

## Modified tutorials in pharmacology for medical students using case based learning and multiple choice questions

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### ABSTRACT

**Background:** Active student centred learning is the need of the hour. Objectives being to compare the difference in the post test scores between students exposed to Case based learning (CBL) and Multiple choice questions (MCQ) (learning tool) during tutorials in Pharmacology for 2<sup>nd</sup> MBBS students. To understand the perception of students regarding teaching learning tools used in the study.

**Methods:** This was a mixed methods study. Sixty eight students were divided into 2 groups. Hypertension and angina was discussed as CBL for Group 1 and as MCQ (Learning tool) for Group 2. One week later, cross over was done, Thyroid and Diabetes was discussed as MCQ for Group 1 and as CBL for Group 2. Post-test MCQ, pre validated questions (Likert scale) and open ended questions (qualitative) were distributed. Statistical Analysis: Difference in the post test scores in both the groups was analyzed using independent sample t test.

**Results:** There was no significant difference in post test scores between CBL and MCQ groups. Questionnaire analysis suggested that both the methods provoked self-learning (45%). Thematic analysis demonstrated the positive experiences like motivated self-learning, clinical application, better understanding than theory classes and drawbacks being time consuming and fear of presentation.

**Conclusions:** Since the study included both qualitative and quantitative analysis, the results can be elucidated comprehensively. This study implies that CBL and MCQ are effective and can be implemented into the curriculum of Pharmacology. This study can serve as an evidence to incorporate these tools in the curriculum.

**Keywords:** Case based learning, MCQ, Pharmacology, Tutorials

### INTRODUCTION

Pharmacology is being taught for 2<sup>nd</sup> MBBS students. As per the regulations laid down by MCI, the entire curriculum is divided into theory and practical classes with

numbers of hours specified. The theory classes are often dealt as didactic lectures in a large group. Tutorials as part of the practical curriculum are also most often dealt as didactic lectures in a small group. With the era of CBME, competency based curriculum seeping into the curriculum

at a faster rate; innovation at different levels is on high demand.

Playing a role of facilitator apart from being a knowledge provider is crucial during tutorials. This way of conducting tutorials is not very commonly seen in the medical colleges. Additional emphasis of the topics which might be difficult during theory classes and also applied pharmacology can evoke interest of the student. There is an additional scope for information recall, group activity, collaborative learning, nurturing the critical thinking, reasoning and improvement of communication skills.<sup>1</sup>

Tutorials also provide an opportunity for the teacher to create an environment where in the students can feel comfortable and let go of their inhibitions to participate in the discussions and productive learning can be achieved.<sup>2</sup> Proper planning of the modules and coordination of the staff members can bring about lot of improvement in the implementation.

Case based learning (CBL) or discussion can help the student nurture his analytical skills which can contribute to his clinical practice in order to comply with rational therapeutics.<sup>3</sup> Multiple choice questions (MCQ) serve as an important tool in interactive teaching. Though often used as an assessment tool, MCQ plays a crucial role in problem solving, activating the students, breaking the monotony thereby useful also as a teaching learning method.<sup>4</sup> Reviewing or reflecting upon the teaching learning methods that are being practiced through formative assessments and student feedback as well, can bring forth many perspectives which can help us keep up with the pace.<sup>5</sup>

So, this study was taken up with the objectives of comparing the effectiveness of 2 teaching learning methods- Case based learning and MCQ and to understand the perceptions of the students regarding these methods.

## METHODS

This was a randomised cross over study which was conducted in the Pharmacology department at Dr. Pinnamaneni Siddhartha Medical College. 68 students have volunteered to participate in the study. Ethical committee approval was obtained and informed consent was taken from the participants. 68 students were randomly divided into 2 groups-G1 and G2.

### *Study period*

2 weeks with 1<sup>st</sup> half of study period- 1 week and 2<sup>nd</sup> half (cross over) in the 2<sup>nd</sup> week. This was a mixed methods study (qualitative and quantitative design). The participants were sensitized regarding the study and were also intimated 1 week prior about the topic which will be discussed during tutorials. 34 students of each group were

again divided into 5 groups of 7 students each. The student's seating arrangement was in a round fashion to ensure participation and discussion of the content. The groups were given about 20mins time to discuss the task given to them and one representative from each group came and explained the MCQs or cases assigned to their group.

During 1<sup>st</sup> exposure, HTN and angina topics were discussed as CBL-G1 and as MCQ-G2. At the end of the discussion, post-test questionnaire was taken from each group. After 1 week, thyroid and diabetes mellitus was discussed as MCQ-G1 and as CBL-G2. At the end of discussions (2<sup>nd</sup> exposure), post-test questionnaire and qualitative analysis (open ended questions) was taken from each group. Prevalidated questionnaire using 5 point Likert scale was also distributed to all the participants after the 2<sup>nd</sup> exposure.<sup>6</sup> Prevalidated open ended questions were given to the students to understand their perception and obtain feedback. The data was collected, verified by other faculty members also and thematic analysis- themes, subthemes and quotes were identified from the data and tabulated.<sup>7</sup>

## *Statistical analysis*

### *Quantitative data analysis*

Independent sample t test (unpaired t test) was done to identify the statistical difference between the 2 groups. A P value <0.05 was considered significant.

### *Qualitative data analysis*

Thematic analysis was done to understand the perception of the students regarding the teaching learning methods used in the study.

## RESULTS

Table 1 analyses the perception of the students regarding the teaching learning methods implemented in the study. About 48.4% students strongly agreed that all topics in Pharmacology have to be taught by these interactive methods. About 62.5% students strongly agreed that both the teaching learning methods (CBL and MCQ) were interactive and 59.3% agreed that the flow of contents discussed were relevant to the topics. 26.5% have given a neutral opinion regarding whether newer teaching methods are necessary in Pharmacology (Table 1).

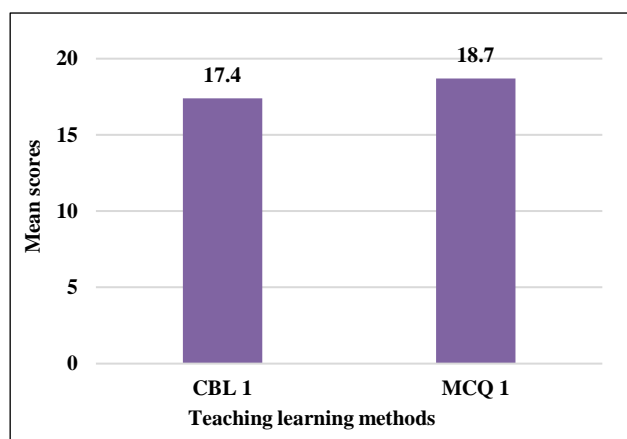
At the end of 1st half of study, the mean scores were obtained from data analysis of Group 1 (both CBL and MCQ). The mean score was 17.4 for CBL group and 18.7 for MCQ group (Figure 1). It can be implied from Figure 1, that there was no significant difference in the mean scores in comparison of CBL and MCQ of group 1.

**Table 1: Perception of the students regarding CBL and MCQ methods Likert scale (Data expressed as %).**

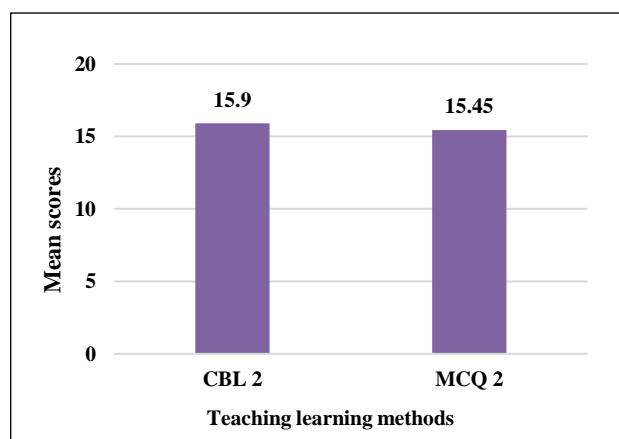
Question	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. Inclusion of small group participation increased the extent of my classroom involvement	56.3	42.2	-	-	-
2. Inclusion of small group participation motivated my preparation prior to attending the class	36	48.4	14	-	-
3. Good understanding achieved by these teaching methods	39	57.8	-	-	-
4. Comfortable and satisfied with these methods	28.12	64	-	-	-
5. Both the teaching learning methods were interactive	62.5	31.2	-	-	-
6. Opportunity to clear the doubts was given	37.5	48.4	-	-	-
7. Flow of contents was clear and relevant with both these methods	26.5	59.3	14	-	-
8. Clinical application was discussed	46.9	56.3	-	-	-
9. These methods have provoked self-learning	56.3	36	-	-	-
10. These methods of teaching and learning will help me score better in my exams	40.6	45.3	-	-	-
11. Knowledge gained with these methods will help me in my practice	45.3	42.2	-	-	-
12. All topics in Pharmacology have to be taught with these methods	48.4	25	23.4	-	-
13. Newer teaching methods are necessary in Pharmacology.	25	39	26.5	-	-
14. Students and teachers should mutually decide the topics for tutorials	31.2	42.2	21.9	-	-

**Table 2: Thematic analysis regarding perception of the students.**

Theme	Subtheme	Quote
Teaching learning methods	Experience during CBL and MCQ	-Interactive, fun based group learning.
		-Better understanding than theory class, increased attention, clinical application, motivated self-earning, more emphasis on clinical points was done.
	Limitations of the study	-Environment in demo room was suffocating, boring.
		-Time consuming, not preferable for whole topic. Should be more basic.
		-Time allotted less, more focus on case/MCQ and less on others.
		-Fear of presentation to the group.
	Suggestions for improvement	-In gallery, Subdivide topics, one topic to be discussed in one class.
		-Larger groups, similar fashion before 3 <sup>rd</sup> internal.
		-Better if the student and the faculty mutually decide the topic.
		-Conduct regularly at least 2-3 times a week.



**Figure 1: Comparison of mean scores of CBL and MCQ in Group 1.**



**Figure 2: Comparison of mean scores of CBL and MCQ in Group 2.**

At the end of cross over (2nd half of study), the mean scores were obtained from data analysis of Group 1 (both CBL and MCQ). The mean score was 15.9 for CBL group and 15.45 for MCQ group (Figure 2). It can be implied from Figure 2, that there was no significant difference in the mean scores in comparison of CBL and MCQ of group 2. Table 2 interprets Qualitative analysis (thematic analysis) of the perception of the students regarding CBL and MCQ. The common theme identified from the study was teaching learning methods. The subthemes identified were the experiences of the teaching learning methods, limitations of the study and suggestions for improvement. Quotes in relation to the themes and subthemes have been elaborated (Table 2).

## DISCUSSION

Pharmacology is often perceived by the undergraduate as a memory game and a separate entity which is confined only to 2<sup>nd</sup> MBBS. This perception has to be changed by involving the students actively in the learning process. These active teaching learning methods like case based teaching or MCQ based learning are often considered superior to traditional methods and can increase the learning outcomes.<sup>8</sup> This study can be considered one of a kind in our department as comparison between CBL and MCQ teaching learning methods has not been done. The results from Figure 1 and 2 indicate that there is no statistical difference in the post test scores of CBL and MCQ of both groups. There were very few studies showing the comparison of CBL and MCQ. This study can imply that both methods can be implemented into the curriculum on a regular basis. This parameter alone cannot rule out the effectiveness of these methods.

Perception of the students from Table 1 indicates that 56.3% of students strongly agreed that the participation and involvement has increased, 59.3% students agreed that the flow of contents was good and relevant to the topics discussed. These results are similar to the findings of Nayana et al.<sup>1</sup> About 45.2% students strongly agreed that the discussion of the topics through these methods has help them a great deal in their clinical practice, 64% students were satisfied and 43% agreed that the methods were interactive. These observations are similar to the study done by Margaret V et al.<sup>9</sup> The students were of the opinion that CBL was more useful, imparted critical thinking and these results were comparable to the studies done by Mukesh Kumar V and SK Rajasekharan.<sup>3,8</sup>

MCQ can also be considered as an alternative method to traditional teaching learning methods. Student led objective tutorials, a novel study done by Sukhlecha et al, has put forwarded that it had improved the academic performance, increased inter group interactions and established uniformity in improving the skills for answering MCQ.<sup>10</sup> Multiple choice questions (MCQ) has been a grave part in the assessment process. In this study MCQ based approach was used not only as assessment method in the form of post-test but also implemented as

teaching learning method which encouraged the students to participate as a group and solve and explain to the remaining groups. The inclination towards CBL could be assumed by the fact that the students are well versed with problem solving by MCQ, but they perceived CBL as a creative tool which can justify the clinical reasoning and rational therapeutics. Qualitative thematic analysis has helped us explore the comprehensive and in depth perceptions of the students regarding the teaching learning methods. This form of feedback obtained regarding the limitations and positive experiences can enhance the quality of sessions. Students also suggested ways to improve the learning outcomes through these methods which can be taken into serious consideration.

## CONCLUSION

This study implies that both CBL and MCQ can be implemented into the curriculum of Pharmacology. This study could pave the way for uninhibited student centred approach which will evoke interest and critical thinking in the future doctors. Increased preference of CBL over MCQ can be attributed as an innovative approach. Efforts have to be made to transform teacher centred tutorials to students interactive teaching learning to prepare these millennial towards a bright future.

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