

## Effectiveness of problem based learning in teaching Neuro-Anatomy and perceptions of the students

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### Abstract

**Background:** Problem Based Learning (PBL) is an effective tool which helps lifelong learning. PBL is different from routine lectures as it makes the students to participate actively. In PBL student has to identify the problem and understand it and has to find solution to the problem, which improves the integrating ability and thought processes of the students.

**Objective:** The present study aimed to assess the effectiveness of Problem Based Learning (PBL) for teaching Neuro-Anatomy and perceptions of the students.

**Materials and Methods:** A total of 100 first MBBS students participated in the study voluntarily. They were divided in to 10 groups randomly and one teaching staff was posted for each group. Multiple Choice questions (MCQ) test was conducted before and after PBL sessions.

**Results:** Significantly high scores were recorded after the PBL sessions. Most of the students preferred PBL along with the regular teaching.

**Conclusion:** As we have observed favorable response and acceptability from the students, we are planning to continue teaching Neuro-Anatomy using more PBL sessions. Further, we urge the Medical teachers involved in curriculum committee to consider implementation of PBL in Medical Curriculum and conducting workshops on PBL. We recommend further multi centered studies to support implementation of PBL in curriculum for the benefit of student population.

**Keywords:** Neuro-Anatomy, Student's Perception, PBL.

### Introduction

Problem-based learning (PBL) was introduced in 1960 by Howard Barrows at McMaster University in Canada.<sup>(1)</sup> PBL involves the students in exploring important and meaningful questions through a series of investigations and collaborations.<sup>(2)</sup> Medical stream is different from others as in this field professionals has to develop lifelong learning habits. More over to become a successful doctor one should develop the skills to integrate the basic medical sciences with the clinical subjects. Understanding Neuro-anatomy is essential for Medical students. PBL is an effective tool which helps lifelong learning.<sup>(3,4)</sup> PBL is different from routine lectures as it makes the students to participate actively. In PBL student has to identify the problem and understand it and has to find solution to the problem, which improves the integrating ability and thought processes of the students.<sup>(5)</sup> PBL was reported as a better method of teaching when compared with regular didactic teaching.<sup>(10)</sup> While dealing with PBL, students have to discuss and refer many books which helps them to remember the learnt information for longer duration. Earlier studies reported that PBL was effective in both general sciences and health sciences.<sup>(11)</sup> Hence, we have introduced PBL in teaching Neuro-Anatomy to make the subject fun and interesting and also to promote the learning process for the benefit of the students. The present study aimed to assess the effectiveness of

Problem Based Learning for teaching Neuro-Anatomy and perceptions of the students.

### Materials and Methods

The present descriptive study was conducted at GEMS Hospital after obtaining the permission from Institutional Human Ethical Committee and permission from concerned authorities. Healthy and willing participants were included in the study after obtaining the voluntary, written, informed consent. A total of 100 male (n=40) and female (n=60) first MBBS students participated in the study voluntarily. The students were briefed about the study and importance of PBL sessions. Then a pre MCQ test for 10 marks was conducted on Neuro-Anatomy topic and score was obtained. The students were randomly assigned in to 10 groups with a facilitator/faculty to supervise each group. PBL was conducted in two sessions. In the first session, Problem based on Neuro-Anatomy was constructed by consensus of all anatomy faculties. Then the problem was projected to all the 10 groups. Then we conducted discussion on the case presented to make the student to understand it clearly. At the end of the discussion the students were instructed to prepare the topic by their own from the online and offline literature through experts suggestions. The second session was conducted after 5 days, where the students were asked to elaborate on their prepared material during group discussion. These sessions took

place in our library where we allotted one table for one group. Students of each group were allowed to discuss the topic. This process was repeated until student thoroughly and effectively presented the topic and confidently ensured that he/she has understood the solution of the problem. After these sessions, the same MCQ test was conducted again and scores were obtained. Also feedback was obtained from the students using standard questionnaire from the literature.<sup>(6)</sup>

**Statistical analysis:** Data was analyzed by SPSS 20.0 version and expressed as mean  $\pm$  SD. Paired t test was used to assess statistical significance. P value less than 0.05 was considered as significant. Perception of students was expressed in frequency and percentage.

## Results

Table 1 presents the mean scores of the students in MCQ test conducted before and after the PBL sessions. Significantly high scores were recorded after the PBL sessions. Table 2 projects the perceptions of the students about the PBL sessions and most of the students preferred PBL along with the regular teaching.

**Table 1: MCQ scores of the participants in pre and post PBL sessions (n=100)**

Pre-MCQ test score	Post-MCQ test score	t value	P value
4.56 $\pm$ 1.2	7.65 $\pm$ 0.64	22.7206	<0.0001***

Data expressed as mean $\pm$ SD. (\*P<0.05 was significant, \*\*P<0.01 was significant, \*\*\*P<0.001 was significant.

**Table 2: Perceptions of students about PBL (n=100)**

S. no.	Question	Agreed (%)	Disagreed (%)	Neutral (%)
1	Method used in teaching PBL in anatomy was useful.	78	2	20
2	Helped in improving understanding further.	71	2	27
3	Process encouraged student responsibility for learning objectives.	80	3	17
4	Brought in more interaction	92	1	7
5	Can be used along with lectures.	90	0	10
6	Improve problem solving ability.	88	1	11
7	Conducted in systematic manner.	92	1	7
8	Facilitators were helpful.	98	1	1
9	Presentation helped to learn better.	76	10	14
10	Opportunity to express.	80	2	18
11	Teach other topic as well by this method & can be continued for further batches.	92	2	6
12	Will help to perform better in university exam. & will help to perform better in later days of clinical course.	70	10	20-

## Discussion

Teaching should be made interesting to the students so that they can learn the subjects with enthusiasm. Hence new methods of teaching should be implemented time to time. Before implementation it is must to get the perceptions of the students. In the present study we have tried PBL to help the students to learn Neuro-Anatomy more effectively, as most of the students report it as a tough subject. Earlier researchers reported that PBL is an effective tool to implement in medical curriculum.<sup>(7,8)</sup> In PBL, Inclusion of a problem triggers collaborative learning among the students.<sup>(12,13)</sup> Over all, PBL improves the clinical reasoning which helps the students to integrate basic and clinical sciences.<sup>(14)</sup> PBL not only benefits the students, but also the teachers as it makes the teacher to think critically and to prepare thoroughly the whole curriculum. As PBL is a team work, it improves relationship between teachers to teachers and teachers to students and also students to students.<sup>(15,16)</sup> A study conducted by Wojciech Pawlina et al., reported that students perceived the PBL as a useful tool to improve learning skills.<sup>(9)</sup> Similar study conducted by Dope Santosh kumar A concluded that, PBL helps students to improve self directed learning, problem solving attitude & analytical skills.<sup>(6)</sup> It has been reported that PBL is a well-established approach for teaching undergraduate, postgraduate students.<sup>(17-23)</sup> Interestingly, it was reported that attendance and academic performance of the students was higher with PBL classes when compared with lecturer based curriculum,<sup>(24,25)</sup> so it is not surprising that most of the countries adapting PBL in the medical curriculum.<sup>(26-28)</sup> Earlier study conducted in India, opinioned implementation of PBL in the curriculum.<sup>(29)</sup> Our study supports earlier studies as we have observed significant improvement in student's performance which correlated with their perception.

## Limitations

The perceptions may vary with gender. In the present study, gender comparison was not performed.

## Conclusion

As we have observed favorable response and acceptability from the students, we are planning to continue teaching Neuro-Anatomy using more PBL sessions. Further, we urge the Medical teachers involved in curriculum committee to consider implementation of PBL in Medical Curriculum and conducting workshops on PBL. We recommend further multi centered studies to support implementation of PBL in curriculum to make the medical teaching more effective.

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