

## The comparison of effectiveness of case based learning with conventional teaching in under graduates in Respiratory Medicine Department

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### Abstract

**Introduction:** Sound knowledge of the subject with clear understanding of its clinical application is important to create strong foundation of sound clinical practice<sup>1</sup> in medical students. Efforts are being made to improve the student learning by using various methodologies including case based learning (CBL). **Objectives:** The objectives of the study are as follows:-

1. To introduce case based learning for MBBS students in department of Respiratory medicine.
2. To compare the effectiveness of case based learning in Respiratory medicine with conventional learning methods.
3. To access the perception of students regarding case based learning.

**Methodology:** It is a comparative observational study designed to compare the effectiveness of case based learning with conventional teaching method in Respiratory medicine subject. The study was conducted in 110 student MBBS in L N Medical College & Research Centre, Bhopal, Madhya Pradesh. The study was conducted in 2 sessions. Total enrolled 110 students were divided into two batches of 55 students each. For post teaching session, questionnaire and feedback paper according to Likert's scale for student perception were prepared. All data compiled and evaluated for further study. **Results:** In Session I, More than 60% marks (15/25 marks) gained by 100 % (55) students who taught topic Tuberculosis by Case based learning teaching method while only 56.36% (31) students gained who taught by conventional teaching method. In Session II, more than 60% marks (15/25 marks) gained by 78.18 % (43) students who taught topic COPD by Case based learning while only 30.91% (17) students who taught by conventional teaching method. Overall range observed in feedback of Participants about case base learning method (except point of more time consuming) by Likert scale between 44.54% (49) -59.09 % (65) students were either agree or strongly agree while 16.36%(18) - 29.09 % (32) students were either disagree or strongly disagree. We observed that teachers also appreciate case base learning method of teaching, now we are more confident to use this method more effectively. **Conclusion:** After both session it was observed that being student centered interactive teaching learning method, students scored better with case based learning than conventional teaching. Feedback response showed that majority of student found very positive to learn by case based learning teaching method. Case based learning method can help students to become lifelong learner, so in judicious combination with conventional teaching can be fruitful to make more competent Indian medical graduates.

**Keywords:** teaching, medicine, knowledge.

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### Introduction

Sound knowledge of the subject with clear understanding of its clinical application is important to create strong foundation of sound clinical practice<sup>1</sup> in medical students. Medical education has introduced numerous changes to make study more interesting, and student centered.

According to Albanese MA et al<sup>2</sup> & Des Marchais JE<sup>3</sup>, most student enjoy the active participation & consider the process to be clinically relevant. Efforts are being made to improve the student learning by using various methodologies including case based learning (CBL).

Respiratory medicine and its clinical presentation have been considered as a milestone in medical education. Respiratory medicine is an important but difficult subject taught to the MBBS students. Sound knowledge of the subject with clear understanding of its clinical application is important to create strong foundation of sound clinical practice<sup>1</sup>.

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Medical education has introduced numerous changes to make study more interesting, and student centered. According to Albanese MA et al<sup>2</sup> & Des Marchais JE<sup>3</sup>, most student enjoy the active participation & consider the process to be clinically relevant. Efforts are being made to improve the student learning by using various methodologies like case based learning (CBL), Problem based learning (PBL), etc. Benkson et al<sup>4</sup> found that Problem based learning and conventional curricula are entirely different concepts, and the two will gradually merge. Case based learning seems to be a more innovative method of student learning because knowledge of respiratory medicine and its application in clinical practice will definitely help medical to improve our health services. Moreover case based learning relies on integrated learning methods which will link Respiratory medicine with other various subjects making it more interesting for the students. Problem based learning proponents explain that Problem based learning methods encourage lifelong learning, simulate clinical practices, encourage curiosity, and create a broader understanding of the complexity of medicine<sup>5,6</sup>. Whereas Problem based learning detractors explain that Problem based learning process is time inefficient, frustrating for time pressured medical learners, and often leads to erroneous conclusions<sup>7</sup>.

Being Respiratory medicine is a important subject, so to make it interesting, interacting, and more clinically oriented, case based learning is a very efficient method and should be incorporated in teaching of Respiratory medicine.

**Aims & objectives**

The objectives of the study are as follows:-

1. To introduce case based learning for MBBS students in department of Respiratory medicine.
2. To compare the effectiveness of case based learning in Respiratory medicine with conventional learning methods.
3. To access the perception of students regarding case based learning.

**Methodology**

It is a comparative observational study designed to compare the effectiveness of case based learning with conventional teaching method in Respiratory medicine subject.

The study was conducted in 110 student MBBS in L N Medical College & Research Centre, Bhopal, Madhya Pradesh. Initially concern faculties and students were sensitized about case based learning approach by seminars organized in the department at L N Medical College & Research Centre, Bhopal, Madhya Pradesh.

The study was conducted in 2 sessions of 60 minutes each. Total enrolled 110 students were divided into two batches of 55 students each. For post teaching session, questionnaire and feedback paper according to Likert's scale for student perception were prepared. In the first session the one batch of 55 students in 5 small groups of 11 were taught topic Tuberculosis by case based learning method by

faculties of Respiratory medicine department with clinical consultation. The other batch of 55 students was taught the same topic Tuberculosis by conventional teaching method. Post teaching questionnaire having twenty five short answer questions and ten feedback points given to all students and collected from students. The results of post teaching questionnaire considering one mark for one short answer question and feedback of all students were evaluated.

In 2<sup>nd</sup> session topic COPD was taught to one batch of 55 students in 5 small groups of 11 by case based learning method and other batch of 55 students by conventional teaching method. Post teaching questionnaire having twenty five Short Answer Questions and ten feedback points given to all students and collected from students. Along with these tests, students feedback on perception about case based learning analyzed according to Likert's scale in 5 degrees of disagree, strongly disagree, Not sure, Agree, and strongly disagree.

All data compiled and evaluated for further study.

**Study design**

Cross sectional study

**Sample size**

110 M.B.B.S. students

**Inclusion criteria**

4th year M.B.B.S. students studying in LN Medical College & RC, Kolar Road, Bhopal, M.P.

**Table 1: Students feedback Questionnaire**

	Feedback	1(Strongly Disagree)	2(Disagree)	3(Not Sure)	4(Agree)	5(Strongly Agree)
A	Improve communication Skills					
B	Remove Stage Fear					
C	Promotes Teamwork					
D	Triggers Problem Solving					
E	Student Centre Teaching					
F	Good for academically weaker students					
G	Improve Leadership Skills					
H	Better clarification of concepts					
I	More time consuming					
J	Interactive session					

**Observations and results**

The study was conducted in 2 sessions. Total 110 students were enrolled and divided into two batches of 55 students. Post teaching questionnaire having twenty five Short Answer Questions and ten feedback points given to all students and collected from students. Data evaluated of these tests and students feedback on perception about case based learning which analyzed according to Likert's scale in 5 degrees of strongly disagree, disagree, Not sure, Agree, and strongly disagree.

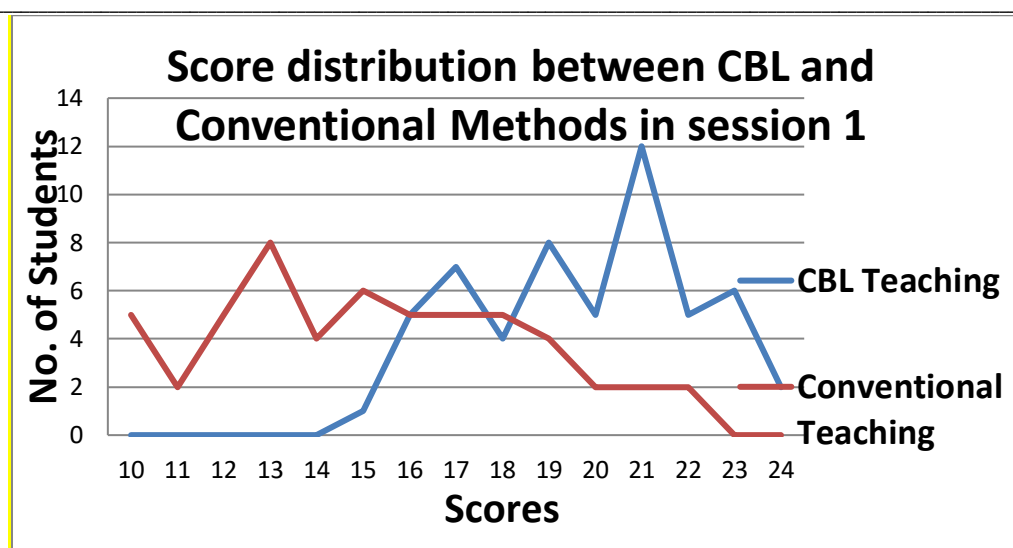


Fig 1: Score distribution between CBL and Conventional Teaching methods in session 1

In Session I, marks gained between 15 and 24 out of 25 questions (considering one mark for one short answer question) by student who taught topic Tuberculosis by Case based learning teaching method while marks gained between 10 and 22 out of 25 questions (considering one mark for one short answer question) by student who taught topic Tuberculosis by conventional teaching method. More than 60% marks (15/25 marks) gained by 100 % (55) students who taught topic Tuberculosis by Case based learning teaching method while only 56.36% (31) students gained who taught by conventional teaching method.

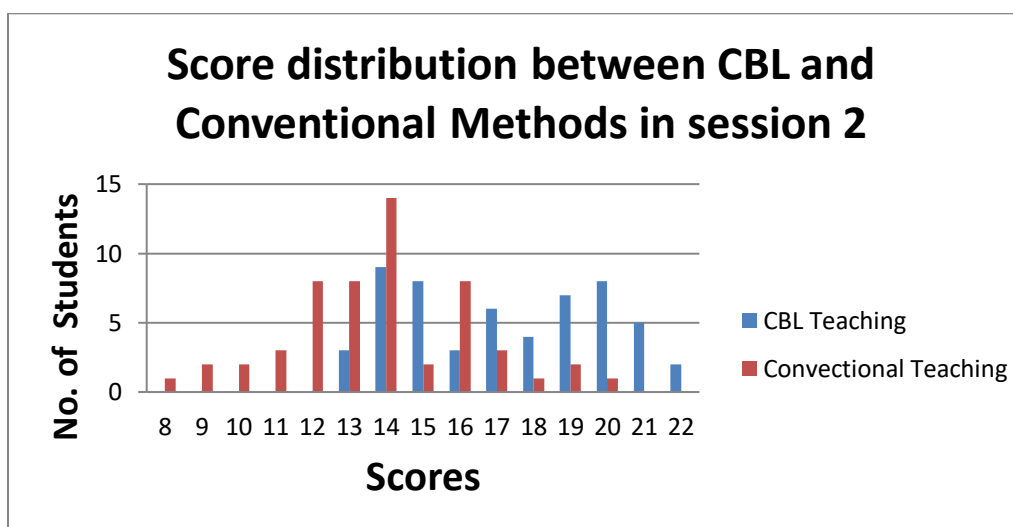


Fig 2: Score distribution between CBL and Conventional Teaching methods in session 2

In Session II, marks gained between 13 and 22 out of 25 questions (considering one mark for one short answer question) by student who taught topic COPD by Case based learning teaching method while marks gained between 8 and 20 out of 25 questions (considering one mark for one short answer question) by student who taught topic Tuberculosis by conventional teaching method. More than 60% marks (15/25 marks) gained by 78.18 % (43) students who taught topic COPD by Case based learning while only 30.91% ( 17) students who taught by conventional teaching method.

Table 2: Students feedback according to Likert's scale

	Feedback	1(Strongly Disagree)	2(Disagree)	3(Not Sure)	4(Agree)	5(Strongly Agree)
A	Improve communication Skills	7.27% (8)	21.82 (24)	20% (22)	41.82% (46)	9.09% (10)
B	Improve desire to learn	8.18% (9)	16.36% (18)	24.55% (27)	40.00% (44)	10.91% (12)
C	Promotes Teamwork	9.09% (10)	17.27% (19)	16.36% (18)	42.73% (47)	14.55% (16)
D	Triggers Problem Solving	5.45% (6)	10.91% (12)	31.82% (35)	39.09% (43)	12.73% (14)
E	Student Centre Teaching	8.18% (9)	12.73% (14)	23.64% (26)	41.81% (46)	13.64% (15)
F	Good for academically	10.91% (12)	10.00% (11)	30.91% (34)	31.82% (35)	16.36% (18)

	weaker students					
G	Improve Leadership Skills	8.18% (9)	17.27% (19)	30.00% (33)	38.19% (42)	6.36% (7)
H	Better clarification of concepts	7.27% (8)	18.18% (20)	17.27% (19)	38.19% (42)	19.09% (21)
I	More time consuming	7.27% (8)	36.37% (40)	18.18% (20)	27.27% (30)	10.91% (12)
J	Interactive session	7.27% (8)	18.18% (20)	15.45% (17)	40.01% (44)	19.09% (21)

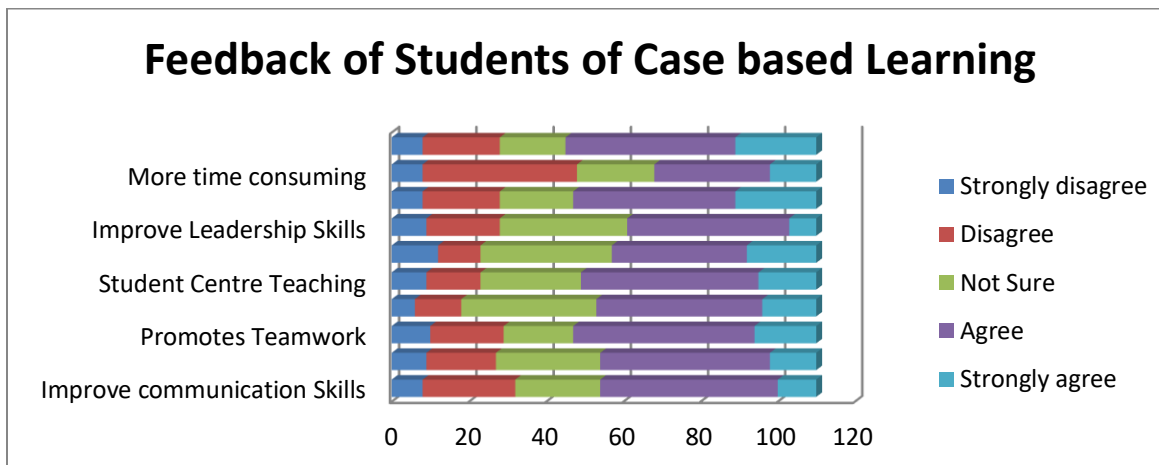


Fig 3: Students feedback according to Likert's scale presented by Bar chart

For feedback of Participants, Likert scale were applied (1=Strongly Disagree, 2=Disagree, 3=Not Sure, 4=Agree, 5=Strongly Agree) for data evaluation on following ten points.

(A) Improve communication Skills (B) Remove Stage Fear (C) Promotes Teamwork (D) Triggers Problem Solving (E) Student Centre Teaching (F) Good for academically weaker students (G) Improve Leadership Skills (H) Better clarification of concepts (I) More time consuming (J) Interactive session

(A) On feedback about whether case base learning method of teaching Improve communication Skills, response of 41.82% (46) students was agree while 7.27% (8) students was strongly disagree. We observe 50.91% (56) students either agree or strongly agree while 29.09% (32) students were either disagree or strongly disagree.

(B) On feedback about whether case base learning method of teaching Improve desire to learn, response of 40.00% (44) students was agree while 8.18% (9) students were strongly disagree. We observe 50.91% (56) students were either agree or strongly agree while 24.54% (27) students were either disagree or strongly disagree.

(C) On feedback about whether case base learning method of teaching Promotes Teamwork, response of 42.73% (47) students was agree while 9.09% (10) students was strongly disagree. We observe 57.28% (63) students either agree or strongly agree while 26.36% (29) students were either disagree or strongly disagree.

(D) On feedback about whether case base learning method of teaching Triggers Problem Solving, response of 39.09% (43) students was agree while 5.45% (6) students was strongly disagree. We observe 51.82% (57) students either agree or strongly agree while 16.36% (18) students were either disagree or strongly disagree.

(E) On feedback about whether case base learning method of Student Centre Teaching, response of 41.82% (46) students was agree while 8.18% (9) students was strongly disagree. We observe 55.46% (59) students either agree or strongly agree while 20.91% (23) students were either disagree or strongly disagree.

(F) On feedback about whether case base learning method is Good for academically weaker students, response of maximum 31.82% (35) students was agree while 10.00% (11) students was strongly disagree. We observe 48.18% (53) students either agree or strongly

agree while 20.91% (23) students were either disagree or strongly disagree.

(G) On feedback about whether case base learning method is Good to Improve Leadership Skills in students, response of maximum 38.18% (42) students was agree while 8.18% (9) students was strongly disagree. We observe 44.54% (49) students either agree or strongly agree while 25.45% (28) students were either disagree or strongly disagree.

(H) On feedback about whether case base learning method is Better clarification of concepts in students, response of maximum 38.18% (42) students was agree while minimum 7.27% (8) students was strongly disagree. We observe 57.27% (63) students either agree or strongly agree while 25.45% (28) students were either disagree or strongly disagree.

(I) On feedback about whether case base learning method is More time consuming, response of maximum 36.36% (40) students was strongly disagree while 10.91% (12) students was strongly agree. We observe 43.63% (48) students were either disagree or strongly disagree while 38.18% (42) students were either agree or strongly agree.

(J) On feedback about whether case base learning method provide platform for Interactive session among students, response of maximum 40.00% (44) students was agree while minimum 7.27% (8) students was strongly disagree. We observe 59.09% (65) students either agree or strongly agree while 25.45% (28) students were either disagree or strongly disagree. Overall range observed in feedback of Participants about case base learning method (except point of more time consuming) by Likert scale were between 5.27% - 10.91% (Strongly Disagree) 10.00% - 21.82% (Disagree), 16.36% - 36.37% (Not Sure), 31.82% - 42.73% (Agree) and 6.36% - 19.09% (Strongly Agree). Overall range observed in feedback of Participants about case base learning method (except point of more time consuming) by Likert scale between 44.54% (49) - 59.09% (65) students were either agree or strongly agree while 16.36% (18) - 29.09% (32) students were either disagree or strongly disagree. We observed that teachers also appreciate case base learning method of teaching, now we are more confident to use this method more effectively.

**Table 3: Average post test score by Unpaired t Test in both the sessions for CBL and Conventional teaching learning methods**

Average post test score in both the sessions for CBL and Conventional teaching learning methods			
Sessions	CBL Group (Mean, SD)	Conventional Group (Mean, SD)	P value
Session 1	19.74, +_2.38	19.74, +_2.38	<0.001
Session 2	17.25, +_2.7	13.8, +_2.53	<0.001

On observation in session I, we found mean  $\pm$  SD 19.74,  $\pm$ 2.38 and 19.74,  $\pm$ 2.38 respectively in Case Based Learning method and Conventional learning method with p value <0.001 (highly significant).

On observation in session II, we found mean  $\pm$  SD 17.25,  $\pm$ 2.7 and 13.8,  $\pm$ 2.53 respectively in Case Based Learning method and Conventional learning method with p value <0.001 (highly significant)

#### Discussion

This study was conducted on 4th year M.B.B.S. students studying in LN Medical College & RC, Kolar Road, Bhopal, M.P. to evaluate effect of Case Based Learning and its comparison with conventional teaching. The basic purpose was to evaluate post test of both teaching learning methods and get feedback response from 4th year M.B.B.S. students. We have limited scope of discussion here, due to unavailability of published article related to Case Based Learning teaching method in Respiratory medicine subject. In this study response of majority of students i.e. in range between 44.54% (49) -59.09 % (65) of students were agree (including strongly agree) with case base learning method of teaching, same pattern was also observed by Praveen R Singh<sup>1</sup> in the range of 51 to 87% students. In this study following percentage of students were agree, not sure and disagree regarding response of Improvement in communication Skills / Opportunity to express due to case base learning of teaching method respectively in 50.91% (56) 20.00% (22) and 29.09 % (32) of students, same pattern was also observed by Praveen R Singh<sup>1</sup> in 64%, 21% and 15% respectively. In this study it was observed that case base learning of teaching method found helpful for Problem Solving in following percentage of students who were agree, not sure and disagree respectively in 51.82% (57), 31.82% (35) and 16.36 % (18) of students same pattern was also observed by Praveen R Singh<sup>1</sup> in 69%, 21% and 10% respectively. In this study following percentage of students were agree, not sure and disagree regarding response of providing better clarification of concepts / improving understanding due to case base learning of teaching method respectively in 57.27 % (63), 17.27% (19) and 25.45 % (28) of students, same pattern was also observed by Praveen R Singh<sup>1</sup> in 62%, 24% and 14% respectively. In this study following percentage of students were agree, not sure and disagree regarding response of providing better platform for Interactive session due to case base learning of teaching method respectively in 59.09 % (65), 15.45% (17) and 25.45 % (28) of students, same pattern was also observed by Praveen R Singh<sup>1</sup> in 74%, 13% and 13% respectively. Overall range of agree (including strongly agree) observed in feedback of Participants about case base learning method by Likert scale between 44.54% (49) -59.09 % (65) of students while same pattern was also observed by Praveen R Singh<sup>1</sup> i.e. 51% to 87%. We observed that concern teachers also appreciate case base learning method of teaching, so now we are confident to use this method more effectively. After session on Tuberculosis and COPD by both Case Based Learning and conventional teaching learning method our both post-test results showed P value as highly significant (<0.001) on application of unpaired t test. Students scored better with case based learning than conventional teaching. Same findings are observed by Elizabeth et al.<sup>[8]</sup>

#### Conclusion

After both session it was observed that being student centered interactive teaching learning method, students scored better with case based learning than conventional teaching. Feedback response showed that majority of student found very positive to learn by case based learning teaching method. Case based learning method can help students to become lifelong learner, so in judicious combination with conventional teaching can be fruitful to make more competent Indian medical graduates.

#### Limitations

This study done on only 110 M.B.B.S. students, so result can't be generalized.

#### Implications

Case based learning method can help students to become lifelong learner, so in judicious combination with conventional teaching can be fruitful to make more competent Indian medical graduates.

#### Abbreviations

CBL: case based learning,

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