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Effectiveness of cased-based learning (CBL) model in clinical practice of orthopedic graduates

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ABSTRACT:

Objective: The primary objective was to evaluate the effectiveness of case-based learning on the clinical practice of orthopedic graduates.

Design: Mixed qualitative and quantitative study

Place and duration of study: This study was conducted at DHQ hospital Narowal for a period of 3 months from January 2023 to March 2023.

Methodology: Six medical officers working in the orthopedics department were recruited for the study through purposive sampling after taking consent. Three CBL sessions were conducted involving common case scenarios. MCQ based pretest and posttest was taken to assess the improvement in knowledge. Feedback was taken from the students using the 5-point Likert scale. Statistical analysis was done using SPSS-16.

Results: Significant improvement was noted in students' performance by the comparison of pre-test and post-test scores(P<.001). According to most students (83.3%) CBL had a positive impact in promoting understanding, problem-solving skills, and better student-teacher relationship. Most of the students (66.7%) in our study were of the view that CBL was a better method of teaching and learning as compared to the traditional lectures. All the students strongly agreed that CBL helped in better retention of knowledge. More than 65% of students felt that CBL improved their communication and team-work skills.

Conclusion: According to our study CBL sessions enhanced the quality of learning among the doctors. It allowed them to follow a structured approach to problem-solving in clinical cases routinely encountered in their specialty and enhanced their critical thinking. Hence CBL sessions should be a regular part of the teaching curriculum of doctors at our hospital.

Keywords: Case-based learning, critical thinking, problem solving

Introduction:

Traditionally, students have been taught through lectures, practical and tutorials in the initial years of medical school and then enter patient care with no previous training. Lectures no doubt play a powerful role in delivering information to a large number of people quickly but there are some limitations. They are a passive method of learning for students and do not teach critical thinking and problem-solving skills which are essential for professions such as doctors.[1] The medical profession is a practice-based profession and requires development of integrative clinical reasoning and clinical application of knowledge.

CBL is one such method that fulfills these requirements and is an active method of learning which makes education of medical students effective to improve their performance and ability of case analysis.[2] It is a structured teaching and learning methodology based on constructivist theory.[3] It prepares the doctors for clinical care of patients by linking science and clinical practice.

It was first started in 1912 by Dr James Lorrain while teaching pathology at the University of Edinburgh. In CBL, a teacher presents a real-life case as a scenario and the students study the cases in the form of small groups. The learning objectives are preidentified and students are guided regarding the preparatory material for advance preparation of case discussion.[4] CBL is centered on well-structured clinical problems through which students identify their needs of learning requirements and focus on application of knowledge with correlation of theory into practice.[5] The teacher's role is that of a facilitator only and not to give pure knowledge. As students are actively involved, it promotes their ability to analyze and learn application of

knowledge in clinical scenarios for treatment of patients. It promotes independent learning in students with deeper understanding of topics and makes them lifelong learners.[6] It involves guided inquiry and is based on CONSTRUCTIVISM where students learn from their knowledge to form new meanings by interaction of their knowledge and environment clinical case.[7]

Our study was conducted at District Headquarter Hospital Narowal where traditional method of teaching and learning is being followed in form of lectures, tutorials, and bedside teaching of doctors. Hence, we thought of starting CBL sessions as a pilot project in our institute. The purpose was to assess their effectiveness in improving the academic performance and critical thinking and problem-solving skills of the doctors working there in the orthopedics department. So that CBL can be incorporated in the teaching plan of doctors and supplement them with a new method of teaching and learning.

Methodology:

Our study was conducted in the department of Orthopedics at District Headquarters Hospital, Narowal from January 2023 till March 2023 with six medical officers working on day and night rotations recruited through purposive sampling. They were involved in handling emergencies and outpatient cases under supervision of consultants of orthopedics department. This was a mixed qualitative and quantitative study. The study was approved by the Institutional Review Committee (IRC/5074/MS).

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A CBL teaching plan was designed after discussion with the unit. Three topics were chosen, and study was conducted over a period of two months. A list of learning objectives for each topic was formulated. Scenarios based on real-life cases and the learning objectives were disseminated to the resident doctors. They were also guided for preparation in advance. They were asked to understand the scenario and discuss the cause, diagnosis, and management plan for that case. The CBL was facilitated by one of the faculty members. Before starting with case-based discussion, the doctors were required to complete a pretest based on multiple choice questions (MCQ). They were then given half an hour to discuss the case and answer the questions. At the end of each session, they were again asked to give a test comprising of the same questions in the pretest. They cycle was repeated for each selected topic. Feedback was taken from the students to assess their attitude towards CBL using a questionnaire. The questionnaire had nine questions regarding the effects of CBL on their learning, application of knowledge, communication and problem-solving skills and teamwork. They were asked to answer the questions using a 5-point Likert scale varying from strongly disagree to strongly agree. The attitude survey was validated by the previous studies.[8]

There were 10 questions that the students attempted in the pre and posttest sessions. Hence, a score out of 10 was obtained for each student. The results of pretest and posttest were compared using the paired T-test. P-value of less than 0.01 was considered statistically significant. Statistical analyses also included descriptive statistical tests and were done using SPSS version 16.0.

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Results:

All the 6 orthopedic graduates attended the CBL sessions. Significant improvement was noted in students' performance by the comparison of pre-test and post-test scores(P=.004) which reflected that CBL was an effective tool to achieve the learning objectives (Fig.1). 66.7% thought that CBL was a better method of teaching and learning as compared to the traditional lectures. According to the majority of students (83.3%) CBL had a positive impact in promoting understanding, problem-solving skills and better student-teacher relationship. All the students strongly agreed that CBL helped them in better retention of knowledge. More than 65% of students felt that CBL improved their communication and teamwork skills (Fig. 2)

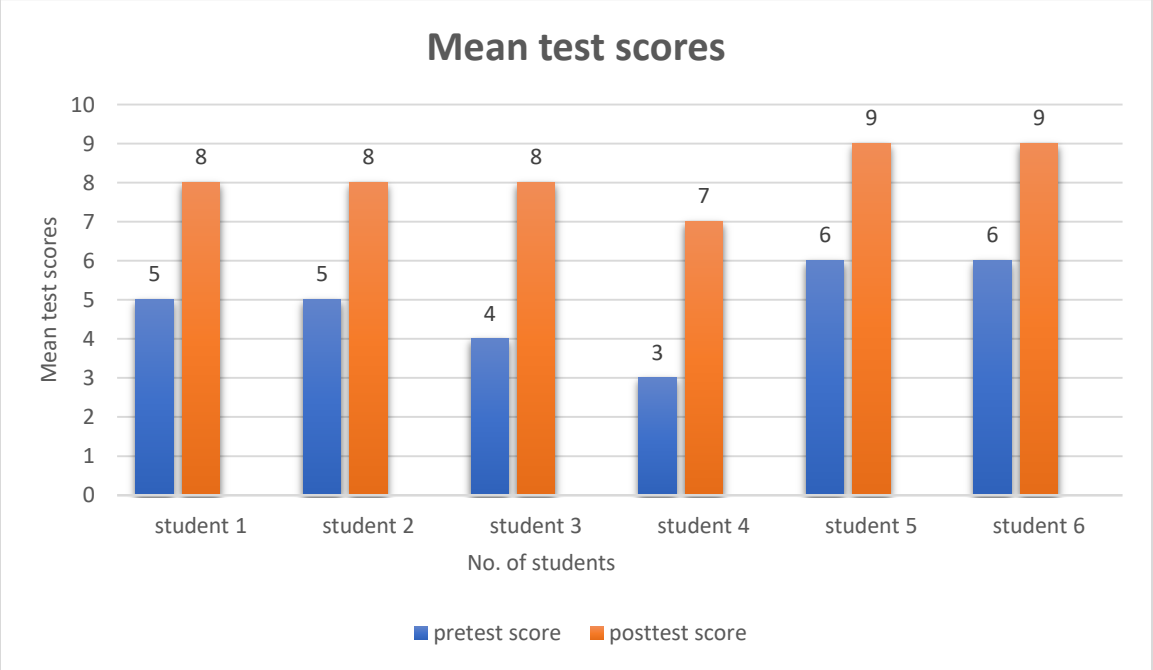

Fig. 1 Bar chart showing mean test scores before and after the CBL session for 6 students.

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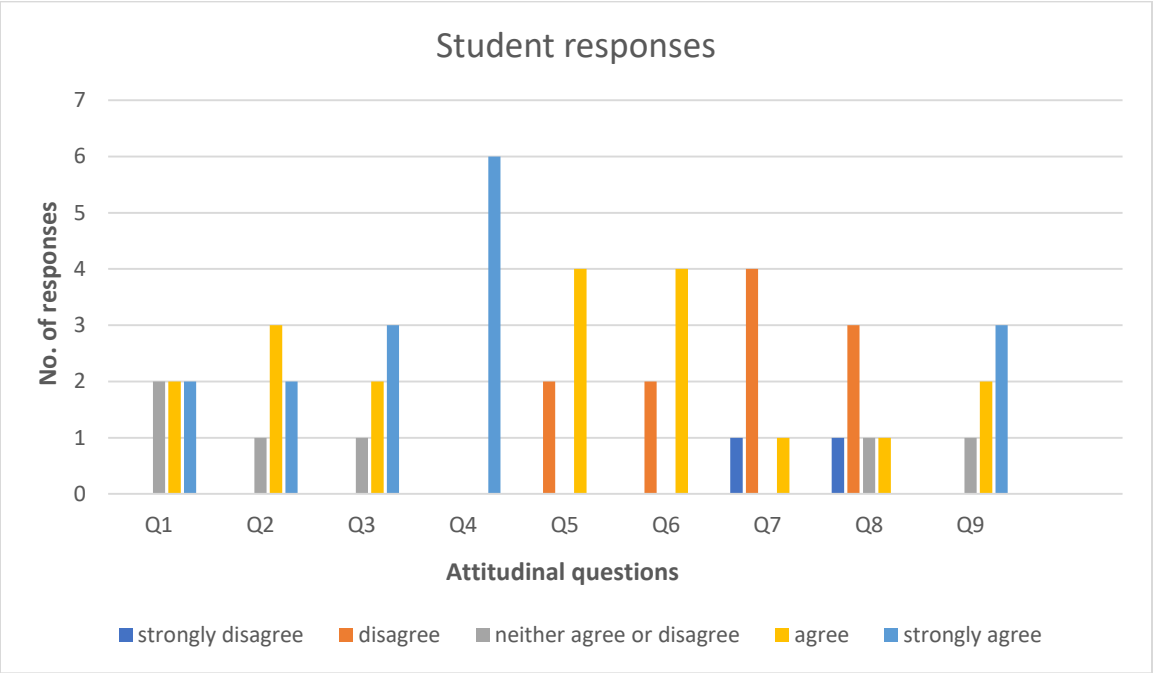

Fig. 2 Bar chart showing student responses on Likert scale.

Discussion:

Clinical thinking skills and communication are essential skills for doctors. Errors in clinical reasoning can lead to morbidity and mortality.[9] Case-based learning is a useful and effective pedagogical method that promotes clinical reasoning, develops critical thinking, and enhances in-depth, active learning.[10]

In the present study, 83.3% of the medical doctors agreed that CBL had a positive impact in promoting understanding, problem-solving skills and better student-teacher relationship which is consistent with the results of other studies.[8,11] The students get a chance to increase their knowledge by active participation and learning is significantly enhanced. According to Kantar

and Sailian (2018) CBL is highly effective in enhancing the critical thinking and clinical reasoning and decision-making skills.[12]

Most of the students (66.7%) in our study were of the view that CBL was a better method of teaching and learning as compared to the traditional lectures. Similar results were found in a study of nursing students which showed that CBL resulted in better understanding of knowledge when compared to lecturing.[13] In a study done in Turkey, the dental students taught with the CBL methodology scored higher than the students taught with lecture based learning.[14]

CBL helps with better retention of knowledge and increases the confidence of the students on the topic being taught. This was reflected in our study by significant improvement of students' performance when the results of their pre-test and post-test were compared and the difference was found to be statistically significant(P=0.001). All the doctors in our study also agreed on this overwhelmingly in the feedback taken from them. A randomized controlled trial comparing case-based learning and traditional teaching method showed that CBL was more useful in summarizing the knowledge and a powerful tool for learning.[15] A systematic review done on undergraduate medical and nursing education showed that this tool helped them retain the details and facts and improved in-depth learning.[16]

Doctors need to be effective communicators to deliver better patient care and counseling of patients. Those doctors have a high patient satisfaction rate who have good communication skills. Our graduates felt that CBL improved their communication and teamwork skills. These

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findings are in line with several research that showed that students were more satisfied with CBL due to the group learning process. It improved their communication through discussion in small groups. The interaction between classmates was enhanced.[17,18]CBL is a more effective way of improving the communication skills as suggested by Yoo et al. in their study carried out on nursing students.[19] Another benefit of CBL reported by the doctors was improved teamwork. Due to their participation in small group discussion, they had an increased desire to help other team members. Hence their ability to work as a team was significantly enhanced. Tayem et al. examined the effect of small group case-based learning in pharmacology among medical students and found that CBL improved the communication skills and ability to work as a team significantly.[20]

Hence the findings of our study are encouraging to introduce CBL as part of the teaching program for trainee doctors in their respective specialties. However, our study had certain limitations. Firstly, it was conducted in only one of the clinical departments at our hospital. Secondly, the sample size was small for generalizing the results.

Conclusion:

According to our study CBL sessions enhance the quality of learning among the doctors. It allows them to follow a structured approach to problem-solving in clinical cases routinely encountered in their specialty and enhances their critical thinking. Doctors enjoy CBL as they get to work as a team leading to improvement in communication skills and teamwork. Hence it

is recommended that CBL sessions should be made part of the teaching curriculum of doctors in all specialties working at our hospital.

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