Original Article

Perception, Knowledge, and Attitude of Problem-based Learning among Dental College Students in India: A Closed-ended Questionnaire Study

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Context: Problem-based learning (PBL) is mostly a student-centered learning method, and it is a new method used in medical and dental education all over the world. In India, PBL is a part of the learning process sparingly followed. Contrary to other institutions, PBL has been introduced in dental curriculum along with the traditional curriculum very recently. Aim: The aim of this study was to evaluate the newly introduced PBL curriculum among the dental students using a closed-ended questionnaire on a five-point scale. Materials and Methods: The questionnaire on PBL was prepared in Google Forms, comprising 22 closed-ended questions on a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). We carried out a pilot study in 10% of the target population to check validity and feasibility. Final study was conducted in the targeted population of 185 dental students who had undergone PBL sessions. Results: The responses for the questionnaire thus received from the students were compiled and analyzed using Google Forms software. Overall rating of PBL by the respondents was as follows. The majority of the student’s responses were agreed with 54.6% and a significant number of students strongly agreed with PBL at 33%. Conclusions: This study shows the responses of the students on aspects of group learning, imparting content knowledge, improvement of group skills, improvement of communication skills, and carrying out self-directed learning within the Indian context of dental health education.

Keywords: Dental college, India, problem-based learning, questionnaire study

INTRODUCTION

Learning is not just mere memorization, but it is a process of actively building up of knowledge. In problem-based learning (PBL), real case scenarios or original problems will become the starting point of learning. Kendal–Wright and Kasuya[1] reported that in the traditional method of learning, there is only one way of communication, and students learn passively. Howard Barrows and his colleagues introduced PBL in McMaster University in Hamilton, Ontario, Canada in 1960s.[2] PBL is a student pedagogy method of teaching and learning where simplification of complex problems are conducted. In this method, learning concepts and principles become more important than memorizing facts and concepts. In addition, PBL promotes the ability to think critically, to solve problems, and to communicate skillfully. It can also improve the capacity of the students to work in groups, exploring research materials, and life-long learning.[3] PBL is a new method used in medical and dental education all over the world. PBL is widely accepted in most curricula worldwide, but since the introduction in India, PBL is a part of

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the learning process only in very few institutions. It has been introduced in Vinayaka Missions Research Foundation (Deemed to be University), Salem, Tamil Nadu, India, in dental curriculum along with the traditional curriculum.

The aim of the study was to evaluate the newly introduced PBL curriculum among the dental students using a closed-ended questionnaire on a five-point scale with an objective to identify the perception, knowledge, and attitude of dental students toward PBL.

**Subjects and Methods**

**Introduction of problem-based learning**

An introductory lecture and hands-on workshop about PBL were conducted for teaching staff by a resource personnel from Penang International Dental College, Penang, Malaysia. The second step was to form a PBL committee comprising all the teaching faculties, who were introduced to PBL through lectures and workshops by coordinator. The third step was carried out by giving introduction lectures to the students in small batches. Finally, PBL was introduced for first-, second-, and third-year undergraduate students of dental college.

**Ethics**

We received clearance from the institutional ethics committee before the start of the study, and individual consent was obtained.

**Pilot study**

A closed-ended questionnaire was prepared and circulated online using Google Forms to obtain feedback, regarding their perception, knowledge, and attitude on PBL in July 2019. It consisted of 22 closed-ended questions on a five-point Likert scale, ranging from strongly disagree (1), disagree (2), neither disagree nor agree (3), agree (4), and strongly agree (5). A pilot study was carried out in 10% of the targeted students to check construct validity and feasibility. We got Cronbach α as 0.81, and internal consistency of the study was found to be reliable for our participants.

**Design**

Consent was obtained from a total of 185 dental students from first, second, and third year, specifically who had undergone PBL training and exercise. Questions, which identified the perceptions of the students to the method of instructions of PBL, were designed and circulated to the students. The questions were designed under the headings of knowledge, attitude, and perception.

**Analysis**

The responses for the questionnaire thus received from the students were compiled and analyzed using Google Forms software.

**Results**

**Demographic data**

Of the participants, 75.1% were females and 24.9% were males. Of these, 45.4% were first-year students, 14.6% were second-year, and 40% were third-year students.

**Attitude**

Of the participants, 29.7% strongly agreed and 57.3% agreed that PBL improves communication skills; 28.6% strongly agreed and 57.8% agreed that PBL promotes student interaction; 25.9% strongly agreed and 47% agreed that PBL helped the students to identify their strength and weakness; 30.3% strongly agreed and 56.2% agreed that PBL improves staff-student interaction; 32.4% strongly agreed and 53% agreed that PBL improves the group skills of the students; and 22.7% strongly agreed and 55.1% agreed that PBL improved the confidence in decision-making of the students.

**Knowledge**

Of the participants, 18.9% strongly agreed and 66.5% agreed that PBL gives more knowledge about the content of the topic; 31.4% strongly agreed and 56.2% agreed that PBL improved self-directed learning on the topic; 23.8% strongly agreed and 59.5% agreed about the retention of knowledge by PBL; 22.7% strongly agreed and 56.8% agreed that learning is made interesting and easy by PBL; and 32.4% strongly agreed and 57.8% agreed that students referred to more resources for learning in PBL.

**Perception**

Of the participants, 23.8% strongly agreed and 43.1% agreed on having PBL combined with traditional curriculum; 23.8% strongly agreed and 53% agreed to include more PBL sessions in the curriculum; 32.4% strongly agreed and 49.7% agreed about the skills of staff of institution in conducting PBL; 28.6% strongly agreed and 56.2% agreed about the motivation of the tutor in participating in PBL; and 23.8% strongly agreed and 57.8% agreed that students referred to more resources for learning in PBL. The most important result was that the percentage of students who had neutral and negative opinion on PBL was very less.

There were 26.9% responses, which were highly satisfactory, and 55.4% responses, which were satisfactory, 14.4% responses were neither satisfied nor dissatisfied, 1.9% responses were somewhat dissatisfied, and 1.4% responses were completely dissatisfied when all the responses were taken into account in this study [Table 1].
Table 1: Distribution of the results of the questionnaire

| S. no. | Questions                                      | 1     | 2     | 3     | 4     | 5     |
|--------|------------------------------------------------|-------|-------|-------|-------|-------|
|        | **Questions on attitude**                       |       |       |       |       |       |
| 1      | PBL improves my communication skills            | 1, 0.5% | 4, 2.1% | 19, 10.2% | 106, 57.3% | 55, 29.75% |
| 2      | PBL improves my group skill                     | 3, 1.6% | 0     | 24, 12.9% | 98, 52.4% | 60, 53.0% |
| 3      | PBL helped to promote student–student interaction | 3, 1.6% | 5, 2.7% | 17, 9.2% | 107, 57.8% | 53, 28.6% |
| 4      | PBL improves staff–student interaction          | 2, 1.1% | 2, 1.1% | 21, 11.4% | 104, 56.2% | 56, 30.3% |
| 5      | PBL improved my confidence in decision-making   | 1, 0.5% | 7, 3.8% | 33, 17.8% | 102, 55.1% | 42, 22.7% |
| 6      | PBL helped me to identify my strength and weaknesses | 3, 1.6% | 4, 2.2% | 43, 23.2% | 87, 47% | 48, 25.9% |
|        | **Questions on knowledge**                      |       |       |       |       |       |
| 7      | PBL imparts better content knowledge of the topic | 0     | 1, 0.5% | 26, 14% | 123, 66.5% | 35, 18.9% |
| 8      | PBL improves the retention of knowledge         | 1, 0.5% | 0     | 30, 16.2% | 110, 59.5% | 44, 23.8% |
| 9      | PBL improves my self-directed learning on the topic | 2, 1.1% | 2, 1.1% | 19, 10.3% | 104, 56.2% | 58, 31.4% |
| 10     | PBL makes the topic more interesting and fun to learn | 4, 2.2% | 8, 4.3% | 26, 14.1% | 105, 56.8% | 42, 22.7% |
| 11     | PBL promotes to explore different resource materials | 2, 1.1% | 3, 1.6% | 30, 16.2% | 107, 57.8% | 43, 23.2% |
|        | **Questions on perception**                     |       |       |       |       |       |
| 12     | Tutor stimulated and motivated us to learn by ourselves | 3, 1.6% | 5, 2.7% | 20, 10.8% | 104, 56.2% | 53, 28.6% |
| 13     | PBL should be combined with traditional curriculum | 6, 3.2% | 7, 3.8% | 39, 21.1% | 89, 43.1% | 44, 23.8% |
| 14     | More sessions of PBL should be included in each year | 4, 2.1% | 4, 2.1% | 35, 18.9% | 98, 53% | 44, 23.8% |
| 15     | The staff of VMSDC are well prepared to conduct PBL | 4, 2.1% | 2, 1.1% | 23, 12.4% | 92, 49.7% | 60, 32.4% |
| 16     | Give an overall rating for PBL                  | 1, 0.5% | 4, 2.1% | 18, 9.7% | 101, 54.6% | 61, 33% |
|        | **Total of answers to all the questions**       | 40, 1.4% | 58, 1.9% | 423, 14.4% | 1637, 55.4% | 798, 26.9% |

VMSDC = Vinayaka Mission’s Sankarachariyar Dental College, PBL = problem-based learning
DISCUSSION

Medical universities in India are trying to revise the curricula, and they are also dreaming of implementing PBL. To implement a new teaching methodology to all the students, dental college has made enormous efforts. To achieve this goal, university and college arranged lectures by resource persons and provided hands-on training to the faculty by arranging workshops.

In PBL, the learning activity starts with a problem, in which a set of phenomena or events are described, which need a detailed explanation in terms of mechanism, principle, or underlying process. Students in small groups analyze these problems. The group of students are asked to explain the phenomena or events provided in the given problem.[9]

Like a two-sided coin, PBL has various advantages and disadvantages. Some of the advantages are as follows: Natural learning of student occurs. It encourages critical thinking of the student, thus developing a good relationship between the student and the facilitator. The student has to spend a minimum of 5–8 h for preparation of each PBL session. The disadvantages are that PBL is a method, which gives intensive work for staff, and high expenses are involved in this. During the initial phases of preparation, there will be huge amount of workload. As there is variation in the expertise of facilitators, all problem-based classes cannot be facilitated equally and well. Strohfeldt and Grant[6] have reported that there will be more workloads for the students though this results in deep and clear learning.

Rust[7] and Biggs[8] reported that learning in students happens in one of the two ways, a surface approach or a deep approach. In the surface approach, students try and memorize the important facts, whereas in the deep approach, there is a need to understand and learn in a deeper level. They try to understand better and learn in detail in this way. Greasley and Ashworth[9] and Richardson[10] agree that a deep approach helps to read and learn to understand the meaning. Richardson[10] stated that the approaches to learning are of three types. If the students study to memorize for assessment, it is called as surface approach. If they study to obtain maximum marks, it is called as strategic approach. And if they study for understanding the topic well, it is called as deep approach.

Strohfeldt and Grant[6] also stated that as there is a heavy workload for conducting PBL, and because of that each institution can adopt a method, which suit the specific needs of the students. Zingone et al.[11] reported that PBL promotes individual learning actively and team-based learning in groups.

A study conducted in Medical College in King Saud University, Saudi Arabia, on student’s perception to PBL sessions had a positive role in the process of learning.[12] Majority of our students also commented that understanding basic concepts, better knowledge, and improvement in problem-solving skills were advantages of PBL.

When the students showed liking for PBL and group study, improvements in analytical performance and thought process after PBL sessions were also noted.[13,14] Neville[2] reported in a comprehensive review on PBL curriculum that clinical supervisors noted a higher rating of clinical performance in students graduated in PBL curriculum.[15]

In a study conducted in Lahore, majority (75.4%) thought that PBL is an interesting method for producing better result in professional examination. One participant commented that “There is no student-teacher barrier so things can be remembered more easily” and another commented that it is “Impossible to sleep during PBL, unlike regular lecture.”[16]

In our study, participants of both genders and all years were positive in their attitude toward PBL. In our study, 75.1% of the students were girls and 24.89% were boys.

A few studies reported that PBL is a time-consuming method and does not help in acquiring knowledge.[17,18] Students in Saudi Arabia reported that there was enthusiasm, motivation, and increased gain of knowledge in PBL sessions. They were of the opinion that communication between students and the presentation skills of students improved after PBL sessions. But, they wanted more training on PBL for both the students and staff involved before the PBL sessions.[16]

Tutors play a very important role to bring about self-learning in PBL sessions. Majority of the students were happy about the preparedness of the staff to conduct PBL. Students were of the opinion that tutors stimulated and motivated them to learn by themselves.

The accreditation body of Nepal, Nepal Medical Council, had decided to include PBL as a new teaching and learning method in the medical curriculum. And 10 of the 17 medical schools of Nepal uses PBL for teaching in one form or other.[19]

In a rapid review of 30 PBL studies conducted over 22 years, performed by Hartling et al., these points are pointed out. Even though there are opposing reports and evidences on PBL, different universities and colleges are continuing to include PBL into medical and dental education. These results do not
provide a uniform opinion of improved and better learning through PBL. These differences can be due to differences in educational curriculum, method of studies, and outcomes of the studies. Betterment in skills and quality of practice and patient care should be measured in the upcoming studies. She also reported that shortcomings in the methodology of previous studies should be taken into consideration, and it should be improved in future studies.

PBL is proven to be fun, resulting in increased retention of knowledge and facts by active participation of students in a small group. It also promotes lifelong self-directed learning. Further studies around outcomes on attitude, perception and lifelong learning skills of the practitioners who graduated through PBL will help us to throw more light to this internationally accepted teaching system.

**Conclusion**

Our study reported that majority of the students in the college were in favor of PBL. When overall rating of PBL was taken among the students, 82.3% of the students were either satisfied or highly satisfied. This study provides a scientific basis about the necessity and feasibility of introduction of PBL along with traditional curriculum as a newer teaching method in Indian dental schools.

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**Conflicts of interest**

There are no conflicts of interest.

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