

To Determine the Effectiveness of Case Based Tutorials As Compared To Traditional Tutorials in Microbiology

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Abstract: Background& Objective: In traditional lecture classes or tutorials students are passive learners, so it is just factual recalling than the reasoning. In case based learning, students take an active part in the discussion and develop a skill for interaction. To test for the effectiveness of Case Based Tutorials (CBL) as compared to traditional tutorials in microbiology. Methodology: A total of 58 students were divided into Batch A and Batch B randomly. Case Based Tutorials was conducted for batch A, and while to batch B traditional tutorials were conducted. Pre test and post test were conducted for both the batches and results were analyzed by unpaired t test. Feedback on CBL sessions was recorded on a pre validated questionnaire. Results: There was significant difference in the knowledge gained by the students as their performance in post test of Case Based tutorial was better as compared to Traditional Tutorial (P <0.001). 27 (93.10%) students opined that CBL improved their learning skills. Conclusion: CBL can enhance the development of learning skills and can be used for early clinical exposure and better application of microbiology in diagnosis & patient care. [Patil M NJIRM 2016; 7(2):5-8]

Key Words: Case based learning, Tutorials, Microbiology education.

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Introduction: Active learning happens when students are given the opportunity to develop a more interactive relationship with the subject matter and encouraging them to generate rather than simply receive knowledge¹. In most of the medical schools of India, microbiology is mainly taught by means of didactic lectures, tutorials, and practical classes. Such a system is teacher centered with minimal active participation from the students. So, case based tutorials were introduced to know the perception of students in better understanding of microbiology, in comparison with traditional tutorials.

Case Based Learning (CBL) is an interactive, student-centered, instructor-led learning approach that is closely related to Problem Based Learning (PBL). CBL promotes active learning by utilizing clinical case scenarios which reflect real life experiences that students will face during the clinical phase of their medical education². CBL prepares the students for clinical practice, through the use of authentic clinical cases. It links theory to practice, through the application of knowledge to the cases³.

CBL has several advantages, including promoting self-directed life-long learning; introducing basic medical sciences in a coherent manner closely related to topics in clinical sciences, and reinforcing the reasoning, collaborative and communication skills of students⁴. Cases are generally written as problems that provide students with the history, physical findings and laboratory results of a patient. Here teacher acts as

facilitator and encourages to explore the case and consideration of the characters' actions in light of their own decisions⁵. The purpose of CBL is to facilitate interaction with students in small groups so as to shift emphasis from acquiring knowledge during lectures to data evaluation and problem solving. Class size is vital in determining the efficiency of teaching and discussion in a CBL which will not be met in CBL in lecture classes this can be overcome in tutorial classes⁶.

Most traditional tutorials are led by faculty members, and students act as passive recipients. Students get a limited opportunity to express their opinions and enhance their communication skills during tutorials⁷. In this regard some studies have reported differences in between educational theory and practice in traditional tutorial method⁸. It is necessary, therefore, to look for adequate but less resource intensive alternatives, keeping in mind the potential benefits of tutorials.

Objectives:

1. To test for the effectiveness of Case Based Tutorials for learning in Microbiology as compared to Traditional Tutorials.
2. To collect students' perception on CBL.

Material and Methods: The study was conducted in the Department of Microbiology, KLE University's J.N. Medical college, Belagavi. Ethical clearance was obtained from JNMC Institutional Ethics committee. Tutorials were conducted for the MBBS II phase II term

students. A total of 58, students were included in the study and they were divided into Batch A and Batch B consisting of 29 students per batch, 1 student remained absent from batch B.

All the students were oriented and informed consent was taken. To batch A, Case Based Tutorials was conducted and while to batch B Traditional Tutorials was conducted. Batch A (n=29) was further subdivided into 5 small subgroups consisting of 6 students each. Topic for the tutorials was informed to the students one week prior and students were asked to prepare for the same. Tutorials were conducted only after the topics were taught during scheduled regular microbiology lectures. Two sessions each of two hours were conducted. In the CBL tutorials clinical case scenario was presented in the form of pre-validated MCQ's by the facilitator. The cases were brief and framed in such a way that they matched the students' level of previously acquired knowledge in the lecture classes. Thereafter, the groups were given 5-10 minutes to discuss the case and answer the questions. During discussion, the facilitator would facilitate discussion and offer suggestions if a group experienced difficulty.

Pre and post-test design was adopted for the study to evaluate the impact of the two methods using pre-validated MCQs. Students perceptions on CBL sessions were recorded using a pre validated questionnaire⁹. The responses were in the YES/NO pattern. The purpose of the questionnaire was explained in detail to the participating students and confidentiality of the results was assured. Pre test and post test score was evaluated using unpaired t test. The student's perception on CBL was also evaluated with percentage positive response by each student.

Results: There was significant knowledge gained by the students by both the methods, however; there was a remarkable improvement by CBL tutorials compared to traditional tutorials. The pre and post - test scores of the CBL tutorial, when compared by paired t - test, was found to be statistically significant $P = 0.001$ (Table 1). The post test scores of TT and CBL tutorials were compared by unpaired t - test, which was found to be highly significant; $P = <0.001$ ($P < 0.05$ was considered significant) (Table 2). Among the 29 students who participated in the CBL sessions (Table 3), 27 (93.10%) opined that CBL improved their learning skills. All the participants also felt that discussion during CBL

sessions addressed the objectives of the case given (100%) and promoted independent learning traits 27 (93.10%). While only 21(72.41%) of them found that CBL had substantially improved their communication skills.

Table 1: Statistical analysis of pre-test and post-test scores of CBLT and TT by Paired t test

	Pre Test scores	Post Test scores	Pre - Post Difference	Paired t test	P
CBL Tutorial N= 29	9.58 ± 2.04	14.17 ± 2	4.58 ± 2.22	10.915	<0.001
Traditional tutorial N= 28	9.14 ± 2.12	10.78 ± 2	1.64± 2.18	3.981	<0.001

Table 2: Statistical analysis of pre-test and post-test scores of CBLT and TT by unpaired t test

	Pre -Post test Difference
CBL Tutorial N= 29	4.58 ± 2.22
Traditional tutorial N= 28	1.64± 2.18
T	5.038
DF	55
P	0.001
95% CI	1.77-4.11

Discussion: There can be no single best way of learning in medicine since each method has its own advantages and disadvantages. Basic science information could be learned and applied most effectively when students participate actively in the process of acquiring knowledge¹⁰. Finding the time to teach clinical microbiology in an already robust medical school curriculum has proved to be challenging. Case-based learning allows for open-ended exploration of topics with a structure and well-defined goals so that there is more efficient use of time¹¹. Clinical problems convert passive didactic lecturing into active mental activity which is a must for learning and it has been shown that retention of knowledge is increased by active learning¹².

CBL appears to foster effective learning in small groups, possibly through the effect of having more engaged learners.

This study was an initial attempt to evaluate the efficacy of an alternative method of conducting tutorial without disturbing the traditional approach and yet ensuring maximum participation.

Our findings clearly show that basic science information, especially microbiology, can be learned and applied more effectively when didactic lectures are supplemented with clinical cases and there is active participation of the students. Small group tutorials has proved that, small study groups foster interactive learning and positive cognitive effects, such as activation of prior knowledge, recall of information, individual and collaborative knowledge construction, and cognitive conflicts leading to conceptual change¹³. We tried to assimilate these benefits of small group learning through the CBL tutorials. The analysis revealed that learning improved by both the methods

(Table 1); however the performance improvement was better with CBL tutorial method (Table 2). The reason was apparent as more number of students actively participated in the modified method where they were subdivided into small groups. The students who feared or were conscious to speak in large group, opened up well within small group. This ensured active involvement of every student and hence the improvement in scores was highly significant by this method.

Students enjoyed CBL and think that it helps them learn better; however, enjoyment can lead to increased engagement and motivation for learning, which in itself is a desirable and positive effect. It also promotes interpersonal and communication skills and self learning among students.

Our results agree with multiple studies available in the literature documenting improved knowledge with the use of CBL in physiology¹⁴, microbiology¹⁵, and Ayurveda¹⁶.

Table 3: Analysis of percentage of student's feedback on CBL

SN	Questions/statements	Responses (Yes in %)
1	CBL has improved my learning skills	93.10
2	CBL has facilitated my independent learning abilities	93.10
3	Cases selected for CBL were appropriate to the block	96.55
4	CBL has enhanced my communication skills	72.41
5	Student discussion during CBL sessions addressed the objectives of the case	100
6	CBL increased my analytical skills	100
7	CBL sessions helped me organizing my study material	72.41
8	The time allotted for the cases studies was adequate	86.20
9	CBL has helped me generate questions that forced me to further investigate the problem mentioned in the case	79.31
10	The reference materials indicated for CBL were useful and adequate	82.75
11	CBL fits well with other elements of my course (like lectures, practical , clinical skills etc)	93.16
12	CBL provided a context that helped me retaining relevant information	86.20
13	CBL helped me gain skills in working with others	79.31
14	CBL gave me an opportunity to help others in the group understand difficult material	79.31
15	CBL helped me better understand the difficult material by hearing my classmates discuss it	86.20
16	CBL helped me better understand the difficult material by talking it out	86.20
17	CBL as a whole has worked as an effective learning tool for me	89.65
18	CBL has helped me in preparing for my examinations	75.86
19	The faculty present during CBL facilitated the whole process	96.55
20	Explaining information to others (before/during/after CBL) helped me better understand the learning objectives	89.65

Conclusion: The present study concludes that CBL can be used as alternative teaching method for increased retention of knowledge, better application of microbiology in diagnosis & patient care. CBL can enhance the development of learning skills by early clinical exposure. Case-based tutorial sessions stimulate students' interest in the subject, they also facilitate higher learning outcomes such as analytical skills and critical thinking.

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