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RESEARCH ARTICLE
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CASE BASE LEARNING

Imran Jawaad[1*], Sadia Sharif[2], Mahwash Shoaib[3], Qurrat-ul-ain Leghari[4], Sadia Irshad Leghari[5], Gulrez Amin[6]

[1*]Professor Forensic Medicine, University College of Medicine, The University of Lahore
[2]Professor Histopathology, UCMD at University of Lahore
[3]Assistant Professor Radiology, Punjab Institute of Neurosciences
[4]Senior demonstrator medical education, UCMD at University of Lahore
[5]Senior demonstrator Medical Education UCMD, University of Lahore
[6]Professor Biochemistry, University College of Medicine and Dentistry, The University of Lahore

***Corresponding Author:** Imran Jawaad
*Email: imranjawaad@hotmail.com

Abstract

Introduction: Medical teaching in Pakistan is following the same traditional way as set by Flexner a century ago, i.e. basic subjects has been distinguished from clinical subjects, majority of the basic subjects are taught until 3rd year of MBBS whereas clinical subjects are taught from 4th year onward. This system strengthens basic knowledge but lacks clinical skills which later are going to go a long way during the life of the doctor.

Objective: To encourage students to opt for problem-based learning approach relevant to the basic science subject and integrate it with clinical scenario, thus motivating them to become self-learners.
To polish their communication skills and understand the dynamics of group discussion.
To adopt peer assisted learning as a learning methodology.

Material and Method: A case of multinodular goiter should be designed. Initially, facilitators from department of physiology, medicine and surgery were trained. At the next step 75 students were engaged in the study. A lecture covering the physiology of thyroid gland was delivered to these 75 students. Later on, these students were divided into small groups of 15 students each headed by a facilitator. Clinical investigations were also provided to students so that they could relate them with the basic knowledge.

Study design: Cross sectional study.

Setting: The study is conducted in collaboration with medical education, physiology, medicine and surgery department of Central Park Medical College Lahore.

Duration: 1st February 2022 to 30th September 2022.

Data Collection: Data was collected through a questionnaire after pilot study.

Results: CBL was acknowledged by majority of the students (87.1%). Self-learning and effective solving of problems also showed improvement in about (82%) of the students. 72.9% of the students were satisfied with the integration between basic and clinical subjects through CBL. Improvement in communication skills was observed by 78.9% of the students, 70% of the students were helped to understand the concept of group dynamics through this program. Better relationships with teacher were appreciated by 81% of the students.

Appreciation of CBL was also acknowledged by facilitators. CBL is supported by more than 86% of the teachers as a very effective method of teaching and learning, as it facilitates self-learning and

problem-solving abilities of the students, is a good platform for teacher-student communication, grooming students to follow group dynamic ethics.
Conclusion: Students as well as teachers appreciated case-based learning as a good means of imparting knowledge and encouraged to incorporate it in future educational programs.

Key words: Case based learning, self-learner, group discussion, communication skills.

Introduction

The traditional method of teaching at medical colleges in Pakistan is followed in a way that basic medical sciences have been distinguished from clinical subjects and taught as an individual subject(1). This practice of teaching and learning is based on memorizing the subject with limited number of clinical skills. The competencies mentioned in the medical council of Pakistan which are expected to be present in a medical graduate is that he should be able to work independently, which does not match the way curriculum is delivered to the students(2).

All such graduates have a sound knowledge of medical subjects but lacks the clinical skills which they are supposed to practice throughout their life(3). The margin of improvement in the present curriculum is so wide that it requires a large period to convert the system to fulfil the requirement of the modern age. With the changes in scientific knowledge, requirements of the society there is a dire need for medical students to become self-directed learners(4).

The political changes have also influenced the medical profession. The objective with the current leadership is to bridge the gap between basic and clinical subjects, integrate the subjects of medical sciences in such a way to make understanding of the students clearer and comprehensive, polish learning and communication skills of the students, early clinical exposure to students of those cases they are going to deal in their professional carrier in the form of small group discussion and case based learning(5).

CBL, case based learning is one of the methods in vogue to enhance learning of medical students(6). It drives students to become self-learners and integrate their knowledge to solve problems at their own. It is quite close to small group discussion method in which students have an advantage to discuss the case under discussion with their teacher in a small group. The objectives of the study were defined as

- To encourage students to opt for problem-based learning approach relevant to the basic science subject and integrate it with clinical scenario, thus motivating them to become self-learners.
- To polish their communication skills and understand the dynamics of group discussion.
- To adopt peer assisted learning as a learning methodology.

Material and Method

The study is conducted in collaboration with medical education, physiology, medicine and surgery department of Central Park Medical College Lahore. The department of medical education played a leading role by supervising all the proceedings. After discussion it was decided that a case of multinodular goiter should be designed. Initially, facilitators from department of physiology, medicine and surgery were trained. At the next step 75 students were engaged in the study, they were explained about the study and written consent was obtained from them.

A lecture covering the physiology of thyroid gland was delivered to these 75 students. Later on, these students were divided into small groups of 15 students, each headed by a facilitator. A case of multinodular goiter written on a paper was given to these students with a difference of one week in two sessions. Ample time was given to students to study and discuss the case. Students were asked to narrate objectives of the case. A list of references was provided to them for discussion in next session. During the next session they were provided with clinical investigations so that they could correlate the initial findings with investigation and solve the case.

The role of facilitator in the whole case was to guide students so that they should be on the right track, to answer the queries and streamline the whole process. Survey of students and feedback of facilitator was done on a 5-point Likert scale from strongly disagree to strongly agree. To evaluate

the effectiveness of the program two tests comprising of MCQs covering cognition, understanding and interpretation were conducted one at the beginning of the program i.e. pretest and other at the end of the program i.e. post-test.

Statistical analysis

Before intervention a questionnaire based on 10 points was provided to students. The same survey based on 10 points was repeated after CBL. It was implemented by all the facilitators who measured pre and post-test intervention impact on their tests. Each facilitator provided an average of pre and post intervention score of students. To determine comprehensive impact of intervention, a nonparametric Wilcoxon rank-sum test was used. Statistical analysis was done by using SPSS software and statistical significance was tested at 5%.

Results

A total of 75 students were enrolled for the program, out of which 70 attended both sessions. After comparing both test scores significant improvement in the performance was observed (p=0.017) which was evidence of how effective the program was. CBL was acknowledged by majority of the students (87.1%). Self-learning and effective solving of problems also showed improvement in about (82%) of the students. 72.9% of the students were satisfied with the integration between basic and clinical subjects through CBL. Improvement in communication skills was observed in 78.9% of the students, 70% of the students were helped to understand the concept of group dynamics through this program. Better relationships with teacher were appreciated by 81% of the students. The summary of results is show in Table 1.

Table 1: Summary of Key Findings from the Results Chapter

Variable	Percentage (%)	Remarks
Acknowledgment of CBL by students	87.1%	Majority of students found CBL beneficial.
Improvement in self-learning & problem-solving	82%	Students demonstrated enhanced problem-solving skills.
Satisfaction with integration of basic & clinical subjects	72.9%	CBL helped students relate basic and clinical sciences.
Improvement in communication skills	78.9%	CBL contributed to better communication among students.
Understanding of group dynamics	70%	Students learned teamwork and peer collaboration.
Better relationships with teachers	81%	CBL fostered student-teacher interaction.
Support for CBL among faculty	86%	Faculty acknowledged CBL as an effective learning method.
Statistical significance	p = 0.017	Significant improvement in test scores post-CBL.

*This table presents the key outcomes of the study, highlighting students' and faculty's perceptions of Case-Based Learning (CBL) and its impact on various educational aspects, including self-learning, problem-solving, communication skills, and integration of basic and clinical sciences. Statistical significance (p = 0.017) indicates a measurable improvement in student performance post-CBL implementation.

Appreciation of CBL was also acknowledged by facilitators. CBL is supported by more than 86% of the teachers as a very effective method of teaching and learning, as it facilitates self-learning and problem-solving abilities of the students, is a good platform for teacher-student communication, grooming students to follow group dynamic ethics. The feedback by teachers for CBL was that it should be a regular part of faculty training program.

Discussion

Traditional strategy of teaching physiology is by didactic lectures and practicals. The method which promotes better understanding of the subject and provides open forum through group discussion have so far not been devised. In Pakistan curriculum is provided by the university with which medical college is affiliated. This does not leave much room for the teachers at the college of derive their own ways and strategies of teaching as all such lectures have to be delivered through didactic teaching, in a qualitative study conducted in 2018 by Pedersen K, Moeller MH, Paltved C, Mors O, Ringsted C, Morcke AM and another study conducted by Sivarajah RT, Curci NE, Johnson EM, Lam DL, Lee JT, Richardson ML in 2019 supports the present study(7, 8). Although didactic lectures are a powerful method of teaching particularly to a large group of students, but it has a lot of limitations, in a study conducted in 2018 by Frolova E, Ryabova T, Rogach O and another study conducted by Alokluk JA about the effectiveness of Blackboard system, and its limitations in 2018 is in favor of our study(9, 10). The information provided to the students is passive without any application or problem solving skills, in a study conducted by Ananthy V, Narayanan S, Asokan A about different learning approaches in Determining Learning Outcome During Active and Passive Learning Sessions in Pharmacology supports the current study(11). Alternative to didactic lectures is available such as CBL which provide a new teaching method with better retention and problem solving approach, in a study conducted in 2020 by George T, Carey RA, Abraham O, Sebastian T, Faith MF in which young residents support CBL to be a preferred source of learning than traditional system which supports our finding(12).

CBL provides an opportunity for students to discuss a clinical case at undergraduate level where they can evaluate and understand the concept of higher order thinking, in a study conducted in 2019 about impact of CBL on higher order thinking by Yulianto T, Pramudya I, SLAMET İ supports our finding(13). It provides an opportunity for active learning, polishing communication skills, respecting the opinion of peers and understand group dynamics in a limited time frame, a study conducted in 2020 by Gold JM, Collazo RA, Athauda G, Obeso VT, Toonkel RL supports the present study(14).

This study has highlighted the enhanced learning skills of students and provides them with an opportunity to answer basic science questions for clinical cases. Retention of the topic was enhanced greatly as discussion of same topic was done by different subject specialists, a study conducted in 2017 by Kulak V, Newton G, Sharma R supports the idea that CBL improves the retention ability which is in favor of our finding(15).

When compared with traditional system of education it was observed that through CBL students were the active learners, where they developed the habit to analyze clinical cases and they could apply basic science knowledge to clinical cases and understand the importance of basic science subjects on which the foundation of clinical cases is based, a study conducted in 2021 by ZENG T, CHEN H supports the present study(16).

When a comparison was done between CBL and PBL i.e. problem based learning, students preferred CBL a more useful method of teaching and learning as it provides more opportunities to solve clinical cases in a short time period, as study conducted in 2021 by Dong W supports the current study(17).

The facilitators of each group also recorded their views about CBL and found it to be very interesting as it was a new experience for them also, a study conducted in 2020 by Wiyarsi A, Damanhuri MI, Fitriyana N supports the present study(18). They recorded their expressions as more joyful and were impressed how easily this method of teaching increased their knowledge about new method of teaching and learning which was very effective and useful for the students, in a

descriptive qualitative study conducted in 2021 by Tang ACY, Chow MCM supports the finding of the present study(19). They were quite excited to experiment more with new methods of teaching and assessment. This experimental method of teaching at our college proved to be very fruitful and encouraged students and the teachers to adopt this strategy across the college.

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References:

1. Vadakedath S, Kandi V. Modified Conventional Teaching: An Assessment of Clinical Biochemistry Learning Process Among Medical Undergraduate Students Using the Traditional Teaching in Combination with Group Discussion. Cureus. 2019;11(8).
2. Sethi A, Wajid G. Continuing Professional Development for Doctors in Pakistan is need of the hour. Health Professions Educator Journal. 2020;3(1):7-8.
3. Bennett LL. The Gap Between Nursing Education and Clinical Skills. ABNF Journal. 2017;28(4).
4. Tekkol İA, Demirel M. An investigation of self-directed learning skills of undergraduate students. Frontiers in psychology. 2018;9:2324.
5. Husain M, Khan S, Badyal D. Integration in medical education. Indian Pediatrics. 2020;57(9):842-7.
6. Zhao W, He L, Deng W, Zhu J, Su A, Zhang Y. The effectiveness of the combined problem-based learning (PBL) and case-based learning (CBL) teaching method in the clinical practical teaching of thyroid disease. BMC medical education. 2020;20(1):1-10.
7. Pedersen K, Moeller MH, Paltved C, Mors O, Ringsted C, Morcke AM. Students' learning experiences from didactic teaching sessions including patient case examples as either text or video: a qualitative study. Academic Psychiatry. 2018;42(5):622-9.
8. Sivarajah RT, Curci NE, Johnson EM, Lam DL, Lee JT, Richardson ML. A review of innovative teaching methods. Academic radiology. 2019;26(1):101-13.
9. Frolova E, Ryabova T, Rogach O. Interactive technologies of forming the students"media competence: opportunities and limitations of their use in Contemporary educational practice. Медиаобразование. 2018(4).
10. Alokluk JA. The effectiveness of Blackboard system, uses and limitations in information management. Intelligent Information Management. 2018;10(06):133.
11. Ananthy V, Narayanan S, Asokan A. Role of Learning Approach in Determining Learning Outcome During Active and Passive Learning Sessions in Pharmacology.
12. George T, Carey RA, Abraham O, Sebastian T, Faith MF. Trainee doctors in medicine prefer case-based learning compared to didactic teaching. Journal of family medicine and primary care. 2020;9(2):580.
13. Yulianto T, Pramudya I, SLAMET İ. Effects of the 21st century learning model and problem-based models on higher order thinking skill. International Journal of Educational Research Review. 2019;4:749-55.
14. Gold JM, Collazo RA, Athauda G, Obeso VT, Toonkel RL. Taking CBL to the Lecture Hall: a Comparison of Outcomes Between Traditional Small Group CBL and a Novel Large Group Team-Based CBL Teaching Method. Medical Science Educator. 2020;30(1):227-33.
15. Kulak V, Newton G, Sharma R. Does the Use of Case-Based Learning Impact the Retention of Key Concepts in Undergraduate Biochemistry? International Journal of Higher Education. 2017;6(2):110-20.
16. ZENG T, CHEN H. Evaluation of CBL application effect in clinical practice teaching of cardiothoracic surgery. Chinese Journal of Medical Education Research. 2021:63-5.

17. Dong W. Application of Cbl and Pbl in Oncology Teaching Reform to Cultivate Students' Comprehensive Ability. Transactions. 2021;3:31-4.
18. Wiyarsi A, Damanhuri MI, Fitriyana N. EXPLORING PRE-SERVICE CHEMISTRY TEACHERS'PROBLEM SOLVING SKILLS ON VOCATIONAL CONTEXT-BASED LEARNING. Jurnal Kependidikan: Penelitian Inovasi Pembelajaran. 2020;4(2):185-99.
19. Tang ACY, Chow MCM. Learning Experience of Baccalaureate Nursing Students with Challenge-Based Learning in Hong Kong: A Descriptive Qualitative Study. International Journal of Environmental Research and Public Health. 2021;18(12):6293.

Annexure

CBL questionnaire feedback from students

Q1. CBL is a superior method of teaching/learning as compared to conventional method of teaching
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q2. CBL encourages students to be self-directed learners and polishes their skills of problem solving
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q3. CBL is useful to recall and apply knowledge to clinical scenario
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q4. CBL is effective in retaining knowledge
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q5. CBL enhance the understanding of group dynamics
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q6. CBL provides an opportunity to students to acquire information from experienced teachers
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q7. CBL is a good platform for teachers to improve their teaching skills
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q8. CBL encourages a strong student-teacher relationship
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.

CBL questionnaire for teacher's feedback

Q1. Compared to conventional teaching method, CBL is a better method
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q2. Self-study and problem solving skills are polished by CBL
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q3. Recall of memory is better with CBL during its correlation with clinical cases
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q4. Communication skills are improved with CBL
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q5. Understanding of group dynamics are improved with CBL
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q6. Opportunity to acquire knowledge with CBL
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q7. CBL provides an opportunity for the facilitators to polish their skills
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.
Q8. Development of strong teacher-student relationship
Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.