knowledge gained by traditional and interactive lecture methods for teaching Biochemistry topics to first year medical students of Government Medical College, Idukki.
2. To assess the perception and preference of the two lecture methods among first year students.

MATERIALS & METHODS:

Study Design: Quasi experimental study.

Period of Study: July 2015 to October 2015.

Study Setting: Government Medical College, Idukki.

Study Population: Fifty first year MBBS students of 2014-2015 regular batch of Government Medical College, Idukki.

Sample Size and Sampling Methods: All the fifty first year MBBS students were included in the study.

Inclusion Criteria: All the first year medical students of Government Medical College, Idukki were included in the study.

Exclusion Criteria: Those students who refused to give consent and those who were absent during the classes were excluded from the study.

METHODS: All the fifty first year MBBS students of the 2014-2015 regular batch were divided into group A and group B by simple random method. Two different topics of Biochemistry which were not covered previously were selected for study. Institutional ethical committee approval was taken prior to the study. All participants were informed of the purpose and procedure and informed consent was taken from all students. Topic one (steps of translation) was taught to group A by Interactive lecture. Various techniques such as brainstorming, open discussion, asking multiple choice questions, confusion technique and summarizing at the end of lecture were introduced in the interactive lectures. Brainstorming is a technique used by teachers to bring out the ideas of each student and present them in an orderly fashion to the rest of them. Brainstorming encourages creative thinking of the student. Brainstorming was carried out at the beginning of lecture by asking questions related to the topic or giving a case history suggesting the diagnosis of the disease. The same topic was taken to group B by traditional lecture method. A pre-test and a post-test containing ten multiple choice questions were given to assess the knowledge gained by two the lecture methods.

The second topic (inhibitors of translation and post translational modifications) was taught on the next day by exchanging the lecture methods. Pre-test and post-test were also conducted to obtain the knowledge gain by different lecture methods. All the lectures were taken by same teacher in different days. Feedback questionnaire were given to the students to collect the perceptions of students regarding the two lecture methods.

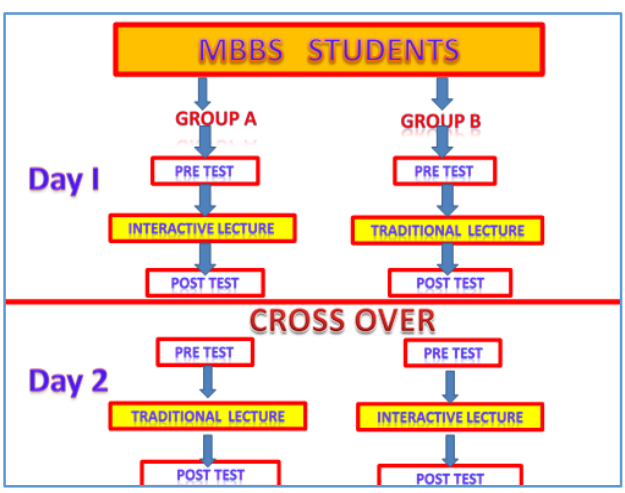

Fig. 1: Flow chart showing groups, tests and lecture methods

Data Analysis: Levels of knowledge gained by both lectures were studied using pre-test and post-test scores. Scores were analysed by statistical software SPSS Version 16. Level of knowledge gained by each lecture method was analysed by paired t test. Comparison between two lectures were analysed using an independent t test. Qualitative data on perceptions and preferences were analysed using Chi square test. The level of significance is fixed at 5%.

RESULTS: All the fifty first MBBS students of Government Medical College, Idukki participated in the study and feedback was collected from all the students. Table I shows the comparison of mean scores of pre-test, post-test and gain in knowledge from both types of lectures in group A and group B. The level of knowledge gained by traditional lectures and interactive lectures in both groups were analysed by paired t test.

Both groups were academically comparable before the lectures. The mean pre-test scores among the two lecture methods were compared by independent t test and were not statistically significant.[Table 2]

The interactive and traditional lecture methods which were taken on different days for each group could not make a significant difference in the gain in knowledge among the students [Table 3].

The knowledge gained from the two interactive and traditional lectures was 7.24±0.697 and 4.44±1.763 respectively [Table 4]. The knowledge gain among the two methods was analysed by independent sample test ('p'<0.001). The increase of knowledge in students subjected to interactive lectures was significantly higher than traditional lectures.

The perception and preferences of the students regarding the two types of lectures were compared by chi-square test [Table 5] and [Figures 2-8.]. Significant number of students agreed that interactive lectures motivated them for self-learning, created an interest in topics, enhanced their understanding, increased their confidence regarding study materials, helped them in recollection of lecture contents, helped them to clear doubts, and enabled them to understand basic principles and hence proved to be much better than traditional lectures ('p'-<0.05).

Regarding the coverage of topics, statistically significant difference was not found among the two types of lectures. The chi-square test value for the variable "wider area of topics covered" was 3.40 and p value was 0.493.

Teaching Learning methods		**Number of students**	**Pre-test** Mean ±SD	**Post-test** Mean ±SD	**Gain in knowledge** Mean ±SD
Interactive lecture	**Group A**	25	2.40±1.756	9.88±0.332	7.48±1.736
	Group B	25	2.80±1.848	9.80±0.707	7.00±1.658
Traditional lecture	**Group A**	25	2.64±1.823	7.00± 1.041	4.36±1.868
	Group B	25	2.72±1.370	7.24± 1.128	4.52±1.686

Table 1: Mean score of pre-test, post-test and gain in knowledge of two lecture methods on both groups (paired t test) Maximum marks =10

Group	**Pre-test Traditional** Mean ±SD	**Pre-test Interactive** Mean ±SD	**p-value**
A(25 students)	2.64±1.823	2.40±1.756	0.862
B(25 students)	2.72±1.370	2.80±1.848	0.437

Table 2: Comparison of pre-test scores among two lecture methods on both groups (independent t test) Maximum marks 10

Level of statistical significance is taken as p value < 0.05.

Tests of Lectures	**Group A (25 Students)** Mean ±SD	**Group B (25 Students)** Mean ±SD	**'p'- value**
Interactive lectures Difference in Post and Pre-test	7.48±1.736	7.00±1.658	0.532
Traditional lectures Difference in Post and Pre-test	4.36±1.868	4.52±1.686	0.469

Table 3: Comparison of knowledge gained by two lecture methods among two groups (Independent t test) Maximum marks 10

Level of statistical significance is taken as p value < 0.05.

Types of lecture	**Number of students**	**Knowledge gained by lecture methods Mean ±SD**	**p value**
Interactive lectures	50	7.24±0.697	0.001
Traditional lectures	50	4.44±1.763	

Table 4: Comparison of knowledge gained among two methods (independent t test) Maximum marks 10

Level of statistical significance is taken as p value < 0.05.

Variables	Chi-square test value	'p'- value
Motivated me to study	59.452	0.001
Created interest in lecture	50.989	0.001
Wider areas of topics covered	3.40	0.493
Enhanced my understanding	58.875	0.001
student's confidence regarding materials	56.789	0.001
Enable the students to understand basic principles	47.580	0.001
student's perceived effectiveness of lectures	51.343	0.001
helped in recollection of lecture content	57.504	0.001
helped me clear doubt	60.491	0.001

Table 5: Chi-square value and p values on the perception by the students (chi-square test)

Level of statistical significance is taken as p value < 0.05.

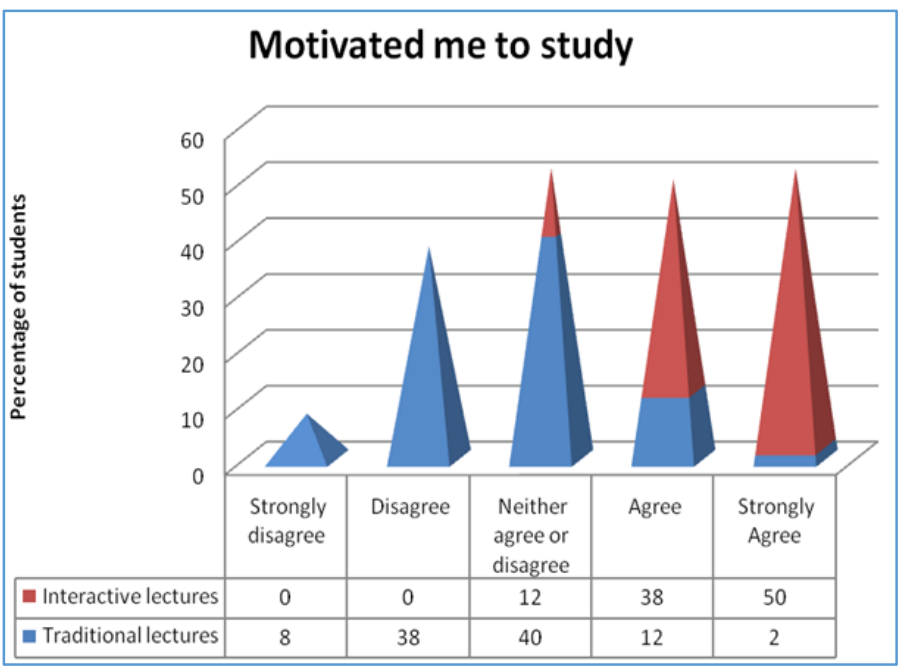

Fig. 2: Student's feedback on "Motivated me to study"

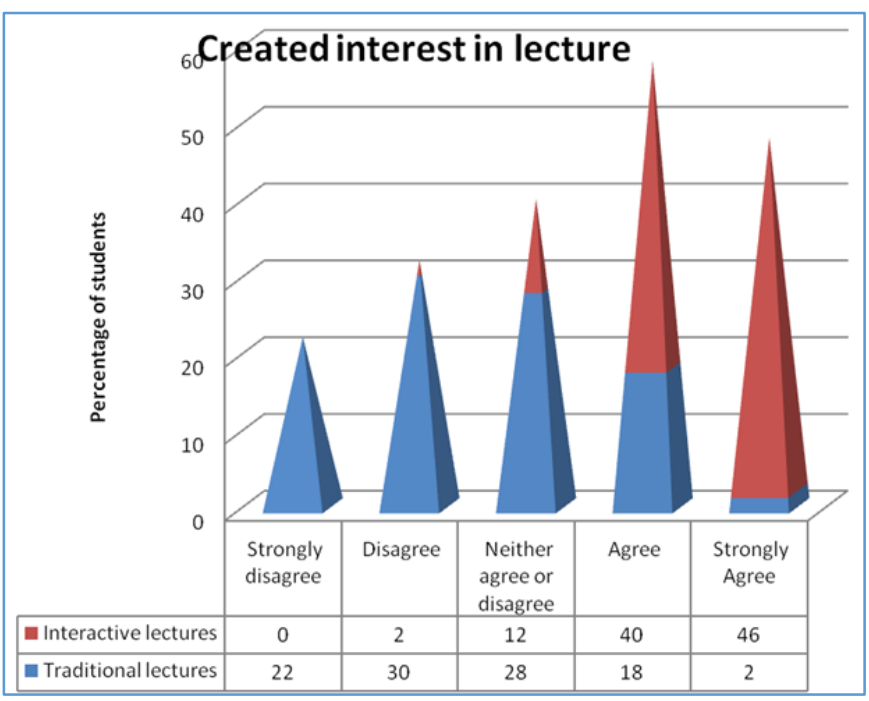

Fig. 3: Student's feedback on "Created interest in lecture"

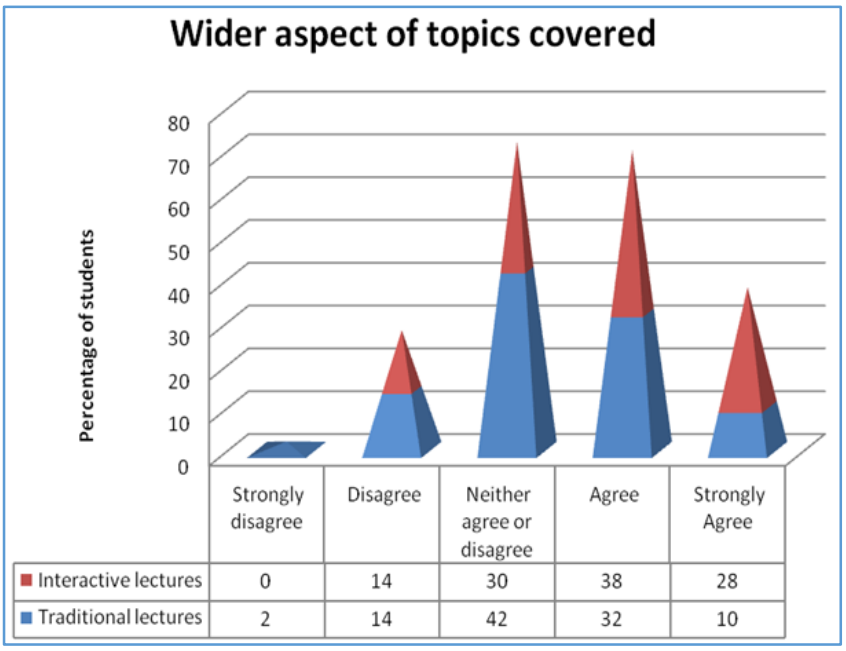

Fig. 4: Student's feedback on "Wider aspects of topics covered"

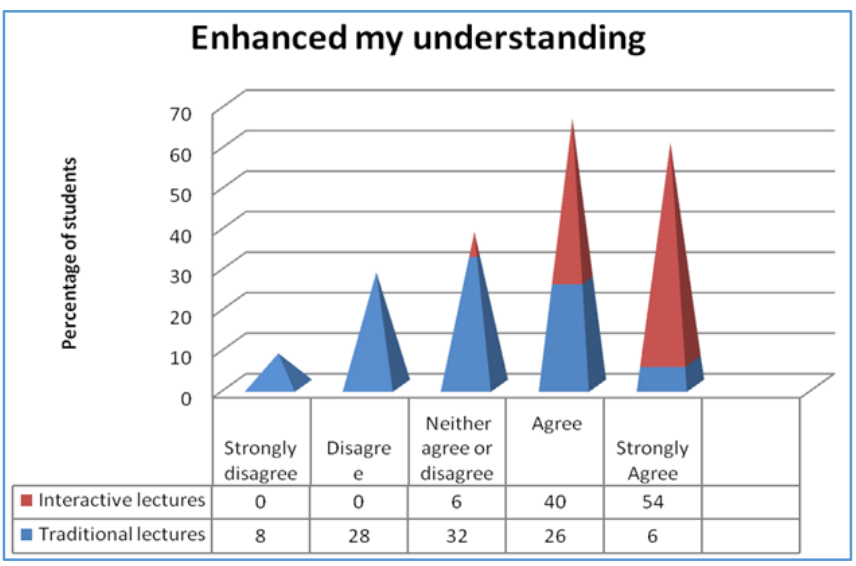

Fig. 5: Student's feedback on "Enhanced my understanding"

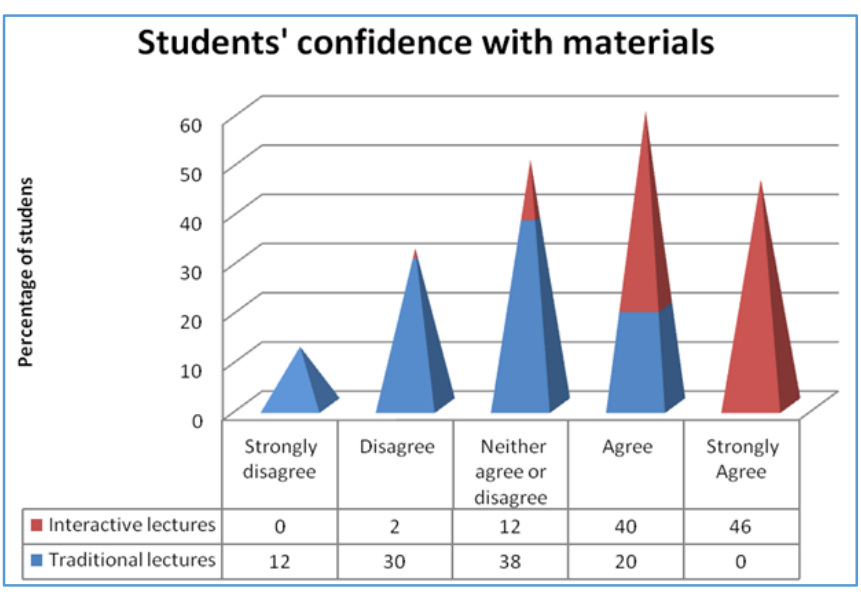

Fig. 6: Student's feedback on " Student's confidence with materials"

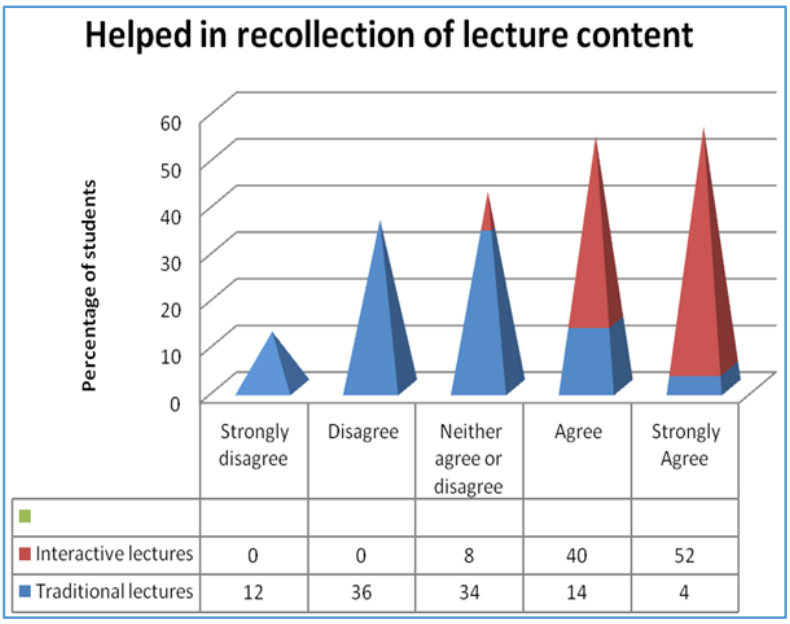

Fig. 7: Student's feedback on "Helped in recollection of lecture content"

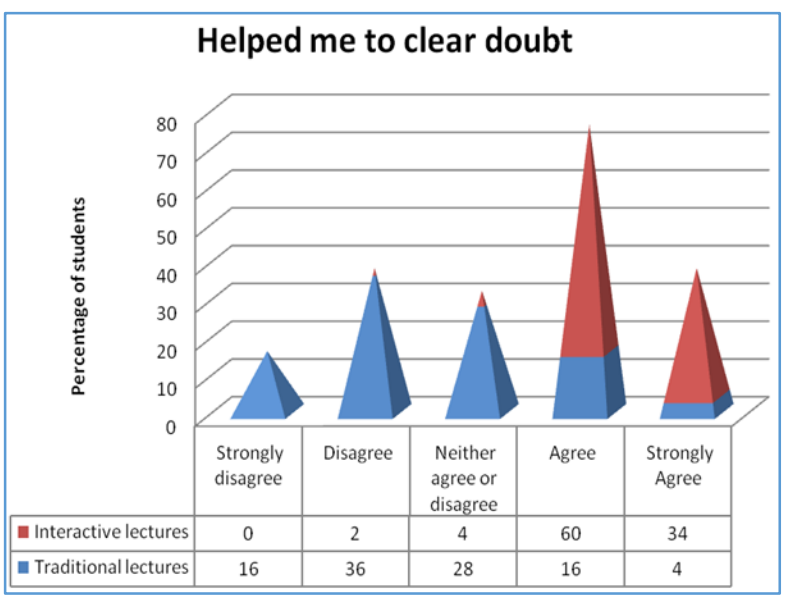

Fig. 8: Student's feedback on "Helped me clear doubt"

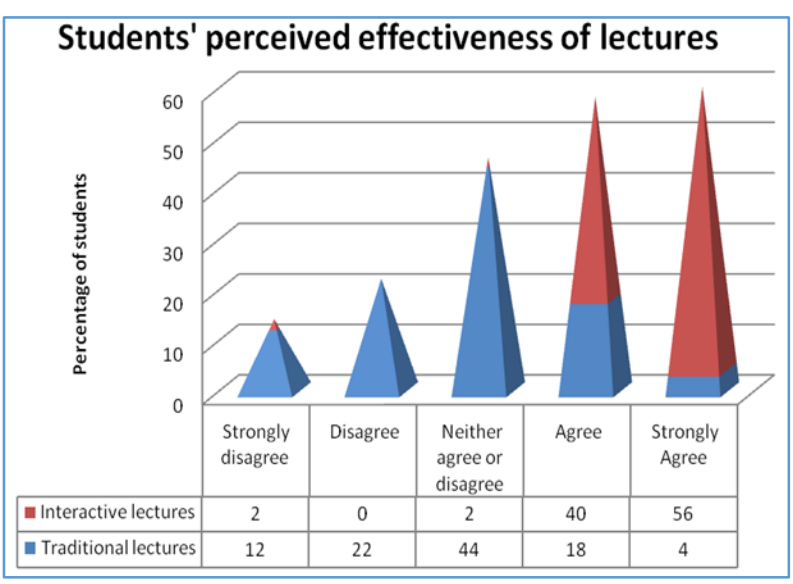

Fig. 9: Student's feedback on "Student's perceived effectivness of lectures"

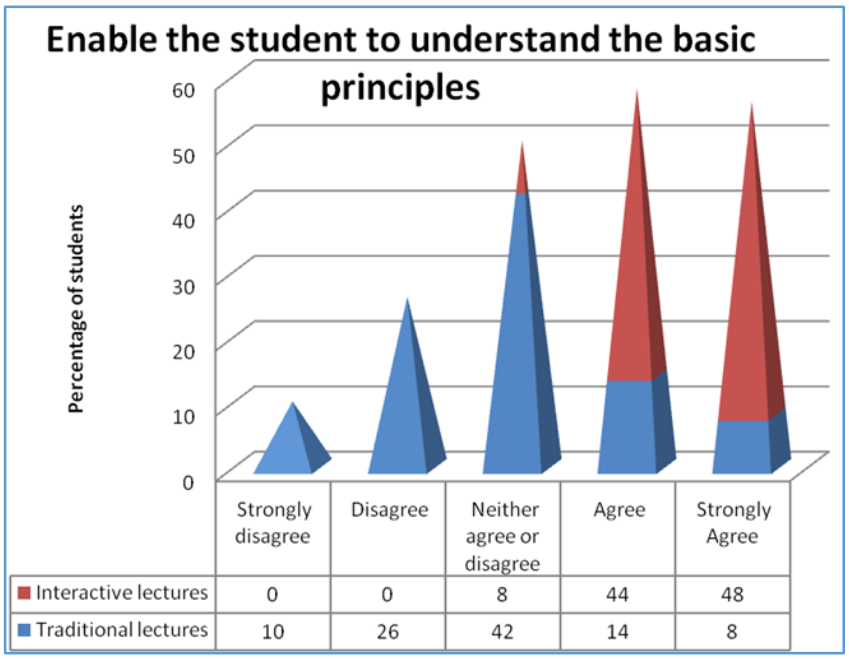

Fig. 10: Student's feedback on "Enable the student to understand the basic principles"

DISCUSSION: The students learnt more from interactive lectures when compared to traditional lectures in our study. Analysis of feedback questionnaire observed that interactive techniques used in the lectures contributed to active participation of students in the class. The students understood the learning objectives better and recollected more in interactive lectures than traditional lectures. Results obtained here are comparable to many other studies comparing interactive and traditional lectures.

Attention of medical students during lectures rose sharply to reach a maximum in 10-15 minutes and fell steadily thereafter. Breaking the lectures by open discussion and other techniques increased the listening capacity of the students and created an interest in the lectures. Structured interactive lectures increased creative thinking, memory and attention of the students.[3] The techniques in the interactive lectures aroused the students and made them active in the class in our study. Brainstorming sessions made a very good start for lectures and turned them interesting. Summarization by the students at the end of interactive lectures helped them to revise all the important lecture content.

Miller et al in their study concluded that interactive lectures resulted in an increase in the student performance in formative (8.6%) and final average examinations (22.9%) [5].It also suggested that interactive techniques enhanced student comprehension drastically. Interpretation of feedback from students suggested that the interactive lectures were more helpful, more enjoyable and interesting to them. Students also reported that interactive lectures improved their understanding of the learning objectives and distracted them less than traditional lectures. Students performed well in multiple choice post-tests of interactive lectures in our study. Feedback questionnaire analysis observed that the students enjoyed the teaching learning process by actively participating in the interactive lectures.

Srinivasan Roopa et al concluded that Interactive lectures were more useful than traditional lectures for 92% of the students. Significantly more number of students agreed that interactive lectures kept them attentive, created interest in topics, helped them to overcome monotony and motivated them for self-learning. Among the various methods used, the students preferred the use of video clipping and open discussion. So they concluded that interactive lectures were more useful than traditional lectures.[6]

A comparative study between structured interactive lectures and conventional lectures was conducted by Chilwant K.S et al of SAIMS Medical College, Indore, India.[8] The mean scores of multiple choice post tests were not statistically significant among the two groups. They observed that 47% students were willing to replace the conventional lecture method with interactive methods and 29% were willing to replace conventional lecture method with interactive method with certain modifications. Results further showed that 15% students suggested some modification in conventional teaching method and this clearly indicated that students were not satisfied with the present teaching method. The knowledge gain by interactive lectures were statistically significant than traditional lectures in our study.

Abubakir et al compared didactic lectures with interactive sessions in small groups among undergraduate medical students. There was no statistically significant difference between mean scores of pre and post tests of didactic lectures. But statistical significant knowledge gain was observed in the mean of pre and post tests scores of interactive lectures. 90% students reported that interactive lecture was a more active way of learning and 81% of them mentioned that interactive session provides more group interactive skills.[9] The results of this study turned out to be undistinguished to our study.

Archana C Buch et al introduced various interactive techniques to make lectures interactive and studied the perceptions of students about the interactive methods. Students opined that asking multiple choice questions (73%) was the most effective interactive techniques followed by brainstorming (64%) and confusion techniques (53%). They concluded that interactions increased communication skills, long term memory and creative thinking of topics [10]. The students opined similar conclusions about interactive lectures of our study. Asking multiple choice questions broke the monotony of lectures and contributed active participation of students in the lecture class. This was one of the easiest methods applied to make the lecture interactive in large group lectures. The students were enthusiastic in answering multiple choice questions and enjoyed the interactive techniques. Brainstorming sessions of interactive lectures increased the creative thinking capacity of the students and activated the decision making capability of students. The ambiguous areas of a topic were cleared by the confusion technique conducted at the end of the session.

L.A. Van Duk et al concluded that interactive techniques increased the motivation of students to read the topics outside the lectures. Student study behaviour and student learning from the course were not found to be statistically significant among the two groups. The motivation for self-study outside the class was significantly more in the interactive lectures than in traditional lectures in our study.[11]

Russel Wilke et al conducted a study on the effects of interactive methods on motivation and self-efficacy of students in human physiology classes. Analysis indicated that interactive groups acquired significantly more knowledge content and were more self-efficacious than traditional groups. Students' motivation was not significantly affected among the two groups. Survey observed that both groups preferred interactive lectures [12]. Students' motivation was significantly improved in interactive lectures when compared to traditional lectures in our study ($p = 0.001$).

Butler JA et al observed that those students actively involved in the lectures could learn effectively than those passively attending the class.[13] Interactive lecture methods introduced in the interactive lectures of our study increased active involvement of students and the students learnt more when compared to traditional lectures.

Louise Nasmith et al assessed the effectiveness of various interactive methods in lectures. They concluded that interactive methods in lectures increased students' participation, creative thinking and their responsiveness even in large class lecture.[14]

Students of Interactive lectures could learn more effectively and their knowledge gain showed a positive response. Students in the interactive lectures developed better problem solving skill than the students in the traditional lectures.[15]

Even though there are many advantages for interactive lectures, they are not being routinely advocated. Fear of not being able to cover the portions, fear of non-response and ridicule from the students, fear of not knowing the answer to a question posed by a student, may be some of the reasons for the same. But this is just a false-pretension.

CONCLUSION: The knowledge gain was significantly more in the interactive lectures than traditional lectures. The students preferred interactive lectures and the techniques introduced in it made the lectures interesting and hence, the students learnt more from the lectures. The present study observed that the present teaching method of didactic lectures is having many lacunae and there is a growing need to modify it.

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