

Introduction of Case Based Learning in Microbiology at Undergraduate Level

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ABSTRACT

Introduction: Didactic lectures still remain as the common method of teaching and learning in microbiology. It is purely a teacher centred method and promotes passive learning. So, adoption of active learning strategies for understanding the subject like microbiology is need of the hour. This can be achieved by incorporation of case based learning along with didactic lectures. It is a student centered method and promotes active learning. So by keeping in mind the above advantages of CBL (Case Based Learning), the present study was planned to assess the perception of students after introducing Case Based Learning (CBL) in Microbiology.

AIM: To use case based learning (CBL) as a tool to improve students understanding of applied aspects of Microbiology.

Methods and Material: The study was conducted on 150 MBBS second year professional Students in the department of microbiology of Maharishi Markandeshwar Institute of Medical Sciences & Research, Mullana. Didactic lectures were taken for the selected topics. Then case based learning sessions were

conducted for all selected topics. At the end of the sessions of CBL, perceptions of students were taken on feedback questionnaire and analysed on 3 point Likert scale.

Results: A total of 138/150 (92%) students responded to the questionnaire. 88% students opined that CBL helped clearing their basic concepts. 77% stated that CBL motivated them for self- study, also improved their communication skills and analytic skills. 90 %, 87%, 76% felt that retention of the subject is more after CBL and also they understand the clinical application of the knowledge, CBL made the topic interesting, increased their attention in the class respectively. 86%, 82%, 78% students felt that there is more interaction with teachers during CBL, they have learnt to work together, and CBL is an effective learning tool for them respectively.

Conclusions: This study showed that there is dire need of introduction of student's centred teaching learning methods. Students find CBL sessions more useful because by CBL, retention of the subject is increased and they learn the subject by means of applying their knowledge.

Keywords: Active learning, Case scenarios, Didactic lectures, Learner-centered teaching method,

INTRODUCTION

In current medical education, learning relevant to the health requirements of the community is the need of the hour [1]. Indian Medical Graduate (IMG) should be competent to function aptly and efficiently as a physician of first contact in the community. IMG must obtain a set of competencies at the time of graduation. So to achieve this goal of undergraduate education programme for medical education, teaching and learning methods should be learner oriented with focus on application of knowledge rather than mere acquisition of knowledge [2].

But in present day scenario in most of medical schools, lectures still remain as the mainstay of teaching and learning for large group of students despite some limitations [3]. This type of teacher centered approach encourages passive learning and fails to motivate the students. Hence in last few decades; idea of active learning has evolved.

Active learning takes place when students are given the opportunity to develop more interactivity with the course content, encouraging them to generate new knowledge rather than simply receive knowledge. Adoption of active learning strategies strengthens the student learning as they apply their own experiences and previous knowledge [4,5].

In most of the medical schools, microbiology is taught in classrooms and practical and clinical exposure is almost negligible, so that is why students could not understand its usefulness in routine practice [6]. As in microbiology, students are taught about various potentially infectious microorganisms which are associated with production of diseases. So students must know the correlation of infectious agent with the diseases. This correlation is not possible by didactic lectures. However incorporation of case scenarios in teaching can resolve this problem to some extent. Here the case is used to teach content and connect the situation

with real life data. It provides opportunities for the students to interact with each other and with faculty. They generate the knowledge, organise it in meaningful manner and try to solve the problem [7]. So in this way it helps in improvement of student's understanding to applied aspects of Microbiology.

Case based learning (CBL) can actively engage student, promotes analytic and problem solving skills in learner. It decreases rote memorisation and enhances critical thinking among students. Students engage themselves in discussions of clinical case as it gives them experience of real life situations [5, 8]. Students interact with each other and work together as a group to solve the case. The teacher's role is that of facilitator [9].

Case based learning improves clinical applications of theoretical knowledge gained about the subject by the student. So with the aim to use case based learning (CBL) as a tool to improve students understanding of applied aspects of Microbiology, the study was conducted by introducing the CBL in microbiology at undergraduate level and its effectiveness was assessed by taking the perception of students.

MATERIALS AND METHODS

It was a prospective study conducted in the department of Microbiology, Maharishi Markandeshwar Institute of Medical Sciences & Research, Mullana, Haryana. The study was of four month duration from 1st May to 31st August 2016. The study was conducted on 150 second year professional MBBS students. Informed consent was taken from students and permission was taken from Institutional Ethical Committee. The faculty of the department was sensitised regarding the method used in the study. Total of four theory lectures and four practicals on topics i.e. Typhoid, Tuberculosis, wound infection and Meningitis were taken from scheduled time table for the study. Case based scenarios for the above topics were prepared and validated by faculty of the department. A sample case scenario used for Typhoid is provided below.

A Sample case scenario for Typhoid fever: Ram an 11 year old boy was admitted to the paediatrics ward with a history of fever which increased gradually in a step-ladder pattern over the period of previous 10 days. He had taken antipyretics and ciprofloxacin, prescribed by a local private practitioner. At presentation to the hospital, he complained of lack of appetite, pain in the abdomen and lethargy. On examination, he was found to have fever with anaemia and hepatomegaly. A blood sample was obtained for culture and serology. His blood culture was positive for Salmonella paratyphi and the Widal test was negative. His isolate was resistant to Ciprofloxacin and therefore he was put on ceftriaxone. He responded after 10 days of therapy.

- What is your probable diagnosis?
- What are the aetiological agents of disease?
- What is the mode of transmission of the disease?
- Enumerate various specimens which can be collected for the diagnosis.

- What are the steps involved in laboratory diagnosis of such patients?
- What is the role of antibiotic susceptibility testing?

Student's feedback questionnaire (Containing 10 questions and muddiest point of each topic) was prepared and was validated by peer review. [Table/fig-1] Also it was validated by cronbach α , Mean was 43.36, SD was 4.75 and value of Alpha was 0.868. It means questionnaire was highly consistent. The students were informed about the conduct of study and consent was taken. Group dynamics was also explained to the students [1]. Didactic lectures were taken for each selected topic using power point presentation in the theory class to give some prior knowledge about the topic and practical classes were used for the sessions of case based scenarios. As per curriculum, we took theory class of one hour twice a week in lecture theatres and practical class of about two hours once a week in departmental practical lab. As MBBS batch is of 150 students. Whole class is divided into two practical batches of 75 students each. Here Group A is batch A and Group B is batch B. CBL session was conducted during practical classes because more time is required for CBL sessions which is not possible in theory classes. Subgrouping was done because CBL is a small group teaching method. Each batch A & B was divided into further nine groups (A1-A9) and (B1-B9) containing eight to nine students each for the session of CBL. All the groups in batch A and batch B were given a case scenario of same topic one week prior and asked to read about the topic from different sources like books, internet etc. After one week they join together in their respective groups and

Sr No	Items	3 Agree	2 Neutral	1 Disagree
	CBL has helped me in clearing the basic concepts	88	10	2
	CBL has motivated me for self-study	77	16	7
	CBL has improved my communication skills	77	17	6
	CBL has inculcated and improved my analytical skills	77	15	8
	CBL has helped me in retention of the subject and its clinical application	90	7	3
	CBL made the topic interesting	87	8	5
	CBL helped increase my attention in the class	76	17	7
	We interact more with teachers in CBL	86	11	3
	Learn to work together	82	13	5
	CBL has worked as an effective learning tool for me	78	15	7

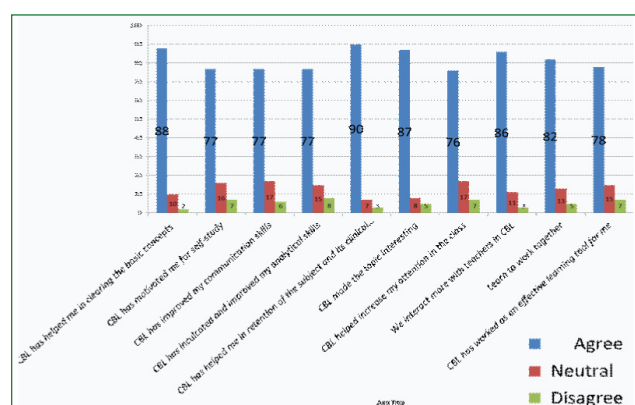
[Table/Fig-1]: Case based learning method- Perception of students regarding CBL (Percentage).

again discussed the scenario with each other for 20 minutes. Then every group discussed the CBL scenario with their respective teachers. Same method was followed with rest of the topics. In this way all the students was exposed to all the sessions of CBL. At the end of the sessions of CBL, perceptions of students were taken on a 3 point Likert scale regarding the CBL method adopted. Feedback was taken from faculty also. At the end of each CBL session, students were asked to write about difficult areas of the topic which is called muddiest point. [1] The feedback from faculty was also taken by asking three open ended questions.

- Do they feel the need of introduction of CBL along with didactic lectures?
- What could be the impact of CBL on learning and performance of students?
- What are the challenges while implementing CBL and how we can overcome it?

RESULTS

Total 150 MBBS second year professional students taken part in Study. Out of 150 students, 138 (92%) students filled up the feedback questionnaire. 88% students stated that CBL helped clearing their basic concepts. 77% stated that CBL motivated them self- study, also improved their communication skills and analytic skills. 90 % students felt that retention of the subject is more after CBL and also they understand the clinical application of the knowledge. 87% students stated that CBL made the topic interesting and 76% students stated CBL increased their attention in the class. 86% students felt that there is more interaction with teachers during CBL while 82% stated that they have learnt to work together. 78% opined that CBL is an effective learning tool for them [Table/Fig-1,2].



[Table/Fig-2]: Bar chart showing student's perceptions on Case Based Learning (CBL).

What was your "Muddiest point"?

Percentage of students given their muddiest point

- Typhoid: Widal test (>75%)
- TB: Pathogenesis of tuberculosis (>50%)

- Wound Infection: Nil
- Meningitis: Etiological agents (<30%)

Knowing muddiest point of the students, teacher can improve teaching methodology i.e. will make more efforts to make that area easy to understand [Table/Fig-1].

Faculty Feedback: All the faculty members opined that there is dire need of introduction of student centered teaching learning methodologies in microbiology. CBL will have a great impact on students learning and performance by increasing their retention of the subject, by motivating for self-directed learning. By this method, students will understand the clinical aspect of microbiology but they also felt that CBL is a tedious and time consuming process so more resources and proper management of time is required.

DISCUSSION

Introduction of learner's oriented teaching learning methods for teaching the subjects like microbiology can improve student's understanding of applied aspect of microbiology. So in the present study on CBL, responses given by students clearly indicated that introduction of CBL improved correlation of the infectious agents with clinical diseases and also retention of the subject has improved which was absent in didactic lectures. i.e. CBL helped clearing their basic concepts (88%), motivated them for self- study , also improved their communication skills and analytic skills (77%). 90 %, 87%, 76% felt that retention of the subject is more after CBL and also they understand the clinical application of the knowledge, CBL made the topic interesting, increased their attention in the class respectively. 86%, 82%, 78% students felt that there is more interaction with teachers during CBL, they have learnt to work together, and CBL is an effective learning tool for them respectively.

Other studies done by Hashim R, Cherubini L, and Mayo JA on CBL concluded that students appreciated the student friendly, thought-provoking approach of CBL. Also there is increased interactivity with course content as well as teachers and peers in CBL as compared to traditional method which is in concordance with our study [10, 11, 12]. Studies conducted by Anita Singhal and Dutta A et al reported that students requested more sessions of CBL on regular basis and said CBL is far better than didactic lecture as far as knowledge gain is concerned. [13, 14].

Results of study done by Suvarna S Tathe are in concordance with our study which showed large proportion of students (91.02%) thought that learning objectives were achieved at the end of CBL session. 87.17% students thought that CBL was an effective learning tool for them and improved their learning skills and helped them in retaining relevant information. 85.89% participants felt that CBL had helped them clearing the basic concepts. 82.04% students responded that CBL had improved their independent learning abilities whereas 65.38% students realised that CBL had improved their analytical skills even though 50%

of them expressed that CBL had noticeably improved their communication skills [7].

Study done by Yasin Tayem showed that students thought case based learning was an effective learning tool, improved their learning skills, independent learning skills and analytical skills in 82%, 83%, 74% and 70% respectively. Students described that team discussions helped them to achieve lecture objectives and improved their communication skills [15].

Study by Ciraj et al also observed findings as per our study that 75.30% students thought case based learning had improved their learning skills and helped them retain the relevant information(77.1%), better understanding of the microbiology, learning objectives(77.7%) and promoted independent learning traits (81.9%). Study showed that case based learning had improved noticeably student's communication skills and analytical skills also [5].

Similar results on CBL are attained by other studies like Nazish Fatima in her study showed that students found CBL as a more effective tool for improving their learning, communication and analytical skills (99.9%, 99.9%, 99.6% respectively) [16].

Shubhada Gade and Suresh Chari in their study showed that 75.30% students opined that CBL improved their learning skills and 62.6% felt that CBL sessions prepared them to be better equipped to face the examinations while 77.1% felt that retention of relevant information is increased. This teaching method contributed to better understanding of microbiology learning objectives (77.7%). Students also felt that CBL had markedly improved their communication skills, enhanced analytical skills in 57.2% and 69.2% respectively. [17].

Kanchan Gupta in her study showed 94.4 % students opined that subject effectively illustrated the medical concepts. 78% opined that motivated them to use additional resources. 87.29 % feels that stimulated their interest in subject. 89.6% opined that intervention of the teacher was useful, 72% opined that session was better than theory classes [18].

LIMITATIONS

More time, space, infrastructure, and facilitators are required to cover the topic. Another limitation of this study is only four topics were covered by CBL session because of shortage of time. Also training is required to involve more faculty members for conduction of such studies in future.

CONCLUSIONS

Present study concluded that CBL motivates the students for self-directed learning by increasing their interest in subject and also stimulating their problem solving skills and by improving their interaction with each other and teachers. It is well accepted by students and faculty of the department.

As the response of students for CBL was very encouraging, so all the faculty of medical schools can be encouraged and motivated for student centered TL methodology like CBL along with didactic lectures in the curriculum by proper management of time and by cooperation of faculty and students. In this way, they will apply their knowledge in clinical phase and will be able to provide effective health care services in the community. For this, faculty should be regularly sensitised and trained by workshops through faculty development programmes.

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