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PBL-An approach in medical biochemistry

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ABSTRACT

PROBLEM-BASED LEARNING (PBL) is a student-centered method of teaching. Several studies have shown that PBL has at least five advantages over Lecture based learning (LBL) in areas like Structuring of knowledge, Development of an effective clinical reasoning process, Better retention of information, Development of self-directed learning skills, Increasing motivation for learning etc. So we tried to compare both the teaching learning processes (PBL and LBL) in our Institute. We choose the topic Vitamin D. We divided the 1st year MBBS students randomly into two equal groups A&B. Group A was exposed to LBL & group B was exposed to PBL. Pre-tests, Post-tests were taken before and after the session. Recall exam was also taken four weeks later. There were significant difference in post-test and recall exam marks of both the groups ($p<0.0001$). We suggest that PBL is definitely a better process of learning for selected topics.

KEYWORDS

Medical education;
PBL;
LBL.

INTRODUCTION

There is growing concern among medical educators that conventional modes of teaching medical students neither encourage the right qualities in students nor imparts a life-long respect for learning[1] In PBL, learning is based on the preparation and study of complex problems encountered in the real world. Such problems act as a stimulus for learning, integrating and organizing learned information in ways that will ensure its recall and application to future problems[2]. In PBL, students work in small collaborative groups and learn means to solve a problem. The teacher acts as a facilitator and guide students through a learning cycle. It is one of the best described methods for interactive learning and is thought to be superior and more effective than traditional methods[3]. PBL was designed with several important goals. It is designed to help the students to construct an extensive and flexible knowledge base; to develop effective problem-solving skills; to develop self-directed & lifelong learning skills; to become effective collaborators; and to be intrinsically motivated to learn[4]. Students in problem-based learning programme place more emphasis on meaning (understanding) than reproduction (route learning and memory),on journals and on-line databases as sources of information; make greater use of the library; make greater use of self-selected reading materials, as opposed to those selected by the teaching faculty; and more frequently feel competent in information seeking skills[5,6,7]. Where as students following the conventional curriculum were more likely to use the key words "non- relevant, passive, and

Regular Paper

boring" to describe their preclinical experience[8,9].

But in most of the medical colleges in India Lecture based method is only method of teaching applies for MBBS students. In our Institute also LBL is the method that has been used for teaching the MBBS students. The question of its efficiency comes into play, since it has never been compared with other methods of learning. Considering the above facts we tried to compare the outcomes of both the methods of teaching.

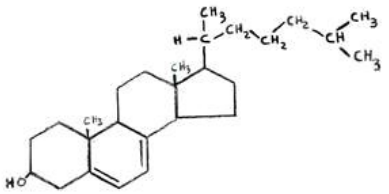
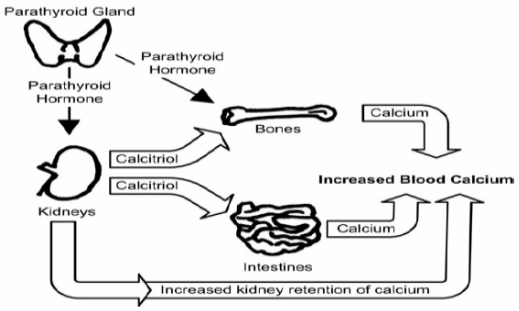
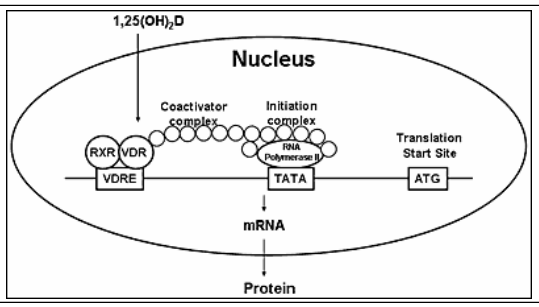
METHODS

To perform the study, 1st year MBBS students (2011-2012 batch) were randomly sampled (by lottery method) into two groups (A & B). The topic chosen was (fat soluble) Vitamin D. Two hours sessions were conducted for both the groups.

Vitamin-D was taught to group-B using PBL method and the same thing was taught to group-A using the traditional Lecture based learning using blackboard and chalk. For the PBL group Vitamin D was divided into five sub- headings as shown in the appendix. In PBL the students were again divided into five sub- groups. Each group was given one sub heading along with one modified problem and some associated questions. One member from each sub-group presented one heading after discussion in the plenary along with the problem. At the end of the session the concerned topic was discussed.

At the beginning of the session, pre-test exams & at the end of the session, post –test exams were given by the students. These tests were taken in the form of 15 MCQs from the concerned topic. Four weeks after the session, another exam consisting of 4 short questions (each 5 marks) was conducted, to evaluate the students recall level. After collecting all the data statistical analysis was done by Microsoft excel 2007.

APPENDIX FOR PBL

SUB GROUPS	HEADINGS	PROBLEMS	ASSOCIATED QUESTIONS
GR-1	Introduction, Chemistry & Sources		1.Idetify this structure. 2.From which compound vitamin D can be synthesized in our body?
GR-2	Absorption, Transport & Biochemical functions.		1.Give explanation to the diagram. 2.Where vitamin D is activated and metabolized?
GR-3	Mechanism of action & Daily requirements.		1. Give explanation to the given image. 2. Vitamin D is a hormone –justify.

SUB GROUPS	HEADINGS	PROBLEMS	ASSOCIATED QUESTIONS
GR-4	Deficiency manifestations	A 4 year old boy was brought to the pediatric OPD with the complaints of mild convulsion about one hour back. There was no fever or loss of consciousness. He also gave a history of started walking late-around 2 years after birth. On examination child's growth was retarded, and he looked ill and malnourished. The limbs had poor muscle tones. His legs looked bowed and there was knocking of knees during walking. Abdomen was protruding.	1. What is your diagnosis? 2. How does a person become deficient in Vitamin D? 3. What are the signs and symptoms of Vitamin D deficiency? 4. What is renal rickets? 5. What could be the cause of convulsion?
GR-5	Hypervitaminosis D	A 70 years old man had a 3 week history of weakness, polyuria, intense thirst, difficulty in speaking and understanding commands, staggering gait, confusion and weight loss. For last one month he took 200,000 units of vitamin D because he had severe osteoarthritis. His plasma calcium level was 13.5 mg/dl.	1. What is your diagnosis? 2. Explain the elevation in serum calcium? 3. How the liver and kidney are involved in vitamin D metabolism?

TABLE : The results of pre, post –test and recall exams of PBL and LBL groups

	Pre-test Average	Post-test Average	Recall test Average
LBL (n = 46)	6.25	9.55	8.91
PBL (n = 48)	6.27	11.83	9.68
P Value	P=0.96	P<0.0001	P=0.025

RESULTS

This study was performed on 1st year MBBS students of Aarupadai Veedu Medical College & Hospital of Vinayaka Missions University, Puducherry, India. 46 and 48 students attended for LBL and PBL classes respectively. The average score of Pre-test of LBL and PBL groups were 6.25 and 6.27(out of 15) respectively. This difference was statistically not significant (p=0.107). The average post test score of LBL group was 9.55 and of PBL group was 11.83 respectively. This difference was statistically significant (p <0.005) as shown in the table. The average score of recall exam of LBL group was 8.91 and of PBL group was 9.68 (out of 20) with a p value equals to 0.025. (Shown in table)

DISCUSSION AND CONCLUSION

In the PBL of medical education the learners encounter a problem and attempt to solve it with information they already possess and further to identify what they need to learn to better understand the problem and how to resolve it. After this the learners engage in self-directed study using different resources like books, journals, reports, online information and e-learning etc. After gaining all the information the learners then return to the problem and apply what they have learnt to understand and resolve the problem from different sources[10,11].

The role of the tutor is to guide the students through the problem, judge the level of understanding, correct mistakes by questioning and direct students to do more in areas where knowledge is insufficient. Tutors should be knowledgeable in the area under study[12].

Studies have shown that students of the PBLC have a more positive attitude towards their curriculum than do students in a conventional class[13,14].

The result of this study showed that the students are more successful in learning and recalling when PBL was used as the educational method. The pre-test scores of these groups showed no statistical difference, so difference of the post-test and recall exam scores could be due to the effect of educational method.

In our study it was confirmed that PBL is definitely better than LBL for selected topics. But further studies should be taken on different topics of Medical Biochemistry before applying PBL as the method of teaching.

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Regular Paper

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