

**Case based learning as an innovative teaching tool****Roopinder Kaur<sup>1\*</sup>, Rakesh Kumar<sup>2</sup>, Vivek Sharma<sup>3</sup>**<sup>1</sup>Department of Pharmacology,  
Genesis Institute of Dental  
Sciences and Research,  
Ferozepur, Punjab, India,<sup>2</sup>Punjab Institute of Medical  
Sciences, Jalandhar, Punjab,  
India,<sup>3</sup>Department of Periodontics,  
Desh Bhagat Dental College,  
Mukstar, Punjab, India**Received:** 10 February 2014**Accepted:** 28 February 2014**\*Correspondence to:**Dr. Roopinder Kaur,  
Email: drroopinder05@gmail.  
com© 2014 Kaur R et al. This is an  
open-access article distributed  
under the terms of the Creative  
Commons Attribution Non-  
Commercial License, which  
permits unrestricted non-  
commercial use, distribution,  
and reproduction in any  
medium, provided the original  
work is properly cited.**ABSTRACT**

The challenges faced by the medical education are similar across the globe. The learning process is problematic with large classes and most of the curriculum time spent on traditional subject oriented didactic lectures during first and second professional, while teaching basic and paraclinical subjects. Various teaching methods were used to make the subjects more interesting, this study was done to determine the perception of case based learning (CBL) and to evaluate its effect in pharmacology among second year students undergoing graduation in Bachelor of Dental Surgery. The perception of student response was collected by questionnaire and records. Data obtained were analyzed statically using paired t test. 86% students (28% strongly agrees and 58% agrees) felt that CBL stimulated their desire to learn and 71% felt that it helps them to solve clinical situation in a better way. 92% felt they were motivated to learn pharmacology. Attendance record of the students improved and number of pharmacology book issued from the central library was increased during the CBL period. The Mean test score obtained by the students before CBL was  $7.172 \pm 2.268$ , which was increased significantly to  $9.195 \pm 3.799$ . The overall goal of this study is to introduce CBL as an innovative teaching tool. This would help the students to develop clinical decision making skill and link pharmacology to clinical practice in a better way during the start of their carrier.

**Keywords:** Case based learning, Pharmacology, Tool**INTRODUCTION**

The Medical and dental education all throughout the world has a similar problem, with exhaustive information, which needs to be learnt in fixed time. The learning process has its own set of problems with traditional teaching methods. Other problems being the large number of students, and most of the curriculum time is spend by teaching the basic health sciences subjects by traditional didactic lectures. While this is an important and effective tool to spread knowledge to a large group in a short time, but this does not provide adequate prospect to the learners to the subject in a contextual manner, so as to be able to identify and apply knowledge to solve clinical problems thus leaving gaps between learning and application of knowledge. Though basic health sciences are taught to dental students pursuing bachelor course in dentistry, but integration of knowledge gained in first 2 years in clinical context is lacking.

Case based teaching was first applied at Harvard law school in 1870; it was applied in the anatomy department of medical school in Newfoundland.<sup>1</sup> Case based learning (CBL) involves the interactive student centered exploration of realistic and specific situations where cases are factually based, complex problems written to stimulate classroom discussion and collaborative analysis done. Although problem based learning and CBL are similar in terms of goal, CBL is a guided approach as it is carried out in addition to didactic lectures so students have prior knowledge of topic.<sup>2</sup> Therefore CBL in an integrated manner is an attempt to narrow this gap between acquiring the knowledge and application of the same in the clinical situation thus better assimilation of knowledge. The present study was conducted to determine the perception of the students about the CBL and to develop it as one of the methods of teaching in the subject of pharmacology.

## METHODS

The project was carried out at Genesis Institute of Dental Sciences and Research, Ferozepur after obtaining consent from the Institutional Ethics Committee during August 2011 to November 2011. This project was carried out in 80 students of the second year Bachelor of Dental Surgery, they were divided into 8 batches of ten students each and every batch had separate time for group discussion (in 5 hrs time slot available for pharmacology department by clubbing theory and practical hours). Two CBL cases were designed and developed after identification of the area of high interest in dentistry (pain [NSAIDS] and chemotherapy) keeping rubrics of relevance, context, and level of knowledge, understanding and interest of students in mind. The learning objectives were identified, case planned accordingly. Clinical departments (oral surgery, conservative department, periodontics and pedodontics) were visited and few of the case histories were identified and collected to be used in making cases for CBL. Cases were framed and reframed keeping in mind the objectives. These cases were discussed and necessary changes were incorporated. A questionnaire based on five point Likert scale containing 12 questions was used to get the perceptions of students for CBL. Fellow faculty was trained for facilitation by presenting power point presentation on CBL and discussion on adult learning principles, small group dynamics and CBL in particular; practice session was carried out in post graduate students.

### *Introduction of CBL in students*

CBL was carried out in two contact sessions. Students were introduced to the concept of CBL; their consent was taken for their voluntary participation in the study. They were divided into small groups of 10 students each and were introduced to the concept of CBL by an orientation lecture, and case discussion (on dummy case). The pilot study was done on senior batch and repeated on Post graduate students. At the start of session, discussion groups were formed so that students are comfortable in their respective group.

The topics on which CBL is based had already been coordinated to be covered in pharmacology didactic lectures. A short pre-test was taken before the start of 1st session of CBL which was based on the short structured questions and MCQ covering the learning objectives (15-20 min). At the beginning of the first discussion session, a case scenario containing patient story/data with real life situation was given to the group. The group identified the key issues/objectives and key relationship between the patient problem and knowledge as and when required open-ended questions were asked to redirect the students to encourage debate and discussion. Group formulated the learning issues to be learnt and explored during the week. These issues were aligned with objectives formulated for the case. Also, students were guided for list of learning material and references for further learning. Group re-gathered after 1 week for further second session for discussion on the learning issues identified in the first session, share the new learning material and look for new learning issues if any and

discussed them. Questionnaire containing 12 questions was administered to find out student perception on CBL at the end of the second session of CBL. They were advised not to consult each other and not to identify themselves by writing their name or roll number. The students were advised to write down any observation or remarks regarding CBL at the end of the questionnaire. A short parallel post-test was taken based on the short structured questions and MCQ covering the learning objectives, but different from pre-test (15-20 min). The feedback questionnaire was evaluated and response obtained calculated in percentage. Pre-test and post-test were evaluated, marks given were compared using paired t test. Attendance record from the department and number of books issued from the library was studied and compared with previous batch during the same time period using unpaired t test.

## RESULTS

86% students (28% strongly agrees and 58% agrees) have the perception that CBL has stimulated their desire to learn and 71% felt that it helps them to solve clinical situation by applying the concepts of basic sciences. 92% felt they were motivated to learn pharmacology after CBL (Table 1). The mean test score of CBL was increased from  $7.172 \pm 2.268$  (pre-test) to  $9.195 \pm 3.799$  (post-test), which was statistically highly significant ( $p < 0.001$ ).

The opinion of the students about CBL in their own words some positive first were:

- I was satisfied with CBL
- I was able to understand topic better
- More topics should be covered like by CBL
- It is very effective
- I enjoyed the discussion
- I became aware of clinical implications
- CBL should be done chapter wise
- It has improved my confidence
- I am satisfied with CBL
- CBL should be carried out in other departments
- CBL is good.

Negative opinion about CBL in students own words:

- CBL is time consuming
- Class tests are better
- Some students just copy
- It is not good
- I was left with doubts
- It was difficult to work in a group.

The average attendance record of students in the month of August was 77%, it improved to 84% in the month of September, October and November 2011. However, this was less than average attendance record but was not significant ( $p > 1.257$ ) when compared with previous batch of 2010 during the same time period which was 86%. There was a significant increase in the number of pharmacology books issued from the central library during CBL period when compared with the previous year (Table 2).

**Table 1: Perception of students to case based learning.**

Sr. No.	Questions	Strongly agree %	Agree %	Not sure %	Disagree %	Strongly disagree %
1.	CBL stimulated my desire to learn	28	58	6	7	1
2.	I feel confident of my ability to apply concept of basic sciences to solve clinical situation	11	60	26	1	2
3.	CBL method is good way to practice integration of skills and knowledge learned in various classes	27	51	11	9	2
4.	I am confident about my clinical reasoning ability	19	50	20	10	1
5.	I was motivated to learn pharmacology	42	50	4	3	1
6.	The emphasis on clinical concept was detrimental to learning pharmacology	8	20	15	31	26
7.	The CBL helped to reinforce concept's taught in class	33	48	10	8	1
8.	CBL improved my skill in teaching myself new material	34	48	10	7	1
9.	CBL has increased my self-confidence and attitude towards learning	36	49	10	3	2
10.	CBL improved my communication skill and team work	49	43	2	4	2
11.	I would recommend CBL to other departments at our institution	24	40	12	16	8
12.	I was satisfied with CBL approach of learning	29	45	17	7	2

**Table 2: Comparison of text book issued from library during CBL period and previous year.**

Subject	During CBL (n=360)	Previous year (n=302)
Pharmacology	143	80
Pathology	45	40
Microbiology	38	42
Dental materials	74	73
Prosthodontics	26	29
Oral surgery	22	19
Conservative	12	19

## DISCUSSION

The usual approach in teaching pharmacology in dentistry students is by giving didactic lectures or use of power point presentation. This approach offers the learner to learn theoretical concepts in initial years while application of the concepts come in later years, which leads to the gap in the acquisition and application of knowledge. In order to become competent physician contextual learning is the only answer. It is well-documented that students are not receiving necessary exposure to clinical skills to become competent physicians.<sup>3</sup> The present study was done to introduce CBL in pharmacology as an innovative teaching tool for the second year dental students.

The overall impact of the study was positive in terms of improved test score, overwhelming positive feedback given by students. CBL stimulated and motivated the desire to learn, build confidence, develop clinical reasoning and understand the subject in a better way among the students, these findings are consistent with

the studies carried out by Garvey et al, Kassebaum et al, Engel and Hendricson, Hay and Katsikitis, Pearson et al and Hansen et al.<sup>2,4-8</sup>

The study shows that CBL is a very useful innovative tool for better contextual learning for teaching pharmacology in the second year dentistry students. This experience has encouraged us to continue CBL in future batches. However, CBL session was done in the month of September, first terminal was posted in the month of October and this could have influenced the result. In CBL students take active responsibility for their learning, which leads to deeper learning, enhance the interest of student in the subject of pharmacology and helps them to develop team based approach in their education.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Feiman-Nemser S, Floden RE. The cultures of teaching. In: Wittrock MC, editor. Handbook of Research on Teaching. 3rd Edition. New York: Macmillan: 505-26.
2. Garvey T, O'Sullivan M, Blake M. Multidisciplinary case-based learning for undergraduate students. *Eur J Dent Educ.* 2000;4(4):165-8.
3. Fincher R, Lewis L. Learning, experience, and self-assessment of competence of third-year medical students in performing bedside procedures. *Acad Med.* 1994;69:291-5.
4. Kassebaum D, Averbach R, Fryer G. Student preference for a case-based vs. lecture instructional format. *J Dent Educ.* 1991;55(12):781-4.
5. Engel F, Hendricson W. A case-based learning model in orthodontics. *J Dent Educ.* 1994;58(10):762-77.

6. Pearson T, Barker W, Fisher S, Trafton SH. Integration of the case-based series in population-orientated prevention into a problem-based medical curriculum. *Am J Prev Med.* 2003;24(4):102-7.
7. Hansen W, Ferguson K, Sipe C, Sorosky J. Attitudes of faculty and students toward case-based learning in the third-year obstetrics and gynecology clerkship. *Am J Obstet Gynecol.* 2005;192(2):644-7.
8. Hay P, Katsikitis M. The 'expert' in problem-based and case-based learning: necessary or not? *Med Educ.* 2001;35:22-6.

**doi:** 10.5455/2319-2003.ijbcp20140428

**Cite this article as:** Kaur R, Kumar R, Sharm V. Case based learning as an innovative teaching tool. *Int J Basic Clin Pharmacol* 2014;3:395-8.