Problem Based Learning: Aspects and Perspectives of Students of a Medical College of Kathmandu Valley, Nepal

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Research Article

Keywords: Medical students, problem-based learning, Nepal.

DOI: https://doi.org/10.21203/rs.3.rs-788058/v1

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Abstract

Background: Problem-based learning focuses on self-directed learning through problem-based approaches. This study was conducted to know the perspectives of medical students towards problem-based learning, along with its advantages and disadvantages, the role of facilitators and participants, and the scenario of problem-based learning in Tribhuvan University (TU) based medical colleges.

Methods: This descriptive cross-sectional study was conducted among the first to third-year medical students at Nepalese Army Institute of Health Sciences, Kathmandu via a self-administered questionnaire. Convenience sampling method was used. The collected data was extracted to Microsoft Excel-13 and analyzed with a statistical package for social sciences (SPSS) version-22.

Results: Out of 234 study participants, the majority found problem-based learning course interesting and informative (97.5%). More than three-fourths of respondents study more regularly in problem-based learning than lectures (82.5%) and understood applied aspects of course better than that taught via lectures because of problem-based learning (80.8%).

Conclusions: The majority of the study participants have found problem-based learning fruitful than traditional lecture learning. Since problem-based learning integrates the basic and clinical knowledge and enhances collaborative learning skills, we strongly recommend frequent problem-based learning sessions in the medical schools of Nepal.

Background

Problem Based Learning (PBL) is a student-centered instructional approach in which a small group defines their learning objectives by using triggers from the problem scenario, in the presence of a tutor [1]. It contributes to the development and promotion of self-directed and lifelong learning, communication and teamwork skills, presentation skills, and enhances students’ motivation and enthusiasm. It improves problem-solving skills and integration of basic science and clinical knowledge [2]. There are five steps in the PBL process: problem analysis, the establishment of learning objective, collection of information, summarizing, and reflection [3].

In Nepal, fewer studies have been done to know the perception of medical students towards PBL and the impact of PBL in the learning process. To fill the gap, this research could be a bridge to know the scenario of PBL in medical colleges in Nepal, especially TU-affiliated medical colleges, along with perspectives of medical students towards PBL.

Methods

A descriptive cross-sectional study was done among the first to third-year medical students of the Nepalese Army Institute of Health Sciences (NAIHS), a TU-affiliated medical college of Nepal. The data for the study was collected from February 25 to March 10, 2020, for first and second-year students, and
the remaining third-years’ data was collected after lockdown imposed due to the COVID-19 pandemic from January 4 to January 14, 2021.

The study was approved by the Institutional Review Committee of NAIHS (Ref no: 245). Written informed consent was taken from all the participants by attaching the consent form in the questionnaire itself. The participation was completely voluntary and anonymity was ensured.

First to third-year medical students from NAIHS who were present in the class during questionnaire administration and consented to participate in the study were included. Those students who were not present in the class during questionnaire administration or didn’t give consent for participation in the study were excluded. The convenience sampling method was used. Keeping ‘z’ at 95% confidence interval, prevalence of study taken 50% , margin of error (e) 5%, total population (N)= 311 and considering 10% as non-response rate, the required sample size becomes 189. So, the questionnaire was sent to around 234 students (higher than the required sample size of 189) expecting some students not giving consent for the study.

A qualitative technique of data collection consisting of a self-administered questionnaire was selected as the data collection tool. The study questionnaire was adapted after an extensive literature search from various similar studies conducted previously. The questionnaire is about perspectives, comparison with lecture-based learning, advantages and disadvantages, and scenario of Problem based learning. The data collected through the self-administered questionnaire was extracted to Microsoft Excel-13 and was then imported and analyzed by using SPSS (Statistical Package for Social Sciences) version 22.

Results

A total of 234 medical students from first (n=86, 36.8%), second (n=55, 23.5%) and third-year (n=93, 39.7%) participated in the study. Around two-thirds of the study, participants were male (n=159, 67.9%). The participants ranged from 18 to 25 years of age. (Table 1)

Table 1. Baseline characteristics of the respondents (N=234)
The majority of the study participants agreed that they have found the PBL course interesting and informative (50.9% agreed, 46.6% strongly agreed). When asked whether PBL provides learning motivation and enhances self-directed learning, the majority of the participants agreed to the statement (46.6% agreed, 48.3% strongly agreed). Also, most of the participants agreed that PBL integrates basic and clinical knowledge and increases the ability to deal with authentic problems of patients (48.7% agreed, 43.2% strongly agreed). More than three-fourths of the study participants had understood the applied aspects of the course better than that taught via lectures (44.9% agreed and 35.9% strongly agreed to the statement).

Almost half of the participants (26.1% agreed, 22.6% strongly agreed) agreed that it takes less time than conventional lecture in learning the course objectives, while 21.4% were undecided and more than one-fourth disagreed with the statement (12.0% strongly disagreed, 17.9% disagreed). When asked about whether PBL enhances collaborative learning skills, the majority of the participants agree that it does (53.4% agreed, 38.5% strongly agreed). More than one-third of the participants disagree with the statement that there is poor evaluation of students individually in the PBL (12.4% strongly disagreed, 23.1% disagreed) while 29.9% were decided and the rest one third agreed (23.5% agreed, 11.1% strongly agreed).

| Variables       | N   | %   |
|-----------------|-----|-----|
| Study Year      |     |     |
| First Year      | 86  | 36.8|
| Second Year     | 55  | 23.5|
| Third Year      | 93  | 39.7|
| Gender          |     |     |
| Male            | 159 | 67.9|
| Female          | 75  | 32.1|
| Age (years)     |     |     |
| 18              | 1   | 0.4 |
| 19              | 25  | 10.7|
| 20              | 45  | 19.2|
| 21              | 50  | 21.4|
| 22              | 43  | 18.4|
| 23              | 42  | 17.9|
| 24              | 23  | 9.8 |
| 25              | 5   | 2.1 |
Only 29.5% of the study participants disagreed with the statement that the tutor provides a source of information and helps use them in discussion (15.0% strongly disagreed, 14.5% disagreed) while more than half of the participants agreed (44.9% agreed, 12.8% strongly agreed).

When asked about whether the study participants hesitate to participate in PBL due to lack of prerequisite knowledge and raised vast questions, almost half of them disagreed with the statement (20.9% strongly disagreed, 27.8% disagreed) while more than one-third of the participants agreed to the statement (29.5% agreed, 10.3% strongly agreed). The majority of the study participants agreed that they studied more regularly in PBL than lectures to avoid being left behind in discussions (49.6% agreed, 32.9% strongly agreed). Also, most of the participants agreed to the statement that the discussion in PBL determines what they should study later (51.7% agreed, 33.3% strongly agreed).

The majority of the study participants agreed that the PBL session is necessary for the TU curriculum (39.3% agreed, 49.1% strongly agreed). When asked about whether the IBMS course along with PBL enhances student analysis and criticism skills regarding patient problems, the majority of the study participants agreed to the statement (48.7% agreed, 41.0% strongly agreed). Around one-third of the study participants disagree that the present PBL session is sufficient for TU based curriculum i.e., one PBL session in each system (18.4% strongly disagreed, 16.2% disagreed) while 14.5% were undecided and the rest agreed (31.2% agreed, 19.7% strongly agreed). An additional file shows results in more detail [Additional file 1]

When the data from the respondents were analyzed within the same study year and among different study years (first, second, and third-year) via ANOVA, only one statement was found to be statistically significant (p value=0.039), i.e. “I study more regularly in PBL than lectures to avoid being left behind in discussions”. [Additional file 2]

**Discussion**

The perception of the majority of students towards PBL was positive according to our findings. The data collected by us show that the students found PBL course interesting and informative. Similarly, 90.7% of students in a study done by Joseph et. al, 2016 revealed that the majority of the students strongly agreed that Problem-based learning helped in creating interest [4]. This must be because, in PBL, student learning centers on a complex problem that does not have a single correct answer. In addition, PBL facilitates integration of knowledge, increases problem solving skills, and enhances learning benefits, including understanding and retention of course materials.

Another study revealed that the majority of the students (91.6%) thought that PBL promotes self-directed learning [5]. The results are similar to the current study with 48.3% strongly agreeing and 46.6% agreeing to it. In contrast, a study conducted by Choi et al. on first-year nursing students in South Korea showed no significant difference in self-directed learning between the PBL and the lecture groups in a theory course, and the student’s responses were found to vary based on their academic level at the school. First-year
and novice students may find it difficult to adapt to PBL because they are used to the lecture method used in high school [6].

PBL has several advantages over the more traditional lecture-based courses: an integrated knowledge base, exposure to real-life experience at an earlier stage in the curriculum, etc [7]. The current study showed that the majority of the students were positive that PBL integrates basic and clinical Knowledge and increases the ability to deal with authentic problems of patients.

The most impressive result of the study done by Klegeris et.al was that student's responses indicated that they not only enjoyed the process but that they believed that they were learning and retaining the information in a superior fashion compared with the traditional methods [8]. Similar findings were found in a study done by Lama et. Al where 92.1% agreed that Problem based learning helps remember and understand better than traditional lectures [9]. These findings are similar to the results of the current study where 35.9% strongly agreed and 44.9% agreed (Total of 80.9%).

54.8% agreed that it takes less time than conventional lecture in learning the course objectives in a study done by Yadav et al [10]. The present study also showed that students think PBL takes less time than conventional lecture in learning the course objectives as almost half of the participants (26.1% agreed, 22.6% strongly agreed) agreed while 21.4% were undecided.

Win and his co-workers in 2015 found that PBL in collaborative groups encourages participation and increases learning, promotes presentation skills, the activation of prior learning, and problem-solving skills [11]. Another study revealed similar findings where the majority of students in the study group strongly agreed that PBL methodology enhances collaborative learning skills (60%) [4]. In this study, too, the majority of the participants agreed that it does (53.4% agreed, 38.5% strongly agreed).

According to Shankar et al 2014, individual interactions within the small group provide students with opportunities to ask questions, receive explanations, and discuss disagreements, which is when the facilitator/tutor has a pivotal role, individually evaluating the students and counseling them to improve group performance in PBL [12]. In the present study, when asked if there is poor evaluation of students individually in PBL, more than one-third of the participants disagreed with the statement that there is poor evaluation of students individually in the PBL, while 29.9 % were undecided and the rest one third agreed.

In our study half of the students agreed that the tutor provides a source of information and helps use them in the discussion. A study conducted by Demirören et al. found out that the teacher evaluation scale is 3.83 and was statistically significant with self-efficacy for PBL at 0.05 level of significance [7]. Another study found out challenging for PBL teachers to decide whether and when to give direction because students' self-promotion and inspiration from each other is a particular aspect of PBL [6]. Also that tutors should encourage them to participate actively during the sessions [7].

In our study, almost half of the students disagreed to hesitation in participation in PBL while one-third agreed to it. One similar study concluded that students were apprehensive and ambiguous when they
were asked to research a topic and were not confident to teach it to the group effectively [13]. A study conducted by Bickerdike et al. mentioned that use of surface learning; common in undergraduate education could limit opportunities in problem and case-based learning [14]. Students' performance during PBL sessions could be a predictor of good results in their academic achievement [15].

The majority of the study participants agreed that they studied more regularly in PBL than in lectures to avoid being left behind in discussions. Though personality may relate to learning styles and learning outcomes, both individual and group behaviors dimensions related to learning processes [15]. A study demonstrated the ways to learn from different sources, not just textbooks but journal articles, the internet, patients, experience, and each other [16]. Our study has given similar results where students thought that discussions in PBL determine what they should study later. This is in concordance with another study by Wormley et al. which resulted that student expressed the experience of transforming into an "active learner" in both the classroom and the clinic environment [13].

Short PBL sessions can be held amidst integrated curriculum using a system-based approach Though this may require other issues for curriculum design and implementation to be tackled [17]. This is per our results where the majority of the study participants agreed that a PBL session is necessary for the TU curriculum. Also, in a study conducted at CMC, Nepal found out that most of the students (86.7%) accepted that PBL is an interactive and a mutual learning method and improves self-directed learning (83.2%) owing to the importance of PBL sessions in the curriculum [10].

The majority of the study participants agreed that an IBMS course with PBL enhances student analysis and criticism skills regarding patient problems. A study done by Pu Dan et al. favored critical thinking disposition among PBL participants [18]. It is found to enhance student analysis and criticism skills regarding patient problems. Improvement was seen in decision-making based on experience and evidence, as well as self-reflection and reasoning [19]. The rationale for the PBL approach in medicine and the health sciences is that it develops student's capacity for clinical reasoning and that it facilitates the acquisition of both basic and clinical sciences enabling retention of clinical tasks [17]. In a nutshell, for medical students, PBL enhances empowerment through problem-solving [20].

TU-affiliated medical colleges still follow didactic lecture methods as the main teaching-learning strategy. In IOM (TU), initially, two cases of PBL were discussed for each of the two years of MBBS. But the medical colleges affiliated with the university organize PBL sessions according to their feasibility. At Nepalese Army Institute of Health Sciences, one session is organized altogether in 2 years of basic science. Around one-third of the study, participants disagree that the present PBL session is sufficient for TU based curriculum. The overall perception of students toward PBL and about the role of tutors involved in the PBL sessions was very positive from our study. This is in line with a similar study by Yadav et al [10].

Since this is a cross-sectional study based on a convenient sampling method and conducted in one medical college it cannot be generalized. Moreover, only three batches of students were taken for this study, so it does not show the perspective of previous batches of the same medical college. In addition,
the small sample size data may be the limitation of this study in satisfying the full potential statistically. Pre-PBL and Post-PBL tests would have helped in showing if PBL had been effective, which could not be done due to time restrictions. Further studies must be carried out in medical colleges all over Nepal to conclude more valid outcomes of PBL.

**Conclusions**

This study accentuates the aspects and perspectives of students of a medical college with findings that show medical students who participated in a PBL session found that it integrates basic and clinical knowledge better than lecture-based learning and increases critical thinking as well as self-directed learning while also enhancing collaborative learning skills. Our findings also suggest that students found the role of the tutors to be effective in providing learning resources and helping to use them accurately. They also studied more regularly in PBL than lectures to avoid being left behind in discussions. The majority of the study participants agreed that the present PBL session is necessary but insufficient for TU-based curriculum i.e., one PBL session in each system. The student satisfaction and motivation as shown by this study will make further research easier, which could certainly help in encouraging additional PBL sessions as a method of learning in medicine.

**Abbreviations**

ANOVA: Analysis of Variance

CMC: Chitwan Medical College

IBMS: Integrated Basic Medical Sciences

IOM: Institute of Medicine

NAIHS: Nepalese Army Institute of Health Sciences

PBL: Problem Based Learning

SPSS: Statistical Package for Social Sciences

TU: Tribhuvan University

**Declarations**

**Ethics approval and consent to participate**

Ethical approval for this study was granted by the Institutional Review Committee (Ref No: 245/2020) of Nepalese Army Institute of Health Sciences (NAIHS). Written consent was taken from the participants
which was attached in questionnaire. All methods were carried out in accordance with relevant guidelines and regulations

**Consent for publication**

Not applicable

**Availability of data and material**

All data and materials are available from the corresponding author by request

**Competing interests**

The authors have no competing interests regarding this paper or the topic of this paper

**Funding**

No external funding was applied to this study

**Authors' contributions**

GM, PJ, PK, MJ, PK contributed in concept and design, analysis, interpretation of data and initial draft of manuscript. AK revised it critically for important intellectual content, assisted in analysis and contributed to review and editing. All authors read and approved the final version of the manuscript before submission, and they are accountable for all aspects of the work

**Acknowledgements**

We would like to acknowledge all the study participants of Nepalese Army Institute of Health Sciences-College of Medicine (NAIHS-COM) and Department of Pharmacology, NAIHS-COM, Kathmandu

**Supplementary Information**

Additional file 1

Additional file 2

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