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RESEARCH ARTICLE

PROBLEM BASED LEARNING FOR PROMOTING INTERDISCIPLINARY RESEARCH IN GENETICS

^{1,*}Dr. Pramila Menon, ²Dr. Payal Bansal, ³Nirmala Narayan Rege and ⁴Dr. Avinash Supe

¹MBBS, MD (Pediatrics), PG Dip Public Health Nutrition, PhD, Assistant Professor, Department of Pediatrics, Department of Pediatrics, Dr. D. Y. Patil Medical College & Hospital, Pimpri, Pune

²MS, PGHDE, FAIMER IFME, MHPE, Professor Maharashtra University of Health Sciences, Nashik

³MD (Pharmacology), DNB (Clinical Pharmacology), PhD (Pharmacology), FAIMER Fellow (2015).

Professor Emeritus, Department of Pharmacology & Therapeutics, Seth Gs Medical College & KEM Hospital, Parel, Mumbai 400 012

⁴MS FICS DNBE FCPS, DHA, PGDME, MHPE (UIC), FIAGES, FMAS, FAIS, Ex Director (ME & MH) and Dean KEM and Sion Hospital, Emeritus Professor, G I Surgery and Medical Education, Seth GS Medical College KEM Hosp

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ABSTRACT

Background: Problem-based learning (PBL) is recognized as promoting integration of knowledge and fostering a deeper approach to life-long learning. In order to encourage health professional who joined genetic courses in our institute to integrate their genetics knowledge in a professionally relevant clinical context, we developed a PBL approach in medical genetics. This paper highlights preliminary data regarding student viewpoint about PBL

Methods: n=31

Students were divided into groups of PBL groups. The participation was voluntary. PBL group was allocated a specific case with more detailed clinical information in three sessions as progressive disclosure. The students spent 2 -3 hours on weekend for group discussion and weekdays were utilized for self study. Pre validated questionnaire was used to evaluate student perception of PBL format, with each being asked to rate the content, structure, facilitator effectiveness, group dynamics and their personal view of the learning experiences.

Results: Two general themes emerged from students were group discussion and self study and active thinking helps to retain knowledge for a longer duration. PBL approach helped in integration of basic and clinical genetics. They felt that the cases effectively illustrated medical concepts and reinforced the students' genetics knowledge. They were motivated their interest in genetics. Peer to peer teaching and interdisciplinary group was a helpful in learning objectives. The course helped the participants to learn to obtain information from a variety of sources. They were comfortable in sharing information with others (100%). They felt that they can apply the general principles they learnt to other genetics problems. They could confess their ignorance on specific issues. But at the same time felt confident to analyze a genetics problem by setting appropriate learning objectives (80.64%). Self assessment of performance was possible in 93.54%. The written problem summary helped the participants to correlate the concepts covered in that problem. They agreed (96.77%) the amount of effort required in the course was greater than usual.

Conclusion: PBL methodology, an integrated approach can be used to teach medical genetics to the students. PBL promotes active learning, self study and helps in retention of knowledge for long duration.

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INTRODUCTION

PBL is an effective way of delivering medical education in an integrated format and offers several advantages over traditional teaching methods. It is based on principles of adult learning theory.

*Corresponding author: Dr. Pramila Menon,

MBBS, MD (Pediatrics), PG Dip Public Health Nutrition, PhD, Assistant Professor, Department of Pediatrics, Department of Pediatrics, Dr. D. Y. Patil Medical College & Hospital, Pimpri, Pune

Problem-based Learning is based on the research of Barrows and Tamblyn (1980). The rationale for this strategy was based on their research on clinical reasoning. Challenging the students with problems and engaging them in exploring new knowledge actively remains an effective way to teach the students. Problem-based Learning is the shift from the teaching paradigm to the learning paradigm (Barr and Tagg, 1995). The focus is mainly on what students are learning rather than what the teacher is teaching. We conducted PBL process in Medical Genetics based on Maastricht "seven jump" process, but its format of seven steps making them short because of time

constraint. Clustered PBL was practiced because of heterogeneous group of health professional and number of participants were more.

Background

Problem-based learning is recognized to promote integration of knowledge and fosters a deeper approach to life-long learning (Spencer et al 1999, Maudsley et al 2000). The experience indicates students a prefer this type of learning (Antepohl et al 1999, Norman et al 2000, Rideout et al 2002, Haghparast et al 2007)

Institutional Setting: In a large medical school genetics concepts are taught by conventional teacher-centered methodologies. Genetics is not given due importance in undergraduate and post graduate courses of medical education. Similarly students from basic sciences, studying genetics are not exposed to medical genetics. To fill up these lacunae we have started certificate courses in Medical genetics. These course in genetics are taught over 24 sessions for six months consists mainly of didactic lectures, demonstration and laboratory visits. The health professionals joined these courses are from diverse background i.e from basic sciences to medical specialists.

MATERIALS AND METHODS

To make genetics teaching more interesting PBL modules were designed based on clinical genetics. This module was designed to be three weeks long. The sessions were planned for 2 hours on weekend and weekdays were mainly for individual study and online interaction. It was decided to use the clinical genetics topic in this module as an opportunity for the students to integrate basic genetics and clinical genetics concepts. PBL modules were designed with the help of experts educationists from the Department of Medical Education. The content of PBL was discussed with the Departmental faculties of Genetics. Students were given overview of PBL and short demonstration of 2 hours session. They were explained about the role of facilitator and the different roles of students like chairperson, scribe and time keeper. They were also helped to find out objectives of PBL which help them to learn in better way. They were told importance of self study and active learning in PBL. The participation in PBL group was voluntary after signing informed consent. Three facilitators, who had previously attended the institutional PBL training course and are FAIMER fellows and Faculty from Department of Medical Education and Department of Genetics, participated in PBL sessions. The project was approved by ethics committee of the department. The information about the project was shared by participants and consent was taken from them.

PBL scenario: The case scenarios were prepared on Progeria, Down syndrome and Marfan syndrome. These cases were fictional with features of the above mentioned syndromes with different problems. Following discussion with an experienced consultant geneticists an outline sketch of each patient was written, based on actual cases. The photographs of the patients, family tree of the patient (pedigree chart) and short story of the patients were used as triggers. In the final session of the PBL chairperson gave a formal, timed presentation and responded to questions from their group (5 students) in relation to their allocated case. This final session was timetabled for 150 minutes and a further 5 minutes for questions and

discussion. Group discussion was followed by a brief summary and discussion led by the facilitator to highlight the integrated approach required in these cases. The resource material was provided by the facilitator.

Evaluation of PBL process: A questionnaire was used to evaluate student perception of PBL format. Questionnaires were prevalidated from the experts from the Department of Medical Education and responses of the students were obtained at the end of wrap up session. The questionnaires consisted of twelve questions and were answerable using a 5-point likert scale. While the remaining questions required the students to give free response. Frequency response of the likert scores were calculated,

RESULTS

Two general themes emerged from students were group discussion and self study and active thinking helps to retain knowledge for a longer duration. The descriptive analysis of this study showed that PBL approach in the practice and training of doctors and basic scientists stressing on the importance of integration of basic and clinical genetics. They felt that the cases effectively illustrated medical concepts and reinforced the students' genetics knowledge. They were convinced that the scenario motivated their interest in genetics. Peer to peer teaching was a helpful in learning objectives. The students appreciated interdisciplinary group helped in learning the subject. The course helped the participants to learn to obtain information from a variety of sources and compared to other classes in their course, they learned much more than usual. They were comfortable in sharing information with others (100%). They felt that they can apply the general principles they learnt to other genetics problems. They could confess their ignorance on specific issues. But at the same time felt confident to analyze a genetics problem by setting appropriate learning objectives (80.64%). They were comfortable with working in groups (90.32%). Self assessment of performance was possible in 93.54%. The written problem summary helped the participants to correlate the concepts covered in that problem. They agreed (96.77%) the amount of effort required in the course was greater than usual and overall they rated the course as excellent.

Qualitative analysis of data: The students were asked in an open ended question for their opinions on PBL process and suggestions to improve PBL tutorials. We analyzed words and terms provided by the participants. Two general themes emerged from the forum repliers about PBL process are: group discussion and self study and active thinking helps to retain knowledge for a longer duration. Most of them enjoyed PBL and recommended PBL for teaching. PBL is mentioned as a useful approach for multiprofessional education (Harden, 1998) with students from the different professions contributing from their disciplines' perspective to the problem as presented (Mires et al., 1999).

Participants reflection

Thought provoking session: Knowledge gained and retained in much better than routine teaching session. Group discussion maintains the interest. PBL should be a part of teaching at all levels.

"Learnt here to study any case for genetic abnormality. Self study gives us detailed knowledge of that particular subject and that can be remembered well as it is active learning "

Impact of the study: The students who participated in PBL started using it in their respective courses. More faculties from the basic sciences from the Department and outside the department want to get trained in PBL.

Limitations: Although the use of this PBL methodology appeared to be successful it should be noted that this study was conducted in a single institution and with a small student group. The limited response from student evaluation of the experience has meant that this is only useful for preliminary data of viewpoints and cannot in itself be utilized as data.

Conclusion: PBL type methodology can be successfully used with groups of students to promote knowledge integration across conventional subject boundaries. PBL helps in active learning, deep learning and promotes group study. In addition to traditional teaching, PBL if introduced in curriculum can make learning enjoyable.

Declarations

Ethics approval and consent to participate: taken

Consent for publication: taken

Availability of data and material – yes

Competing interests: None

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Authors Contribution: PM was planning and execution of the study. PB, AP and NR were involved in reviewing and guiding the study. all authors have read and approved the manuscript", and ensure that this is the case.

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