

Case Based Learning among second professional MBBS students in a Government Medical College of Rajasthan: An innovative teaching learning method in Clinical Pathology

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Abstract

Introduction: Over the years, several innovative educational strategies like self directed learning, problem-based learning, task-based learning, co-operative learning and peer assisted learning have been developed. One such innovative teaching learning method is case based learning (CBL), where clinical cases are used to assist in teaching the concepts. CBL focuses on exploring real-life situations using an interactive student-centered approach. It enables the medical graduates to correlate their theoretical knowledge of the subject with the clinical case and diagnosis of disease.

Aim: The current study was undertaken to determine the effectiveness of CBL in academic performance (learning & retention of knowledge, problem solving skills) of the second professional MBBS students in pathology subject and also to know the level of satisfaction perceived by students about this methodology via communication feedback.

Materials and Methods: This cross-sectional study was conducted in the Department of Pathology among second professional MBBS students. Two groups of 54 students were taught two different topics (pulmonary tuberculosis and meningitis) using CBL and didactic lectures with cross-over study design. Students' learning was assessed by two post-tests (each with 15 MCQ's), an immediate post-test within 2-3 days and a late post-test after three weeks of the completion of session. Mean \pm SD of the both the post-test scores of the students was taken. The post-test scores of the students in both the groups were compared. Using a pre-validated, feedback questionnaire students' perceptions towards usefulness of the CBL were recorded by a 5-point Likert scale.

Results: The Mean \pm SD of the early and late post-test scores after didactic lecture for group A and group B were 7.41 \pm 1.42; 5.98 \pm 1.12 and 6.81 \pm 1.23; 5.83 \pm 1.29 respectively. Similarly, the early and late post-test scores after CBL for group A and group B were 9.31 \pm 1.55; 9.07 \pm 1.53 and 9.15 \pm 1.39; 9.02 \pm 1.43 respectively. Feedback analysis from the students revealed that majority of the students agreed that CBL teaching learning method provides opportunity to exchange ideas (71.3%), improves critical reasoning and thinking (71.3%) and helped in clinical application of the theoretical knowledge (70.4%).

Conclusion: CBL is an interesting and effective teaching-learning method in pathology. If used strategically, CBL may prove to be an effective tool in bridging the gap between theory and practice. The students found CBL educationally stimulating than the didactic lectures and also felt that more such sessions should be done on other topics as well.

Keywords: Active learning, Didactic lectures, Medical curriculum, Problem based learning, Teaching learning method

INTRODUCTION

Pathology is one of the fundamental sciences in medical curriculum and a sound knowledge of pathology is very important for the clinical practice. [1] Second professional MBBS is considered as a crucial period in undergraduate education as during this stage the students are taught with etio-pathogenesis of various disease processes, and they simultaneously interact with the patients during their clinical postings. [1,2] Hence, understanding the fundamentals of pathology helps in bridging the gap between basic sciences and clinical medicine. The main goals of undergraduate pathology teaching are to provide a framework for the description of disease and to impart knowledge about the functional and structural changes in disease so that the clinical signs and symptoms can be understood and interpreted effectively and efficiently. [3] In majority of the institutions, pathology teaching is mostly lecture-based, with practical and tutorials as interactive sessions. This conventional system of lecture taking lacks the active participation from the students and results in passive acquisition of knowledge. Moreover, pathology being taught as an individual subject, there is no interdisciplinary interaction. This eventually results in

failure to associate and correlate the disease pathophysiology with the clinical presentation and diagnosis of the disease and application of the theoretical knowledge to clinical practice. [4] As pathology is a vast subject, and teaching hours have decreased over the years, meticulous planning is required for effective and productive learning. [5]

Over the years, undergraduate medical curriculum has evolved from being teacher centered to student centered, from discipline based to integrated core and options based and from passive acquisition of knowledge by teachers to active problem based learning. [6] It is now realized that in order to ameliorate the clinical practice by a medical graduate, a blend of basic and clinical sciences as an integrated curriculum is required and to achieve this, clinical work has to be incorporated early in the medical course. There is also an immense need to create an environment of active learning by interactive student centered approach, which may help in teaching critical thinking and problem-solving skills among the students. Therefore, as per the graduate medical education regulations (GMER), the National Medical Council (NMC), erstwhile Medical Council of India (MCI) has

introduced competency-based medical education (CBME) pattern for medical graduates, and with introduction of CBME pattern the educational scenario in Indian Medical Colleges has undergone a paradigm shift. [2]

The CBME pattern mainly focuses on 'application of the knowledge' rather than only gaining knowledge. [7] This new curriculum aims to minimize the compartmentalization of traditional medical disciplines through integration methods. Over the years, several innovative educational strategies like self directed learning (SDL), problem-based learning (PBL), task-based learning (TBL), co-operative learning (CL) and peer assisted learning (PAL) have been developed to achieve this. [8] One of such method is case based learning (CBL), where clinical cases are used to assist in teaching the concepts. It is an effective teaching method and an active learning strategy as it links learning across multiple disciplines and allows for clinical integration. [9] CBL is closely related to the PBL, infact CBL incorporates many traits derived from PBL. [8]

CBL focuses on exploring real-life situations using an interactive student-centered approach. In this method, the case serves as a trigger to initiate the process of learning. The clinical cases are given as problems to the students along with detailed patient history and clinical situations. Additional information such as relevant physical and/or radiological examination or laboratory investigations is given to support the clinical decision-making. [10] The medical students integrate the clinical history of patients with their laboratory investigations and use it for the diagnosis and further management of the patient. This enables the medical graduates to correlate their knowledge of pathology with the clinical case and diagnosis of disease. Hence, CBL involves maximum interaction among participants and emphasizes on teamwork and multidisciplinary approach in evaluating a clinical case with the help of existing knowledge. The instructor here plays the role of a facilitator only, with students being the principal analyzers of the given case. [10]

Considering the above background, it seems imperative to incorporate CBL in pathology, as it not only will improve the knowledge retention, motivate the student for directed learning and better correlate the subject clinically, but will also increase their interest in the subject itself. The current study was undertaken to determine the effectiveness of CBL in academic performance (learning & retention of knowledge, problem solving skills) of the second professional MBBS students in pathology subject and also to know the level of satisfaction perceived by students about this methodology via communication feedback.

MATERIALS AND METHODS

This cross sectional, observational study was conducted at a Government Medical College in Rajasthan for a period of two months (8th December 2022 to 7th February 2023). After taking approval from the Institutional Ethics Committee (vide letter no. – GMC/IEC/2022/150, dated 5/12/2022), the brief study protocol and the academic purpose of the study was explained to all 2nd professional MBBS students ($n=134$) and they were asked for their

voluntary participation in the study. They were also oriented regarding the process of CBL and the role of faculties as facilitators. The students having <75% of attendance ($n=19$) and those who refused to participate ($n=7$) were excluded from the study. Remaining 108 students were equally divided into two large groups: Group A and Group B with 54 students in each group. Two common topics viz. pulmonary tuberculosis and meningitis were taught in two sessions to both the groups. Keeping in view the NMC's latest CBME pattern, the CBL exercises of the aforementioned two topics along with their learning objectives were prepared in consultation with the physician. The cases used for CBL were developed by pathology faculties and were approved by the subject experts in alignment with educational goals.

In the first session, Group A was taught with conventional didactic lectures (DL) by pathology faculties on one topic and the Group B was taught the same topic with CBL tool jointly by Pathology faculties and clinical faculties. Once the session was over two post-tests were conducted, an immediate post-test within 2-3 days and a late post-test after three weeks of the completion of session. In the second session (conducted after one week) the groups were crossed over i.e. a new topic was taught to Group A with CBL tool, whereas Group B had DL for the same topic followed by the two post-tests as described previously. Late post-tests were conducted for the purpose of testing retention of knowledge. Of note, in both the sessions the learning objectives (in respect to the particular disease) for DL and CBL were same. Both the post-tests (immediate and late) were multiple-choice question (MCQ) based with 15 MCQs/test of single best response type and having one mark for each MCQ. For comparison purpose, the post-test marks were divided into two categories (DL and CBL).

Finally, after completion of both the sessions, feedback questionnaire (pre-validated) was administered to the study participants and their perceptions regarding usefulness of the CBL were recorded by a 5-point Likert scale questionnaire where responses varied from 'strongly agree' (score value = 5) to 'strongly disagree' (score value = 1), with a neutral midpoint response of 'not sure' (score value = 3). The students were asked to respond to all statements based on their own judgment.

The data obtained was managed on an Excel spreadsheet. Simple descriptive statistics were used to generate frequencies, percentages, and proportions. The informed consent of each student was obtained and all the responses were kept anonymous.

RESULTS

Table 1 depicts the Mean \pm SD of the early and late post-test scores acquired by the study participants of both the groups in session-1 and session-2. As evident by the mean scores itself, it is clear that there was a significant improvement in learning of the students with CBL as compared to the didactic lectures.

Table 2 depicts the perception of students regarding the CBL teaching learning method. Feedback analysis from the students revealed that majority of the students agreed

that CBL teaching learning method provides opportunity to exchange ideas (71.3%), improves critical reasoning and thinking (71.3%) and helped in clinical application of the theoretical knowledge (70.4%). They also agreed that

this exercise should be regularly incorporated into the curriculum.

Table 1: Early post-test and late post-test scores of Session-1 and Session-2 for both the groups.

Variables	Topic of teaching learning method			
	(Session-1) Pulmonary Tuberculosis		(Session-2) Meningitis	
	Group A (DL) n=54	Group B (CBL) n=54	Group A (CBL) n=54	Group B (DL) n=54
Early post-test	7.41±1.42	9.15±1.39	9.31±1.55	6.81±1.23
Late post-test	5.98±1.12	9.02±1.43	9.07±1.53	5.83±1.29

CBL: Case based learning; DL: Didactic lecture

Table 2: Students perceptions about the usefulness of CBL pattern in undergraduate medical curriculum. (n=108)

Statements	Strongly agree (%)	Agree (%)	Not sure (%)	Disagree (%)	Strongly disagree (%)
Helps in better understanding of the topic	63 (58.3)	31 (28.7)	11 (10.2)	3 (2.8)	0 (0.0)
Makes the subject more interesting	64 (59.3)	32 (29.6)	7 (6.5)	5 (4.6)	0 (0.0)
Learning experience was more satisfying	69 (63.9)	28 (25.9)	8 (7.4)	2 (1.9)	1 (0.9)
Provides opportunity to exchange ideas	77 (71.3)	24 (22.2)	7 (6.5)	0 (0.0)	0 (0.0)
Improves self confidence and attitude to learning	67 (62.0)	29 (26.9)	8 (7.4)	3 (2.8)	1 (0.9)
Improves critical reasoning and thinking	77 (71.3)	26 (24.1)	4 (3.7)	0 (0.0)	1 (0.9)
Interactive sessions are helpful in promoting active learning	74 (68.5)	29 (26.9)	5 (4.6)	0 (0.0)	0 (0.0)
Provides context that is helpful in retaining relevant information	67 (62.0)	32 (29.6)	7 (6.5)	2 (1.9)	0 (0.0)
Helps in effective clinical application of the basic science knowledge	76 (70.4)	28 (25.9)	3 (2.8)	1 (0.9)	0 (0.0)
Should be regularly incorporated in the curriculum	66 (61.1)	21 (19.4)	17 (15.7)	3 (2.8)	1 (0.9)

CBL: Case based learning

DISCUSSION

There are few studies emphasizing the importance of integrated, case and competency based medical education (CBME) in different subjects among the undergraduate medical students, [7,11,12] and the need to address this issue cannot be ignored at the current stage of transformation in medical education in India. Pathology is a vast subject covering a wide spectrum of diseases and investigations used for the diagnosis and only a part of it is taught to undergraduate students in the MBBS curriculum. It has been understood that education needs to be an active productive mental activity. To make someone comprehend a certain area of knowledge, it is best to involve them in the learning process. [13] Various modalities can be used to implement this acquisition of knowledge and they range from traditional didactic methods, integrated learning models and also some modern methods like PBL and CBL. The present study was conducted to analyze the effectiveness of CBL compared to traditional didactic method among second professional MBBS students in the subject of pathology and also about the students' perception about CBL teaching learning method.

As evident from our study results, CBL certainly did improve the learning ability of the students. Significant increase in the post-test scores of CBL group was

observed as compared to didactic lectures. Students also found that the CBL method was interesting, promoted active learning, stimulated the critical reasoning and thinking and a helped in clinical application of the theoretical knowledge and retaining relevant information. According to the student perception results, it was observed that CBL also improved clinical decision-making, and diagnostic interpretations among them. Previous studies by various researchers from different geographical locations and studying different subjects corroborated our study findings. [8,14-16] Two recent studies conducted on the pharmacology subject also concluded that CBL was an effective tool in teaching the subject to a large group of students. [15, 16] Hasamnis *et al.* also concluded that CBL helped in amalgamating theoretical knowledge into clinical pharmacology practices. [15] An approach to self-learning, critical thinking, and arousal of interest in the subject were the positive effects of the introduction of CBL in the teaching of concepts of pharmacology. [17] A fact can be well shared that learning and remembering a subject becomes much easier when it is linked to a real life patient case. A strong positive perception to CBL with its high acceptability amongst the students and teachers may be mostly because of the fact that, it is a student centered

teaching learning process, which effectively promotes self-directed learning.

It is widely believed that success of any teaching learning method depends on active involvement of students in classroom discussions. Scope for adequate discussion or interaction is very limited during didactic lecture sessions and there is limited active participation by only few front bench students. Moreover, being one sided and the pace of delivery, understanding of students, number of lectures level of difficulty for each topic are some of the many variables behind the boredom of conventional didactic teaching method. On the other hand, case based learning can effectively provide a broad base for discussion resulting in significant development of learners problem solving and decision making skills.

Increasing the case-based or problem-based studies over didactic lectures, integrated teaching for more effective learning, group discussion for active participation of as many students as possible and conducting quizzes create a healthy competitive and fun filled learning environment among the students.

Majority of the above mentioned methods of teaching are widely prevalent in developed countries, however in India, even after four decades, PBL is still in its infancy, or its use is limited to particular subject or topics of a few apex institutions. [2] Departmental autonomy, attitude of faculty members, faculty shortage and lack of resources are few among many reasons behind a slow change in the direction of active, student oriented and competency-based learning. [18]

Through this study, the authors were able to ascertain that CBL promoted efficient group dynamics among the students, their ability to ask questions and solve problems on their own was mentally refreshing to the students. The crux of CBL is the strength of the case which is also its weakness, i.e., the stronger the case design the better the CBL methodology of teaching. The interest and involvement of the students is of paramount importance for the CBL to be an effective teaching learning method. Teaching is a task that requires enthusiasm and time, and if done with commitment, is greatly rewarding. If pathology teachers do a good job of imparting knowledge, then, there is hope that the budding doctors will understand the mechanisms of disease, use laboratories properly, and be stimulated to become pathologists themselves. If not, there is the danger of producing doctors who cannot explain disease to their patients, who abuse laboratories and who have no interest in pursuing pathology as a career, leading to a slow and possibly irreversible decline in pathology as a medical profession. [5] To avoid such situation, the onus lies on the medical teachers only.

CONCLUSION

CBL is an interesting and effective teaching-learning method in pathology. If used strategically, CBL may prove to be an effective tool in bridging the gap between theory and practice. The students found CBL educationally stimulating than the didactic lectures and

also felt that more such sessions should be done on other topics as well. Further studies conducted in various subjects with a large group of students will help provide a more student focused approach to the medical education curriculum. Also, studies comparing the effect of CBL + didactic lectures vs. only regular lectures on students' exam performances can also be conducted to evaluate the effectiveness of CBL better.

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