

ORIGINAL ARTICLE

CLINICALLY ORIENTED TEACHING OF PHYSIOLOGY THROUGH CASE BASED LECTURING

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Background: Case based lecture is an interactive student centred approach that promotes active learning by interaction of students. These lectures generate knowledge, organise it in a meaningful sequential manner which helps to associate problem in the clinical case with disturbance in normal mechanisms. The present study was undertaken to analyse perception of students about case based lectures in teaching of Physiology. **Methods:** It was a cross sectional descriptive study carried out from January to December 2010 among second year medical students of Bahria University Medical & Dental College. Case based lectures were carried out on systems of gastrointestinal, renal, neuroscience, endocrine and reproductive Physiology. A self-reported questionnaire was designed to evaluate positive and negative responses of students on usefulness of these lectures. Frequencies of responses were analysed. **Results:** A total of 17 case based lectures were carried out in a batch of 100 students and the questionnaire was responded at a rate of 98%. Medical students; 67 (68%) were able to understand core content of subject and 64 (65%) recognised its structure and functional relationship. Case based lectures helped students; 69 (70%) to integrate knowledge of basic health sciences with pathological aspects, 63 (64%) to identify illness and 64 (65%) to understand disturbance in mechanism which gives rise to disease. **Conclusion:** Majority of medical students were able to understand core content of Physiology in context with structural and functional relationships and pathological aspects with identification of disease by case based lectures.

Keywords: Physiology, Case based lectures, Medical students, Medical Education

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INTRODUCTION

In this era of medical education, a combination of teaching methodologies can be acquired to facilitate learning among students who have different learning approaches.¹ Teaching of Physiology in this context is an art that transfers knowledge from instructor to student by means of competent teaching-learning exchange process.² The subject needs to be taught with comprehension of concepts and mechanisms together with orientation of clinical aspects of disease.³ The curriculum of teaching Physiology in Bahria University Medical and Dental College (BUM&DC) is thus based on large group discussions as interactive and case based lectures (CBL) and small group discussion attained by interactive tutorials, lab sessions, Problem based learning and seminars (Figure-1).⁴

In the large group discussions, interactive lectures (IL) is a prototype of conventional teaching in which lecturers outline course objectives, communicating with students through voice, gesture, movement, facial expression, and eye contact.^{5,6} CBL as part of large group discussions, facilitates self-directed learning and links the gap between subjects of basic and clinical sciences.⁷ There can be no single best way of learning with merits alone, so the effectiveness of any teaching tool can only be acquired by student's feedback.⁸ The objective of this study was to evaluate usefulness of CBL for teaching of Physiology in terms of perception of students.

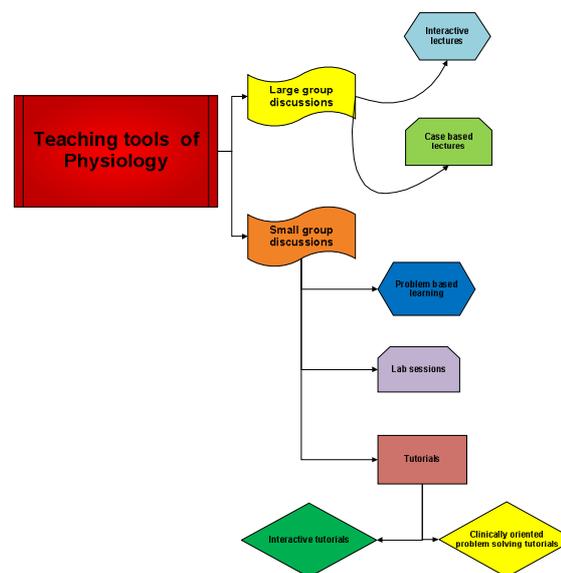


Figure-1: Representation of teaching tools for Physiology at BUM&DC

MATERIAL AND METHODS

It was a cross-sectional descriptive study conducted on second year MBBS students from January to December 2010 after approval from Ethical Review Board of BUM&DC. The academic hours allocated to interactive lectures were 111, out of which 17 hours were allocated for CBL of gastrointestinal, renal, neuroscience;

endocrinology and reproductive systems, (2, 3, 5, 6, and 1 hours respectively). Each clinical case scenario was jointly prepared by a team of two physiologists and one clinician, focused on the objectives of the content. The course objectives were displayed two to three days before CBL and all sessions were carried out by senior faculty members of the Department of Physiology. When a case was first introduced to them, students were given 5–10 min to discuss its physiological basis with their peers. The facilitators engaged the students in a learner centred environment and encouraged active participation to reach the final conclusion.

These lectures were evaluated by a self-reported questionnaire which was pre-tested and verified for error on group of 50 students. The reliability of the questionnaire was determined by measuring the related Cronbach's Alpha which was equal to 81%, indicating good consistency in the responses from study participants. Convenient sampling of 100 students was done and questionnaire was distributed after completion of three modules of gastrointestinal tract, renal, neuroscience endocrine and reproductive Physiology. The positive or negative responses, in terms of understanding: content, structure and functional relationship, difficult concepts, perception of pathological aspects, appreciation and application of basic science knowledge in health and disease were collected by six items of the questionnaire.

The data were analysed using SPSS-15. Frequencies of responses were analysed.

RESULTS

The responses were acquired from 98 students (62 females (63%) and 36 (37%) males) with an age range of 20±2 years. Usefulness in terms of comprehension of content of subject was valued by 67 (68%) students. These lectures helped 64 (65%) and 57 (58%) students to understand structural functional relationship and difficult concepts respectively. Students 69 (70%) were able to integrate knowledge of basic health sciences with pathological aspects, 63 (64%) were able to identify illness and 64 (65%) were able to apply this knowledge to evaluate health and disease (Table-1).

Table-1: Responses of students on usefulness of case based lectures [n(%)]

Objective	Responses
Able to comprehend content of subject	67 (68)
Able to recognize structure and functional relationship	64 (65)
Able to understand difficult concepts	57 (58)
Able to relate it with pathological aspects of disease	69 (70)
Integrate knowledge of basic health sciences with clinical aspects to identify illness	63 (64)
Apply this knowledge to evaluate health and disease	64 (65)

DISCUSSION

It has been observed that CBL is an effective interactive approach for students to learn biological processes in

relevant, real-world contexts that results in significant learning outcomes.⁹ These innovative approaches develop interest, cultivate curiosity, facilitate argument and foster discussion among the students to improve their learning capabilities and eventually performance in examination.¹⁰ The response obtained from students at the same time can be employed to bring change in teaching methodologies and promote competency based curriculum.^{11,12}

Integration is a key issue in medical undergraduate programs in both conventional and hybrid medical curriculum where basic sciences are taught in first two years of teaching then recalled and integrated later in clinics.⁴ It has been observed that learning when placed in the context of a case integrates student theoretical knowledge with understanding of the basic and clinical sciences.¹³ In our study, questions asked during CBL enabled students to understand the physiological disorders in integration with the clinical presentation. The results are comparable to a study in which CBL improved understanding of subject of Biochemistry.¹⁴ The encouragement and motivation by the tutor further helped to boost confidence and reinforce the objective to identify the disease and treat the patient. The results thus empower CBL to be a successful teaching methodology in terms of linking theory to practice, by students as well as tutors.¹³

In the journey from school leaving to medical practice, practitioners face a number of hurdles before they become competent medical practitioners.¹³ The use of CBL for teaching large group of students has been applied in various subjects like radiology, vascular Physiology, cardiovascular and respiratory Physiology to bridge this gap between basic and clinical sciences.^{9,15,16} The relationship of functions with structure and disturbance that causes illness is the essence of teaching by way of clinical cases. In another study done on clinically oriented problem solving tutorials conducted after the interactive lectures, students developed reasoning skills interactive attitudes and were able to integrate subjects as a result of exposure to clinical scenario.³

Difficult concepts in any subject can be taught by stimulating, pertinent, well planned and open ended questions.^{3,9} Majority of students in our study were able to comprehend the difficult concepts which is similar to an observation made by Brian et al who demarcated the understanding of students by using pre and posttest.⁹ Our medical students reported that the higher-order thinking skills with orientation to relevant, real-world contexts can be applied in clinical practice for the benefit of patients.

The study has a number of limitations like small sample size, conducted in just one medical college, did not compare CBL with IL and no pre or post test was done to evaluate the intervention (CBL).

Nevertheless it is the first study done on CBL at BUM&DC in Pakistan which may help to introduce and implement a number of innovations in teaching strategies after taking feedback from the stake holders.¹⁷⁻¹⁹ The continuation of CBL will be another step to facilitate and improvise better understanding among learners. The implementation will be a step to enhance understanding of Physiology subject, clear the misconceptions and develop the ability to apply this knowledge and skill for the treatment of patient.

CONCLUSION

Medical students valued CBL as an important tool for understanding the pathological aspects that form a bridge between health and disease. They were able to comprehend the content and its difficult concepts in association with structural and functional relationship by clinical cases presented during discussions.

RECOMMENDATION

CBL should be introduced in teaching curriculum of Physiology in both conventional and hybrid medical colleges.

REFERENCES

1. Rehman R, Khan R, Akhail MA, Hassan F. Approach of freshly inducted medical students towards learning at Bahria University Medical & Dental College. *J Pak Med Assoc* 2013;63(3):320-6.
2. Singh S, Savita S, Gautam S. Teaching styles and approaches: medical students' perceptions of animation-based lectures as a pedagogical innovation. *Pak J Physiol* 2009;5(1):16-9.
3. Kamran A, Rehman R, Iqbal A. Importance of Clinically Oriented Problem Solving Tutorials (COPST) in teaching of Physiology. *Rawal Med J* 2011;36(3):232-6.
4. Rehman R, Iqbal A, Syed S, Kamran A. Evaluations of integrated learning program of undergraduate medical students. *Pak J Physiol* 2011;7(2):37-41.
5. Rehman R, Afzal K, Kamran A. Students' opinion about usefulness of interactive lectures in conventional and hybrid medical colleges. *Pak J Physiol* 2013;9(1):7-10.
6. Rehman R, Afzal K, Kamran A. Interactive lectures; A perspective of students and lecturers. *J Postgrad Med Inst* 2013;27(2):152-6.
7. Hodgest LC. From Problem-based Learning to Interrupted Lecture using case-based teaching in different class formats. *BAMBED*, 2005;33(2):101-4.
8. Rehman R, Syed S, Iqbal A, Rehan R. Perception and performance of medical students in objective structured practical examination and *viva voce*. *Pak J Physiol* 2012;8(2):33-6.
9. Rybarczyk BJ, Baines AT, McVey M, Thompson JT, Wilkins H. A case-based approach increases student learning outcomes and comprehension of cellular respiration concepts. *BAMBED* 2007;35(3):181-6.
10. Latif R. Impact of case-based lectures on students' performance in vascular physiology module. *Adv Physiol Educ* 2014;(38)3:268-72.
11. Rehman R, Razi S, Syed S. Impact of alterations in teaching methodologies on learning capabilities. *J Pak Med Assoc* 2011;61:982-6.
12. Rehman R, Iqbal A, Rehan R. Do adults learn by experience; Students' perceptions and performance in Neuro Physiology Lab Course? *Rawal Med J* 2012;37(2):206.
13. Hudson JN, Buckley P. An evaluation of case-based teaching: evidence for continuing benefit and realization of aims. *Adv Physiol Edu* 2004;28:15-22.
14. Nair SP, Shah T, Seth S, Pandit N, Shah GV. Case based learning: a method for better understanding of biochemistry in medical students. *J Clin Diagn Res* 2013;7(8):1576-8.
15. Dullo P, Pathare NA. Case based methodology: A method to enhance the learning of physiological basis of cardiovascular and respiratory system to undergraduate medical students. *Am J Educ Res* 2013;19(10):425-9.
16. Tathe SS, Singh AL. Case based lectures versus conventional lectures for teaching medical microbiology to Undergraduate students. *Int J Cur Res Rev* 2014;6(4):35-41.
17. Rehman R, Rubab Z, Usmani A, Rehan R. Problem Based Learning Development Program at Bahria University Medical and Dental College. *Pak J Med Dent* 2013;2(2):21-6.
18. Rehman R, Khan AN, Kamran A. Role of small group interactive sessions in two different curriculums based medical colleges *J Pak Med Assoc* 2012;62(9):920-3.
19. Rehman R, Rubab Z, Usmani A, Rehan R. Steps towards implementation of modular hybrid system at Bahria University Medical & Dental College. *J Postgrad Med Inst* 2014;28(1):98-102.

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