EVALUATION OF EFFICACY OF ONLINE CASE BASED LEARNING AS A TEACHING LEARNING TOOL IN UNDERGRADUATE ORAL PATHOLOGY COURSE

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Citation

ABSTRACT

Introduction

COVID-19 had enforced educational institutes to adopt online learning.

Objectives

This study was designed to compare the learning outcome of online case and online lecture based learning in the undergraduate Oral pathology module of our institute and to compare the perception of students towards the course attended.

Methodology

The 3rd year dental students (N=25) were split into – online case based learning (A1=6, A2=6) and online lecture based learning groups (B=13) randomly. An online multiple choice questions tests were conducted before and after the interventions. An online questionnaire based survey was conducted to evaluate students' perceptions toward the course attended. The statistical analysis was done using paired t test and Mann Whitney U test.

Results

Online case based learning was found to be a more effective learning method than online lecture based learning group (online case based learning post test mean rank=16, online lecture based learning post test mean rank=9.54, P=0.026). Significantly more students in the online case based learning group had positive perception towards the course attended (online lecture based learning; mean value =2.5+/- 0.54, online case based learning; mean value =2.87+/-0.2, P=0.041).

Conclusion

Online case based learning should be integrated in Oral Pathology curriculum amidst such pandemics when onsite classes are not possible.

KEY WORDS

Online learning, oral pathology, perceptions

INTRODUCTION

Most of the medical and dental schools in Nepal were enforced to switch to online mode for the delivering education during COVID-19 pandemic lockdown period.[1] As recent meta-analysis showed the learning outcome of online learning to be comparable to face-to-face learning, teaching method rapidly transitioned to online mode.[2] The software (such as Zoom application), enabled with the functions of web conferencing and screen sharing, had increasingly been used in our institute to conduct online classes basically in lecture based format. The learning has been seen to be better achieved with student centered active learning in comparison to traditional teacher centered learning.[3] So, recently, the dental education has undergone significant curriculum reform around the world, which includes the introduction of active learning strategies.[4] Integration of case-based learning (CBL) strategies might improve the outcomes of even online learning.[2] An environment which activity engage the students with the subject to generate knowledge has to be created rather than just receiving it passively through didactic lectures.[3] CBL is an active learning strategy which facilitates the students to understand and apply the concept in lifelong clinical practice.[3,5] Integration of CBL in oral pathology is considered essential as it provides an early clinical exposure and allows integration of basic science knowledge with clinical application. Moreover, involvement of clinical context in learning process might increase the interest of students towards this basic science subject.[3-6]

There is paucity of study evaluating the efficacy of online CBL (OCBL) and online lecture based learning (OLBL) in dental education in Nepal. So, we intended to compare the learning outcomes of OCBL and OLBL and to compare the students' perception towards the course attended.

METHODOLOGY

An online pre-and post-test study was conducted from July to August 2020 among all the 3rd year dental students of Gandaki Medical College, Pokhara Ethical approval from the institutional review committee of Gandaki Medical College was obtained (Regd. No. 049/2077/2078).

All the 3rd year dental students (N=25) of college of dental science, Gandaki Medical college, Pokhara were included in this study. This study was conducted after obtaining the consent of all the students and the process of this study was well explained to the students. The students were split randomly into two cohorts: OCBL group A (n=12) and OLBL group B (n=13). Group A was further split into 2 small groups A1 and A2 (n=6).

Leukoplakia was chosen as a learning topic in oral pathology subject. This disease is one of the most common potentially malignant oral lesions and the students should be aware of this lesion. The learning objectives regarding the lesion were prepared. Two clinical case scenarios with 3 vignettes were prepared for the OCBL sessions by the core team. These cases along with the facilitator guide, were finalized.

We adopted an established case based learning process.[7,8]

During the pandemic lockdown period, the dental students were exposed to an online learning environment (using Zoom application software). Before conducting the OCBL, OCBL viber group was created. The OCBL group was explained about the group dynamics and was oriented to OCBL. At the pre-session phase of OCBL, reading materials and the learning objectives related to the case was given to the OCBL interventional group as an attachment in the OCBL viber group, 1week before OCBL session and were requested to study and not to share the materials with the OLBL group. At the 1st session, the 1st case was discussed with the 2 subgroups through web conferencing at different time schedules. At the 2nd session, which was conducted 1 week after the 1st session, all subgroups then communicated and presented case summary of the previous case and the same facilitator gave comments and then the subgroups discussed another similar case in line with the learning objective. OCBL sessions were conducted at different time schedules and each lasted for 90 minutes.

Two OLBL in lecture format were conducted by Oral pathology faculty using PowerPoint by online screen sharing. The duration of each OLBL session was 1 hour.

A pretested questionnaire comprising 12 multiple choice questions (cronbach's alpha value =0.7) prepared in google form was used to access the online pretest and posttest knowledge outcome in both the interventional groups. The link to the online questionnaire was attached in 3rd year dental students' viber group and the interested participants followed a link to an online questionnaire. The first page consisted of a consent form; if they consented to participate, students responded to questionnaires. An online survey questionnaires adapted from previous study, were used to evaluate students' perception regarding the course attended.[4] The response to the questionnaire was in 5 point likert scale. The response was re-coded to 3 point likert scale while analyzing the result. Strongly disagree and disagree was categorized as 1, neutral as 2 and strongly agree and agree as 3. The data was entered in SPSS 20 (Statistical Package for the Social Sciences software) and statistical analysis was done. Paired sample t test was used to analyze the effectiveness of each intervention. The comparison of the learning outcome of OLBL and OCBL as well as comparison of the perception of both the interventional groups towards the course attended was done using Mann Whitney U test. The level of significance was set at P<0.05.

RESULTS

Among the total of 25 third year dental students, 1 student was absent during the intervention, so the sample size for the statistical analysis used was 24.

Paired sample t test analysis showed that both the OLBL and OCBL were effective in acquiring knowledge as post-test mean scores (OLBL=5.85 ± 0.899, OCBL=7.55 ±1.753) were significantly higher than pretest mean scores (OLBL=4.31 ± 1.548, OCBL=4.09±1.375) with P value =0.006 in OLBL and P value <0.001 in OLBL group (as shown in Table 1).

Table1. Effectiveness of online lecture based learning (OLBL) and online case based learning (OCBL)

TL method	MCQs Evaluation	Mean (FM=12)	SD	MD +/- SD	t test value	P value
OLBL (N=13)	Pretest	4.31	1.548	1.538 +/-1.664	3.333	0.006
	Posttest	5.85	0.899			
OCBL (N=11)	Pretest	4.09	1.375	3.45+/- 1.572	7.286	<0.001
	Posttest	7.55	1.753			

$P \leq 0.05$, statistically significant; $P > 0.05$, non-significant. TL: teaching learning, N: Number of students, FM: full marks, MD: mean difference, SD: Standard deviation

The comparison of the learning outcome of OLBL and OCBL teaching learning method by Mann Whitney U test is shown in Table 2. OCBL was found to be a significantly more effective teaching learning method than OLBL (P =0.026).

Table 2: Comparison of effectiveness of online lecture based learning (OLBL) and online case based learning (OCBL)

TL method	Test FM=12	Mean Rank	Sum of ranks	U	P value
OLBL (N=13)	Pretest	12.92	168.00	66.00	0.776
OCBL (N=11)	Pretest	12.00	132.00		
OLBL (N=13)	Posttest	9.54	124.00	33.00	0.026
OCBL (N=11)	Posttest	16.00	176.00		

The perception of students towards the course attended (OLBL and OCBL) is shown in Table 3. Comparison of perception of students towards the course attended between two groups by Mann Whitney U test showed a statistically significant difference (online lecture based learning; mean value =2.5+/- 0.54, online case based learning; mean value =2.87+/-0.2,P=0.041).

Table 3: Perceptions of student towards the online lecture based learning (OLBL) and online case based learning (OCBL)

Items	Group	Agree (3)	Neutral (2)	Disagree (1)
Stimulate study interest	OLBL	9 (69.2%)	2 (15.4%)	2 (15.4%)
	OCBL	9 (81.8%)	2(18.2%)	0
Help to understand basic concepts	OLBL	11(84.6%)	1(7.7%)	1 (7.7%)
	OCBL	9 (81.8%)	2 (18.2%)	0
Extent more related knowledge	OLBL	11(84.6%)	1(7.7%)	1 (7.7%)
	OCBL	9 (81.8%)	2 (18.2%)	0
Help to find out key points	OLBL	9 (69.2%)	3 (23.1%)	1(7.7%)
	OCBL	11 (100%)	0	0
Promote self-learning	OLBL	6 (46.2%)	4 (30.8%)	3 (23.1)
	OCBL	9 (81.8%)	2 (18.2%)	0
Can promote communication	OLBL	7(53.8%)	2 (15.4%)	4 (30.8%)
	OCBL	11 (100%)	0	0
Enlighten students during interaction with tutor	OLBL	7 (53.8%)	4 (30.8%)	2 (15.4%)
	OCBL	11(100%)	0	0
Facilitate to solve clinical problems	OLBL	7 (53.8%)	4(30.8%)	2(15.4%)
	OCBL	11(100%)	0	0
Improve arrangement of ora pathology curriculum	OLBL	8 (61.5%)	4(30.8%)	1(7.7%)
	OCBL	9(81.8%)	2(18.2%)	0
Be expanded in more teaching procedure of Oral pathology course	OLBL	8(61.6%)	5(38.5%)	0
	OCBL	9(81.8%)	2(18.2%)	0

DISCUSSIONS

Lecture based learning is followed in most of the medical and dental colleges in Nepal including our medical institute.[9] Most of us converted our lecture class power-point to online classes. Online lectures were found to be an applicable and effective learning method in the wide body of existing literature. In a recent review article by Tang B et al, the integration of online lectures into undergraduate medical education was seen to be well accepted by students and was seen to improve knowledge, clinical skills, and other learning outcomes.[10] Tayler R et al observed that online module was non-inferior to face-to-face learning in terms of improving application and knowledge and the partcipants had similar levels of satisfaction with the 2 modes of learning.[11] Similar to the findings by Tang B et al and Tayler R et al, we found OLBL to be effective in acquiring knowledge.[10,11] However, insufficient pre-class preparation, limited interaction in class and inadequate in depth discussion, common in traditional teacher centered teaching and online teaching in lecture format, may result in superficial learning.[12]

There is a need to evaluate the effectiveness of student centered active learning especially in our scenario where the learning is mostly teacher centered. COVID -19 pandemic has further complicated the issue enforcing rapid transition to online learning. In present study, OCBL was found to be more effective than OLBL. There is paucity of literature comparing online CBL and online LBL, however, face to face CBL had been found more effective than in class LBL in previous studies which was consistent to our findings.[6,8,13-15] Consistent to our findings, Dutta A and Ray J observed significant increase in mean-scores of post-tests than from pretests in both phases, with post-test mean-scores of CBL group significantly higher than that of didactic lecture group. They suggested CBL is a more effective and highly acceptable teaching learning tool than didactic lecture group in Pathology. Similar to our findings, Du et al found that the test scores of the CBL group were significantly higher than those of the LBL group showing CBL is more effective than lecture based education in dental students. They suggested that CBL should be added in the future curriculum for dental students.[8] Consistent with our findings, in a study by Ilgüy M et al, the scores at the top two levels of the SOLO taxonomy were higher in students of CBL group than the LBL groups. Their findings suggested that the integration of case-based curriculum may be effective in promoting students' deep learning.[13] In a similar study by Deshpande et al, more proportion of students in CBL group showed improvement in knowledge compared to didactic lecture group. They suggested that case based learning was a best approach to break the monotony of didactic lectures and improve student's learning.[14]Lecture classes rarely facilitate interaction between facilitator and students and students usually lack interest to be actively involved in the lecture class.[6]Whereas, the small group in CBL process facilitates effective involvement and interaction between the students and with the tutor. This interaction avoids monotony of lecture based learning, enhance the attention span of students and actively engage students in the process of deeper learning.[5]

The case based learning strategy as opposed to lecture based learning, actively involve the students in the process of learning and thus prepares them for a lifelong self directed learning process and is helpful for developing students' critical thinking and problem solving skill.[15,16]It has been shown that the individual who gain the knowledge through problem solving are more like to apply it spontaneously to solve a new problem than the individuals who acquire the same information passively through lectures.[17] We conducted online CBL as the learning outcome of online case based learning had been found as effective as face to face-CBL.[18,19] In a study by Nicklen P et al, the postintervention multiple-choice test results of traditional-CBL and remote-online CBL groups did not show any statistical significant difference. It had been suggested to be incorporated in teaching learning activities when face to face CBL is not possible.[18,19]

In our study, WCBL group had positive perception towards course attended which was consistent to previous studies.[3,6,8] In the study by Shingal et al, most students agreed that CBL was an effective learning tool, enhanced their learning skills and analytical skills, motivated for independent learning, and improved their communication skills.[3] Consistent with findings of Du et al, we observed that significantly more students in case based learning group (online lecture based learning; mean value =2.5+/- 0.54, online case based learning; mean value =2.87+/- 0.2,P=0.041) percieved that the CBL: stimulate study interest, help to understand basic concepts, extent more related knowledge, help to find out key points promote self-learning, can promote communication, enlighten students during interaction with tutor and facilitate to solve clinical problems.[8]

CONCLUSION

Online case based learning was seen to achieve better learning outcomes compared with online lecture based learning and more students in CBL group had positive perception towards the course attended. So, online classes in case based learning format should be preferred over online class in lecture format and should be integrated in our Oral Pathology curriculum whenever the face to face classes are not possible.

RECOMMENDATIONS

In the future curriculum of Oral Pathology, more modules should be prepared and more facilitators should be trained for conducting either online or face to face classes in CBL format. Similar studies should be conducted in large sample size to validate the result.

LIMITATIONS OF THE STUDY

Limitations of the study exist which are listed as followings:

1) The small sample size and short exposure to online teaching may have influenced the research results.

2) We were unable to get the final examination results from participants to evaluate whether there were any differences in long-term retention of knowledge by either group.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

FINANCIAL DISCLOSURE
None

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