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Research Article

Early clinical exposure to first year medical students through case-based learning in endocrine physiology

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ABSTRACT

Background: As per the Medical Council of India's Vision-2015 document, coordinated inter-departmental efforts should be undertaken to provide early clinical exposure and to develop communication skills among medical students during the first year of Bachelor of Medicine, Bachelor of Surgery (MBBS) course. For this reason, this inter-departmental study was undertaken, to provide early clinical exposure while teaching endocrine physiology to first-year medical students. Case based learning (CBL) was used as an add-on to traditional didactic lectures (TDLs) for teaching endocrine physiology to first-year undergraduate medical students to compare the cognitive domain scores in pre CBL and post CBL tests.
Methods: After getting permissions from the Institutional Ethics Committee (IEC) and other institutional authorities for conducting the study, the objectives of the study were explained to first year MBBS students. Written informed consent was taken from students (n=59) who were willing to participate in the study. After delivering regular TDLs on endocrine physiology as per topics in the syllabus, a pre CBL test was conducted. Subsequently, the participating students were simultaneously exposed to case scenarios related to the endocrine system by the same facilitator. A post CBL test (identical to pre CBL test) was administered to compare the cognitive domain scores.
Results: Statistically significant differences were found in the student wise and question wise scores in the pre and post tests.
Conclusions: Early clinical exposure of a relatively larger batch of students to CBL by the same facilitator was found to increase cognitive domain scores.

Keywords: Endocrine physiology, Case based learning, Early clinical exposure

INTRODUCTION

The Medical Council of India's Vision-2015 document envisages coordinated inter-departmental efforts to provide early clinical exposure and to develop communication skills among students during the first year of Bachelor of Medicine, Bachelor of Surgery (MBBS) course.[1] Besides providing relevance to teaching of basic medical sciences, early clinical exposure can help first-year MBBS students to develop communication skills and the desired attitudes, and also provides opportunities to inculcate professional behavior at an early stage.[2,3]

Case-based learning (CBL) makes use of guided enquiry and discussions on real or simulated case scenarios and is typically employed during small-group educational sessions. However, integration of clinical problems into the large-group traditional didactic lecture (TDL) sessions in endocrine physiology has been reported to improve student grades, increase student interest and improve student-teacher dialogue.[4] CBL improves

reasoning skills and comprehension of a basic science subject, such as physiology since learning is placed within the context of a medical problem.[5]

CBL has been compared with the TDL format.[6-9] TDL, though criticized for creating information overload with inadequate critical thinking, is reportedly more helpful to students in preparing for a written examination.[10-12]

Case scenarios have been utilized to enable learning.[4,13-18] CBL uses trigger cases to generate interest in a specific topic of the curriculum.[14] If the case scenarios extend over multiple topics, the students create multiple inter-concept links and retain the knowledge better.[16] Studies have reported that CBL in endocrine physiology provided early clinical exposure, enhanced student's performance, helped them to relate clinical conditions to basic sciences, improved communication skills, motivated students towards self-directed learning and helped them to develop clinical reasoning and analytic skills.[15,17] A single post-test after CBL has been found adequate and learning was retained even after six months.[13]

This inter-departmental study was undertaken, using CBL as an adjunct to TDLs for teaching endocrine physiology to first year medical students. The objectives of this study were to evaluate the cognitive skills acquired by the participating first-year MBBS students after attending TDLs on endocrine physiology (using a pre-CBL test) and to study the cognitive skills after using CBL as the educational intervention (using an identical post-CBL test).

METHODS

This complete-enumeration, before and after type of study (without controls) was conducted in 2016 in a municipal medical college in Kalwa, Thane, located about 30 kilometres from Mumbai city in the state of Maharashtra in Western India. The objectives of the study were explained to first-year MBBS students after getting permissions from the Institutional Ethics Committee (IEC) and other institutional authorities for conducting the study. Written informed consent was taken from students who were willing to participate in the study. After completing regular curriculum-based TDLs on endocrine physiology, a pre-CBL test was conducted. The pre-CBL test comprised ten multiple choice questions (single best response type) with one mark for each correct answer and zero mark for each incorrect answer. The post-CBL test was identical to the pre-CBL test.Owing to time constraints in the teaching programme for the first-year MBBS course, all the participating students were simultaneously exposed to case scenarios related to the endocrine system by the same facilitator. The outcome studied was the difference in cognitive domain scores after attending TDLs (by a pre-CBL test) and CBL (by a post-CBL test).

The pre-CBL and post-CBL test scores were tabulated and statistically analysed using EpiInfo Version 7.0 (public domain software package from Centers for Disease Control and Prevention, Atlanta, GA, USA). Categorical data were presented as percentages and continuous data as Mean and standard deviation (SD). Confidence interval (CI) was stated in the range of (Mean-2 x Standard Error) to (Mean+2 x Standard Error). Chi Square test was used with Yates' correction where applicable. A 'p' value of < 0.05 was considered to be statistically significant.

RESULTS

All the 59 participating students were jointly exposed to the same series of TDLs, same facilitator for CBL and took identical pre-CBL and post-CBL tests. Therefore, the consequences of possible confounding variables would be nullified.

Statistically significant differences (p=0.011) were observed between the mean student-wise correct responses in the pre-CBL and post-CBL tests (Table 1).

The post-CBL responses of 54 out of 59 students (91.52%) showed improvement in all the ten questions. As compared to the pre-CBL test, the minimum, first quartile, median, third quartile and maximum correct responses were higher in the post-CBL test (Figure 1).

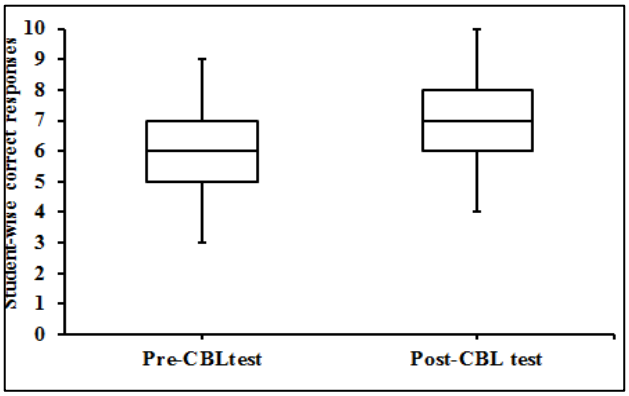

Figure 1: Student-wise correct responses in pre-CBL and post-CBL tests.

Table 1: Student wise correct responses.

Parameter	Pre-test	Post-test
Responses per student	10	10
Mean correct responses	6.22	7.08
Standard deviation	1.54	1.52
Confidence interval	5.82 - 6.62	6.69 - 7.48
Z (Relative deviate) value	3.062	
p value	0.011*	

* Statistically significant.

Table 2: Question-wise correct responses (n=59).

Parameter	Question Numbers									
	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5	Q. 6	Q. 7	Q. 8	Q. 9	Q. 10
Pre-test	57	36	14	28	41	32	43	41	40	35
Post-test	59	40	18	35	45	40	46	49	46	40
Increase	2	4	4	7	4	8	3	8	6	5
χ^2 value #	0.5	0.59	0.69	1.67	0.67	2.28	0.41	2.99	1.54	0.91
p value	0.48	0.44	0.41	0.2	0.41	0.13	0.52	0.08	0.21	0.34

Chi-square test with Yates' correction where applicable (not significant).

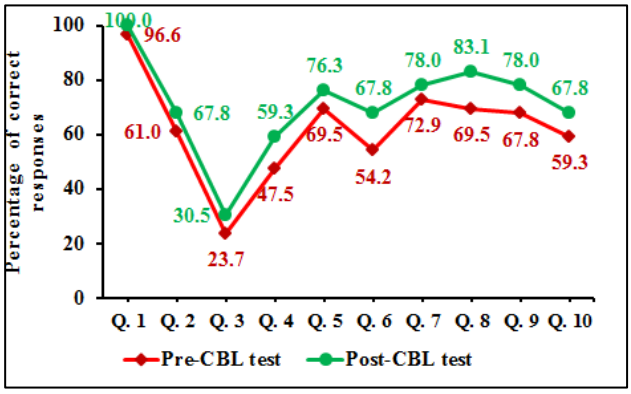

Figure 2: Improvement in percentage of correct responses in the pre-CBL and post-CBL tests.

The differences between the question-wise correct responses were not statistically significant (Table 2). The line graph (Figure 2) reveals percentage improvement between the pre-CBL and post-CBL tests in all ten questions. The coefficient of correlation between question-wise improvement in correct responses (pre-CBL versus post-CBL) and post-CBL correct responses was minus 0.15. Thus, the improvement levels remained more or less constant throughout the spectrum of median question-wise correct responses.

DISCUSSION

CBL transforms the teacher into a facilitator who can mingle among the students and get acquainted with them on a more personal level.[18] Learning and its retention is facilitated when the subject matter of the topic is linked to authentic contexts since the students experience the essentiality of knowing the topic for future clinical practice.[14]

The creation of numerous interconnected mental models during the process of meaningful learning enables learners to take a broad view and to apply their knowledge in practical settings.[19] During CBL, the student's discussions may help them relate to patients in resource-poor settings and thus their application of knowledge would also reach out to the affective domain.[13]

Limitations of the present study were that it was conducted on only one batch of 59 first year medical students using case scenarios that pertained only to the endocrine system and the participating students could not be exposed to real life patients owing to time constraints of the first year MBBS course. A larger study with suitable cases pertaining to the entire curriculum of physiology would be necessary in order to generalize the results.

CONCLUSION

In spite of time constraints in the teaching schedule for first year medical students, inter-departmental cooperation is possible for carrying out CBL as an adjunct to TDL. Early clinical exposure of a relatively larger batch of students to CBL by the same facilitator was found to increase cognitive domain scores.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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