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Effectiveness, Acceptance and Satisfaction of e -learning among Preclinical Prosthodontic Students during Covid-19

Dr. Hareesh M. T[1], Dr. Bennett Atlin Correya[2], Dr. Pramod Kumar A.V[3], Dr. Vinni. T.K

[1](Department of Prosthodontics, Government Dental College, Kozhikode)

Abstract

Background*: The lockdown measures imposed by the Government to curb corona virus had resulted in complete shutdown of all educational institutions. Since the traditional class room oriented learning was not possible, the only alternate to option to gain knowledge was through online learning.*

Aims and objectives: *To assess effectiveness, acceptance and satisfaction of e-learning among preclinical prosthodontic students during Covid-19.*

Materials and Methods: *A cross‐sectional observational study was conducted among preclinical prosthodontics dental students of various dental Colleges under Kerala University of Health Sciences (KUHS). An online structured self-explanatory questionnaire with a consent form attached to it was developed and the link of the questionnaire comprising of 21 questions were sent through the e-mails as Google e-forms.*

Results: *Response rate obtained was 95.3%.Rseults revealed that large proportion of students (64.42%) were unhappy about the concept of implementing clinical knowledge through the preclinical prosthodontics online classes. Acceptance of the preclinical prosthodontics online classes were among 7.49% of students and only 8.49% of students were satisfied after attending the preclinical online class.*

Conclusion*: Overall, students displayed a low positive contentment towards preclinical prosthodontics online classes. Unlike other higher education courses, dentistry involves more practical oriented sessions and relies more on hands on approach than theoretical learning. Hence no virtual media can replace the pre-clinical and clinical training experience attained by the dental students during their learning process.*

Key words: *Acceptance, Covid-19, Effectiveness, e-learning, preclinical prosthodontic students, satisfaction*

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I. Introduction

Covid-19 pandemic has gripped across the globe in 2020 and many of the countries imposed various lockdown measures to curb the spread of corona virus. Educational sector was one among the first few sectors that faced rapid shut down of all its activities. Many schools, colleges and millions of students were affected by lockdown, as the first response from the educational sector was to completely halt its operations. Educational institutions are still struggling to find alternatives to deal with this challenging situation. [1]

In the current scenario of Covid-19 when traditional classroom-oriented learning is not possible, the only alternate option to gain knowledge and new skills is through online learning. It is a type of learning environment that takes place over the Internet, often referred to as e-learning where knowledge can be transferred and learning can be acquired virtually using multiple media. An online educator creates a supportive environment for the students, to compensate for the lack of physical presence of a virtual classroom. In this system, learners use Internet technology to communicate virtually with their teachers and fellow learners through email, whatsApp, and video-conferencing or using other tools. Video conferencing can, be utilized effectively in online learning to promote group communication and a sense of community amongst learners, and can replace face-to-face classroom learning to some extent. [2]

E-learning definitely has its own advantages like flexibility, accessibility to information despite location, availability of wide selection of programs, a more customized learning experience, cost-effectiveness, improved scope of learning as per individual interest, comfort and flexibility of sharing knowledge with others.[3]Students in health profession fields are required to gain and integrate theoretical and clinical knowledge in a suitable environment to become safe and competent health professionals. The importance of one-to-one supervision and hands-on training in such fields poses a real challenge for e-learning curricula. [4] So, when e-learning is implemented in dental speciality which relies more on practical and clinical skills and is practised through a more hands on approach than theoretical learning, the situation becomes more complicated than any other higher education entity. Preclinical education in dentistry provides with various simulation exercises to promote the development of competency and expertise before dealing with real patients.[5]Hence it is very

important to evaluate the level of acceptance and effectiveness in transferring, receiving and reproducing the practical skill development in dentistry in comparison with other higher education system. Thus, this study was undertaken to assess effectiveness, acceptance and satisfaction of e-learning among preclinical prosthodontic students during Covid-19.

II. Materials and Methods

This study was conducted among preclinical prosthodontics dental students of various dental Colleges under Kerala University of Health Sciences (KUHS). A list of colleges offering BDS degree were obtained from KUHS. After obtaining prior permission from the respective heads of the institutes, the investigator collected the email id of every preclinical student. Ethical clearance was obtained by the Institutional Ethics Committee bearing a registration number179/2020/DCC.

Study design: Cross- Sectional observational study

Study duration: August 2020 to November 2020

Sample size (n) = $\frac{4pq}{d^2}$

Where,

P= 68 (Percentage of Character

Q= 32 (Counter Part)

d =6 (Precision)

10% of the calculated sample size was added to compensate for sampling loss if any, thus the final sample size accounted to a total of 264 pre-clinical students.[4]

Subjects and Selection: Preclinical prosthodontics dental students of various dental Colleges under Kerala University of Health Sciences (KUHS)

Inclusion Criteria

- Students willing to give informed consent for participation through Google forms

Exclusion Criteria

- Five reminders were given through e-mail with an interval of two days and students who did not respond were excluded from the study

Data collection instrument

The questionnaire was formed on three domains: the first domain consisted of questions assessing the effectiveness of e-learning among dental students, second domain comprised of a set of questions targeting acceptance and third one consisted of question related to satisfaction of e-learning among dental students. Most of the responses were elicited on a five point Likert scale.

Validation of the tool

A set of 24 questions in English pertaining to various domains were prepared based on literature review. These questions were emailed to five experts in the field to perform content validation on a five point Likert scale. Each question was assessed for its relevance by calculating its Aiken's index. Questions which obtained a score ≥ 0.6 were included in the proforma. Reliability of the questionnaire was assessed by Cronbach's alpha value which ranged between 0.72 and 0.891 with a median of 0.84 showing good reliability.

Study procedure

An online structured self -explanatory questionnaire with a consent form attached to it was developed. The link of the questionnaire comprising of 21 questions were sent through the e-mails as Google e-forms, and every student was allowed to give only one response. Participants were automatically directed to the study details and informed consent after obtaining and clicking the link which was followed by a sequence of questions. Completeness and consistency were checked for the collected information and the results were collected anonymously on Survey Monkey (www.surveymonkey.com).

Statistical analysis

Descriptive statistics of student's response to different questions were assessed using IBM SPSS (Statistical Package for Social Sciences) Version 21.0, Chicago.

III. Results

Among the 280 preclinical students, 267 students completed the questionnaire yielding a response rate of 95.3%. Analysis of effectiveness of e-learning among preclinical students revealed that 73 % of the students were expecting minimum knowledge from the teachers about the technology platform used, typing and

communicating skills, analytical thinking skills, knowledge management skills and ethical and responsible behavioural skills to make the preclinical prosthodontics e-learning classes effective. There were only 3.75% of students strongly agreed about student-teacher interaction which was effective during the preclinical prosthodontics online class and majority (41.57%) considered the interaction as less effective. A large proportion of students (64.42%) displayed low positive contentment on the concept of implementing clinical knowledge through the preclinical prosthodontics online classes. It was agreed by 38.2% of students that the classes could effectively convey knowledge and 37.8% students were uncertain about the same. Most of the students reported that (36.7% disagreed, 17.23% strongly disagreed and 31.8% were uncertain) preclinical prosthodontics online classes couldn't develop new clinical skills effectively. Majority of the students (70.41%) agreed that repetition of classes helped in improving their knowledge. Around 41.95% students were uncertain about getting individual attention during online classes. Preferred time for effective learning as suggested by the students were 41.95% each, for early morning and forenoon as depicted in Table 1.

Table 1: Effectiveness of e-learning among preclinical prosthodontic students

Si No	Questions	Responses	Frequency
1.	What kind of digital skills do you expect from the teachers to have to make the preclinical Prosthodontics e-learning classes effective?	Minimum knowledge about the technology platform used	12 (4.49%)
		Typing and communicating skills	14 (5.24%)
		Analytical thinking skills	13 (4.87%)
		Knowledge management skills	22 (8.24%)
		Ethical and responsible behavioural skills	11 (4.12%)
		All of the above	195 (73.0%)
2.	Do you agree that the student teacher interaction is effective during the preclinical Prosthodontics online class?	Strongly disagree	18 (6.74%)
		Disagree	111 (41.57%)
		Don't know	39 (14.6%)
		Agree	89 (33.33%)
		Strongly agree	10 (3.75%)
3.	Implementing clinical knowledge through the preclinical Prosthodontics online classes?	Strongly disagree	56 (20.97%)
		Disagree	116 (43.45%)
		Don't know	58 (21.72%)
		Agree	32 (11.99%)
		Strongly agree	5 (1.87%)
4.	Preclinical Prosthodontics Online classes can effectively convey knowledge?	Strongly disagree	12 (4.49%)
		Disagree	41 (15.36%)
		Don't know	101 (37.83%)
		Agree	102 (38.2%)
		Strongly agree	11 (4.12%)
5.	Preclinical Prosthodontics Online classes can develop new clinical skills effectively?	Strongly disagree	46 (17.23%)
		Disagree	98 (36.7%)
		Don't know	85 (31.8%)
		Agree	37 (13.86%)
		Strongly agree	1 (0.37%)
6.	Do you feel repetition of classes will improve your knowledge?	Strongly disagree	5 (1.87%)
		Disagree	18 (6.74%)
		Don't know	56 (20.97%)
		Agree	132 (49.44%)
		Strongly agree	56 (20.97%)
7.	Are you getting Individual attention during the preclinical Prosthodontics online classes?	Strongly disagree	21 (7.87%)
		Disagree	65 (24.34%)
		Don't know	112 (41.95%)
		Agree	66 (24.72%)

		Strongly agree	3 (1.12%)
8.	Preferred time for effective learning the preclinical Prosthodontics online class?	Early morning	112 (41.95%)
		Forenoon	112 (41.95%)
		Afternoon	19 (7.12%)
		Evening	24 (8.99%)

Analysis of acceptance of e-learning among preclinical students reported that preclinical prosthodontics e-learning couldn't enhance traditional learning method , since 35.38% of students disagreed and 32.58% were uncertain .Large proportion of the students(47.19%) were not at all self-motivated and 23.97% were somewhat motivated by an online class. Most of the students didn't consider e-learning (55.44%) as an alternate method for traditional classroom study. Acceptance of the preclinical prosthodontics online classes were among 7.49% of students. Around 70.79% students reported that online preclinical prosthodontics classes couldn't improve their practical skills. Most of the students (53.93%) revealed that online classes were not expensive. According to majority (66.84%), online classes could not reduce their financial burden as shown in Table 2.

Table 2: Acceptance of e-learning among preclinical prosthodontic students

Si No	Questions	Responses	Frequency
1.	What kind of digital skills do you expect from the teachers to have to make the preclinical Prosthodontics e-learning classes effective?	Minimum knowledge about the technology platform used	12 (4.49%)
		Typing and communicating skills	14 (5.24%)
		Analytical thinking skills	13 (4.87%)
		Knowledge management skills	22 (8.24%)
		Ethical and responsible behavioural skills	11 (4.12%)
		All of the above	195 (73.0%)
2.	Do you agree that the student teacher interaction is effective during the preclinical Prosthodontics online class?	Strongly disagree	18 (6.74%)
		Disagree	111 (41.57%)
		Don't know	39 (14.6%)
		Agree	89 (33.33%)
		Strongly agree	10 (3.75%)
3.	Implementing clinical knowledge through the preclinical Prosthodontics online classes?	Strongly disagree	56 (20.97%)
		Disagree	116 (43.45%)
		Don't know	58 (21.72%)
		Agree	32 (11.99%)
		Strongly agree	5 (1.87%)
4.	Preclinical Prosthodontics Online classes can effectively convey knowledge?	Strongly disagree	12 (4.49%)
		Disagree	41 (15.36%)
		Don't know	101 (37.83%)
		Agree	102 (38.2%)
		Strongly agree	11 (4.12%)
5.	Preclinical Prosthodontics Online classes can develop new clinical skills effectively?	Strongly disagree	46 (17.23%)
		Disagree	98 (36.7%)
		Don't know	85 (31.8%)
		Agree	37 (13.86%)
		Strongly agree	1 (0.37%)
6.	Do you feel repetition of classes will improve your knowledge?	Strongly disagree	5 (1.87%)
		Disagree	18 (6.74%)
		Don't know	56 (20.97%)
		Agree	132 (49.44%)
		Strongly agree	56 (20.97%)
7.	Are you getting Individual attention during the preclinical Prosthodontics online classes?	Strongly disagree	21 (7.87%)
		Disagree	65 (24.34%)

		Don't know	112 (41.95%)
		Agree	66 (24.72%)
		Strongly agree	3 (1.12%)
8.	Preferred time for effective learning the preclinical Prosthodontics online class?	Early morning	112 (41.95%)
		Forenoon	112 (41.95%)
		Afternoon	19 (7.12%)
		Evening	24 (8.99%)

Analysis about satisfaction of e-learning among preclinical students stated that, only 36.33% of students agreed that online classes were convenient. Majority of the students (84.27%) could spent 1-2 hours in a day for the preclinical prosthodontics online classes and favourite choice of gadget for the same was mobile phones (76.4%). Large proportion of students preferred live class (61.8%) than content upload and pre-recorded classes. Degree of satisfaction after attending the preclinical online class among the students were less [satisfied (8.99%), very much satisfied (0.75%)]. Preclinical prosthodontics online classes provided more comfortable learning environment which was agreed by 29.59% of students as described in Table 3.

Table 3: Satisfaction of e-learning among preclinical prosthodontic students

Si No	Questions	Responses	Frequency n (%)
1.	Preclinical Prosthodontics Online classes are convenient?	Strongly disagree	9 (3.37%)
		Disagree	46(17.23%)
		Don't know	115(43.07%)
		Agree	92 (34.46%)
		Strongly agree	5(1.87%)
2.	Do you feel how much time you can spend in a day for the preclinical Prosthodontics online classes?	1-2 hours	225(84.27%)
		2-3 hours	37(13.86%)
		3-4 hours	2(0.75%)
		More than 6 hours	3(1.12%)
3.	Your choice of gadget for the preclinical Prosthodontics online classes?	Desktop	0
		Mobile phones	204 (76.4%)
		Smart TV	0
		Laptops	63 (23.6%)
4.	Which online mode is preferred by you for the preclinical Prosthodontic class?	Live class	165 (61.8%)
		Pre-recorded	70 (26.22%)
		Content uploaded	32(11.99%)
5.	Degree of satisfaction after attending the preclinical Prosthodontics class?	Not at all satisfied	8 (3%)
		Somewhat satisfied	134 (50.19%)
		Don't know	99 (37.08%)
		Satisfied	24 (8.99%)
		Very much satisfied	2 (0.75%)
6.	Preclinical Prosthodontics Online classes provide more comfortable learning environment?	Strongly disagree	21 (7.87%)
		Disagree	55 (20.6%)
		Don't know	112 (41.95%)
		Agree	68 (25.47%)
		Strongly agree	11 (4.12%)

IV. Discussion

Most Governments around the world had temporarily closed educational institutions to control the spread of the Covid-19 pandemic. As a result, students are relying on technology and digital solutions to keep learning and get connected to the outside world.[2]We are now entering a new era, the revolution of online

education otherwise known as e-learning. Several arguments are associated with e-learning. Accessibility, affordability, flexibility are some of the positive arguments related to e-learning. It is considered to be a relatively inexpensive mode of education in terms of the lower cost of transportation, accommodation, and the overall charge of institution-based learning. Flexibility is another interesting aspect of online learning. A learner can plan their time for completion of courses offered online. Students can learn anytime and anywhere, thereby developing new skills in the process leading to life-long learning. [6]

Dentistry is a combination of three fundamental components; theory, laboratory and clinical practice unlike many other careers. Under this triage, a vast number of social programs, research projects and interdisciplinary learning experiences are intricated.[7] Appraisal of the tools and value of online learning among students and evaluation of their attitudes are important factors that are essential to judge the success of any online learning system. Student's perception towards online learning in dental education system had been the subject of research in many countries. However, no documented studies have been published till date in India, evaluating the perception, exclusively towards preclinical prosthodontics online class among various students. Hence, the present study is aimed to understand the effectiveness, acceptance and satisfaction of e–learning among various preclinical prosthodontic students.

Findings of this study suggested that there was a low positive contentment among majority of the students towards the concept of implementing clinical knowledge through preclinical prosthodontics online classes. Moreover, most of them agreed that those classes failed to develop and improve their clinical skills which was in accordance to the study conducted by Abbasi et al. [8] where students did not consider e-learning as useful for developing clinical and technical skills. A study conducted by Gormley et al. [9] reported e-learning as highly as other traditional methods for clinical skill teaching which was in contrast to the results obtained in our study where most of students agreed that e-learning couldn't enhance traditional learning methods .More than 40% of the students accepted e-learning as a medium for acquiring theoretical knowledge in a study conducted by Abbasi et al. [8] which was in line with results obtained from our study where most of them agreed that online classes could effectively convey knowledge and repetition helped in improving their knowledge. E-learning had shown to improve student motivation and concentration levels according to findings by Rodrigues et al.[10] whereas in this study majority weren't self-motivated by an online class. The possible reason could be could be immediate social isolation imposed in the pandemic, resulting in low motivation levels. In the present study, most of the students didn't consider e-learning as an alternate method for traditional classroom study which was in accordance to the study conducted by Asri.et al.[11] where students considered online learning helpful as a supplement to their learning rather than a replacement for traditional teaching methods. Results of or study showed that acceptance of preclinical online classes among the students were very less which was in accordance with study conducted by Tuladhar et al.[12] where majority of the respondents rated that the online classes as not effective. When assessed for the degree of satisfaction, less than ten percent of the students were satisfied about the pre-clinical online class which was in accordance with study conducted by Abbasi et al. [8] where the overall satisfaction level of e-learning among developing countries was significantly low compared to the developed countries suggesting students in developed countries are well trained and equipped in virtual medium of education.

Limitations inherent to this study were subjective nature of outcome assessment that reflected students' perception and satisfaction towards online learning. Apart from this, we didn't make an attempt to assess the mental health status of the students due to social isolation and their skills towards the use of technical gadgets. Results of this study should be discussed and interpreted with caution because of paucity in published literature. Findings obtained in our study is still uncertain and any definitive conclusion should be avoided at this stage. However, findings of our study revealed that e-learning was satisfactory in acquiring knowledge, though not effective in acquiring clinical and technical skills.

Nonetheless, the e-learning process demands dramatic changes, including a focus on the advancement of clinical skill development in the field of dentistry through creative electronic learning methods. In addition as the study findings reflect lack of self-motivation among students, counselling sessions for monitoring and managing mental health issues among students are required. However, the findings of our study pave the way for future studies to examine dental students' status and the usability of electronic learning as an adjunct to the typical dental education process to provide them with a comprehensive dental education and sufficient clinical experience for their budding career.

V. Conclusion

The Covid-19 pandemic is ongoing and will continue to disrupt dental education and training. The valid solution to curb this disruption is to engage students through e-learning. Though most of the students considered preclinical prosthodontic online class as less effective, few students reported that this class had helped in conveying knowledge effectively. Unlike other higher education entities, preclinical and clinical training on models and patients constitute the foundation stone in dental education. Hence no virtual media can

replace the hands on experience, acquired by the students during their preclinical and clinical training sessions. In our study, most of the preclinical students showed less acceptance and satisfaction towards e-learning.

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