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Original article

Application and Evaluation of Case-Based Learning as a Part of Early Clinical Exposure for Undergraduate Medical Education Program

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Abstract

Introduction: Medical Education is witnessing a significant transition and global shift towards competency based medical education (CBME) which includes early clinical exposure (ECE) program to help students apply and correlate principles of preclinical subjects with clinical scenarios, in various forms and in a variety of settings. One of the easy and feasible methods of ECE being Case Based Learning (CBL), our study aimed to design a case scenario and to evaluate impact of case base learning as a part of ECE module in first year undergraduate medical teaching program in nerve muscle physiology. ***Methods:*** The present study was conducted in 96 students at Ashwini Rural Medical College Hospital and Research Centre, Solapur after obtaining institutional ethics committee approval. 3 hrs session of CBL was conducted for a case scenario on myasthenia gravis in the nerve muscle physiology module. The students' responses on pre-test, post-test and their insights regarding the CBL were taken through a pre validated questionnaire using 5-point Likert scale. ***Results:*** High impact of CBL was seen as significant improvement in student's performance. Maximum students felt CBL to be easy method of learning and was highly appreciated through their feedback. ***Conclusion:*** CBL was found to have positive impact on understanding and perception of topic. CBL helped students to understand, evaluate, analyze, diagnose and interpret the case, paving them towards newer approach of self-directed and vertical integrated learning. CBL is easier, feasible an effective method among other early clinical exposure methods as it involves students in deeper and self-directed active learning, encouraging and promoting them to reach higher levels of cognitive domain of Bloom's taxonomy. This method will be very useful in its practical implementation during online classes for ECE module in the threat of COVID 19 situation as well.

Keywords: ***Competency based Medical education, Early Clinical exposure, Case based learning.***

Introduction

Medical Education is witnessing a significant transition in teaching learning methods and experiencing a global shift towards competency based medical education (CBME).The goal of undergraduate CBME program is to create an "Indian Medical Graduate" (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so as produce physician of first contact of the community or doctors of first contact [1]. The five roles of a doctor were stated as: Clinician, Leader, Communicator, Lifelong learner, and Professional [1]. Having stated these roles and goals, competency driven CBME curriculum for MBBS has therefore been modified such that clinical exposure can be introduced in first year along with the basic sciences. Early clinical exposure (ECE) program helps students to apply and correlate principles of preclinical subjects with clinical scenarios right from beginning of first year MBBS. As per GMER, 2019, the time allotted for ECE in each subject is 30 hours in first year [2]. Students can be exposed to early clinical experiences in various forms and in a variety of settings. The various ECE methods can be, case base learning scenarios, case videos, actual patient, simulated patient, problem-based learning etc [2]. One of the easy and feasible methods of ECE being Case Based Learning (CBL), our study aimed to design a

case scenario and to evaluate impact of case base learning as a part of ECE module in first year undergraduate medical teaching program in nerve muscle physiology. The goal of CBL is to prepare students for clinical exposure, through the use of authentic clinical case scenario linking theory to practical knowledge [3].

Material and Method

The present study was conducted at Ashwini Rural Medical College hospital and research centre, Solapur after obtaining institutional ethics committee clearance. Out of 100 first year MBBS students, 96 students were present for Case base learning session and gave a voluntary informed consent to participate in the study. After the completion of didactic lectures over Nerve Muscle Physiology, one 3 hrs session of CBL (as per ECE guidelines) was designed and conducted accordingly (planning and scheming). This session began with brief explanation about CBL as a new method of teaching and learning followed by written informed consent from all students (sensitization of students). The case scenario (myasthenia gravis case) was displayed over the screen and their understanding and interpretation about displayed case was assessed through paper-based pre-test. Then subsequently the students were divided into 8 groups, each group of 12 students. The case was discussed by the facilitator through an interactive session with students from each group, promoting more comprehension and approach towards understanding the case gradually reaching toward the diagnosis of the case for a session of one hour (intervention). After the discussion, paper based MCQ post-test was conducted that also included feedback rating of CBL method. Post-test assessed impact and effectiveness of CBL as a new method of learning (assessment of impact). Lastly, perception of students regarding CBL was administered by feedback questionnaire using the 5-point Likert scale (feedback) ranging from strongly agrees to strongly disagree. All queries and doubts related to case or CBL were resolved at the end of 3 hr session. Statistical analysis: Descriptive statistics such as frequency and percentage was used to present the data. Qualitative data analysis of MCQ pre test and post testwas done by McNemar's test. A p-value less than 0.05 were considered as significant. Rating of CBL method was also obtained and analyzed before and after discussion of case base learning. Feedback questionnaire was obtained on 5-point Likert scale and perception of the students about CBL as teaching learning method were expressed as percentage. Data analysis was performed by using software SPSS v20.0.

Results and Discussion

I. Results:

Table 1: Comparison of MCQ scores

MCQ no.	Pre-test (%)	Post-test (%)	Mc Nemar's χ^2 value	p-value
1.System involved in this clinical condition	75 (78.1)	87 (90.6)	6.72	0.009
2.Diagnostic clinical features	66 (68.8)	92 (95.8)	20.83	<0.0001
3.Likely diagnosis	69 (71.9)	95 (99.0)	22.32	<0.0001
4.Different lab investigations	54 (56.3)	96 (100)	40.02	<0.0001
5.Drugs used in the treatment	64 (66.7)	86 (89.6)	15.75	<0.0001

There was significant improvement in student's performance (the percentage of correct MCQs answered) in post-test for all MCQs. Highly significant results were obtained on statistical comparison of scores between pretest and post-test. This result proves high impact of CBL as reflected in figure no.1

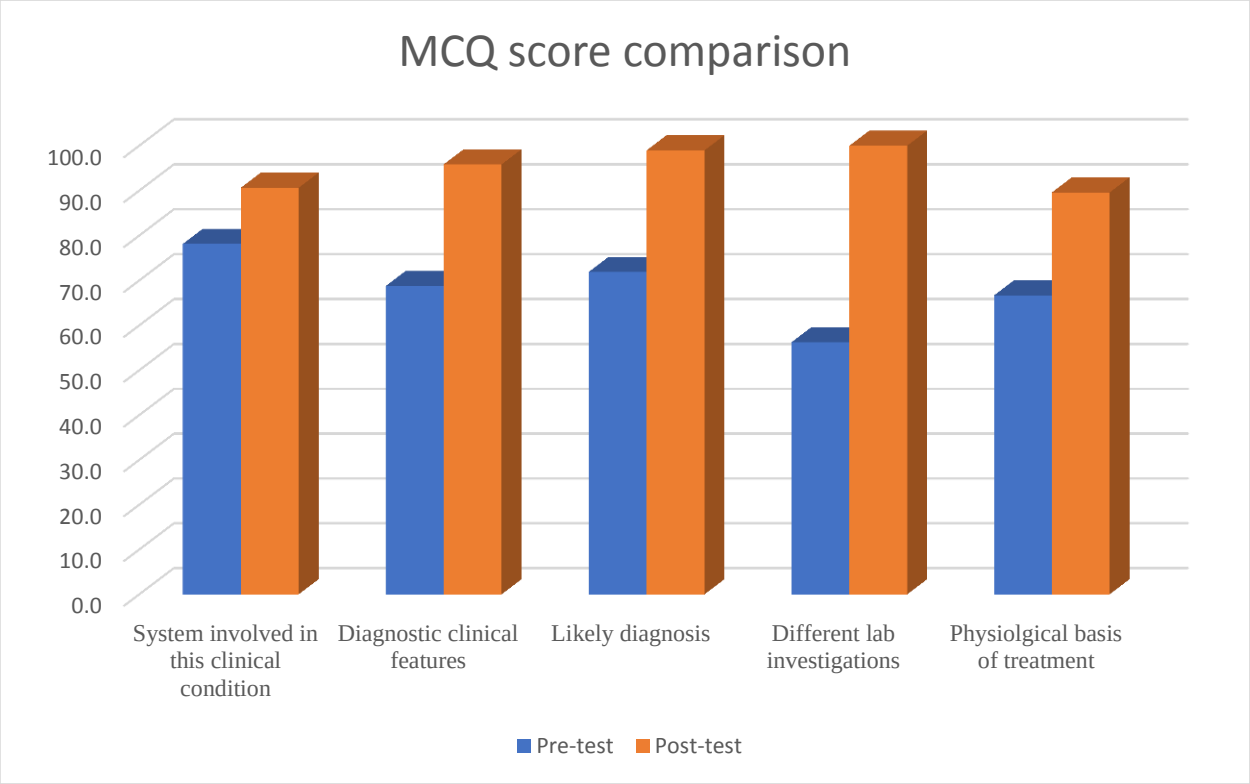

Figure no. 1

Table 2: CBL methodology rating for understanding the topic

	Pre-test (%)	Post-test (%)
Very easy	0	5 (5.2)
Easy	14 (14.6)	58 (60.4)
Difficult	80 (83.3)	33 (34.4)
Very Difficult	2 (2.1)	0

Above table depicts increase in post test rating for CBL method. 60.4% students felt CBL to be easy method of learning after discussion and 5.2% students felt CBL method to be very easy. Whereas difficultly level dropped from 83.3% to 34.4% (figure no.2) and none of the students felt CBL method to be very difficult after discussion session.

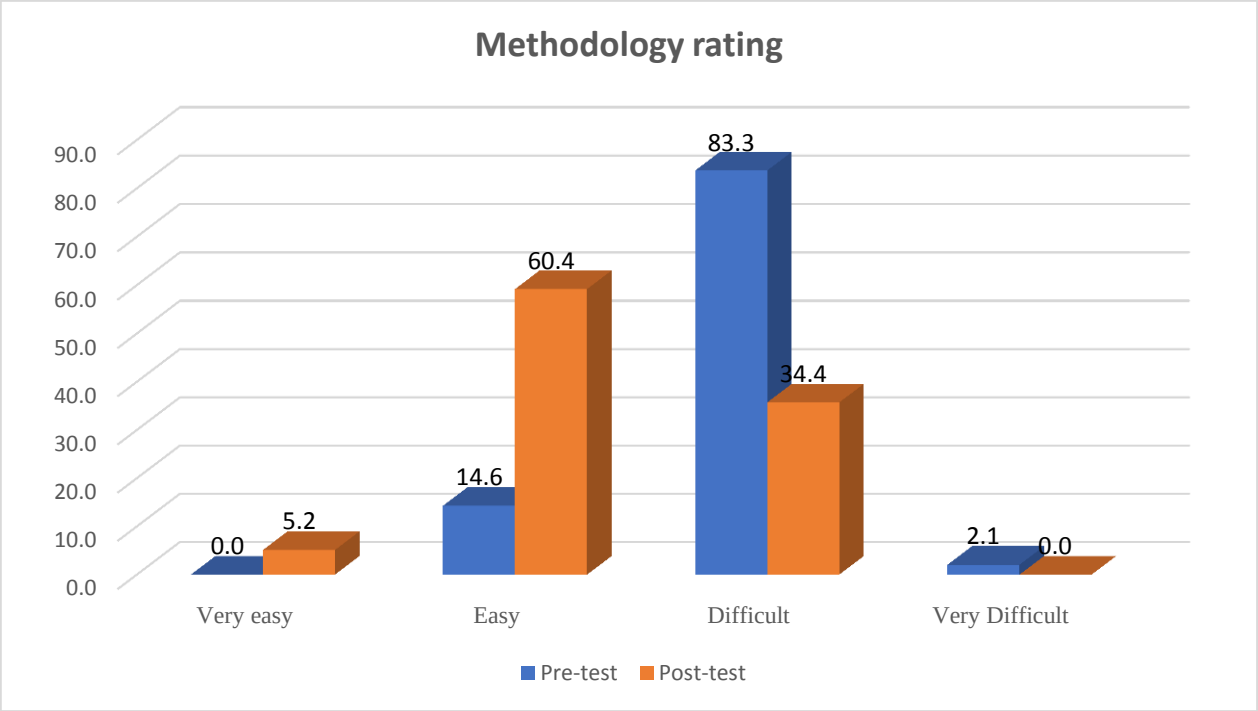

Figure no.2

In pre-test, students were sceptical about the methodology. But later when the methodology of case-based learning was explained to the students, it made them aware of the way in which CBL progresses. In post-test, they did find CBL easier method of learning and not that difficult as in comparison with the pre-test results.

Table 3: Positive Feedback about CBL

Feedback Questionnaire	Percentage
Helped to understand the topic effectively	64.6
Interesting experience	69.0
Provided the real time relevance	65.0
Encouraged intellectual curiosity	68.0
Keptengaged during the session	66.4
Provided an opportunity for self-learning	68.4
Feel confident about the subject after this technique	60.0
Effective means to learn the concepts	65.0
Satisfying learning experience	62.6
Like to involve in more of such cases	66.0
Involved deeper learning approach and helped in developmentof critical thinking	67.8

Students highly appreciated CBL as a new method of teaching learning through their feedback. 64.6% students opined that CBL helped them to understand the topic effectively. 69% students strongly agreed that, CBL created interesting experience whereas 65% learners felt CBL provided real time relevance. 68% students were of opinion that CBL encouraged their intellectual curiosity and in this method kept 66.4% students engaged during the session. This method provided 68.4% students an opportunity for self-directed learning and 60% students felt confident about the subject after CBL. 65% agreed that CBL is effective means for learning concepts and 62.6% students had satisfying learning experience.66% students liked to get involved in more such cases and 67.8% students (figure no.3) strongly felt CBL made them think critically to learn topic in depth.

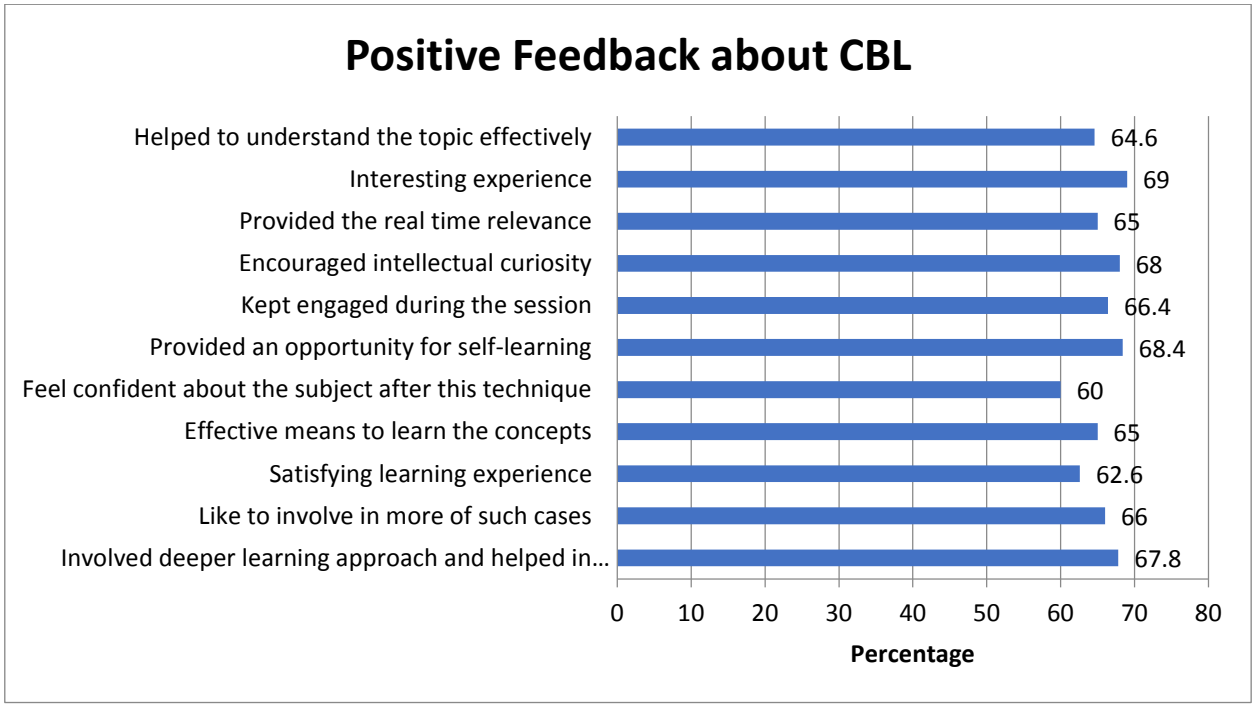

Figure no.3

II. Discussion

In our study, Case Based Learning (CBL) was found to have positive impact on understanding and perception of topic taught to students as evident from results. This method provided them an opportunity to understand, evaluate, analyze, diagnose and interpret the case, paving their way towards newer approach of self directed and vertical integrated learning. Students highly appreciated CBL as a new method of teaching learning through their feedback. CBL created interesting experience, provided real time relevance; encouraged student-centered active learning which made them confident about the topic. As CBL made them think critically to learn topic in depth most of them emphasized to get involved in more such cases and more topics. CBL method of teaching is gaining much attention in medical education. It is student-centered teaching method that exposes students to clinical case scenarios and help the students apply the basic knowledge to learn clinical concepts [4].

Our study findings are in accordance with study done by Ghosh S [5] and Lujan HL et al [6] who also found CBL to be effective alternative method of teaching that would help the students to understand the subject as a whole. Similar study was done by Vari RC et al [7] in endocrine physiology in which CBL helped student apply appropriate basic science knowledge to analyze clinical problems. Our study findings are consistent with Nordquist J et al [8] where in CBL created an interesting experience, provided the real time case scenario, encouraged students and involved them in deeper thinking. Similar other studies, concluded that CBL helps in developing an effective learning environment [9]. This method of teaching helped learners to remain attentive which developed interest about the subject, to actively participate [10]. According to Srinivasan et al [11] CBL helped students in developing logical thinking, clinical reasoning and diagnostic interpretation. The present study findings are also consistent with Rehman R [12] who found majority of medical students were able to understand core content of physiology and co relate it with pathological aspects to identify diseases by case-based learning. Our study concurs with the finding of Panja et al [13] where CBL was applied on two batches, and was found to impart significant difference in students' performance. Study done by Diwan et al [14] concluded that CBL when used as an adjunct to didactic lectures strengthens traditional teaching through active learning. Our study results also goes along with findings of Bansal et al [15] in which CBL was found to be effective active learning strategy.

The changing needs of society, advances in scientific knowledge, and innovations in the field of medical education have prompted to adopt a competency based medical education curriculum that imparts early clinical exposure for its application to future medical cases [16].

Conclusion

Our study concludes that CBL is an easier, feasible and effective method among other early clinical exposure methods as it involves students in deeper and self directed active learning, encouraging and promoting them to reach higher levels of cognitive domain of Bloom's taxonomy. CBL under ECE module in first yr of medical education program emphasizes clinical exposure at primary care level which will integrate learning basic and laboratory as well as clinical science subjects. CBL not only provides authentic doctor-patient context as early introduction into the clinical environment but also improves communication skills and task- based learning sessions.

Initially the students were first exposed to the lectures and then shifted to patient care. Now as the society needs a competent Indian Medical Graduate, medical education has realized the importance of early clinical exposure and has included it in undergraduate medical education programme that vertically integrates basic and clinical sciences. There is a shift from typical didactic lectures to the need-based, case-based approach of teaching. Hence this method may be introduced and implemented for majority of ECE module teaching hours. Suggestion: This method will be very useful and its practical implementation is possible during online classes for ECE module in the threat of COVID 19 situations, where the case scenarios will help students understand the topic without actual cases or patients.

List of Abbreviations

CBME = Competency Based Medical Education
ECE = Early Clinical Exposure
CBL = Case Based Learning
IMG = Indian Medical Graduate
MCQ = Multiple Choice Questions

Conflicts of Interest

The authors declare to have no conflict of interest.

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Authors' contributions

All authors were in involved in the collection of data, analyzation and interpretation of the data. Ramesh Patil helped with the use of the software and statistics calculations. Correspondence and compilation of was done by Dr Vandana and Dr Prafull. All authors have read and approved the final manuscript.

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