



Research Article

## INTRODUCTION OF CASE BASED LEARNING AS A TEACHING TOOL IN CLINICAL MICROBIOLOGY FOR 2<sup>nd</sup> YEAR MBBS STUDENT IN MEDICAL COLLEGE OF SOUTH WEST BIHAR INDIA

Mukesh Kumar<sup>\*1</sup>, Rana Pratap<sup>2</sup>, Ashwini Kumar<sup>3</sup>, Prabhat Kumar<sup>4</sup>  
N.P Sahu<sup>5</sup>, Shakira Ansary<sup>6</sup> and Animesh Gupta<sup>7</sup>

<sup>1,2,3</sup>Associate Professor Dept of Microbiology Narayan Medical College Jamuhar Sasaram Bihar

<sup>4</sup>Professor Dept of Microbiology Narayan Medical College Jamuhar Sasaram Bihar

<sup>5</sup>Professor & HOD Dept of Microbiology Narayan Medical College Jamuhar Sasaram Bihar

<sup>6</sup>Tutor Microbiology Narayan Medical College Jamuhar Sasaram Bihar

<sup>7</sup>Associate Professor Dept of PSM Narayan Medical College Jamuhar Sasaram Bihar

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### ABSTRACT

**Background:** The teaching of microbiology is mainly through conventional methods and its clinical application is lacking among medical practitioners, so active learning is required to facilitate student's learning. Case-based learning (CBL) is one such method of active learning where it helps to enhance knowledge and clinical applications of Microbiology in routine practice. **Aim:** To introduce case base learning as teaching learning methods in Clinical Microbiology for undergraduates. **Methodology:** Educational Intervention Study was conducted for 2<sup>nd</sup> phase MBBS student at Narayan Medical College Hospital, Jamuhar Sasaram Bihar. A total of 83 participants were involved, of which two groups were created. The project was carried out after sensitizing the faculty with CBL. The 1<sup>st</sup> group was subjected to a CBL and 2<sup>nd</sup> group was subjected to didactic lecture and crossover done. Pre and Post-test were conducted and the perception of student as well as of faculty were noted and analyzed. **Results:** CBL was appreciated by students as well as teachers. Perceptions from students and teachers were taken on Likert's scale ranging from strongly disagrees to strongly agree. Around 76.8 % of student stated that in CBL we interact more with teachers, followed by 65.9% student stated that CBL has helped me in retention of subject and its clinical application and 62.2% of student perceive that CBL has motivated for self-study in comparison to Didactic Lecture. **Conclusions:** CBL in Microbiology is a useful tool to improve and bring changes in student's attitude towards application of microbiology in clinical practice. It also develops the learning interest in students and better understanding of microbiology.

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### INTRODUCTION

The teaching of microbiology is mainly through conventional methods has been observed that there is inadequate retention of microbiology. Active learning is required to facilitate student's learning. Case-based learning (CBL) is one such method of active learning strategy involving an exploration of real-life case scenarios for an interactive student-centred. Cases used in CBL are real-life situations that provide the student with the history and symptoms of a patient along with clinical signs and the laboratory investigation data.<sup>[1,2,3]</sup> In Clinical microbiology, students learn about various microorganisms and factors that lead to disease. In reality, patients present with various signs and symptoms which has to be correlated with infectious agents and host's response.<sup>[4]</sup>

\*Corresponding author: Mukesh Kumar

Associate Professor Dept of Microbiology Narayan Medical College Jamuhar Sasaram Bihar

In Didactic lecture, this correlation is not possible. Incorporation of case base learning in microbiology can solve this problem. CBL is learner centered and motivates the student for self-directed learning, better correlation of subject clinically, enhances skill and better teacher student relationship which enhances interest in Microbiology. So, with this background present study was undertaken with following aims and objectives:

- To introduce case base learning as teaching learning methods in Clinical Microbiology for undergraduates
- To assess case-based learning is an effective teaching tool for the clinical Microbiology
- To evaluate the perception of 2<sup>nd</sup> year medical students' and faculty about this new methodology

### METHODOLOGY

It is an Educational Intervention Study conducted in the Department of Microbiology, NMCH Jamuhar, Sasaram,

Bihar. The study duration was 5 months from June to October 2019. The study was conducted on 2<sup>nd</sup> Phase MBBS students. After getting permission from Institution Ethics Committee, 82 students from 2<sup>nd</sup> Phase MBBS (2014) batch participated in the study. The students were sensitized about the project and divided into two groups (Group 1 and Group 2). All the faculty from Department of Microbiology were sensitized about Case based learning (CBL) methods in Microbiology. Two clinical cases were prepared for CBL session and topic for didactic lecture (DLs) were also discussed in the department with all faculty. The questionnaires for CBL session were finalized and validated by Microbiology faculty. Group 1 had one CBL session and group 2 had DLs on same topic of 45 minutes session for each learning method. After one session, the groups were crossed over and each session was followed with pre and post test in the form of MCQ. 15 Feedback questionnaires for students and 9 for faculty were validated with HOD Microbiology and colleagues. A sample case scenario used to teach Urinary Tract Infection (UTI) are given below.

A sample case scenario for UTI: A young female was admitted to hospital with history of fever and increased frequency of micturition since last 4 days. She also complains of burning sensation while passing the urine.

1. What is your most probable diagnosis?
2. Which part of genitourinary tract is likely to be affected?
3. Enumerate common etiological agent in above condition.
4. Keeping in mind the age and gender of the patient identify the most likely pathogen.
5. Explain the pathogenesis and complications of the clinical condition.
6. What are the investigations required in the case?
7. Do you need to give some instructions to the patient for appropriate sample collection, if yes which instructions are needed?

Feedback was taken from student immediately after each session and for faculty after 1 month. The feedback questionnaires were based on 5 points Likert scale to assess perception towards CBL and DLs in Microbiology. Statistical analysis was done by using statistical software SPSS 21 trial version. One sample T test was used for standard mean deviation and statistical significance was tested in terms of P value of <0.05.

## RESULTS

A total of 83 students from 2<sup>nd</sup> phase MBBS were participated out of 100 students. The mean score of didactic lectures in pretest was 7.91±2.20 and post-test was 10.54±1.94, which was statistically significant as shown in Table 1. The mean score of CBL in pretest were 8.73±2.81 and post-test were 9.41±2.44.

In Didactic lecture, the score of the students were high in Post-test as compared to Pre-test. Approximately, 91.5% students score more than 50% marks in post-test, whereas only 35% student score more than 50% marks in pre-test. Similarly, in CBL, the performance score of the student were good in post-test as compared to pretest. Around 68.3% students score more than 50% in post-test which were higher than pretest (52.5%)

as shown in Figure 1. CBL was appreciated by students as well as teachers. Perceptions from students and teachers were taken on Likert's scale ranging from strongly disagrees to strongly agree as shown in Table 2 & 3. Approximately, 76.8 % student stated that, in CBL we interact more with teachers, followed by 65.9% student stated that, CBL has helped me in retention of subject and its clinical application and 62.2% of student perceive that CBL has motivated for self-study.

Out of 6 faculty, 2 faculty were strongly agree that CBL helps to increase student's interest in microbiology, CBL imparts factual knowledge to the students and CBL improves long term retention of the knowledge.

**Table 1** Comparison between mean test score of didactic lecture and case-based learning during pre and post-test sessions (n=82 & Total Score= 16)

	Mean score (SD)		p value
	Pretest	Post test	
Didactic lecture	7.91 (2.20)	10.54 (1.94)	< 0.000
CBL	8.73 (2.81)	9.41 (2.44)	0.098
<b>p value</b>	0.039	0.001	

**Table 2** Percentage of the student's perception on case-based learning on a 5-point Likert scale

Feedback questionnaire	1	2	3	4	5
CBL has helped me in clearing the basic concepts.	1.2	1.2	1.2	36.6	59.8
CBL has motivated me for self study	2.4	0	8.5	26.8	62.2
CBL has improved my communication skills	0	2.4	11.0	31.7	54.9
CBL has inculcated and improved my analytical skills	1.2	0	7.3	41.5	50.0
CBL has helped me in retention of subject and its clinical application	3.7	0	0	30.5	65.9
CBL has helped the topic interesting	2.4	0	0	36.6	61.0
CBL has helped to increase my attention in class	2.4	0	3.7	34.1	59.8
We interact more with teachers in CBL	2.4	0	0	20.7	76.8
CBL has worked as an effective learning tool	1.2	0	1.2	46.3	51.2
CBL has improved my learning skills	2.4	7.3	42.7	47.6	47.6
CBL has facilitated independent learning abilities	1.2	2.4	3.7	46.3	46.3
CBL sessions helped me organizing my study material	1.2	2.4	18.3	34.1	43.9
CBL helped me gain skills on working with others	0	0	24.4	37.8	37.8
CBL has helped me in preparing for my examinations	3.7	1.2	13.4	34.1	47.6
CBL helped me better understand the difficult material by discussion with my classmates	2.4	3.7	13.4	34.1	46.3

**Table 3** Faculty perception on case-based learning on a 5-point Likert scale

Feedback questionnaire	1	2	3	4	5
CBL helps to increase students' interest in microbiology	1		1	2	2
CBL enhanced students clinical reasoning abilities	1		1	3	1
CBL imparts factual knowledge to the students	1		1	2	2
CBL has helped improve peer interaction	1		1	3	1
Time (Duration) allotted for CBL sessions were adequate	1		1	2	2
The topics selected for CBL sessions were appropriate	1		1	2	2
CBL makes the students better prepared for examinations	1		1	2	2
CBL improves long term retention of the knowledge	1		1	3	1
The orientation program equipped me to conduct the CBL sessions effectively	1		1	2	2

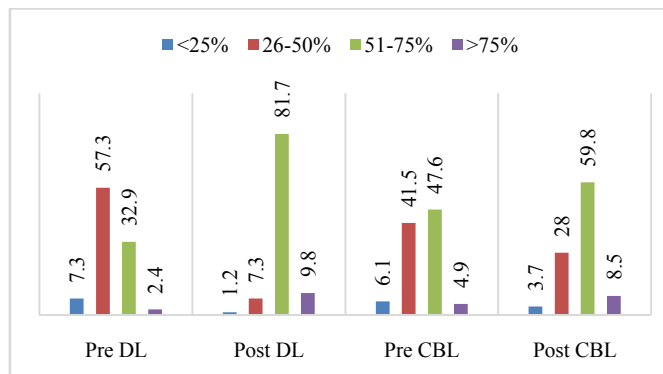


Figure 1 Score Percentage of students in didactic lecture and CBL during Pre & Post-test session

## DISCUSSION

Introduction of case base learning as a teaching tool in Microbiology can improve MBBS student's knowledge in terms of clinical application and its importance in field of diagnostic and treatment of the patients. In most of the Medical Colleges, Microbiology is taught in classrooms & practical lab and its clinical application is almost negligible, so that is why students could not understand its clinical application in their routine management of patients.<sup>[5]</sup> So, in the present study, the response regarding CBL given by students clearly indicates that CBL has helped in retention of topics in Microbiology and its clinical application which in concordance with study conducted by Ritu Garg et.al.<sup>[6]</sup> In this study we have noticed that, 76% students had perception that, in CBL we interact more with teachers as compared to didactic lecture which was similar with study conducted by Hashim R, Cherubini L. and Mayo JA.<sup>[7,8,9]</sup> In a Study done by Yasin Tayem showed that CBL has worked an effective tool, improved learning skills and improved analytical skills in 82%, 83% and 70% subjects respectively, whereas in our study, it was found that 51%, 47% and 50% which was less than Yasin Tayem study.<sup>[10]</sup> In our study 47% of student reacted that CBL helped them in preparing for examination whereas Suresh Chari showed 62.6%.<sup>[11]</sup>

Student feedback were positive for CBL. We have observed that more than 50% to 76% of the students were strongly agree that CBL helped in clearing basic concepts (59.8%), motivates self-study (62%), analytical skill (50%), clinical application (65%), interest in topic (61%), increase attention in class (59%), more interact with teachers (76%) and effective learning tool (51%). Similar findings were reported by various studies conducted by various authors from different part of country from different specialties of medical colleges.<sup>[12,13]</sup>

Medical science is a field where students are required to recall a lot of knowledge and skills learned during their medical college and also to keep updating that knowledge with the latest research and technology. Medical college around the globe are adopting various interactive teaching methods to enhance learning and retention and to inculcate self-directed learning skills in medical students. However, the medical college in this part of India are still following the conventional approach though some colleges have started experimental implementation of interactive teaching methods for active learning to see the effect so that they can be adopted as a part of the curriculum.<sup>[14]</sup>

In this study, the perception of faculty regarding CBL was also noted. Among all faculty, one faculty was strongly disagreed and one was neutral for CBL, while rest four faculty were

strongly agreed on positive aspects of CBL. Faculty also found that students were interacting nicely with the faculty facilitator.

**Outcomes: What this study adds:** CBL in Microbiology is a useful tool to improve and bring changes in student's attitude towards application of microbiology in clinical practice. It also develops the learning interest in students and better understanding of Microbiology subject. CBL will also lead to more interaction between students and faculty, thereby leading to more learning and more amicable atmosphere.

## CONCLUSIONS

CBL is learner centered and motives the student for self directed learning, better correlation of subject clinically, enhances skill and better teacher student relationship which enhances interest in Microbiology. CBL can be introduced as teaching learning method in microbiology

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