Problem-Based Learning in Dental Education: Pre-post Orientation Study

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ABSTRACT

Objective: As the dental education is getting advanced, a need for better pedagogy and learning techniques is imperative. Problem-Based Learning (PBL) is one such method which has been adopted by the medical education system worldwide. Relevant evidence regarding PBL’s effectiveness and acceptability amongst dental students in India is lacking. The main aim of this study is to assess the awareness and perception of dental undergraduate students towards PBL in dental education. Methods: This was a perception-based, pre-post questionnaire pilot study done on a convenience sample of 32 second-year dental undergraduate students. The knowledge and attitude assessment were done on students towards PBL before the orientation and sensitization lecture on PBL. The investigator himself gave the speech for 15-20 min with an interactive session. A post-questionnaire was administered to the same set of students to understand the perception related to PBL with items related to demographic data, knowledge, and scope, opinions related to PBL and teaching methods taken as the Regular feedback. Results: Twenty-five students attended the sensitization lecture and discussion session on PBL. Pre-test, Post-test, and feedback. 64% students reported a positive attitude towards PBL with 72% agreed that PBL session helped them to make a diagnosis in real clinical practice and want to be taught by a PBL facilitator than a regular teacher and 20% students had doubt on PBL. Knowledge of the students was significantly improved as evidenced by post-test and feedback data (Unpaired t-test P value = 0.00).

Conclusion: PBL, if incorporated in the undergraduate dental curriculum may help the students develop flexible knowledge, practical problem-solving skills, self-directed learning, and collaborative skills. Since it is a newer technique for Indian education system, the majority of them, however, felt the need for specialized training. Customization and perseverance could become keywords for a successful PBL implementation.

KEYWORDS: Dental Education, Problem-Based Learning, Small Group Teaching

INTRODUCTION

The demand for the reforms in medical and dental education is increasing in lieu of tremendous advancement in knowledge, increased public expectations, and stakeholders’ concerns. This reforms in education would help the graduates to cope up with the rapidly changing world of the 21st century. Another dispute that the educators face is to communicate to students the skills to cope up with the swift development of knowledge and expertise. In this ground, educators are usually skilled clinicians who have limited or no former exposure to official teaching. Henceforth, teachers are produced as necessitated rather than by undergoing formal training. The knowledge and technical skills of these clinicians are adequate for practical education, which is presumed to affect the student learning at a later stage.\(^1\) As the information becomes obsolete too soon, hence mere knowledge transmission doesn’t remain the prime teaching objective. Therefore, conveying learning skills in a way that release students and modernize them into lifelong learners is now more vital. The last amended Dental Council of India guidelines advocate and transmit the use of new pedagogical methodologies in the institutions. This amendment will not only make the students realize the seriousness of this subject but also instill in them the ideology of self-learning. The idea is to channelize skill development in a way that transforms students to “world citizens” irrespective of their varied backgrounds. This transformation seems to be achievable if the teaching methods enable incorporation of the newer developments taking place in the field of learning.\(^2\)

To cater to this, the proposal of newer strategies along with the position of the more comparable environment for student knowledge.\(^3\) Globally, in some of the medical and dental schools, the new curricula employ the use of Interactive learning and Problem-based learning (PBL). At some places, the traditional methods of didactic teaching have been substituted entirely with student-centered learning (“pure PBL”), while others have adopted hybrid forms (both didactic and PBL approaches).\(^1,4\)

Problem-based learning (PBL) is an educational strategy in which a problem instills the end-user for active learning. The strategy works in a way that the students...
identify and define the problem in focus and discuss any related issues, initially. This method helps to build a complete understanding of and around the problem. This approach is based on small groups of students working together and collaborating with a faculty member. Research classifies it as powerful classroom-based learning that sensitizes students towards understanding research basics and conceptualizing it, leading to proper channelizing of the gathered data. This problem-solving exercise is mainly directed to enhance adult-learning skills through self-direction and self-realization.6,7,8

Previous studies found students exposed to PBL found to have better problem-solving abilities along with a better research outlook in comparison to traditional base students.9 Furthermore, students have shown significant improvements in preventative care and diagnostic performance in practice after graduation.10,11 According to another study, PBL has been reported to be effective at increasing the students’ critical and interdisciplinary thinking, communication with patients, cooperation skill, problem-solving skill, and ability to work independently.12,13,14

The format of traditional health sciences projects the biomedical knowledge in a fragmented manner and emphasizes greatly on memorization which has shown unsatisfactory clinical performance.15

At the same time, incorporation of PBL into existing curriculum is difficult at best because it requires proper faculty training, multidirectional effort, and well-planned strategy.16 Very limited studies have been done to assess the attitude of students towards PBL incorporation in existing conventional curriculum in developing nations.17,18

So, the main aim of this study is to assess the awareness and perception of dental undergraduate students towards Problem Based Learning (PBL) in dental education.

MATERIALS AND METHODS

This study is an exploratory, pre-post comparative pilot study done among second-year dental undergraduates at the Maulana Azad Institute of dental sciences, New Delhi, India. Study subjects gave the Written Informed consent. Institute ethical board granted ethical approval. PBL involves small group teaching, a purposive sample of a batch of second-year Dental Undergraduate students consisting of 32 students selected for the study. The BDS 2nd year curriculum involves the preclinical work, laboratory classes, and lectures or tutorials without yet clinical exposure which starts in the 3rd year. The 2nd year becomes the apt period for teaching new techniques for better understanding and relating to patients. The investigator explained to the students about the objective of the study and the process involved, and they were invited to participate. It was stressed that participation was voluntary, free to withdraw from the study at any time, and free not to answer specific questions if they felt uncomfortable providing the information. The study includes those Students who were present on the day of survey and gave informed consent.

The Pre-test was undertaken before sensitizing lecture and discussion to assess the level of awareness of students towards the PBL using a pre-test questionnaire. For Pre-test, questionnaire consisted of 5 open-ended items which assessed the awareness and knowledge of students towards the PBL as given in table 2. This section of the questionnaire offered respondents an opportunity to enter text responses and commentaries on particular questions, qualitative quotes from this section was retrieved and thematically analyzed by the authors. Five minutes were given to the students to complete the assessment. To ensure the evaluation measured knowledge derived from the PBL process; students were not given notice of the questionnaires. Students were told verbally that the questionnaire was a tool for self-assessment of their PBL-related concepts and that although the questionnaire would be graded, the results would not affect course grade. The investigator made the 20 minutes orientation lecture consisting of the introduction of PBL, history of PBL, objectives of PBL, its advantages and disadvantages along with the role of students and tutors in PBL program. The lecture was in the form of the power-point presentation. The experienced faculty within the concerned subject guided in developing and validating the speech. The parameters used for validation of the lecture were the reliability of content, clarity, appropriate use of audio-visual aids and communication skills on a 5-point scale. 50% was considered the cut off for the validation.

After the 20 minutes orientation and sensitization lecture by the investigator on PBL, a post-questionnaire was administered immediately to the same set of students with similar questions as a pre-test to assess the change in knowledge and awareness. The standard feedback in the form of a questionnaire consisting of six closed-ended questions on the 3-point Likert scale (yes/no/no opinion) was taken from students.19 Another standard questionnaire was used to assess the perception related to PBL after the lecture.19 The questionnaire was consisting of 7 closed-ended questions on a 5-point Likert-type scale according to 1=totally disagree, 2=disagree, 3=neutral, 4=agree, and 5=totally agree. Scale 1 & 2, as well as 4 & 5, were merges for the analysis purpose.

The results of the Pre-Test, Post-Test questionnaires were encoded in numerical variables and entered into Microsoft Excel software and analyzed using SPSS® version 19.0 (IBM Corporation, Armonk, NY, USA) statistical software. The data were subjected to descriptive analyses. Chi-Square test was used to analyze the qualitative data and t-test for quantitative data.

RESULTS

The study was done to assess the awareness and perception of dental undergraduate Students towards Problem Based Learning in dental education.
The total number of study subjects selected was 32 among which 25 could complete the study. Seven subjects were not included either due to absence on the day of study or unwilling to give written consent. 25 students had attended the sensitizing lecture and discussion session on PBL and had given Pre-test, Post-test, and feedback. Out of 25 students, 64% (n=16) were females and 36% (n=9) males. The age range was 19-21 years (mean age is 20±0.61).

The lecture validated by the faculty gave an overall score of 75% (score of 15 out of 20) which was above the cutoff point as shown in table 1.

Table 2 shows the comparison of pre-test and post-test scores at pre-sensitized lecture and had given Pre-test, Post-test questionnaire. In pre-test questionnaires, 100% (n=25) students respond to the complete teaching method. After lecture cum discussion, 40% (n=10) of students were aware of only chalk and talk type of teaching method. After lecture cum discussion, 40% (n=10) of students were now aware of all the principles of acquiring new information. 96% (n=23) know the role of students in the PBL and advantage of PBL and 100% (n=25) students were aware of three different teaching methods.

The total score for the questionnaire was 20. The mean scores at pre-was 1.0 ± 0.0 and post were 11.88 ± 3.20 as shown in table 2. The pre-test and post-test shows significant improvement in the post-test score which indicates students are receptive towards a newer innovative method of teaching and learning.

The unpaired t-test shows pre-test mean 1.0 and post-test mean 11.88. The Standard deviation (SD) are 0.00 and 3.2 for pre-test and post-test respectively. The standard error mean (SEM) is 0.00 and 0.64 for pre-test and post-test with two-tailed p-values equal to the 0.000.

Table 3 shows the opinion of students on sensitizing lecture cum discussion. 68% (n=17) of students has been sensitized by the introductory sensitizing lecture cum discussion and 20% (n=5) students doubted PBL. 76% (n=19) of the students wanted special training on PBL. 64% (n=16) students were in favor of implementation of PBL than traditional teaching and want to be taught by a PBL facilitator than a regular teacher.

Table 4 shows the students perception of PBL and 88% (n=22) agreed that PBL facilitate self-learning, help students to make diagnosis in real clinical practice 72% (n=18), better way of understanding learning.
DISCUSSION

The traditional lecture mode of teaching is teacher-dominated and leads to one-way transmission of information. There is shift in the role of the teacher from presenter of knowledge to the promoter of learning. Thus, not only students but the teachers need to be regularly updated with a content teaching-learning approach.

PBL is a student-centered approach, which enables the need for understanding the problem thoroughly and then retaining the knowledge by exposing students to skills such as clinical reasoning, critical thinking, and self-directed learning. In India, various medical colleges have inculcated PBL like Christian Medical College, Vellore and Melaka-Manipal Medical College, Mangalore. These institutes have been using PBL for teaching their students, have received favorable feedback regarding this method. Till date, Dental Education employs very traditional approaches, and there is a lot of scope for evolution as compared to other developed countries. Moreover, there is lack of literature on PBL in context of Indian Dental Education. Hence, an effort was made to assess the awareness and perception of dental undergraduate Students towards Problem Based Learning (PBL) in dental education, and to compare our study results with the other studies. Only two studies have been conducted on Indian dental students. Our study showed that the 64% students reported a positive role towards PBL. Most of the participants were motivated and felt that further training is essential to implement PBL in the traditional curriculum. This result could be attributed to the PBL intervention that improved communication skills by enhancing public speaking through the acquisition of newer concepts, consequently leading to smart decision-making. A similar result has been inferred in various studies where students were satisfied with the PBL system and reported it to be a superior means of learning.

Seventy-two percent of our study sample reported that the PBL session would help them to make a diagnosis in real clinical practice. This score matches with a study by Zhang et al.

Students in the current study also reported that the PBL session helped them to develop their decision-making skills and encouraged collaborative learning. All these conclusions may be due to the active contribution of students and peer to peer teaching and stimulus in teaching learning process in PBL. Fifty-six percent students expressed a desire and a need to continue PBL sessions in future also. On the contrary, they don’t want to replace all the lectures by PBL as they think all the basic concepts cannot be covered in PBL. Previously, medical teachers have affirmed that the introduction of a problem-based form of learning in line with the already existing more traditional mode would prove to be successful.

Apparent benefits of PBL include the development of self-directed learning, problem-solving attitude, and analytical skills.

The study shows that 64% of students are still in support of a hybrid curriculum that includes some elements of PBL with long-established methods (lectures). As traditional teaching methods involve didactic and passive learning, it does not prepare the students to tackle the real-life problems as health professionals and to use the resources efficiently with eagerness to acquire new knowledge. In a study among Korean nursing students, the PBL group showed better aptitude in problem-solving, autonomous learning, and grave thinking as compared to lecture-based traditional learning group. Twenty percent of participants still doubt PBL; possibly because of acceptance of a new method of teaching would take some time for the students as they have been exposed to the traditional way of teaching from school days.

Bassir et al. conducted a systemic review which states that there are insufficient studies which have checked the effectiveness of PBL, especially on the entire curriculum. The verification is deficient in support that PBL helps in humanizing the clinical skills of dental students. Some studies have shown PBL to be an acceptable and effective educational policy for undergraduate students. The evidence from this study suggests that PBL has a positive effect on students’ skills which can also improve the ability of students in applying their knowledge in the clinical setting.

Study Limitations: Convenient sampling method was the basis for this cross-sectional study and students provide the self-reported information. However, the small sample size may be exploiting the data to their full potential, with a considerable increase in statistical power. Therefore, other similar studies can be conducted in all the dental colleges, which introduce the PBL as a method of learning in the system-based hybrid curriculum, to approve or disapprove our results. Apart from the single small sample study mentioned, there have no prior analyses of possible determinants of students towards PBL. Thus, the explanation of the finding here is merely representing the author’s personal opinion, primarily unencumbered by theory.

CONCLUSION

Regarding PBL implementation, there exist no reports on its withdrawal or termination from any schools where this approach was previously employed either entirely or partly. Although this thought is encouraging regarding the future of dental education, however more detailed research in this regard is needed. Routine practice, recognition, and insistence can become keywords for a successful PBL implementation. Hence further orientation programs are required to educate and inform students about PBL. Randomized trials to assess the effectiveness of PBL on larger sample size and with...
longer follow up study would give us more insights into the applicability of PBL among Indian Students.

**ACKNOWLEDGEMENT**

We would like to express our thanks and gratitude to our Director-Principal Prof. Dr. Mahesh Verma to allow present study and their research orientation motivational support.

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Source of Support: Nil
Conflict of Interest: Nil