

Impact of Case Based Learning on Teaching of Undergraduate Oral Pathology Course

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ABSTRACT

Background: Oral Pathology curriculum is taught as didactic lectures which promotes rote learning. This study intends to introduce and assess the impact of Case based Learning in student's performance and to obtain the perception of students towards it.

Methods: This cross-sectional study was conducted from March 2021 to January 2022 among dental undergraduate students (N=25) of Gandaki Medical College, Pokhara. The syllabus of Potentially Malignant Oral Lesions and Oral Cancer were covered for BDS third year students by didactic lectures, followed by Case Based Learning sessions (session I- Oral Leukoplakia, session II- Oral Squamous Cell Carcinoma). A pre-test and post-test, containing Multiple Choice questions relevant to the topics, were administered before and after the interventions. Students' perceptions were collected using feedback questionnaire. The scores obtained in the pre and post-test were compared by Wilcoxon pair test and Mann Whitney U test. The level of significance was set at $p < 0.05$.

Results: Twenty and 21 students participated in session I and II respectively, and all (100%) of them felt that the case scenarios made the subject more interesting, and 19 (90.5%) students felt more such sessions should be added and be used along with lectures. Post test score after case-based learning was significantly higher (For Oral Leukoplakia $p=0.028$, for Oral Squamous Cell Carcinoma $p<0.001$) in comparison to didactic lectures.

Conclusions: As case-based learning was positively perceived and preferred along with lectures, an attempt to incorporate it along with lectures in clinically important topics should be made.

Keywords: Case based learning; dental undergraduate students; lecture; medical education; oral pathology

INTRODUCTION

Most medical colleges in Nepal follow a traditional curriculum, which sparingly advocate the use of active learning strategies to cover theoretical parts of subjects.¹ Oral Pathology content is also delivered predominantly by means of didactic lectures in our institute. However, dental education has undergone significant curriculum reforms around the world, which includes the introduction of active learning strategies such as Case Based Learning (CBL).² Integration of CBL in oral Pathology is considered essential as involvement of clinical context in learning process might increase the interest of students towards this subject and makes students learning more real and relevant.^{3,4} There are few evidence showing the use of CBL in Nepal.^{5,6} In this context, we intend to conduct this current study

to introduce and assess the impact of CBL in students' performance. The perception of students towards the CBL was obtained using anonymous questionnaire adapted from previous study.⁷

METHODS

This cross-sectional study was conducted from March 2021 to January 2022 among the third-year dental students of Gandaki Medical College, Pokhara. Ethical approval was obtained from the Institutional Review Committee of Gandaki Medical College (GMC-IRC99/77/78). All the 25 students perusing Bachelor of Dental Surgery at the College of Dental Surgery of Gandaki Medical College, Pokhara and currently in their third were included. The written consent to participate in the study was obtained from the students.

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Leukoplakia and Oral Squamous Cell Carcinoma were chosen as learning topics in oral pathology subject. The learning objectives regarding the lesion were prepared. Two Clinical case scenarios with three vignettes were prepared for the CBL sessions by the core team. These cases along with the facilitator guide, was finalized. Multiple-choice questions (MCQs) relevant to each topic (12 MCQs for each topic) were prepared for this study. Two didactic lecture (DL) classes of one hour duration were conducted by a faculty of Oral pathology using PowerPoint for each selected topic. The CBL was conducted using process that had been adapted from previous study.^{7,8} The dental students were oriented to CBL and were explained about the group dynamics. At the pre-session phase of CBL, reading materials and the learning objectives related to the case was given one week before the session and were requested to study before attending the session. The CBL session was conducted 1month after the DL. At the CBL session, the case scenario was discussed with the two subgroups at different time schedule and the session lasted for 90 minutes each. Pretesting and post-testing were conducted using Multiple choice questions before and after DL as well as CBL sessions for each topic.

An anonymous pre-tested feedback questionnaires adapted from previous study was used to evaluate the perception of student towards CBL.⁷ The response to the questionnaire was recorded in five-point Likert scale, with 1 as Strongly disagree and 5 as Strongly agree.

The data obtained was entered in SPSS 20 (Statistical Package for the Social Sciences software) and statistical analysis was done. To check whether the data was normally distributed, Kolmogorov Smirnov and Shapiro-Wilk test were used. Non-parametric tests were used for the non-normally distributed data. The level of significance was set at $P < 0.05$.

RESULTS

Out of 25 students, 20 students were present for session on Oral Leukoplakia and 21 students were present for session on Oral Squamous Carcinoma. The summary of pre and post-test scores of students for the DL and CBL sessions on Oral Leukoplakia and Oral Squamous Cell Carcinoma was shown in Table 1 and 2 respectively. Analysis of the paired result showed statistically significant rise in posttest Knowledge score ($p < 0.001$) for both the DL and CBL sessions on Oral Leukoplakia and Oral Squamous Cell Carcinoma. The comparison of effectiveness of DL and CBL in session on Oral Leukoplakia and Oral Squamous Cell Carcinoma are shown in table 3

and 4 respectively. The comparison of post-test scores of DL and CBL shows significantly higher score after CBL session on both the selected topics (For Oral Leukoplakia $p = 0.028$, for Oral Squamous Cell Carcinoma $p < 0.001$) in comparison to DL.

Table 1. Summary of pre and post-test scores of students for the DL and CBL session on Oral Leukoplakia.

Teaching Learning method	Test by MCQs	Mean Score (Total score 12)	SD	P value
DL	Pre-test	2.05	0.294	<0.001
	Post-test	5.6	0.266	
CBL	Pre-test	3.8	0.258	<0.001
	Post-test	6.65	0.342	

Paired Wilcoxin signed rank test: negative mean ranks= 0, positive ranks=10.5, ties=0, for didactic lectures and negative ranks= 0, positive ranks=10, ties=1, for CBL.

Table 2. Summary of pre and posttest scores of students for the DL and CBL session on Oral Squamous Cell Carcinoma.

Teaching Learning method	Test by MCQs	Mean Score (Total score 12)	SD	P value
DL	Pre-test	4.05	0.198	<0.001
	Post-test	6	0.192	
CBL	Pre-test	4.2	0.287	<0.001
	Post-test	7.8	0.287	

Paired Wilcoxin signed rank test: negative mean ranks= 0, positive mean ranks=9.5, ties=3, for didactic lectures and negative ranks= 0, positive ranks=10.5, ties=1

Table 3. Comparison of effectiveness of DL and CBL in session on Oral leukoplakia.

Test	Groups	Mean Score	SD	P value
Pretest	DL	4.05	0.198	<0.001
	CBL	3.8	0.258	
Post-test	DL	5.6	0.266	0.028
	CBL	6.65	0.342	

Mann-Whitney test: Mean ranks=13.73, Sum of the rank 274.5 for Pretest lecture, Mean ranks=27.28, Sum of the rank 545.5 for Pretest CBL. Mean ranks=16.48, Sum of the rank 329.5 for posttest Lecture, Mean ranks=24.53, Sum of the rank 490.5 for posttest CBL.

Table 4. Comparison of effectiveness of DL and CBL in session on Oral Squamous Cell Carcinoma.

Test	Groups	Mean Score	Significance	P value
Pretest	DL	4.05	0.198	
	CBL	4.2	0.287	
Post-test	DL	6	0.192	
	CBL	7.8	0.287	

Mann-Whitney test: Mean ranks=19.8, Sum of the rank 396 for Pretest lecture, Mean ranks=21.2, Sum of the rank 424 for Pretest CBL, $p=718$. Mean ranks=14.08, Sum of the rank 281.5 for posttest Lecture, Mean ranks=26.93, Sum of the rank 538.5 for posttest CBL, $p<0.001$.

Students gave positive response to the CBL intervention. All of them (100%) felt that the Case scenarios made the subject more interesting. All of them felt CBL helped in better understanding of the disease, motivated them to use additional learning resources, improved their learning abilities, facilitated team learning, enhanced their communication skills and made them feel more confident about dealing with a clinical situation. All of them found the intervention of the teacher helpful. Seventeen (80.9%) students felt that the cases fitted their level of knowledge, 17 (80.9%) agreed that the cases were appropriate, 19 (90.5%) students felt that they were explained what was expected, and 19 (90.5%) felt more such sessions should be added.

Table 5. Feedback of students to CBL sessions.

Feedback questions	Mean	SD
Cases/scenarios made the subject more interesting	4.67	0.483
Helped in better understanding of the disease process	4.62	0.498
Motivated me to use additional learning resources	4.71	0.463
Made me feel more confident about dealing with a clinical situation	4.43	0.507
Improved my learning abilities	4.43	0.507
Enhanced my communication skills	4.33	0.483
Facilitated team learning	4.48	0.512
Cases fitted my level of knowledge	3.9	0.539
Cases selected were appropriate	4.24	0.768
I was explained what was expected	4.1	0.539
The intervention of the teacher was helpful	4.33	0.483
The session was better than tutorial	4.14	0.573
More such sessions should be added	4.29	0.644

Eighteen (85.7%) students felt that CBL should be used only in some, and not all the topics, and 19 (90.5%) of them felt that it should be used along with lectures.

DISCUSSION

Traditional teacher centred approach which may promote rote learning, is commonly used to deliver the Oral pathology curriculum in Nepal. Therefore, it is a need of an hour to reform the teaching learning methods introducing active learning strategy such as Case based learning in Nepal including our institute. CBL has received extensive attention in clinical teaching in recent years.

CBL is a guided inquiry-based learning method in which realistic patients are used to demonstrate relevance to students and it emphasizes linking of theory to practice with integration of basic science and clinical management. CBL functions as a bridge between learning/knowledge and working life and is both student and patient centered.^{9,10} Early clinical exposure has been recommended by previous studies as it contributes to students' satisfaction towards medical education and avoids the abrupt transition from academic textbooks to patients and diseases.^{8,11,12}

Du et al¹³ showed CBL to be more effective than lecture-based education and suggested that CBL should be added in the future curriculum for dental students. Similarly in a study by Llguyet al¹⁴ the scores were higher in students of CBL group than the LBL groups, suggesting the integration of case-based curriculum may be effective in promoting students' deep learning. Similarly, the results of a recent meta-analysis on effectiveness of CBL in medical education showed that students' academic performance and case analysis ability has been improved by CBL indicating it to be effective method for educating medical students. CBL was positively perceived as an effective teaching method highlighting its importance in medical students' education. However, in the subgroup analysis of learning performance in the same meta-analysis, there was no significant difference between CBL and traditional learning.¹⁵ Yet another meta-analysis on effectiveness of CBL in dental education suggested that the CBL pedagogy has potential to increase knowledge scores, skill scores, comprehensive ability scores and teaching satisfaction compared with that of the traditional LBL teaching model.¹⁶ The current study was designed to use CBL as an adjunct to DLs in which CBL followed after completion of topics by DLs as done by previous studies.^{7,17} This approach might help students to retain the knowledge through practice application of acquired knowledge in real life case scenarios rather than memorization.¹⁷ In our study, there was significant increase in post test score after CBL session in comparison to post test score after the lecture (For Oral Leukoplakia $p=0.028$, for Oral Squamous Cell Carcinoma $p<0.001$), a finding similar to previous study.⁷ Our finding may be attributed to positive effect of reinforcement of knowledge gained during lecture as the CBL was used as an adjunct to lecture.⁷

Teaching and learning can be improved, by understanding the students' perceptions so evaluating the students' perception towards CBL approach was a major specific aim of the present study. Feedback questionnaires showed students perceived the CBL session better

than lecture classes and desired for more CBL sessions. However, the students favoured and highly accepted the use of CBL along with lectures, a finding similar to a previous study.^{7,18} This perception may be supported by the findings that lectures help in better preparation for written examinations and CBL can be promoted as an effective adjunct to lectures.⁷

The successful conduction of CBL depends on the quality of the case scenarios which should be relevant, realistic, engaging, challenging, instructional, enjoyable, and based on a real-world professional context.¹⁹ The students perceived that cases selected were appropriate and fitted their level of knowledge which was consistent with finding by Dubey et al.⁷ The students perceived that CBL sessions made the subject more interesting, assisted in better understanding of the disease process, motivated to use additional learning resources, made them feel more confident about dealing with a clinical situation, and improved their learning abilities. The results of the present study are consistent with those of previous finding.^{7,19,20} Most of the students had positive perception towards CBL as seen in previous studies.^{7,12,19-21} The positive perception can be attributed to the initial exposure of a newer experience having a supportive and informal environment with constant encouragement of students to give their inputs and ideas with more time spent on individual cases otherwise not feasible in clinics.¹⁹

They even appreciated that CBL enhances communication skills and facilitates team learning as has been done by students in previous studies.^{7,11} CBL sessions help them hone the collaborative, and communication skills. While working in group, the participants are mutually dependent, they share responsibilities, and work together to achieve a common goal which facilitates team learning. They are even encouraged to interact with each other which may enhance their communication skill.¹¹

The major limitation in proper administration of CBL is lack of sensitization and training of faculty members in CBL as it is not practiced in most of the medical and dental institutes in Nepal. Another limitation is the long-term outcome of CBL was not evaluated. To overcome these limitations, further studies should be carried out in other departments and other institutes along with sensitization and training of faculty members and the long-term outcome of CBL need to be evaluated in our context. There was also an absence of a control group for whom traditional teaching methods for the same topics are used with no CBL implementation.

To overcome this limitation, future study needs to be designed where we assess the students' performance in topics that are taught using both didactic and CBL and compare it to their performance in topics taught without CBL sessions in the same block.

CONCLUSIONS

CBL, an active learning strategy, was positively perceived by most of the students and was preferred along with lectures. So, an attempt to incorporate it along with lectures in clinically important topics should be made.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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