

MEDICAL EDUCATION

TUTORIAL SESSION IN COMPARISON TO PROBLEM-BASED LEARNING IN UNDERGRADUATE CANDIDATES OF MEDICAL AND DENTAL COLLEGE

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Background: Tutor has an essential role in conducting tutorial sessions and encouraging effective learning in students. The tutor develops learning objectives, monitors and clarifies the queries of students. Whereas students learn to understand and teach each other by participating and this helps the students better understand the subject and gain deeper knowledge of the various topics of each module in medical curriculum. The advantage of these sessions is to improve students understanding of topic, allowing time for discussion, and making them, self-learners. Problem-based learning (PBL) is a tool in medical education to teach and learn basic and clinical concepts in medicine and become self-learner. Aim of the study was, to evaluate the significance of tutorials as effective learning tool and was compared to problem – based learning for medical and dental undergraduate students, for topic understanding, time required to understand the topic, filling in gaps in knowledge and improvement in examination scores.

Methods: Tutorial sessions and PBL were conducted as small group learning in Department of Pharmacology, Jinnah Medical and Dental College, Karachi, Pakistan. In each class of undergraduate MBBS and BDS, students were distributed into 10-12 students groups. Students, from MBBS III year students and BDS II year, participated in this study and filled in questionnaires at the end of tutorial sessions. Comparison of tutorial and PBL sessions were evaluated by a second questionnaire by MBBS undergraduate students.

Conclusion: The study participants were undergraduate students of MBBS and BDS. They found the tutorial sessions were effective tool. Although in comparison to tutorial, the students found problem-based learning more significant in understanding concepts of medical curriculum.

Keywords: Tutorials; Problem-Based Learning; Knowledge, Small Group Learning; Interactive Session; Self-Learners.

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INTRODUCTION

Tutor conducts these tutorial sessions and encouraging effective learning in students. The tutor develops learning objectives, monitors and clarifies the queries of students. Students learn to understand and teach each other by this tool and this helps the under graduate medical candidates to develop a more elaborate and in-depth understanding of the various topics in each module^{1,2}.

Tutorial sessions has been beneficial teaching-learning tool in basic science of medical education and a number of studies have shown the significance of using these sessions to impart better understanding of the topics in each module²⁻⁷. It is conducted as a session or multiple sessions by the

instructors, thus provide a better understanding of a subject to a small groups of students. By conducting tutorial sessions, undergraduate medical students are taught to develop and assess their extent of background knowledge, which enables them to properly understand concepts which may not have been understood in lectures, identify new problems, develop problem-solving skills, and most helpful in making them self-learners. Although, researches identifies certain important issues with respect to hurdles and a few limits by conventional tutorial method.

Issues such as deficiencies in structural uniformity increase in expense and limited resources for teaching in small groups the shortage of supply of highly trained tutors are difficulties in conducting tutorial sessions. Studies also suggest modifications

of these sessions according to the requirement to overcome the difficulties in conducting them, without compromising the integrity of tutorial. The suggestions are to make alterations in these sessions to developing competent professionals who have better communication and self-directed learning skills. Evidence is present that different tutorial formats may be favorable in different fields of medical courses and levels of study and hence should be in accordance for the appropriate need of the curriculum²⁻⁶. The focus is to assist in improvement in medical knowledge for both student and tutors. Tutorial process has the advantage to improve students understanding of topic, allowing time for discussion, and making students self-learners³. Students were subjected to interactive structured tutorial. It is structured by formulating specific learning objectives, classification of contents into must know, desirable to know and nice to know, and summarization of important points at the end.

Efforts are taken to identify difficulty index of topic and by repeating concepts which are difficult and that require proper understanding. The tutorial session are concluded with a summary given by students of all that is taught at the end. Through tutorial sessions the thinking ability and sharing the knowledge is improved. In addition, it is a simple but highly effective teaching methodology, which allows all the students in as small group sessions to participate and interaction with tutors to clarify concepts. Proper structuring of tutorials improves effectively as well as results in better utility of time⁴. Study conducted on tutorials, the subtopics to be discussed were provided to students two days prior to each session^{4,5}. In addition, another study done amongst the students who participated in the tutorial session about 45 (63.4%) said that they understood the topic better in tutorial. Also students found tutorials more interactive than a lecture⁶. In a study done, students agreed that tutorial sessions help better time management as compared to lecture also they were more interactive than a lecture^{6,7}. Studies conducted on topics done by tutorials sessions were an effective tool in learning pharmacology. Tutorials sessions for pharmacology modules, teaching and learning were found to be effective tool⁸⁻¹⁰.

The major apprehension regarding conventional methods of teaching medical students (lecture-based curricula) was that it might not evaluate the qualities in students or enabling them to become life-long learners. Fundamental reforms in undergraduate medical education were established in 1899, Sir William Osler father of modern medicine and the founding professor of John Hopkins School of Medicine. He was the first to bring medical students out of lecture halls to patients'

bedside for clinical training. He had been able to identify that medical education had to advance further than just the lectures by the teachers to teach everything that the medical students needed to learn. Sir Osler recommended a change from the lecture based method of instruction to teaching at patients' bedside. Thus established the importance of medical teachers in helping students to observe and gain medical knowledge¹¹.

Thus in current medical curriculum introduction of several innovation have been done, in medical teaching tools, problem-based learning is one of them in which discussion of medical problems is done in small groups¹². Problem-based learning pedagogy is most useful in improvement in learning and recall of the taught topics than the traditional method of teaching. The updated methods of medical education in the medical schools based more toward problem-based learning, it is suggested that the innovations will bring changes for the better understanding by improvement in thinking, understanding principles and problem solving^{11,12}. Faculty of Health Sciences at McMaster University, instead of following the conventional method of teaching basic medical sciences as separately, has adopted PBL. Thus, the subjects such as physiology and pharmacology are not taught as individual courses instead in the integrated method. Problem-based learning (PBL) which is more of student centered has been the main form of instruction for students learning pharmacology within the medical curriculum.

PBL is the tool to method of teaching which allows the undergraduate students to have better concepts of the topic rather than simple memorization. For the medical students, typically in the Pharmacology courses, both student-centered learning and teacher-centered teaching approaches are being used¹². PBL is a method to learning, which is based on group discussions of clinical problems or cases conducted as small groups. One or more expert tutor or instructor facilitates each group. Many U.S. and other foreign medical schools have adopted this method and practice of teaching and learning through discussion. A large number of highly prestigious medical schools, such as Harvard have almost completely shifted towards a PBL preclinical curriculum based medical education¹³.

Aim of this study was to acknowledge the significance of tutorials as effective tool in learning pharmacology by medical and dental undergraduate students, topic understanding, filling in gaps in knowledge and improvement in examination scores in relation to the tutorial session as compared to problem-based learning session for undergraduate students.

METHODS

Total number of hundred students were included from MBBS (third year) and fifty students from BDS (second year) were included in this questioner based study. All the students present were included and all the students absent from the tutorial and PBL sessions were excluded from the study.

Tutorial sessions were conducted as small group learning in Department of Pharmacology, Jinnah Medical and Dental College, Karachi. In each class undergraduate students were divided into small groups (8-10) students per group, MBBS III year students (hematology module) and BDSII year students (basic pharmacology) per class in these modules during course work designed for each module. Students regarding the tutorial sessions conducted in student as participants' filled end of tutorial session a questionnaire.

In addition, questionnaire was developed and filled

for the comparison of learning by tutorial sessions compared to problem based learning, by participating students from MBBS undergraduates as problem based learning sessions are conducted for the MBBS undergraduates only. By entering the data in SPSS 25.0, statistics was done by applying student t-test was applied to compare means.

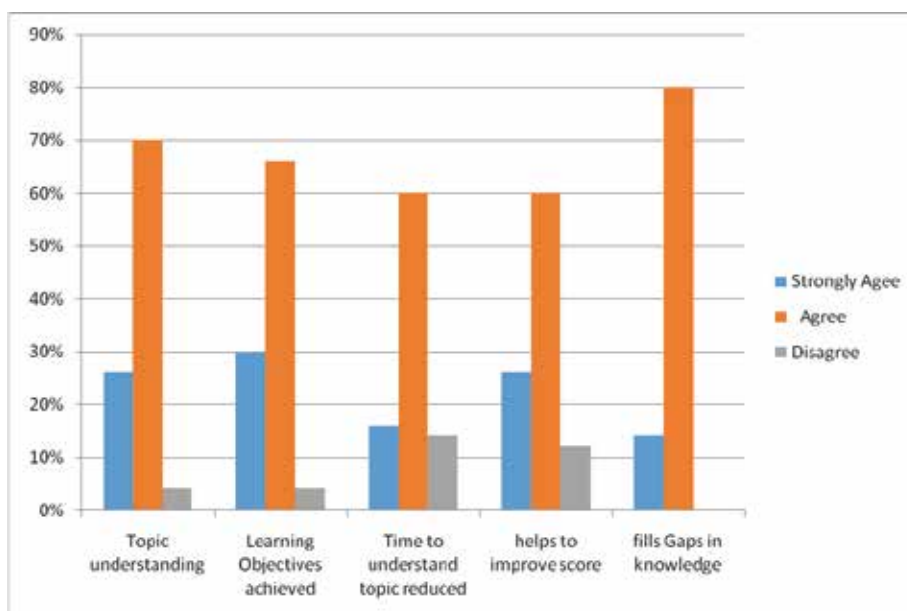
RESULTS

Out of total of hundred MBBS- III year students and fifty BDS – II year students, majority of students strongly agree or agree that tutorial sessions improved over all knowledge of topic, learning objectives achieved, time to understand and helped in improvement in scores of examinations as shown in (Table 1). Response of undergraduate medical and dental students for effectively of tutorial session (Graph 1) was presented.

Comparison between tutorial and problem based

Table 1: Undergraduate medical and dental students' response to learning pharmacolog by tutorial as an effective tool.

Goals (N=100)	Strongly agree	Agree	Disagree
Topic understanding	26%	70%	4%
Learning objectives achieved	30%	66%	4%
Time to understand topic reduced	16%	60%	14%
Helps in improvement of score	26%	60%	12%
Fills Gaps in Knowledge	14%	80%	6%



Graph 1: Response of undergraduate medical and dental students effectively of tutorial session.

learning questionnaire was filled by hundred undergraduate medical students. Problem based learning sessions were more useful in topic understanding, achieving learning objectives, reduced time to understand topic, score improvement and fill gaps in knowledge was found

to be more significant compared to tutorial sessions (Table 2). Figure 2 showing steps followed for conducting tutorial sessions and problem based learning at Jinnah Medical and Dental College, Karachi.

Table 2: Comparative evaluation of small group learning between tutorials and problem based learning.

Goals (N=100)	Tutorials	PBL	p-value
Topic understanding	24	69	≤ 0.00
Learning objectives achieved	27	68	≤ 0.00
Time to understand topic reduced	32	69	≤ 0.00
Does it help in scores improvement	25	65	≤ 0.00
Fill Gaps in knowledge	9	86	≤ 0.00

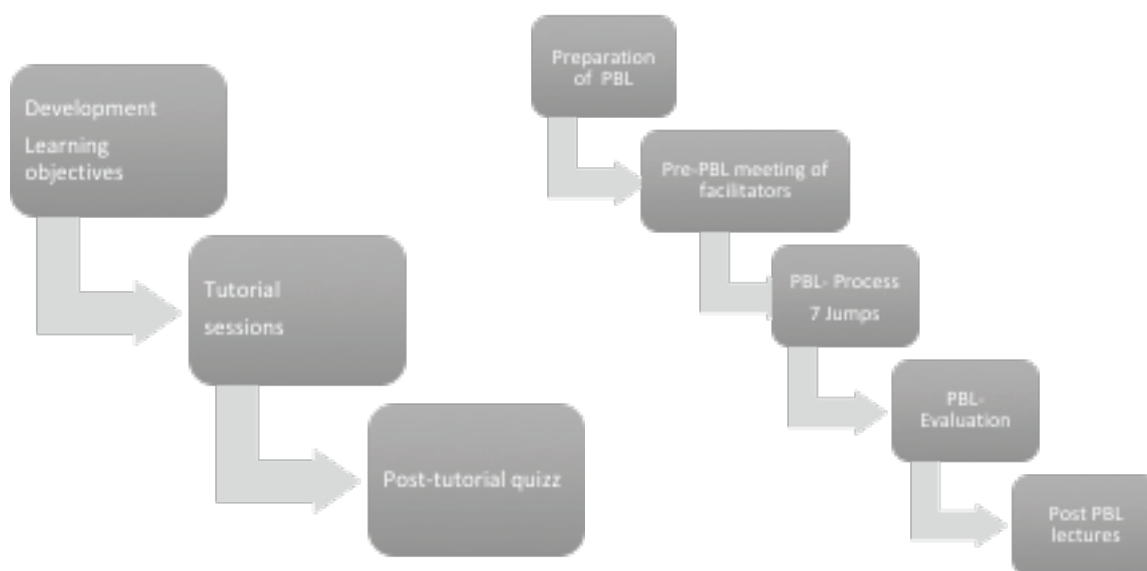


Figure 2: Tutorial session vs. Problem based learning.

DISCUSSION

Tutorials have evolved as most effective teaching-learning pedagogy in teaching courses to undergraduate medical and dental candidates and have shown to be highly effective by improved learning outcomes. The class having been divided into small groups for conducting these small group tutorial sessions in which tutors or lecturers assigned to each group conduct these sessions, groups consist of about 10-12 students. Thus medical students benefit by tutorials sessions, to assess their obtained knowledge, clarify concepts, which were also taught in lectures. Thus, identify clinical problems along with cultivation of problem-solving skills, and develop practice of self-learning. Various studies have shown the benefits and most important role of tutorial sessions in imparting better standards medical education¹⁻⁷.

A study done amongst the students who participated in the tutorial session about 45 (63.4%) said that they understood the topic better in tutorial. 49 (69%) students agreed that time management was better in a tutorial as compared to lecture, 55 (77.5%) students found tutorials more interactive than a lecture^{6,7}. Studies conducted on tutorials sessions were also found to be an effective tool in learning pharmacology⁸⁻¹⁰.

This study was done in medical and dental undergraduate students in Jinnah Medical and Dental College. The tutorial sessions improve in topic understanding 26% students strongly agreed, 70% students agree and 4% students disagreed. Tutorials help in achieving learning goals, 30% students strongly agree, 66% students agree and 4%

students disagree. Time required understanding topic was reduced, 16% students strongly agreed, 60% students agreed and 12% disagreed. Tutorial help in scores improvement 26% students strongly agree, 60% students agree and 12% disagreed. In addition, these sessions were found to fill in gaps in knowledge 14% students strongly agreed, 80% agreed and only 6% disagreed.

Study was conducted for introduction and assessment of unconventional and new method called the Student-Led Objective Tutorial (SLOT) among undergraduate medical students. SLOT has shown a beneficial and effective tool in providing deep and better understanding of a subject than simple lectures might provide. It also improved in communication skills among students. In this study, the faculty also agreed, that tutorial session are active way of learning and teaching new concepts, and tutorial sessions are beneficial for training the new faculty for learning and teaching medical undergraduates¹⁰.

In planning and conducting problem based learning medical curriculum, the medical students can also be made to participate in the process developing learning objectives and assessment^{12,13}. Problem based learning makes it necessary for the medical students after each session to review the session topics for integration, strengthen knowledge, clarification of topic, and develop better concepts from these PBL sessions is expected. PBL has been reported not only to have been beneficial in improvement in knowledge but also enjoyable for medical student. Learning how to apply knowledge obtained in undergraduate medical studies in solving clinical problems and in

clinical practice is the most important role of designing a PBL based medical curriculum providing most effective patient care¹⁴.

Also a study done on Asian medical students has shown better participation of PBL trained students in small groups as compared to non PBL trained candidates¹⁵. A study done PBL has been immensely enjoyable for my classmates and student. PBL helped gain knowledge because of medical science thus enabling medical graduate to provide excellent care of patients¹⁶. Studies done to compare LBL (Lecture based learning) and PBL as pedagogy for conducting the courses in medical education curriculum and have shown that PBL have been highly effective compared to LBL(lecture based learning) in providing better understanding and concepts of topics been taught in curriculum, most of these studies have shown the same outcomes¹⁷⁻²¹. The greatest benefit of PBL based curriculum depends on the quality of the clinical problems that are prepared by faculty. The clinical scenarios are the initial requirement for best learning by PBL. By active participation in PBLs, students develop the skills of analyzing and problem solving and generate ideas, and acquire the knowledge and skills required to become a good doctor. Students get better knowledge retention with this method and PBL increases in-depth training and improve students' performance in examinations. PBL motivates self-learning is one of the main benefits of this method. Some are of view that it is time-consuming and does not provide a better clinical competence. In LBL (lecture based learning), students mainly receive information from the lecturer and attempt to memorize the content instead of understanding the concepts and using them in clinical practice. Therefore, at the patient's bedside, they are only performing the routine work, passive with new situations, and unable to make to resolve and manage the problems with critical thinking and innovation to diagnose and meet the requirements to deal with the medical problem²²⁻²⁵.

In this study while comparing tutorial sessions with problem-based learning methodology has been found to be highly effective in understanding of topics, achieving learning objectives, reduced time to understand the topic, improvement in the assessment scores and fill in gaps in knowledge or the topics taught. These questionnaires were filled by question MBBS students and it shown problem based learning is more beneficial in achieving all the above goals.

PBL based curriculum teaching is the standard rather than the conventional lectures based teaching at each course level. For medical students, PBL continues to be the major form of instruction in a small-group tutorial setting at the curricular level. The PBL curriculum is integrated for all systems including cardiovascular, renal, respiratory, gastro-

intestinal, neural, etc and across the all-disciplinary areas such as physiology, anatomy, biochemistry, pharmacology, and community medicine.

Those students who lack a pharmacology background or wish to enhance their pharmacological knowledge can take up elective courses in topics of pharmacology. For medical students it is essential to learn pharmacological principles extensively. Thus by integrating them into the clinically relevant situations, and then ultimately apply them to the management of patient care. By this pedagogy the deep understanding of topic is most effectively achieved in a student-centered problem based learning which makes them life-long learner. Pharmacology is a medical science subject that deals with action and effects of chemicals/ drugs within the biological systems. The teaching and learning of pharmacology in traditional method takes place after the other core courses of medical sciences, such as anatomy and physiology. However, the origin of pharmacology goes back before the establishment of anatomy and physiology as academic medical sciences. Thus, the understanding of interactions between drugs and biological system was acquired by generations of knowledge accumulation based on research and observations. With the new discoveries of drugs and chemical agents, has caused the rapid advancement in pharmacology and other biomedical sciences (often dependent on pharmacological tools) thus further advancement in pharmacology curriculum²⁵. Thus, problem-based learning is a highly beneficial pedagogy in medical education for teaching up to date knowledge of pharmacology for making medical students as self-directed learners.

The study conducted on tutorials sessions and problem-based learning were found to be an effective tool in learning pharmacology by medical and dental students. Since, it helps in the topic understanding, learning objectives, reduced time of understanding topic, filling in gaps in knowledge regarding the topic and improvement in scores post course evaluations and examination of students actively participating in these sessions. Problem based-learning was found to be more effective teaching and learning method in small group sessions.

CONCLUSION

The study participants were undergraduate students of MBBS and BDS. They found the tutorial sessions were effective tool. Although in comparison to tutorial, the students found problem-based learning more significant in understanding concepts of medical curriculum.

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CONFLICT OF INTEREST

There was no conflict of interest among the authors.

AUTHORS CONTRIBUTION

SPK conceived the idea, developed questionnaire, wrote the manuscript, MA and MP helped in distribution of questionnaires post tutorial and PBL session to the participating students.

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