Original Article

Teaching-learning methods in Biochemistry: First MBBS students' preferences and expectations

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Abstract : Background: The planned teaching-learning methods in Biochemistry encompass lectures, laboratory exercises that students do on their own, theoretical exercises and coursework. Interactive teaching, implemented at the faculty of Biochemistry, implies student's active participation in the teaching process for better acquisition of necessary knowledge and skills. Medical Council of India (MCI) has specified 240 hours of teaching for completion of the curriculum. Hence, judicious and optimum utilization of these teaching hours is of utmost importance for attaining the specified objectives. Aim: To know the preferences and the expectations of the existing methods of lectures in Biochemistry by the first professional MBBS students. Settings and design: The type of study was a descriptive cross-sectional, conducted at the Department of Biochemistry, Maharajah's Institute of Medical Sciences, Vizianagaram, India. Methods and subjects: A prevalidated questionnaire was used to collect data from the first professional MBBS students. Statistical analysis: The responses were analyzed to know the statistical significance. Results and Conclusions: Out of 136 study participants, 46 were male students and 90 were female students. The most preferred teaching style by the students was interactive followed by formal lectures. Rapid changes in the content of the curriculum may not be required, but a gradual introduction of the novel approach and the methods of teaching Biochemistry can be adopted into the curriculum. Feedback from the students facilitates a change in preconceived notions about teaching-learning principles to meet their expectations.

Key Words : Biochemistry, MBBS students, Teaching-learning methods

Introduction

Lectures can be traced as far back as the Greeks of the fifth century BC, and in medieval times lectures were the most common form of teaching (Brown and Atkins, 1988)[1]. The most common method of teaching for medical students is lecture. Though small group learning is the best way for teaching, still we prefer lecture as we have a large numbers of students. Hence, it is immensely important that lecture should be as effective as possible[2]. It is likely that mismatches exist between teaching styles of medical teachers and the learning styles of medical students. At present, the most common aids of lecture delivery include the lectures using powerpoint presentations (PPT), lectures utilizing the transparency and overhead projector (TOHP) besides the traditional blackboard, 'chalk and talk' method. Use of teaching aids in medical education technology is swiftly changing from blackboard to virtual simulations and teaching methods range from lectures to integrated teaching[3]. However, the optimum use of audiovisual aids is essential for deriving their benefits[4]. Although the maximum benefit of visual aids is obtained only in conjunction with a well structured lecture, comparison of the recall of visually and verbally presented lecture information has shown a clear superiority of visual information over verbal information for both immediate and long-term recall[5]. Understanding of Biochemistry requires knowledge of the molecular basis of diseases. The planned teaching methods encompass lectures, laboratory (experimental) exercises that students do on their own, theoretical exercises and coursework. Interactive teaching, implemented at the faculty of Biochemistry, implies student's active participation in the teaching process for better acquisition of necessary knowledge and skills. Medical Council of India (MCI) has specified 240 hours of teaching for completion of the curriculum (Regulations on Graduate Medical Education, 1997). Hence, judicious and optimum utilization of these teaching hours is of utmost importance for attaining the specified objectives. Each series of lectures is assigned to a particular faculty member in accordance with the curriculum recommended by the MCI. In such a setting, it is worthwhile to consider student's opinions and act accordingly. Therefore, the present study was undertaken

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to know the undergraduate's preferences and perceptions of teaching-learning activities and changes recommended for Biochemistry discipline of medicine.

Methods and Subjects

In the MBBS curriculum, Biochemistry is taught in the first year of the course. Each Biochemistry topic has theoretical class, and certain number of hours reserved to practical activities, which are taught in a specific laboratory for clinical analysis. The present study analyzed the teaching-learning activities in Biochemistry discipline of medicine undergraduate course at Maharajah's Institute of Medical Sciences, Vizianagaram, Dr. NTR University of Health Sciences, Andhra Pradesh, India.

The type of study was a descriptive cross-sectional. A prevalidated questionnaire was the study tool for the collection of data. The study group included the first semester undergraduate medical students, total 150 in number, out of which 138 students were present. Completely filled in questionnaire proformas were returned by 136 respondents, who formed the final study group. The Biochemistry subject in the undergraduate course is divided into structural and metabolic topics[6,7]. The structural aspects include carbohydrate structure, lipid structure, amino acids, peptides, proteins structures, enzymes, vitamins, thermodynamics, membranes and transport and inborn metabolic errors. The metabolic topics involve carbohydrate, lipid and amino acid metabolisms, as well as the integration of the metabolic pathways. Preferences and perceptions of teaching-learning activities were determined from questionnaire applied to students. The data was collected relative to the objectives about preferred teaching styles, aid of lecture delivery, perceived qualities of a good teacher, duration of a theory class, practicals, written test of up to 5 questions at the end of each class, opinion on theory classes and their suggestions. The responses obtained from the questionnaire were entered in Microsoft office excel 2007 and analysis was done. The data was expressed in percentages and relevant statistical tests were applied.

Results

Of the 136 respondents, 90 (66.18%) were female students and the remaining 46 (33.82%) were male students. The mean age of the students was 17.83±0.85 years. The preferences of the teaching styles for understanding Biochemistry are represented in table 1. The lectures in Biochemistry are delivered with various teaching aids such as only a talk by the teacher, chalk and talk, overhead projector and the recent power-point presentations using liquid crystal display (LCD) projector. The study participants were asked to choose the preferred aid of lecture delivery. The details are represented in table 2. The study participants were asked regarding the expectations about qualities of a good teacher. Students opted for more than one option. The perceived preferences are displayed in table 3. Duration of student's concentration for a theory class is shown in figure 1. The students were questioned whether practicals on a given topic of Biochemistry help in understanding the subject better. These responses are tabulated in table 4. In response to the question that short written test of up to 5 questions at the end of each theory class will enhance the subject understanding, 77 (56.62%) students gave a positive answer and remaining 59 (43.38%) students denied for it. The study was conducted at the end of the lecture series on carbohydrate chemistry. The study participants were asked to grade the lecture series. The graphical representation of grading is in figure 2. Certain suggestions/comments were also made by students which were related to various aspects of teaching and evaluation. The suggestions for improvement of teaching-learning are shown in figure 3.

Discussion

From Biochemistry education point of view, it is very difficult to make the subject more interesting by adopting a single teaching method. An evaluation made by students can provide the teacher with useful feedback information, obtained through informal mutual communication or preferably by a designed questionnaire. The questionnaire in the current study was an overall assessment tool, where the students were encouraged to put in their own observations regarding the aspects of teaching-learning methods. The students have expressed that the interactive and formal lectures as the most preferred and private study and student role play as the least preferred method of teaching- learning style. The findings of Williams's s et al[8] have also revealed interactive as the most preferred and private study as the least preferred methods. Interactive lectures highlight common misconceptions held by the students and encourage students to question[9] and thus increases self efficacy of student which is linked to their academic achievements. Goldberg et al have found that

interactive lecturing increases the educational value of lecture time[10]. Some previous studies have reported that certain teaching-learning methods, such as problem based learning, are favoured over the traditional methods i.e. lectures[11,12]. The favourism expressed towards interactive lectures in the current study highlights that in the Indian scenario, lectures still hold ground over the private study. Question of which aid for Biochemistry teaching is most appreciated by students indicated that they preferred powerpoint presentations followed by traditional face-to-face explanation using blackboard teaching methods. These findings are consistent with other researchers[13]. In contrast to the current study, Baxi et al reported that their study participants preferred multimedia usage[14]. There is no single best teaching-learning strategy that can work for every student, no matter how good that approach is. Majority of the students expressed approachability and teaching skill on the part of the teacher as the favourite qualities of a good teacher. This is well explained as the teacher having the aforementioned qualities will make the teaching-learning process more effective. These findings are in contrast with another study[8] in a foreign set up. Majority of the students in the present study felt that the duration of student's concentration for a theory class can be variable depending on the topic and the teacher or it should be 30 to 45 minutes. This may be because usually in a theory lecture the attentiveness of the students declines after around 45 minutes. The ideal duration of a lecture has been 45 minutes also another Indian study[15]. Majority of the study participants expressed that Biochemistry practicals help them in understanding the subject. There was a statistically significant difference between male and female students regarding this opinion (p-value=0.019). More than half of the students were in favour of a small test/question session at the end of the class. Questioning in the class room should be for developing communication skills. It is recognized that increased student involvement leads to change in attitude and learning outcomes[16]. Majority of the students graded the series of lectures on carbohydrate chemistry as good. The collected data in the current study revealed that majority of the students suggested that for improvement of teaching-learning, more than one type of lecture delivery should be included and there is a need of more interactive sessions in small groups. Other suggestions given by the students were inclusion of more pictures and animations, decreasing the speed of lecture delivery, emphasis on the expected questions in the university examination. However, due to time constraint, all suggestions cannot be always put into practice. The findings of the present study suggest that it may be possible to enhance student's perception of the value of a teaching session by modifying the session in the light of student based evaluation. The summary of the consolidated observation on the most accepted aspects and suggestions for improvements were taken into consideration and implemented.

Figure 1: Duration of student's concentration for a theory class

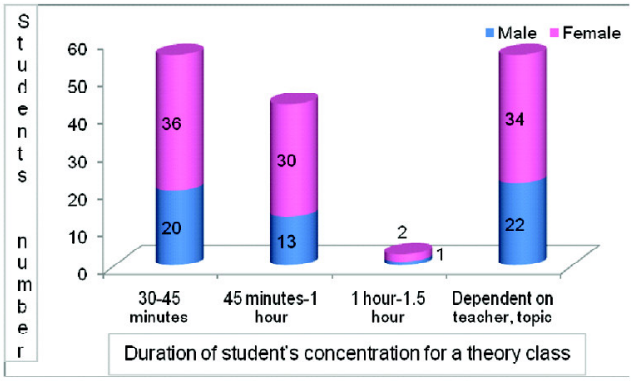


Figure 2: Grading the lectures series on carbohydrate chemistry

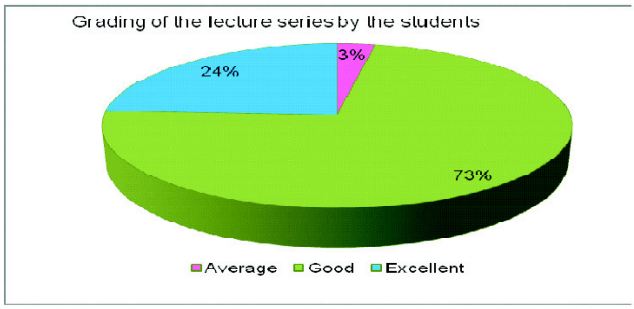
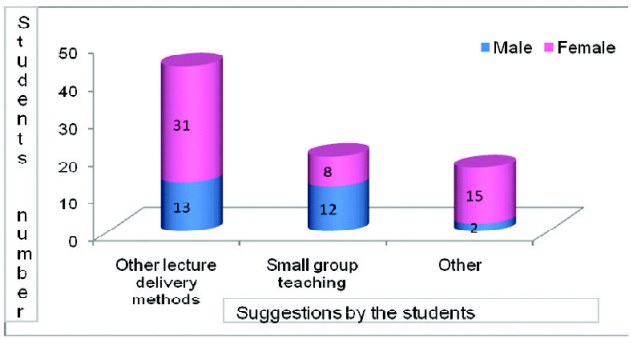


Figure 3: Suggestions given by the students



Tables & Figures

Table 1: Preferred teaching style by students for understanding Biochemistry

Teaching style	Number of students*	Percentage
Interactive Lecture	49	36.02
Formal lecture	42	30.88
Group Work	34	25
Student Presentation	11	8.09
Private Study	10	7.35
Student Role Play	8	5.88

*Multiple responses

Table 2: Most preferred aid of lecture delivery for understanding Biochemistry

Preferred aid	Number of students*	Percentage
Only a talk by the teacher	2	1.47
Chalk and talk	49	36.03
Overhead projector	22	16.18
Powerpoint presentation	75	55.15

*Multiple responses

Table 3: Student's expectations about qualities of a good teacher

Qualities of a good teacher	Number of students*	Percentage
Approachable	83	61.03
Teaching skill	69	50.74
Thorough subject knowledge	65	47.79
Enthusiasm	34	25
Organization	27	19.85
Punctuality	21	15.44

*Multiple responses

Table 4: Biochemistry practicals helpful in understanding the subject

Practicals helpful	Males	Females	Total
Yes	37	85	122
No	9	5	14
Total	46	90	136

Chi square=6.47; df 1; p-value=0.0109

Conclusions

It is imperative that the health courses reflect on sophisticated technology and methodical presentation with high density of information in Biochemistry discipline. It is evident from the feedback obtained that the students still prefer to be taught with the help of multiple teaching-learning aids, i.e. the most authentic chalk and talk with the more technological powerpoint method which reflects their lack of or incomplete attitudinal shift towards the more institutionalized care-based environment of a medical education institution.

Recommendations

Although the findings of the present study cannot be globalized due to the small sample size, such surveys can be conducted in different settings so that the teachers become aware of the student's learning styles and they can therefore incorporate teaching-learning strategies which are tailored to meet the student's learning preferences. This would not only create an efficient learning environment, but it would also motivate the students to achieve academic success. The students enter the auditorium with their own interest, motives, needs, abilities, experiences and culture. The lecturer should consider student's abilities and select the teaching method that will help the students to reach the expected results. Teaching should be oriented in such a way that it could reach the important goals and the objectives in class.

Acknowledgement

The authors acknowledge with grateful thanks, the Management, Maharajah's Institute of Medical Sciences, Nellimarla for the constant motivation for conducting research. The Dean, the Principal and the Medical education unit of Maharajah's Institute of Medical Sciences are specially acknowledged for their sustained support. The authors extend their sense of gratitude to the study participants with whose active participation the study had been complete.

Source of funding: None

Source of conflict: None

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