ORIGINAL ARTICLE

Introduction of Case Based Learning Among First Professional MBBS Students in the Department of Biochemistry

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Abstract

Background: In the traditional system of medical education, biochemistry was mainly taught by means of didactic lectures, tutorials and practical classes. It was teacher-centred, with minimal active participation from the students and hence, the students lacked critical thinking. These days, the education is changing to a student-centred teaching–learning process with the use of various innovative teaching methods. Case based learning (CBL) is one such approach which can make learning more effective and interesting and motivates the learner to gain knowledge. ***Purpose:*** To introduce the CBL in biochemistry at undergraduate level and to see its effectiveness in understanding the given concept. ***Material and Methods:*** The study was conducted among 150 MBBS first prof. students. Both, the faculty and students were sensitized to introduction of case-based learning methods. Theory lectures were taken for both the selected topics i.e., jaundice and diabetes mellitus. Then case-based learning sessions (CBL) were conducted for both the topics. At the end of both the lectures and CBL sessions, a post test (MCQ) was conducted. A repeat test was taken after 4 weeks from the first post-test (MCQ) for each topic. Also, the perceptions of students were taken on a pre-validated feedback questionnaire and analysed on 5-point Likert scale. ***Results:*** A total of 144/150 (96%) students participated in the study. The CBL scores were significantly higher than didactic lectures session scores (p <0.001). This difference was also seen in scores after four weeks of session completion (p <0.001). Student's feedback was taken on 5-point Likert scale feedback form which showed that 92% students either strongly agreed or agreed that topic was more interesting and easier when taught by CBL. Almost same number (92%) agreed to better understanding of topic and also that their attention span was more during CBL sessions. 87% students felt that it motivated them for self-study. 90% students agreed to have learnt teamwork during CBL sessions. 97% students agreed that CBL should be made a regular part of the curriculum. ***Conclusion:*** This study showed that case-based learning is an active method of learning resulting in better understanding and retention of subject of biochemistry.

Key Words: Case based learning (CBL); Didactic lectures; Teacher-centred; Student-centred

Introduction

The medical education in India is rapidly progressing and improving since last decade. The subject of biochemistry in first year MBBS is a key subject which forms the base of laboratory medicine and includes diagnostic methodology. In medical colleges in India, Biochemistry is mainly taught by didactic lectures, practicals and tutorials.

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The approach of students towards learning depends upon learning styles, environment and context (1). Students often complain that basic sciences curricula are theoretically overloaded, they could recall less information and hence the knowledge acquired by them was not applicable to clinical practice and they only concentrate on getting good marks. Therefore, in last few decades; concept of interactive learning has evolved where they can apply their own experiences and the knowledge to solve problems (2). Case based learning (CBL) is one such strategy. It is an interactive, student centred approach. It is an established pedagogical method that uses case studies as active learning tools (3).

This Case Based learning allows students to work as a team to solve a clinical case scenario with the knowledge they have gained. It provides opportunity for the student to interact with each other and with faculty. They generate the knowledge, organize it in meaningful manner and try to solve the problem (4). The role of facilitator (teacher) is also important who assists the students, engages them in analysis and helps in arriving at solutions or strategies (5). Hence, keeping in mind the above reported advantages of case-based learning, the present study was conducted to introduce the CBL in Biochemistry at undergraduate level and to see its effectiveness in understanding the given concept.

Material and Methods

The present study was conducted among 150 first professional MBBS students in the Department of Biochemistry Govt. Medical College, Jammu after obtaining prior approval from the Institutional ethical Committee It was a cross sectional, observational study. The faculty of the department was sensitized regarding the method used in the study. Two most clinically related topics of Biochemistry i.e., Jaundice and Diabetes Mellitus, were selected from MBBS scheduled time table. CBL scenarios were prepared and were discussed among the faculty. Feedback questionnaires for students were designed and validated by faculty members.

The students were informed about the concept of Case Based Learning, group dynamics and an informed consent was taken. First, Group A had CBL session on Jaundice whereas Group B had DL on the same topic. After these sessions, the groups were crossed over. This time, Group B had CBL session for the next topic i.e., Diabetes Mellitus whereas Group A had DL for same. Didactic lectures were taken for each topic using power point presentation. Three faculty members and three senior residents from the Department of Biochemistry were sensitized and trained for group dynamics and CBL.

Both the Batches, A and B and were given the clinical case scenario a week before the session and were instructed to study about the case and do some further reading from suggested sources. CBL sessions were conducted in demonstration room of Biochemistry Dept. and each lasted for approximately 90 min. During the CBL session, the students were divided into five subgroups of fifteen students each. Along with each group there was one teacher whose role was of facilitator. A post test was conducted for each batch immediately after the CBL and DL sessions were completed, and then a repeat test was taken after 4 weeks duration from the first post test. The post tests were in multiple choice questions format with twenty questions of half mark each. The post-test marks were divided into two categories (CBL and DL) of ten marks each for comparison between the two post-tests. At the end of each CBL session, perceptions of students were taken using validated questionnaire which included 12 questions. (a) Section I had eleven closed-ended questions with 5-point Likert scale response. (b) Section II had one open-ended question.

Statistical analysis: Qualitative data were expressed in percentages, and quantitative data were expressed in the form of mean ± standard deviation and significance of difference was assessed by t-test. A p value of < 0.05 was considered statistically significant. All statistical calculations were done using computer program Microsoft Excel Version 7 (Microsoft Corporation, NY, USA) and SPSS Version 20.0 (Statistical Package for the Social Science, SPSS Inc. Chicago, USA).

Results

Total 150 MBBS First Prof students gave consent for this study. Out of 150 students, 144 (96%) students actually reported for study. On comparison of post test scores, the student's scores were higher for the CBL sessions than DLs sessions in both the tests: one taken immediately after the sessions and second taken at an interval of 4 weeks after the completion of sessions. The difference in the score of the two methods was found to be statistically significant. The difference in scores was more in test taken after 4 weeks ($p < 0.001$) (*Table 1*). Also, it was observed that among both the groups over a period of time, there was a decrease in the mean score, which was significantly higher in the DL group than the CBL group (*Table1*).

Table 1: Comparison Between Test Marks of Didactic Lecture and Case-Based Learning Sessions

Scores on MCQ Test (n=144)	Mean Score (SD)		
	Immediately after session	4 weeks after session	*p* value
After DL	5.67 (0.87)	4.01 (0.86)	<0.001
After CBL	7.16 (0.97)	6.07 (1.04)	<0.001
p value	<0.001	<0.001	

Table 2: Perception of Students Regarding CBL

Sr. No.	Items	Strongly agree N (%)	Agree N (%)	Neutral N (%)	Disagree N (%)	Strongly disagree N (%)
1.	CBL has made the subject interesting	100 (69)	32 (22)	10 (7)	2 (1.3)	0 (0)
2	CBL has made the subject easy	102 (70)	30 (21)	10 (7)	2 (1.4)	0 (0)
3.	CBL has helped me in understanding the topic better	98 (68)	34 (24)	11 (8)	1 (0.7)	0 (0)
4.	CBL process was a motivation for self-study	96 (67)	30 (21)	15 (10)	3 (2)	0 (0)
5.	CBL has improved my communication skills	90 (62)	40 (28)	11 (8)	3 (2)	0 (0)
6	CBL has brought more interaction with teacher	100 (69)	40 (28)	3 (2)	1 (0.6)	0 (0)
7.	CBL has improved my problem-solving ability	100 (62)	38 (26)	14 (10)	2 (1)	0 (0)
8	CBL made me more attentive in the class	98 (68)	34 (24)	10 (7)	2 (1.4)	0 (0)
9.	During CBL sessions, I learned to work in team	94 (65)	36 (25)	12 (8.3)	2 (1.4)	0 (0)
10.	Topics covered by CBL would be helpful for future application of knowledge	130 (90)	10 (7)	4 (2.7)	0 (0)	0 (0)
11.	CBL should be made a regular part of the curriculum	130 (90)	10 (7)	4 (2.7)	0 (0)	0 (0)

Regarding perception of students about CBL, majority of students agreed that they find the subject boring with conventional lectures. CBL gave them better understanding of topic, improved communication skill and inculcated sense of self-study, team work and increased attentiveness during class. 97% students agreed that CBL should be continued for future batches and should be made a regular part of the curriculum (*Table 2*).

Discussion

Increasing globalization of medicine needs a call for physicians to set the standards for minimum essential requirements for use in medical education. In defining the essential competencies that all physicians must have, an increasing emphasis needs to be placed on professionalism, social sciences, health economics and the management of information and the health care system. This must be done in the context of social and cultural characteristics of the different regions of the world.

Furthermore, the global essential requirements are not a threat to the fundamental principle that medical education has to identify and address the specific needs in social and cultural context where the physician is educated and will practice. Finally in pursuing the global minimum essential requirements, medical schools will adopt their own particular curriculum design, but in doing so, they must ensure that their graduates possess the core competencies envisioned in the minimum essentials. They must in short 'think globally and act locally (6).

Without clinical exposure during early years of medical education, the understanding of basic sciences subjects

is difficult. Many students are of the view that they could recall very less information from early years and could not apply that knowledge to clinical practice. CBL may be introduced along with traditional lectures in a way that it creates interest, promotes active learning and provides better understanding so that learning becomes a pleasure and motivates the student to become lifelong learner (7).

In our study we could demonstrate that students had better understanding of topic with CBL compared to traditional approach (p <0.001). Since CBL is a learner-centred approach as compared to a conventional curriculum which is teacher-centric. In CBL, the students will be able to retain knowledge by active participation and develop reasoning strategies and assume responsibility for learning. The students collectively address the clinical problems from a perspective that requires analysis it helps in longer retention of concept learned (8). In present study we also found that the topics which were taught using CBL were better retained even after four weeks (p <0.001). Similar findings were observed by other authors in their studies (2,4,7).

After analysing the perception of students regarding CBL we observed that around 92% students either strongly agreed or agreed that topic was more interesting and easier when taught by CBL as compared to didactic lectures. Cases helped them to develop problem solving skills which are going to be useful for them as clinicians. Almost same number (92%) agreed to better understanding of topic and also that their attention span was more during CBL sessions. 87% students felt that it motivated them for self-study. Further 90% students agreed to have learnt teamwork during CBL sessions. Similar trends have been reported by Tathe *et al*. (9) who concluded that 91% students agreed that learning better understanding was achieved at the end of CBL session, 89% students agreed that CBL was an effective learning tool and improved their problem solving skills.

In our study we found that students strongly agreed to have improved interaction with teachers which was 97%. Team work and better communication skills were found to be 90% each. A study done by Yasin I. Tayem (10) showed that 84% students reported that team work helped them to achieve lecture objectives and 68% admitted to improved communication skills. Whereas Fatima *et al.* (11) in their study showed that 99% students found CBL to improve their communication skills and increased ability to work in a team. 97% students agreed that CBL would be helpful for them in future application of their clinical knowledge and should be made a regular part of the curriculum. Similar results were found in a study conducted in Bihar which reported that 95% students recommended CBL for future batches (12).

Our students admitted that the whole experience was very interesting and it has enhanced their knowledge about the subject. It has also given them a chance to interact with the faculty in a better way (13,14). Similar findings were concluded by other studies (15,16).

Conclusion

The present study concluded that CBL is significantly more effective than Didactic lectures in understanding a particular topic of Biochemistry. It increases their attention span, their interest in the subject and also helps in retention of learned concept better when compared with traditional lectures. Simultaneously, it motivates the students for self-directed learning and improves their communication skills and should be a regular part of the curriculum.

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Conflicts of Interest

There are no conflicts of interest.

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