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Original Research Article

A Comparative Study of Case-Based Learning with Traditional Teaching Method in Microbiology among Second Year MBBS Students

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Abstract

Background: Traditional medical microbiology education has relied on an organism-centric, didactic lecture approach that lacks clinical relevance and appeal. Case-based learning, as opposed to didactic lectures, has been found in studies to increase comprehension and understanding of the subject. As a result, the current study was conducted to determine whether CBL is an effective teaching tool for Medical Microbiology and to assess students' perceptions of the utility of the CBL method in Microbiology

Methodology: This cross-sectional study was conducted among 2nd year MBBS students of 2020-2021 batch. The study design included a pre-test, a CBL discussion on a specific topic, and a post-test following the CBL session. MS Excel and SPSS version 22 were used to gather, tabulate, and statistically analyze the data. Results from the pre-and post-tests were compared using the student's "t" test, and a p-value of < 0.05 was regarded as statistically significant. Students' perceptions of the CBL approach were assessed using a Likert scale ranging from strongly disagree to strongly agree.

Results: When pre-and post-test results were compared, the students' performance significantly improved. The majority of students supported CBL activities. Over 92% of the students thought CBL classes kept their attention and inspired them to learn more effectively. 90% of the students thought CBL was a useful tool for their learning. More than 88% of students said that CBL enhanced their capacity for analytical thought and problem-solving. More than 91% of the students thought that CBL enhanced their communication abilities. 95% of the students felt that CBL increased their ability to link theoretical knowledge with practical case data, rule out and rule in potential diseases and aetiologies, and make a diagnosis. The benefits of CBL sessions for information retention and long-term memory were favoured by more than 91% of the students.

Conclusion: It is concluded that CBL is an outstanding tool for motivating and promoting student learning. It strengthens students' analytical reasoning, clinical reasoning, conceptualization, and retention of knowledge.

Keywords: Case Based Learning, Active learning, Microbiology.

Introduction

Traditional medical education has relied on the didactic lecture (DL) method.[1] The 1-hour lecture format is the usual traditional method used in all medical schools. This strategy has been found to be effective for information transmission in large group education, but it also has inherent limits. Keeping students' attention throughout the lecture delivery period is frequently difficult for the teacher. The existing curriculum for students in our country's medical colleges places little emphasis on clinical and practical elements of medical microbiology. [2] Case-based learning (CBL) has been found in studies to improve understanding and clinical comprehension of microbiology.[3]

Traditional didactic lecture-based microbiology instruction has traditionally been a 1-hour class in which the teacher presents the subject within that time and is frequently one-sided, with little engagement from the students. Microbiology is founded on cognitive knowledge and theory, yet an organism-centered curriculum based on bacterial identification, growth, and cultural traits lacks clinical relevance and relevance for a medical student.[4] With automation making its way into clinical microbiology laboratories, interpreting lab findings, and identifying antibiotic resistance patterns of infections, an emphasis on clinical and practical aspects of disease is essential to bridge the gap between theory and practise.[5] As a result, adopting novel approaches to instruct medical students in clinical microbiology that encourage problem-solving ability, enhance analytical thinking, and elicit enthusiasm in learning, such as CBL, should be used as an auxiliary to traditional methods. Hence, the current study was done to apply a case-based learning activity in microbiology and analyse its usefulness in student learning.

Materials and Methods

It is a cross-sectional study that was carried out in the Department of Microbiology at VIMS, Ballari from March 2022 to May 2022. The study involved 60 second-year MBBS students for the 2020-2021 academic year. The Institutional Research and Ethical Committee approved the study, and it was carried out after the students provided informed consent. Faculty members created a clinical case scenario on Mycobacterium tuberculosis that had previously been covered in regular didactic lectures for CBL sessions. A week before the exercise, students were told about the theme.

On the day of the activity, students were given pre-test questions about the topic to see how much knowledge they had gained from the regular lecture. A case-based lecture was given to 60 students. Each group member received a handout comprising a clinical case scenario as well as various learning concerns linked to clinical cases such as clinical features, terminologies, clinical diagnosis, pathophysiological mechanisms, laboratory tests, and case management. To solve the case and related learning challenges, all students in the group were requested to actively participate in the conversation. The facilitator summarises the scenario at the end of the exercise. To assess the knowledge gained via the activity, all participants were given a post-test comprising of questions relating to the case issue. After completing the clinical case at the end of the academic session, students were given a self-administered questionnaire to measure their assessment of the CBL's usefulness in their learning. The evaluation was done on a 5-point

Likert scale, with 1 being severely disagree, 2 being strongly disagree, 3 being neutral, 4 being agree, and 5 being strongly agree. Table 1 contains a sample of the questionnaire as well as the replies requested. The information was gathered, collated, and statistically analysed.

Data Analysis

Using Microsoft Excel and SPSS version 22, the completed response sheets were gathered and statistically examined to determine the results. mean ± standard deviation were used to express quantitative data. Student's "t" test was used to compare pre-test and post-test scores The value of $p<0.05$ was considered statistically significant.

Result

A total of 60 second year MBBS students participated in the study. In the study, the post-test score after the CBL session was significantly better than the pre-test score of the session (Figure 1). The t-test between pre-test and post-test scores were statistically significant with a value of $p<0.05$.

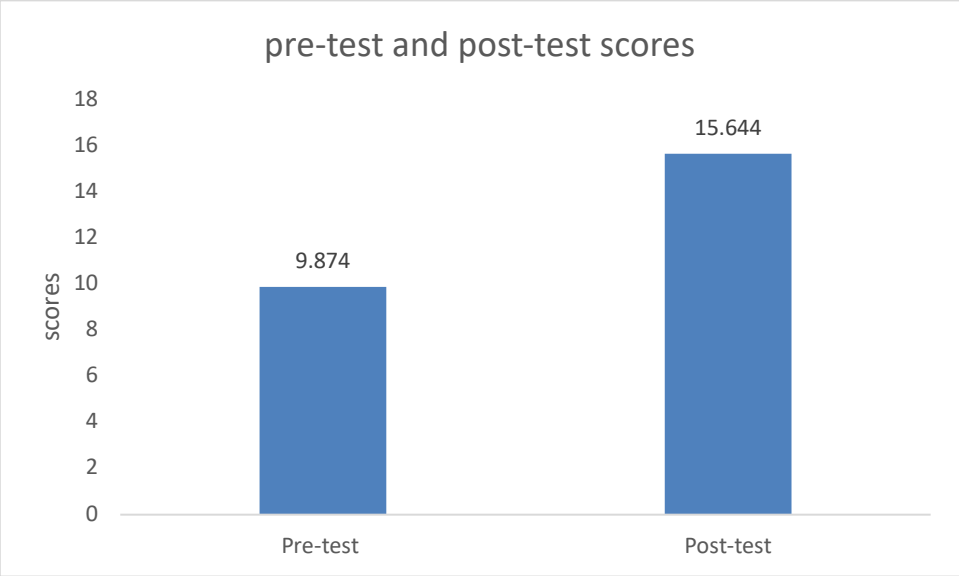

Figure 1: pre-test and post-test scores

Students' perception of usefulness and effectiveness of case-based learning (CBL) was evaluated on a 5 point Likert scale questionnaire. The vast majority of the students reported satisfaction with CBL sessions and highly appreciated this method of teaching in microbiology. More than 92% of the students opined that CBL sessions held their interest and motivated them to learn better. 90% of the students felt that CBL has worked as an effective learning tool for them. More than 88% of students CBL sessions presented many challenging questions that helped them to improve their analytical thinking and problem-solving ability. More than 91% of the students felt that CBL improved the communication skills. 95% of the students opined that CBL improved their ability to correlate theoretical knowledge with clinical findings of a case and to rule-out and rule-in the possible diseases and etiologies in establishing the diagnosis. More than 91% of the students were in favor of CBL sessions in terms of benefits towards knowledge retention and long-lasting memory. (Table 1)

Table 1: student's responses about CBL using LIKERT scale

S. No.	Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	CBL promotes self-study and problem-solving abilities of the students	2	2	3	28	25
2	CBL sessions held my interest	1	2	1	30	26
3	CBL sessions motivated me to learn	1	2	1	29	27
4	CBL has worked as an effective learning tool for me	2	2	2	29	25
5	CBL helps in improving communication skills of the students	2	2	1	28	27
6	CBL helps in the recall and application of basic sciences to the given clinical scenario.	0	1	2	30	27
7	CBL provides benefits in terms of knowledge and long-lasting memory	2	2	1	27	28

Discussion

To boost student enthusiasm and active learning, different teaching strategies are used in medical education. The adoption of an engaging, student-centered methodology has fundamentally altered how pupils learn. With repeated experiences in a supportive environment and a focus on the complexity of clinical care, the case-based method has the advantages of encouraging self-directed learning, clinical reasoning, clinical problem-solving, and decision making.[6] The purpose of the current study was to assess medical students' perceptions of this novel teaching approach and to ascertain if interactive, case-based lectures are an effective teaching tool for medical microbiology.

Following CBL sessions, significant enhancement in the students' learning has been seen in the current study. All of the CBL sessions' posttest scores were significantly higher than their pretest values (p 0.05). These results are consistent with numerous previous global studies of a similar nature [7,8,9].

The vast majority of students in the current study felt that CBL was an efficient mode of instruction that boosted their learning, improved their ability to think critically and analytically, and inspired them to pursue self-directed learning. Similar results have been documented by numerous prior investigations on CBL in other medical specialties conducted throughout [10,11].

Case-based learning, according to a study by Yasin Tayem, enhanced students' learning abilities, autonomous learning abilities, and analytical skills in proportions of 82%, 83%, 74%, and 70%, respectively. Team discussions, according to students, helped them accomplish the goals of the lecture and boost their communication abilities [12].

Most of the students in the current study believed that CBL had improved their communication and analytical skills. Suvarna S.T. & A.L. Singh [13] discovered that CBL enhances communication skills, which is similar to what we found. When learning is centred on solving real-world problems, information is retained better. [14] To

tackle the issue, the students communicate with the professor and one another.

Conclusion

It is concluded that CBL sessions improved active learning in Microbiology, and that such sessions would not only assist students get the necessary knowledge in microbiology, but would also improve their communication and analytic skills.

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