ORIGINAL ARTICLE

Impact of integration of traditional-didactic teaching with case-based teaching on phase I medical students' performance in physiology

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Abstract

Background: Our teaching schedules included only didactic lectures and practical till now. A new Competency Based Medical Education (CBME) curriculum demands developing critical thinking, problem solving, and analytical skills in medical students. These skills cannot be taught through lectures and practical. So, we decided to include case-based discussion classes in the regular teaching schedule and to record its impact on the earlier-mentioned skills through a test. *Aim and Objectives:* To evaluate the effect of integrating case-based discussion class with traditional teaching on students' performance in particular topics by a test and to obtain perceptions of students as well teachers about the case-based teaching-learning method in physiology. *Material and Methods*: This educational interventional study was conducted in a group of 127 phase-I M.B.B.S. students. A case-based discussion class was conducted after didactic teaching of the same topics in physiology. Before the discussion class, a pre-test on scenarios and cases which tested knowledge, critical thinking, problem-solving, and analytical skills was administered to analyse their performance after didactic teaching. A post-test was conducted on the same questions as the pre-test after the case-based discussion class. Paired *t*-test was performed to compare pre-test and post-test scores. The feedback from students and teachers was obtained and analysed. *Results:* Students' performance after case-based teaching improved significantly. Positive feedback was received from students and teachers about this teaching method. *Conclusion:* Case-based teaching should be integrated into the regular teaching schedule of Phase-I M.B.B.S. Physiology classes because it improves students' performance in solving case-based, scenario-based, and application-based questions. It also creates interest in learning and improves teachers' satisfaction.

Keywords: Didactic Teaching, Case-Based Teaching, Medical Students, Integration, CBME curriculum

Introduction

A new Competency Based Medical Education (CBME) curriculum demands the developing of critical thinking, problem solving, and analytical skills in phase I medical students. According to the CBME curriculum, students should be able to correlate theory with practice and should be able to apply their knowledge clinically. CBME curriculum also recommends integration in teaching. CBME examination pattern for phase I MBBS physiology includes case-based, scenario-based, and application-based questions in theory and practical examination. Till now our teaching schedules included only didactic lectures and practical. So, it is of prime importance to train the students in developing all these skills and train them in this new examination pattern. Case based discussion is a teaching-learning method that helps develop higher order thinking skills like critical thinking,

problem solving, and analytical skills in the students [1]. It helps them learn to correlate theory with practice and they can apply their knowledge clinically. If we include case-based discussion classes with regular didactic teaching it may further enhance their understanding due to integration in teaching [2]. Many studies are conducted to compare the efficacy of newer teaching methods like problem-based learning, Self-Directed Learning (SDL) and Case-Based Learning (CBL) with didactic teaching [3]. However very few studies were conducted to analyse the effect of supplementing didactic teaching with newer teaching methods. The case-based teaching is said to enhance the higher order skills. Also we wanted to align teaching with assessment. So, we decided to integrate case-based discussion classes into the regular teaching schedule and record its impact on the earlier-mentioned skills through a test. The objectives of our study were to evaluate the effect of integrating case-based discussion class with traditional teaching on students' performance in particular topics by a test; to obtain students' perception of the case-based teaching-learning method in physiology and obtain teachers' perception of case-based teaching-learning methods in physiology.

Material and Methods

This educational quasi-experimental study was conducted in a group of 127 phase I M.B.B.S. students, after taking their permission, informed consent and ethics committee approval. A case-based question paper on general physiology, blood, nerve, and muscle in physiology was prepared and validated by expert faculty. The faculty involved was trained in Case-Based Teaching (CBT). Students' feedback questionnaire on CBT was adopted after due permission from the authors of an article on CBT [4]. The questionnaire included an item asking whether or how case-based discussion class improved students' learning, engagement and satisfaction. Their difficulties and suggestions were also questioned. The teachers motivated the students to study the topics taught regularly while teaching in the form of lectures was in progress. The students were given 2 weeks to study after the didactic teaching finished. Then a case-based discussion was conducted in a class of 127 students out of which 1 student joined the class late and did not appear for the pre-test. Just before the discussion class, a pre-test on scenarios and cases which tested knowledge, critical thinking, problem-solving, and analytical skills was administered. This was to analyse their performance just after their didactic teaching and studying the topics for the test without any formal training in CBT. During the case-based discussion, a didactic lecture on how to solve a case-based question was conducted. After this the class of students was divided into 8 groups and each group was given one case. They discussed the case among their group. Then the teacher discussed each case in the class with the active participation of each group. A post-test was conducted after the class on the same questions as the pre-test.

Statistical analysis

The statistical analysis was conducted using Statistical Package for the Social Sciences software version 20. The score of the pre-test and post-test was compared by paired *t*-test and '*p*' value less than 0.05 was considered as statistically significant. The criteria for satisfactory outcome was considered as 'minimum 50% improvement in post-test score of minimum 60% of students'. The 11 items of students feedback questionnaire

were measured using a 5-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). Students' difficulties and suggestions were also asked in the feedback. This was analysed qualitatively. The teachers' feedback in the form of an interview about CBT was obtained and analysed qualitatively.

Results

Out of 127 students who participated in the study 1 student could not attend pre-test, so 126 students' performance was analysed. According to Table 1 there is significant increase in the marks after case-based teaching. Table 2 describes analysis of feedback of the students. In this around 96% students agreed (agree & strongly agree) that CBT made learning enjoyable. Around 92% students agreed that CBT helped them to link theory to practice & 87.7% students felt that CBT helped them to grow more confident in their ability to perform future clinical work. Most of the students (84.2%) were motivated by CBT to actively participate in the class. The majority of the students (92.1%) agreed that CBT would improve their attendance in the class. Around 79.5% students preferred CBT & assessment based on it in future. Most of them (93.7%) felt that case-based test is better assessment method compared with conventional questions. More than 90% of the students felt that cases were challenging but focused & interesting. They (more than 95%) also felt that these cases stimulated their critical thinking & helped them to understand link between physiology & medicine.

In an open-ended question "What did you like about case-based teaching?" around 50% students replied that they liked this method of teaching because they could relate theory to practical cases. Around 25% of students liked this method because of its interactive nature. A few others liked it for some other reasons like, they could assess their own learning during session & their confidence in the topic increased after CBT.

In another open-ended question asking suggestions from students for further improvement in case-based teaching, students suggested to decrease time duration of a session & to include less number of cases on one topic in a session. They also suggested to include more videos in discussion. They suggested to form smaller group of students for discussion during the class.

According to Table 3 there is more than 50 % improvement in post-test score of 78.5% of students & more than 100% improvement in post test score of 53.9% students.

Table 1: Comparison of student's performance before and after CBT

	No. of Students	Marks	SE	*p*
Pre-Test	126	4.61 ± 2.459	0.219	0.000*
Post-Test	126	8.77 ± 2.551	0.227	

*Values expressed in Mean ± SD- standard deviation, SE-standard error, *significant*

Table 2: Feedback of students on 5-point Likert scale

Q. No		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total
1	CBT made learning enjoyable	40 (31.5%)	82 (64.5%)	5 (4%)	0	0	127
2	The cases and trigger questions stimulated my critical thinking	61 (48%)	64 (50%)	2 (1.5%)	0	0	127
3	Cases were challenging but interesting	49 (38.5%)	69 (54.3%)	7 (5.5%)	2 (1.5%)	0	127
4	Cases were focused and helped me to understand the link between physiology and medicine	55 (43.3%)	70 (55%)	2 (1.5%)	0	0	127
5	CBT helped me to link theory to practice	55 (43.3%)	62 (48.8%)	10 (7.8%)	0	0	127
6	CBT helped me to grow more confident in my ability to perform future clinical work	48 (37.7%)	70 (50%)	8 (6.2%)	1 (0.7%)	0	127
7	CBT motivated me to actively participate in the class	36 (28.3%)	71 (55.9%)	16 (12.5%)	3 (2.3%)	1 (0.7%)	127
8	CBT would improve my attendance in class	62 (48.8%)	55 (43.3%)	10 (7.8%)	0	0	127
9	I would prefer this type of teaching and assessment in the future	33 (26%)	68 (53.5%)	23 (18.1%)	0	3 (2.3%)	127
10	The use of case-based questions is a better assessment method compared with conventional questions	53 (41.7%)	66 (52%)	7 (5.5%)	0	1 (0.7%)	127
11	I think CBT approach should be used in all preclinical lectures	63 (49.6%)	50 (39.3%)	11 (8.6%)	2 (1.5%)	1 (0.7%)	127

CBT: Case-based teaching

Table 3: Percentage improvement in the post test score

Increase in Post test score (%)	No of students (%)
Up to 50	27 (21.5%)
More than 50	99 (78.5%)
More than 100	68 (53.9%)

Discussion

Case Based Learning (CBL) is a new method of teaching-learning. It is an interesting and interactive method of teaching [5]. As per Table 1, there is a significant increase in post-test score of the students. In this study, a pre-test was conducted after traditional didactic lectures on the given topics and just before the case-based discussion class. This implies that integrating CBT improved their knowledge, higher-order skills, and their application. Similar results were found in many different studies on CBL where the post-test score was significantly higher compared to the pre-test score [6]. They also concluded that CBL is an interesting and effective active learning strategy. A study by Alsunni *et al*. found that the mean percentage of exam scores in the CBT group was significantly higher compared to the Traditional Didactic Learning (TDL) group [4]. Another study reported that the performance of the students in terms of clinical knowledge with CBL significantly improved compared to the performance of the students with the traditional curriculum [7]. In contrast to our findings, some studies showed no significant difference in performance between the CBL and TDL groups [8-9]. Some authors even found TDL to be superior to CBL, and most of their students reported that CBT was not effective in imparting knowledge or improving their exam results [10-11]. It is therefore important to identify the reasons for the differences in findings. According to our experience and feedback from students, the success of CBT depends upon the proper training of the teacher. The teacher should be able to effectively manage student groups, engage with them, and encourage inactive students to participate in discussions.

According to McGraw Hill, in CBL instructors should provide guided discussions and have specific learning outcomes defined before the class [1]. This is a crucial factor to CBL and affects the efficacy and adoption of instruction. According to Minghong *et al*. [12], differences between teachers in communication and interpersonal skills may influence outcomes. According to feedback from students, the groups formed should contain lesser number of students so that all of them can participate actively and interaction becomes efficient. According to McGraw-Hill [1], quality educational outcomes depend on quality cases. So, the case scenarios should be relevant and focussed. During the physiology class, relevant basic physiological processes that can be applied clinically should be discussed. Discussion should be at the level of phase of MBBS, otherwise, most of the students do not understand and get bored.

We found that students enjoyed the new way of teaching (Table 2). The students could understand and correlate theory and practice (clinical). Also, some students liked the interactive nature of the teaching. According to feedback from students for question numbers 8, 9, 10 and 11, it appeared that

students were interested and enjoyed this type of teaching. Around 92% of students felt that CBT would grow their confidence in future clinical work. CBL also promoted healthy competition among groups and increased their communication skills. Similarly, the study conducted by Ahmed found that 87% of the students responded that the cases helped them to understand the link between physiology and pharmacology. In a study conducted in biochemistry, the students opined that this innovative method improved their reasoning skills, motivated them to learn, and helped them develop self-learning skills. It improved their attitude towards the newer trends in medical education. [7]. Similar results were found in the study done by Bansal [6]. In a study conducted by George *et al*., the students felt that CBL facilitated SDL by helping them identify areas where they lacked knowledge and read more on the topic [13]. The post-test scores improved more than 50% in 78.5% of students and more than 100% in 53.9% of students (Table 3). This indicates that didactic teaching alone is insufficient for enhancing these skills in students, but becomes highly effective when combined with CBT. In our study according to the teachers' feedback obtained in an interview, the students could solve the cases and apply their knowledge with some hints from the teacher and after proper training in the class. The teachers found this CBT approach quite challenging, as it demanded critical thinking from students. In larger classes, such as ours, managing students and facilitating interactions during discussion required the support of an assistant teacher. Despite these challenges, the teachers expressed high overall satisfaction with this teaching method. According to feedback in a study by Sawang *et al*., both students and staff agreed that CBL helped in deeper learning and in promoting critical thinking than didactic teaching [14]. In a study conducted to check the impact of the national faculty development program, the CBL method was found to be the least preferred method of all commonly practiced newer methods in teaching [15]. An article analysing the strengths and weaknesses of implementing the CBME curriculum also agreed with the finding that though these newer methods including CBT have increased learning and satisfaction of learners, they are difficult to practice due to the intensive workforce involved [16]. It is obvious that without such type of case discussion in classes and training, students will lack confidence in doing at least initial clinical work. It would be as if we were sending someone to sail their boat in the ocean without formal training.

Conclusion

Integrating CBT with traditional didactic teaching improved performance of students. It created interest in learning amongst students and also increased satisfaction of teachers. Therefore CBT should be included in regular teaching schedule of Physiology Phase I M.B.B.S.

Limitations of the study

We did not assess the retention of knowledge and skills over time.

References

1. Anon. Case-based learning in medical education-preparing students for success in clinical practice [Internet]. www.bing.com. McGrawHill; 2022 [cited 2024 Feb 15]. Available from: https://access.mhmedical.com/umbrella-main.aspx
2. Garapati S, Chandrupatla M, Ariyanchi and Yadav K, the effectiveness of integrated teaching methodology in comparison to traditional teaching among first MBBS students. *Int J Curr Med Appl Sci* 2022; 37(1):04-08
3. Rao N, Singh V, Harrison A, Prabhakar P. Komattil R. Transition from traditional to problem based and self-directed learning: A retrospective analysis of student performance. *J Krishna Inst Med Sci Univ* 2023;12(3): 89-94
4. Alsunni A, Rafique N. Effectiveness of case-based teaching of cardiovascular physiology in clinical pharmacy students. *J Taibah Univ Med Sci* 2020;16(1): 22-28.
5. Yalavarthi S, Deshpande S. Effectiveness of case based learning over traditional teaching methods in Phase II MBBS students. *Int J Edu Res Stud* 2021;3(3):14-18.
6. Bansal M, Goyal M.To introduce and measure the effectiveness of case based learning in physiology. *Int J Res Med Sci* 2017;5(2):437-445.
7. Surapaneni KM. The effect of integrated teaching with case based learning (CBL) in the biochemistry of undergraduate medical curriculum. *J Clin Diagn Res* 2010;4(5):3058-3063
8. Khoshnevisasl P, Sadeghzadeh M, Mazloomzadeh S, Hashemi FR, Ahmadiafshar A. Comparison of problem-based learning with lecture-based learning. *Iran Red Crescent Med J* 2014; 16(5): e5186.
9. Khan H, Taqui AM, Khawaja MR, Fatmi Z. Problem-based versus conventional curricula: Influence on knowledge and attitudes of medical students towards health research. *PLoS One* 2007; 2(7): e632
10. Johnston JM, Schooling CM, Leung G. A randomised controlled trial of two educational modes for undergraduate evidence-based medicine learning in Asia. *BMC Med Educ* 2009; 9(3): 63e65.
11. Kassebaum D, Averbach R, Fryer G. Student preference for a case-based vs. lecture instructional format. *J Dent Edu* 1991; 55(12): 781e784.
12. Bi M,Zhao Z,Yang J, Wang Y. Comparison of case-based learning and traditional method in teaching postgraduate students of medical oncology. *Med Teach* 2019;41(10):1124-1128.
13. George T, Carey RAB, Abraham OC, Sebastian T, Faith MF. Trainee doctors in medicine prefer case-based learning compared to didactic teaching. *J Family Med Prim Care* 2020; 9(2): 580-584.
14. Sawang S, Seangrung R, Tontisirin N, Wanpiroon. Assessing the effectiveness of a digital, case-based learning platform for cancer pain management in residency training. *Int J Med Edu* 2023; 14:187-192.
15. Gade S, Mishra V. Impact analysis of the national faculty development program for medical teachers: A way forward. *J Krishna Inst Med Sci Univ* 2020;9(3): 82-90.
16. Gugapriya TS, Dhivya MS, Ilavenil KN. Vinay Kumar, Strength weakness opportunities challenge analysis of implementing competency based medical education curriculum: Perspectives from anatomy specialty. *J Krishna Inst Med Sci Univ* 2024;13(1):25-36.

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