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Original Research Article

A Comparative Study on Traditional and Case Based Teaching Learning Methods and Its Impact on Academic Performance Among First Year Medical Students

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ABSTRACT

Background: The goal of medical education is to develop skilled practitioners who are attuned to the health issues faced by the community. Although lectures are commonly employed to impart new information, a drawback is that the audience tends to be passive and may thus become disengaged. Learning is made up of various interconnected components and involves complex mental processes like problem-solving and analytical thinking. The goal of using structured methods and organized resources is to equip students with effective learning tools. This enables them to gain a deep understanding of cognitive processes and develop the relevant skills needed for their careers. Case-Based Learning (CBL) involves examining a health issue presented by a patient, analysing and understanding pertinent details from past cases, systematically exploring and evaluating the situation, and planning the appropriate management for the patient.

Materials and methods: The present study was cross sectional case control study conducted in the department of anatomy, Sri Siddhartha Medical College, Tumkur, Karnataka, India.

Results: A total of 192 first year MBBS students participated in the first session of the study and 172 first year MBBS students participated in the second session of the study. The pre-test and post-test total scores of first and second session shows that students have performed better in CBL group when compared to the traditional lecture method of teaching. In the Critical Thinking Exercise scores of session -1 and 2, CBL group was found to be higher when compared to the traditional lecture group which was statistically significant. Comparison of means of internal assessments scores of CBL and Traditional lecture groups showed that the mean internal assessments score of CBL group was higher compared to Traditional lecture group which was statistically significant.

Conclusion: Incorporating case-based learning (CBL) into our medical curriculum as a regular teaching method for large group settings should be considered. The integration of didactic lectures with CBL proves to be an effective educational approach. Positive feedback from both students and faculty suggests that CBL has been successfully introduced in departments like anatomy. However, further research is needed to evaluate how well students learn, understand, and retain the course content to fully support the implementation of this method in large undergraduate classes.

KEY WORDS: Case-based learning, Traditional teaching learning methods, Critical thinking.

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BACKGROUND

The goal of medical education is to develop skilled practitioners who are attuned to the health issues faced by the community [1]. First-phase medical students are taught human anatomy, physiology, and clinical biochemistry through both theoretical and practical classes. In large-group settings, lectures remain one of the oldest and most widely used methods for delivering information [2].

Although lectures are commonly employed to impart new information, a drawback is that the audience tends to be passive and may thus become disengaged. Learning is made up of various interconnected components and involves complex mental processes like problem-solving and analytical thinking. The goal of using structured methods and organized resources is to equip students with effective learning tools. This enables them to gain a deep understanding of cognitive processes and develop the relevant skills needed for their careers [3]. In the previous curriculum there was hardly any coordination between the departments of basic medical sciences and no inputs from clinical departments during first year of MBBS and also lecture method of instruction which keeps the learners passive [4].

During last two decades medical educators in India have tried various student centric Teaching – Learning (TL) methods to provide active learning experiences for undergraduate medical students. The Teaching Learning (TL) methods like Problem Based Learning (PBL), Case Based Learning (CBL), Project Based Learning (Pj. BL) and Electronic Learning (e- learning) methods have been used in different disciplines of medicine to understand their benefits. Case-Based Learning (CBL) is an active learning strategy designed to encourage students to take initiative in their own learning, fostering habits of self-directed study and the integration of knowledge from various subjects to tackle problems. Case-Based Learning (CBL) involves examining a health issue presented by a patient, analysing and understanding pertinent details from past cases, systematically exploring and evaluating the situation, and planning the appropriate management for the patient [5]. It encompasses several distinctive features of adult learning, such as active learner engagement, interaction with the community, input from instructors and peers, information exchange, observational learning, clinical reasoning, structured action, feedback on reactions, and a collaborative learning environment, all of which contribute to the active construction of knowledge [6].

CBL has been shown to introduce medical students to patient interactions as early as their first year, helping them link observable disease conditions to fundamental sciences and develop strategies for gathering and analysing patient information. It also improves students' scores, enhances their abilities to exchange, create, and share information, and encourages them to make independent decisions and organize their own work rather than simply following instructions from teachers [7].

Aim: To evaluate and compare traditional teaching learning methods and case based teaching learning methods and its impact on academic performance among first year medical students

Objectives:

1. To evaluate and compare student performance in traditional teaching learning methods versus case based teaching learning methods using MCQs as the assessment method.

2. To assess the effectiveness of CBL on academic performance of first year medical students using their scores in the 1st internal assessment.

3. To assess and compare the critical thinking ability scores of the students of traditional teaching method and CBL method

4. To record and analyse the perceptions of CBL teaching learning methods among first year medical students

MATERIALS AND METHODS

The present study was conducted in the department of anatomy, Sri Siddhartha Medical College, Tumkur, Karnataka, India.

Type of study: Cross sectional case control study

Type of sampling: convenient sampling

IEC Approval No: SSMC/MED/IEC-092/ Feb-2024

Methodology - The students who participated in the study were divided into two equal groups by random allocation. Pre-test MCQs was given to both the groups. The first group was taught with traditional lecture. The second group was divided again in to smaller groups and each group was given a case scenario of the topic, followed by group discussion which was moderated by a faculty. Adequate time was given for case discussion and solving the Specific Learning Objectives by the students. The students of the both the groups were given post-test MCQS on the topic. The scores of pre-test and post-test obtained was compared with both the groups and statistically analyzed. The above groups were flipped and the second topic will be given and the same procedure was followed as done for the first topic.

Assessment of critical thinking ability:

This was done using a simple model of critical thinking exercise chart created on the anatomy topics of ingunal canal and large intestine by faculty of our department. The template was developed to assess learning on integration of basic science knowledge with clinical application, which is at the "Application" level of cognitive domain in Bloom's taxonomy. It was also validated and peer reviewed before used for assessment.

Finally, feedback was taken from the students and faculty, which was analysed and expressed in percentages.

Methods of collection of data:

The following research techniques was used to collect the data:

1. Pre-test and post-test MCQ scores were taken to compare the knowledge about the topic in both the groups

2. The feedback survey was based on questionnaire which was analyzed and expressed in percentages to assess the perceptions of students and barriers in implementing the CBL by the faculty.

Venue of research: Department of Anatomy, Sri Siddhartha Medical College, Tumkur, Karnataka.

Sample size: All the first year medical students

Inclusive criteria: All the first year medical students who volunteered to participate in the study were included in the study.

Exclusive criteria: All the first year medical students who were not willing to participate in the study were excluded.

Study duration: 06 months.

Statistical analysis: Assessment of academic performance of both the groups was done by statistical evaluation of MCQ pre-test and post-test scores by using SPSS Version 20

Feedback survey based on questionnaire was analyzed and expressed in percentages to assess the perceptions of students and barriers by faculty in implementing the CBL.

OBSERVATION AND RESULTS

A total of 192 first year MBBS students participated in the first session of the study and 172 first year MBBS students participated in the second session of the study.

Table 1: Pre and post total score comparison of CBL and Lecture methods [Session1].

Method of teaching		N	Mean	Std. Deviation	t-value	P-value
Pre Score	CBL	85	7.34	2.25	-0.153	0.879
	Lecture	78	7.4	2.45		
Post Score	CBL	85	12.14	2.69	3.512	0.001
	Lecture	78	10.6	2.91		

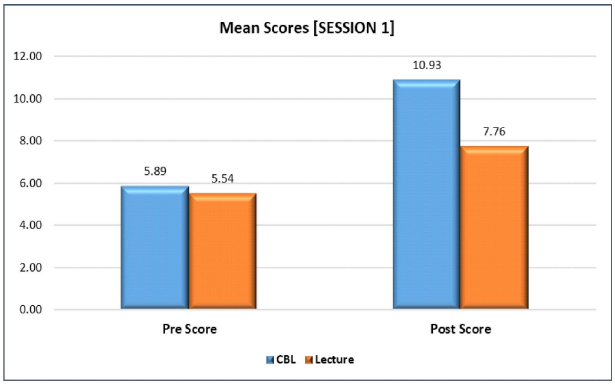

Fig. 1: Pre and post total score comparison of CBL and Lecture methods [Session 1]

The pre-test and post-test total scores of first session shows that students have performed better in CBL group when compared to the

traditional lecture method of teaching. (Table -1) Thus it shows that CBL method of teaching has good academic out come as compared to traditional lecture method of teaching and is statistically significant with p-value < 0.001.

Table 2: Pre and post total score comparison CBL and Lecture methods (session 2).

Method of teaching		N	Mean	Std. Deviation	t-value	P-value
Pre Score	CBL	95	5.89	2.35	1.05	0.295
	Lecture	96	5.54	2.3		
Post Score	CBL	95	10.93	3.18	7.227	<0.001
	Lecture	96	7.76	2.86		

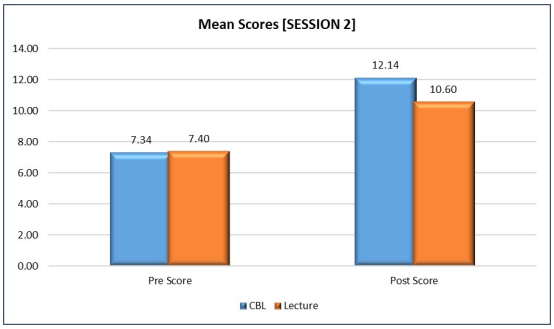

Fig. 2: Pre and post total score comparison of CBL and Lecture method [session 2]

The pre-test and post-test total scores of second session shows that students have performed better in CBL group when compared to the traditional lecture method of teaching. (Table -2) Thus it shows that CBL method of teaching has good academic out come as compared to traditional lecture method of teaching and is statistically significant with p-value < 0.001.

Table 3: Critical Thinking Exercise (CTE) [Session 1].

CTE	Mean	Standard Deviation	t-value	P-value
CBL	78.73	16.84	4.362	<0.001
LECTURE	66.27	15.21		

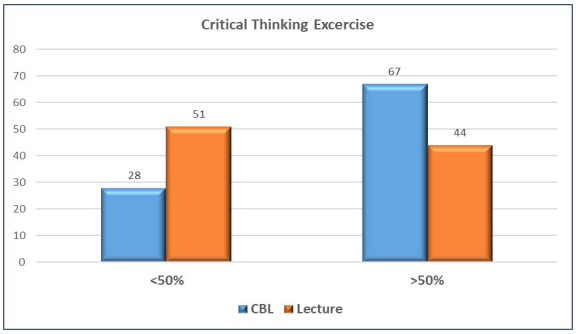

Fig. 3: Critical Thinking Exercise (CTE) [Session 1]

In the Critical Thinking Exercise scores of session -1, CBL group was found to be higher when compared to the traditional lecture group. The difference was statistically significant. (Table-3 and figure 3)

Table 4: Critical Thinking Exercise (CTE) [Session 2]

CTE	Mean	Standard Deviation	t-value	P-value
CBL	79.48	14.45	5.622	<0.001
LECTURE	64.16	17.21		

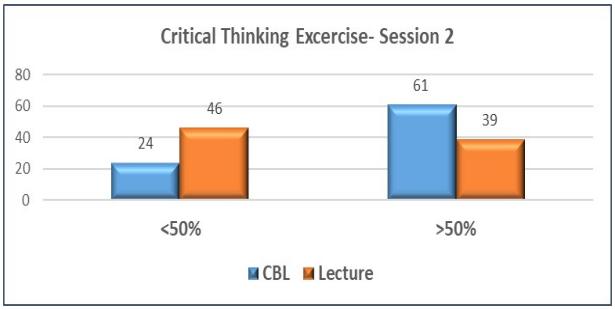

Fig. 4: Critical Thinking Exercise (CTE) [Session 2]

In the Critical Thinking Exercise scores of session -2, CBL group was found to be higher when compared to the traditional lecture group. The difference was statistically significant with p value < 0.001. (Table 4 and figure 4)

Perception of students regarding CBL:

Many students suggested increasing the number of CBL sessions. They agree that effective learning happens in CBL compared to traditional lecture type of teaching learning method. About 92.2% of the students agree for CBL in the CBME curriculum. (Figure- 5)

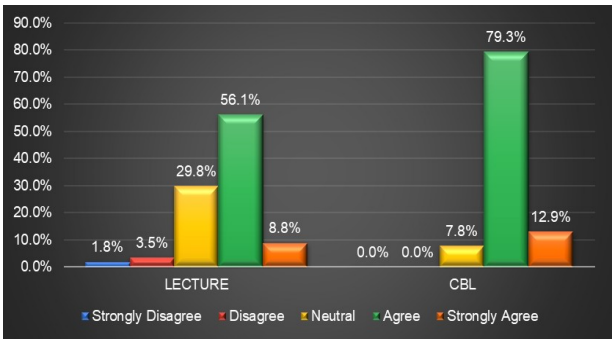

Fig. 5: The response to the student feedback questionnaire (based on a 5-point Likert-type scale).

Perception of faculty regarding CBL

A total of five anatomy faculty were involved in the study who gave their feedback. Some of the suggestions given by the faculty included proper training of faculty for CBL by holding training sessions and to make a collection of cases, problems, and prescriptions for future use. Most of the faculty agreed for the introduction of CBL in the CBME curriculum. (Figure -6)

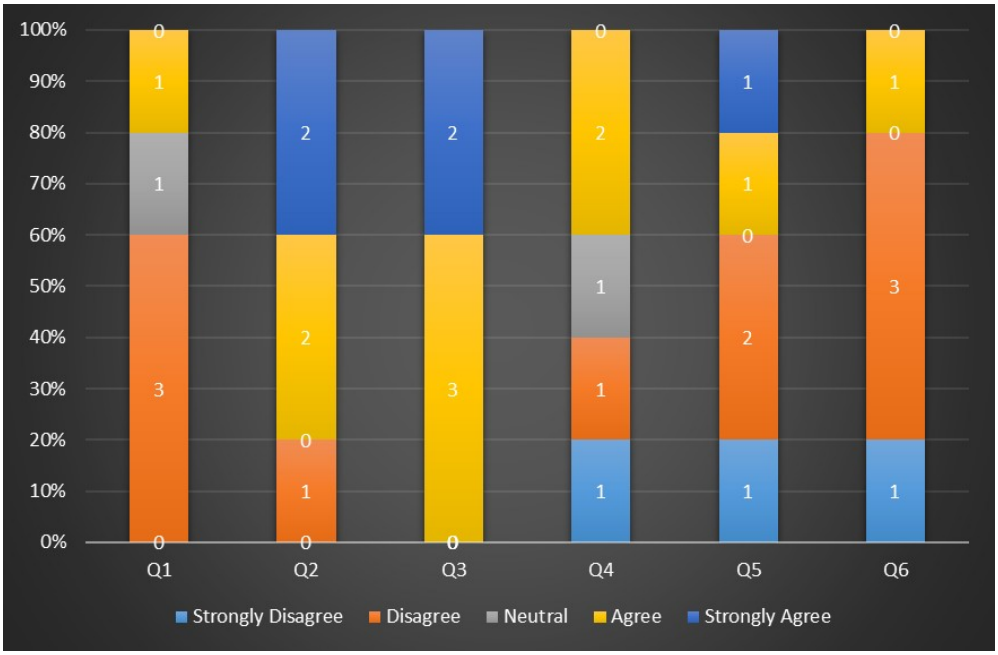

Fig. 6: The response of faculty feedback questionnaire (based on a 5-point Likert-type scale).

Table 5: Comparison of Internal Assessment scores among CBL and traditional lecture group of medical students

	CBL	Lecture	t-value	P-value
IA Scores	68.90±17.2	61.60±18	3.183	<0.001

Comparison of means of internal assessments scores of CBL and Traditional lecture groups showed that the mean internal assessments score of CBL group was higher compared to Traditional lecture group. The difference was statistically significant. (Table 5 and figure 7).

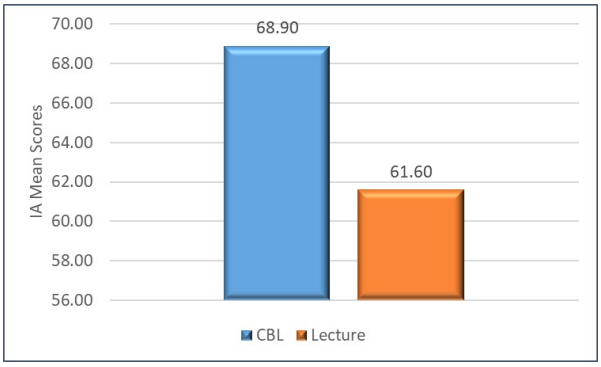

Fig. 7: Internal assessment scores of CBL and Traditional lecture methods.

DISCUSSION

This study was conducted among undergraduate medical students of Sri Siddhartha Medical College. The study participants were undergraduate students belonging to 2 batches of Phase I MBBS of both the sexes and in the age group between 18-20 years.

The core aspects of learning due to Case Based Learning method was evaluated using the level 2 of Kirkpatrick evaluation model. We assessed the short-term, long-term knowledge gains ranging from acquiring basic facts to higher order learning of problem solving and the critical thinking ability.

In the present study the pre-test and post-test total scores of session 1 and 2 shows that students have performed better in CBL group when compared to the traditional lecture method of teaching. Thus it shows that CBL method of teaching has good academic out come as compared to traditional lecture method of teaching and is statistically significant. Similar results were obtained in a studies conducted by Amruta S B et al, [8] Monika Bansal et al, [9] Diwan.JS [10] Tiwale SM, et al, [11] which showed significant knowledge gain in case based small group discussion compared to didactic lectures group.

In the Critical Thinking Exercise scores of session -1 and 2, CBL groups were found to be higher when compared to the traditional lecture groups. The difference was statistically significant. Similar results were found in studies conducted by Garg P [12] and McLean SF [13]. In a study conducted by Roshan V et al, [14], the 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%).

In the present study many students suggested to increase the number of CBL sessions. They agree that effective learning happens in CBL compared to traditional lecture type of teaching learning method. About 92.2% of the students agree for CBL in the CBME curriculum. Similar results were obtained in a study by Roshan V et al, [14].

In the present study the means of internal assessments scores of CBL and Traditional lecture groups showed that the mean internal assessments score of CBL group was higher compared to Traditional lecture group. The difference was statistically significant.

In the present study the perceptions of the faculty suggested that there should be a proper training of faculty for CBL by holding training sessions and to make a collection of cases, problems, and prescriptions for future use. Most of the faculty agreed for the introduction of CBL in the CBME curriculum.

CONCLUSION

Incorporating case-based learning (CBL) into our medical curriculum as a regular teaching method for large group settings should be considered. The integration of didactic lectures with CBL proves to be an effective educational approach. Positive feedback from both students and faculty suggests that CBL has been successfully introduced in departments like anatomy. However, further research is needed to evaluate how well students learn, understand, and retain the course content to fully support the implementation of this method in large undergraduate classes.

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Author Contributions

Shivaleela C- Study concept and design, Acquisition of data, Analysis and interpretation of data, Drafting of manuscript.

Anjali Borle- Study concept and design, Critical revision of manuscript, Study supervision.

Vaibhav Anjankar- Study concept and design, Administrative support, Study supervision.

Kumar G V- Study concept and design, acquisition of data, analysis and interpretation of data, Drafting of manuscript.

Riyaz Ahmed- Analysis and interpretation of data, Statistical analysis.

Conflicts of Interests: None

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