

ORIGINAL ARTICLE

IMPACT OF CONTEXTUAL LEARNING ON RETENTION OF KNOWLEDGE

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Background: Case stimulated learning approach provides a link between basic and clinical sciences. Learning in a contextual clinical situation motivates the students and has a positive impact on their assessment. The objective of this study was to assess the effectiveness of interactive and case stimulated teaching of endocrine physiology to medical students at the University of Lahore. **Methods:** In this comparative cross-sectional study, a total of 260 second year medical students of 2014 and 2015 batches were included through convenience sampling. In the first batch, a total of 137 students (43 males and 94 females) were offered interactive endocrinology lectures. Whereas, in the second batch, a total of 123 students (55 males and 68 females), were exposed to case stimulated teaching by the same facilitator. Multiple-choice questions were used to assess the students before and after the teaching sessions. The results of both sessions were analyzed by Student's *t*-test. **Results:** Students who were taught through case stimulated methodology performed better during examination as compared to those who were taught through conventional methodology (19.8 ± 0.4 vs 13.5 ± 0.3 , $p < 0.001$). **Conclusions:** Students retain knowledge for a longer time when it is relevant and applicable to clinical context. Use of case stories in classrooms promotes better understanding, and the question and answer activity helps in making critical decisions in clinical practice. Case stimulated learning strategy can be adopted not only to enhance academic performance but also to promote contextual learning.

Keywords: Case-stimulated learning, Assessment, Evaluation

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INTRODUCTION

Knowledge imparted with clinical relevance can be retained for longer periods of time as perceived relevance of the subject aids in knowledge retention and facilitates its application at later stages.¹ Highlighting relevance of basic sciences knowledge to clinical situations will guarantee retention of gained knowledge and its implication in the clinical practice.² The case stimulated learning provides a bridge between the core physiological concepts and clinical manifestations.³ It triggers the common human nature to learn from stories. Case stimulated learning approach facilitates better understanding of the relationship of normal functions with health and disease.⁴

Integrating simple clinical problems to improve interaction during lectures between students and text, among students and between student and teacher/facilitator has been exceedingly successful, and has been found to improve the student grades from good to excellent.⁵ Similarly, case studies aid in integrated learning and can be used to signify connections between academic topics and real-life issues.⁶ Case stimulated learning is expected to provide an early clinical introduction to the students in their preclinical education and consequently, aid in vertical integration.⁷

This study aimed to assess the effectiveness of contextual case stimulated learning of endocrine physiology among second year medical students of University College of Medicine and Dentistry (UCM&D), The University of Lahore.

SUBJECTS AND METHODS

It was a comparative, cross-sectional study carried out at University College of Medicine and Dentistry Lahore after getting approval from Ethical Board of the university. Written informed consent was also obtained from all the participants. Two hundred and sixty (260) students of 2nd Year MBBS class were recruited through convenience sampling. The students were divided into a control group, group I (Batch 2014–2018), including 137 students (43 males and 94 females) and an experimental group, group II (Batch 2015–2019), having 123 students (55 males and 68 females). Before commencement of the teaching session, both the groups underwent an exam (pre-test) to assess their basal level of knowledge.

After that, they were taught endocrine physiology by same facilitator through 15 interactive sessions. In group I, each session started with revision of key points of previous lecture. The lectures were delivered with the help of PowerPoint presentations which aided students' learning in the form of pictures, diagrams and videos. The students were also given assignments on important topics. However, in group II 'Case Stimulated Learning' approach was adopted to teach endocrine physiology. The students were given work sheets that included pre-class reading assignments, unlabeled figures, flowcharts and clinical scenario with several questions related to the case to be solved in class. In the beginning of the lecture, each case scenario was projected as a stimulus and described for the

students. The clinical scenario was based on simplified versions of clinical information necessary to illustrate selected basic physiological concepts. Several questions were listed after this information. During the interactive lecture, the facilitator served as a guide by the side and encouraged them to solve the questions in the work sheets, using their responses (correct and incorrect), and physiological concepts were discussed in the lecture.

At the end of teaching session both the groups again underwent an exam (post-test) to assess the academic performance. Assessment tool was the MCQs of C2 and C3 level.

The results of both exams were compared by using student's t-test using SPSS-24, and $p \leq 0.05$ was considered statistically significant.

RESULTS

Out of 137 students in group I, there were 43 (31%) males and 94 (69%) females whereas in group II there were 55 (45%) males and 68 (55%) females out of total 123 students.

There were no statistical differences between the pre-test scores of both groups (Table-1). However, in the post-test the performance of group II was significantly higher than group I. Similarly, in both groups the performance of male and female students was same in first assessment. However, significantly better results were obtained in the post-test for both the categories (Table-1).

Table-1: Comparison of exam scores between the two groups

Exam	Mean MCQ score		p
	Group I	Group II	
Pre-test	16±0.3	16±0.3	0.45
Post-test	13.5±0.3	19.8±0.4	<0.001*
Pre-test (Male students)	16±0.4	15±0.4	0.07
Post-test (Male students)	13.1±0.5	18.9±0.7	<0.001*
Pre-test (Female students)	16±0.4	17±0.5	0.11
Post-test (Female students)	13.7±0.4	20.5±0.5	<0.001*

*statistically significant

DISCUSSION

Students who were taught through case stimulated learning technique performed better in exam compared to those who were taught through conventional methods; therefore, supporting that contextual case stimulated learning is a more effective teaching and learning tool compared to conventional lectures. Even when we compared the marks of male and female students separately it showed the same results though the performance of female student was somewhat better than their male counterparts. In a study conducted at Kingsborough Community College, better examination scores were observed by incorporation of case studies in a genetic course.⁸ Case studies facilitate better participation in class activities which promotes better retention and enhanced academic performance.⁹

Our work establishes that creating an active learning environment and engaging students in the case stimulated learning can facilitate the students in retention of knowledge. This observation is supported by other studies reporting that active learning through activities during traditional lectures, promotes student engagement and aids in better understanding of the subject.^{7,10} The current study showed that presentation of content to be taught in the format of a story accompanied by questions and activities facilitates good academic performance. Analysis of the studies conducted at Buffalo and New York University, indicated that initiation of higher order thinking occurs by shifting from recall of knowledge to analysis and application by adapting contextual narrative approach like case studies and problem-based learning.¹¹⁻¹³ The results of our study are also comparable to a similar study done in Middle East Technical University, Turkey comparing two groups of high school students for the effects of contextual learning.¹⁴

Likewise, a survey conducted on perception of faculty members showed that students who were taught with case studies developed new ways of thinking and became active learners.¹⁵ In another survey the students' reactions were reported to be very positive towards case based learning and it was reported that they found it better than lectures and texts.¹⁶ There were a few studies which reported that the two teaching methodologies were almost equal in their outcomes, however, contextual learning might be more enjoyable for the students but the effectiveness is still to be determined.^{17,18}

CONCLUSION

Students retain knowledge for a longer period when it is relevant and applicable to clinical context. Use of case stories in classrooms promotes better understanding and the question and answer activity helps in making critical decisions in clinical practice. Case stimulated learning strategy can be adopted not only to enhance academic performance but also to promote contextual learning and make it more applicable during clinical practice.

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