Original Research Article

A comparative study of the effectiveness of problem-based learning versus tutorials in first-year MBBS students

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Abstract

Background: Anatomy is one of the basic subjects a first- year of M.B.B.S student has to learn. It is the keystone to the foundation of the medical curriculum. Knowledge of Anatomy is extensively related in context to almost every aspect of the Medical Curriculum and practice of medicine. Hence it needs to be taught and learned efficiently by medical graduates. The current study aims to record and analyze the effect of teaching methodologies like problem-based learning (PBL) and tutorials when combined with didactic lecture among first -year medical undergraduate students. Materials and Methods: This comparative study was done at A.C.S Medical College and Hospital .150 first- year M.B.B.S students had given consent to participate in the study. All students attended to didactic lectures. They were randomly split into 2 groups (Group A and Group B-75 in each). Group A and B were further divided into 3 small groups (25 students in each). Both groups are to undergo tutorial and PBL sessions for 4 selected topics in Gross Anatomy of Abdomen during the practical session. A Pre-test followed by a post-test was given to compare the knowledge acquired by the students. Self-administered feedback was taken to understand the preferred methodology. Results: On data analysis, the paired T showed a significant difference between the means of Pre-test and Post-test marks (P=.001) in both the groups exposed to didactic lectures with tutorials and didactic lectures with PBL, thus indicating that knowledge acquired in both teaching-learning methods was of significance. Knowledge gained in didactic lectures with PBL was significantly higher (P=0.001) than from didactic lectures with tutorials. 76% of students preferred and accepted PBL as a better teaching methodology Conclusion: The current study clearly states with PBL is more effective in terms of critical thinking and concept building. However, students want both PBL and tutorial sessions to be included along with didactic lectures.

Keywords: Didactic Lecture, Problem based learning (PBL), tutorial, small group teaching (SGT), teaching-learning, methodology (TLM).

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INTRODUCTION

Medical education has evolved in the recent past with research being done in newer teaching techniques. Conventional lectures have been in practice even before the printing of books had begun and are still considered to be the preferred choice of teaching methodology[1,2] The students are passive listeners in a Conventional lecture, which may not contribute enough to the learning process[3]. To facilitate a better learning process, medical schools have introduced several strategies in teaching that will prepare the students to practice self-directed learning for the long-term.[4] Anatomy has been identified as the keystone in the medical curriculum. It lays an essential

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foundation for a medical graduate to take on the clinical field in the upcoming years. Anatomy is a platform for other subjects in the medical curriculum to apprehend. Even though anatomy has been taught for several years in the past, the discussion continues regarding the appropriate teaching-learning methodology for Anatomy.[5] To become a competent medical professional a doctor has to obtain skills and can integrate clinical subjects with basic medical sciences. One way to becoming a successful doctor is to be a lifelong learner[6]. In 1960, Howard Barrows introduced Problem-based learning (PBL) to students at McMaster University in Canada[7]. PBL ignites the students to explore several questions which are put forth in form of investigations or clinical findings[8]. PBL is being considered as an effective tool that attributes to lifelong learning.[9] The success rate of the learners improves with smaller classes[10]. A tutorial is one type of small group teaching which includes a collective of learners of varied numbers who can interact and work as a team to achieve a common learning goal. A Tutorial class is conducted by a tutor for a single student or a small number of students[11]. Tutorial classes for medical students help them to understand the general concepts, clarify doubts and to encourages in them and come up with their concepts and identify new problems in it and to come up with solutions. This contributes to the development of problem-solving skills and encourages self -learning.[12] In this study, we focus to understand a more effective combination of teaching Methodology. We want to analyze the perceptions of first year medical students about didactic lectures with PBL and didactic lectures with tutorials.

MATERIALS AND METHODS

This Comparative study was done in First-year M.B.B. S Students of A.C.S Medical College and hospital following Ethical Clearance in 2020. Data were collected from 150 Students enrolled in the study after obtaining a written consent form. The students were divided into two groups by lottery method (group A and Group B) each containing 75 candidates. Group A and group B were Split into small groups of 25 for the practical sessions where they will be exposed to tutorials and problem bases teaching-learning methodologies (TLM). PBL and tutorial sessions are planned for 6 topics in the gross anatomy of Abdomen (Table No 1). All the students were exposed to regular didactic lecture for the same topics. During the Practical Hours Group, A was first exposed to a tutorial session for topics 1 and 2 Group B was exposed to topics 3 and 4 as a PBL session. Each Small group teaching for the selected topics was done on the same day the didactic lecture was taken. The facilitators involved in tutorial and PBL classes were instructed regarding the plan and its execution. For the first and second topic, group A was allotted to a tutorial class following the didactic lecture, and group B to PBL class preceded by the didactic lecture. A pre-test and post-test containing 10 objective questions were given to assess the knowledge gained. The groups were then swapped to allow the students to experience both the teaching-learning methodologies however data was not recorded for statistical evaluation. For the third and fourth topics, Group A was allotted to PBL class, and group B to tutorial class after the didactic lectures. Following this pre-test and a post-test questionnaire containing 10 objective questions were given to assess the knowledge gained in these sessions. Once again, the groups were swapped to the other TLM to avoid ethical issues but the assessment was not recorded. Data from 125 students who attended both the teaching learning methodology sessions were recorded and evaluated.

Table 1: List of Topics for Small Group Teaching

1	Peritoneum
2	Stomach
3	Liver
4	Pancreas

STATISTICAL ANALYSIS

The statistical analysis was carried out by SPSS (Version 21). Paired T test was done for the comparison of pre-test and post-test marks obtained by the students exposed to tutorials and PBL sessions. Unpaired T test was done to compare the marks earned by the two methodologies. The feedback obtained was assessed to record the psychometric results of the study

RESULTS

The data collected was analyzed. A paired T was done to analyze the difference in the mean between the Pre-test and Post-test marks in both methodologies. A significant difference (P=.001) in the mean scores was identified indicating that knowledge was acquired in the tutorial and PBL sessions were of great magnitude (Table 2). To identify the better teaching learning methodology, an unpaired T Test was done. The results showed that the knowledge gained by PBL following a didactic lecture was significantly higher (P=.001) than that was gained by a tutorial session after didactic Lecture (Table 3).

Table 2: Pre-post-test Marks; Comparison of Tutorial and PBL

Teaching Methodology	No of students	Pre-test Marks (Mean±SD)	Post-test Marks (Mean±SD)	Stat. Test (T value)(P Value)
Tutorial	125	2.33±1.74	7.02±1.86	Paired T test (t=24.71) (P=0.001)
PBL	125	4.27±1.87	6.33±2.11	Paired T test (t=14.02) (P=0.001)

Table 3: Comparison of Marks gained in Tutorial and PBL

Teaching Methodology	No of students	Marks gained (Mean±SD)	Stat. Test (T value) (P Value)
Tutorial	125	2.33±1.74 7.02±1.86	UnPaired T test (t=10.43)
PBL	125	4.27±1.87 6.33±2.11	(P=0.001)

Feedback analysis is done to understand the perception of the students on which Teaching- learning Methodology was better (Table No 4). In our study, 59 % of student's felt that both TLM, PBL and, Tutorial's sessions following didactic lecture helped in better understanding of the topics.56% of the student's agreed that both TLM helped in bridging the gaps in learning. 69% of the student's had expressed that concept building took place in PBL sessions. 78 % of the students PBL sessions evoked critical thinking. 45% students said that Interaction between staff and students happened in PBL sessions. But 48% of them had also agreed that Interaction between staff and students happened in both PBL and Tutorials sessions. 86 % of the students felt that interaction among students was more in PBL sessions. 45% of the students say that subject retention was better with didactic sessions with PBL. 44% of the students were motivated to learn with PBL sessions. 70% of the students suggested that both TLM be practiced in future classes and 85% suggested both PBL and tutorial sessions be included along with a didactic lecture for learning other subject.

Table 4: Feedback Questionnaire

S No	Questions	Didactic Lecture + Tutorial	Didactic Lecture + PBL	Yes, to Both TLM	No to Both TLM	Neutral
1	Which teaching Methodology was helpful in better understanding of the topics taken	14	25	59	nil	02
2	Which Teaching methodology helps in bridging gaps in learning	16	28	56	nil	nil
3	Which Teaching methodology helps Concept building	14	69	17	nil	nil
4	Which Teaching methodology evoked Critical thinking	03	78	19	nil	nil
5	Which Teaching methodology helped Interaction between staff and students	08	43	48	nil	01
6	Which Teaching methodology helped Interaction among students	05	86	08	nil	01
7	Which Teaching methodology helped in better retention of the topics taken	14	45	39	nil	02
8	Which Teaching motivated the students to learn	15	44	35	nil	nil
9	Which Teaching methodology do you want in the future classes	13	17	70	nil	nil
10	Which Teaching methodology do you suggest for learning other subjects?	04	10	85	nil	01

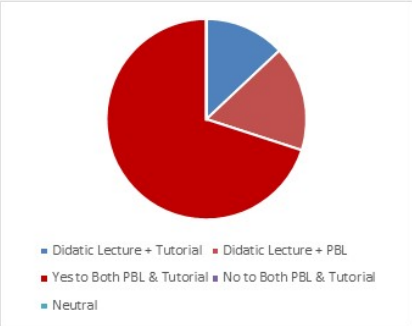

Figure 1: Teaching Learning methodology do you want in the future classes

DISCUSSION

Anatomy plays a very crucial role in the Medical Curriculum. Sound Knowledge of anatomy is crucial in laying a strong foundation to becoming a competent Indian medical graduate.[5] Inclusion of techniques like PBL and Tutorials in addition to the conventional lecture system will lead to Advantages in a clinical setup.[10,11] Amir *et al.* in their study have confirmed that PBL is an effective way to help the students to learn anatomy better and gain better scores.[13] In the present study, the students gained significant knowledge after being exposed to both PBL and tutorial sessions following didactic lectures. The knowledge gained from a PBL session was more when compared to that of the tutorial session. The majority of the students in this study opted for tutorials and PBL sessions to be done in combinations along with didactic lectures, thus suggesting that small group teachings facilitate better academic achievements. A study by Zuzana *et al.* done in 2010 approves this finding by stating that small group teaching can bring a greater learning satisfaction.[14] Ratnakar *et al.*, in their study states that small group teaching alone is not sufficient for a good teaching-learning experience, but good interaction between the faculty and students and interaction among students will make the sessions more beneficial.[15] In our study majority of the students agreed upon the fact that students interacted with faculty in both PBL and tutorial sessions. However, the majority of the students thought that interaction among the students was more in a PBL session. Nyemb in his study on PBL in anatomy focuses on understanding the use of learning anatomy from a clinical perspective. It encourages the students to have better interactive sessions. It ignites critical thinking among the students which allows better understanding and retention of the subject[16]. In the current study also, the students expressed that critical thinking and subject retention were better with PBL sessions. When the students of the current were asked if they would like to have a combination of didactic lectures and PBL or Didactic Lecture and Tutorials, they opted for a combination of both TLM depending on the requirements of the topics in anatomy. In a study by Shetty *et al.*, he says that students preferred PBL in combination with Conventional Lecture[17]. And in a study by Gino, the students had opted for a small group tutorial session along with didactic lecture.[18] The current study also expresses that the students wanted a combination of both TLM (didactic lecture and PBL /Didactic Lecture and Tutorials) in other subjects too. This is supported by studies done by Shetty *et al.*[17], Gino[18], and Margaret [19] in students with the subject Biochemistry, Physiology, and Pharmacology Respectively. This study was done to reinforce the idea of adding smaller group PBL or Tutorial sessions to the regular didactic lectures to bridge the gap in learning the core concepts in anatomy. When such sessions are included, the students will benefit in terms of subject retention and clinical application of the subject studied.

CONCLUSIONS

With this study, we would like to conclude by saying that Problem based learning sessions are required to learn the concepts in anatomy in an enjoyable manner. It is a good tool to promote student interaction and self-directed learning. However, a combination of PBL with Tutorial sessions in addition to the didactic lectures will help the students to get a clear understanding of anatomy. With good knowledge in basic subjects, the students will take one step forward to become competent Indian Medical Graduates. Acknowledgements I thank the First year M.B.B. S students for their active participation in the study. I also thank Dr. M. Sasirekha the HOD of the department of Anatomy and Dean of A.C.S Medical College and Hospital for the Motivation and support to conduct the study. Sincere Thanks to Dr. Aprajita Raizada and Mrs. P Chanemougavalli for the help offered to conduct the study.

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