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Feasibility and Ease of Knowledge Dissemination through Online Teaching –A prosthodontic perceptive during Covid-19

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Abstract:
Background*: As a result of lockdown measures during Covid 19, all the educational institutions have been temporarily closed. Thus, there occurred a transition from traditional classes to online classes.*
Materials and Methods*: A cross‑sectional observational study was conducted among prosthodontic faculties 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 20 questions was sent through the emails as Google e-forms.*
Results *The response rate obtained for the survey was 78.9%. Results revealed that a large proportion of the faculties (65.34%) stated that e-learning could not enhance conceptual learning in dentistry and suggested (61.38%) that simulatory tools could not complement the hands-on experience in prosthodontics.*
Conclusion: *Online teaching was feasible and helped in the dissemination of knowledge but was not effective in delivering clinical and technical skills needed for moulding a future dentist.*
Key Word*: Covid-19, Dissemination, Feasibility, Knowledge, Online Teaching, Prosthodontic perceptive*

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I. Introduction

Novel coronavirus disease 2019 (Covid-19) pandemic undoubtedly embodies the worst public health catastrophe of the 21st century. Global efforts to alleviate disease spread affected all aspects of daily life. Students are no exception to this disruption as many institutions have been temporarily closed and transitioned from in-person to online learning. Dental faculties recognize this as an unusual challenge in terms of educating students. Specifically, the pandemic disrupted the clinical experiences for students who had not yet completed clinical requirements as a part of their dental curriculum. [1]

The importance of classroom learning and the development of practical skills is undeniable in dentistry. In the current scenario of Covid- 19, when traditional classroom-oriented learning is not possible, the only alternative option to gain knowledge and new skills through e-learning. It is a type of learning environment that takes place over the internet. [2] This pandemic proves that shifting to online learning is inevitable in this era. With modern technology at our fingertips, it is practical for the students to access each lecture's contents from home. Even though the technology is useful for many faculty and students, it still involves a learning curve for most of them. Dental faculties are struggling to learn and understand the various aspects of online learning during this emergency. [3] They are transitioning through an uncertain time in terms of their professional lives and work. The rapid move to online modes of delivery to keep students engaged in learning has led to significantly intensified workloads for staff as they work not only to move teaching content and materials into the online space but also to be sufficiently adept in navigating the requisite software. The present situation has even pushed even the most traditional academician to learn the ropes and explore the potential of e-learning.

As colleges adjust to a new educational environment, little is known about dental faculties' experiences and perceptions as they navigate a new paradigm. Understanding the "teachers' perspective" and incorporating their views is vital for administrators and other policymakers as they are trying to re-conceptualize dental education in a new reality.[1] Prosthodontic faculties play an important role in inculcating technical or preclinical skills among dental students, which are the foundation stone of dental education from which various clinical skills are developed.[4] Hence, it is essential to assess the feasibility and ease of knowledge dissemination among prosthodontic faculties through online teaching and how this can be modified to improve dental education quality.

II. Material And Methods

A cross‑sectional observational study was conducted among prosthodontic faculties of various dental colleges under Kerala University of Health Sciences (KUHS). After obtaining prior permission from the institutes' respective heads, the investigator collected the faculties' email ids. Ethical clearance was obtained by the Institutional Ethics Committee bearing a registration number 180/2020/DCC.

Study Location: This was done among the Prosthodontic faculty of various Dental colleges in Kerala

Study Duration: August 2020 to November 2020.

Sample size: 125 Prosthodontic faculty

Sample size calculation: The sample size was calculated according to the given formula. [5] Study Design: Prospective open-label observational study. Sample Size (n) =4Pq/ d2

Where,

P= 68 (Percentage of Character)

Q= 32 (Counter Part)

d =9 (Precision)

15% of the calculated sample size was added to compensate for sampling loss, if any; thus, the final sample size accounted for a total of 125 prosthodontic faculties.

Subjects & selection method: An online structured self -explanatory questionnaire with a consent form was sent to prosthodontic faculty of various dental colleges in Kerala through email as Google forms, and five reminders are given an interval of two days. Faculty who responded are included and those not responding are excluded. Questions are based on literature search and expert opinion to assess the following objectives

1.Feasibility of online teaching

2.Ease of dissemination of knowledge

Inclusion criteria:

Faculties willing to give informed consent for participation through Google forms **Exclusion criteria:** Five reminders were given through email with an interval of two days, and faculties who did not respond were excluded from the study

Procedure methodology: An online structured self -explanatory questionnaire with a consent form attached to it was developed. The study started from August 2020 to November 2020. The questionnaire's link comprising 20 questions was sent through the emails as Google e-forms, and every faculty was allowed to give only one response. Participants were automatically directed to the study details and informed consent after obtaining and clicking the link followed by several questions. Completeness and consistency were checked for the collected information, and the results were collected anonymously on Survey Monkey (www.surveymonkey.com).

Validation of the tool

A set of 23 questions in English relating to various domains was 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 Aiken's index. Questions that obtained a score ≥ 0.6 were included in the proforma. The questionnaire's reliability was assessed by Cronbach's alpha value which ranged between 0.717 and 0.821, with a median of 0.83showing good reliability.

Statistical analysis

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

III. Result

Among 128 prosthodontic faculties, 101 faculties completed the questionnaire yielding a response rate of 78.9%. Analysis of demographic data revealed that that majority of faculties were males (57.4%) belonging to the age group between 35-50 years (64.4%) having 10-20 years of teaching experience (36.6%) as assistant professors (37.6%) shown **in Figure 1 to 4.**

Analysis of feasibility and ease of knowledge dissemination through online teaching reported that student-teacher interactions were effective during online classes was disagreed by most of them.[(Strongly disagree 16.83%, Disagree 35.64%)]. The preferred time period for effective knowledge dissemination by most faculties (74.26%) was up to 45 min for each class. Around 40.59% of faculties were uncertain regarding the interest of students towards online learning. A large proportion of the faculties (65.34%) stated that e-learning could not enhance conceptual learning in dentistry. E-Learning could be a source of internal motivation for students by searching for analogies, relating to previous knowledge, and theorizing what is learned was agreed by most faculties (59.4%). The morning session was preferred by the majority (79.21%) for effective learning,

and the live class was their favourite choice (77.23%) than content upload and pre-recorded classes. There were only 19.8% of faculties confident enough in organizing and managing the content for e-learning. Minimum knowledge about the technology platform used was the digital skill expected by most faculties (37.62%) for their students to make e-learning classes effective. More time and effort had to be devoted to content development, according to most faculties (69.31%), in e-learning platforms compared to conventional teaching. The majority (69.31 %) were somewhat confident in making the classes lively and interactive, regardless of the virtual environment's physical limitations. Most of the faculties (61.38%) suggested that simulatory tools could not complement prosthodontics' hands-on experience. Around 56.44% stated that they need more training in various outcome assessment tools of e-learning platforms. Technical knowledge, lack of devices to connect, network connectivity issues, and financial concerns, especially with devices and data packages, will be the limitations foreseen by most dental faculties (56.44%) in using e-learning platforms. Around 74.26% of faculties agreed that interdepartmental and intercollegiate collaboration could effectively bring out a structured dental curriculum incorporating the best e-learning facilities. Such collaborations can reduce the burden of bringing out a structured dental curriculum incorporating the best e-learning facilities agreed by most dental faculties.[Agree(57.43%) ,Strongly agree (17.82%)].

IV. Discussion

The global shutdown of educational institutions due to Covid-19 had disrupted students' learning, and they have to rely upon e-learning as an alternative. E-learning uses the computer, internet and associated technologies to deliver a broad array of solutions to enable learning and improve performance. [6].The dental education sector's biggest challenge was postponing direct patient care, a vital component of the dental curriculum. Virtual sessions cannot duplicate close experience with patients. [3]In prosthodontic speciality, students used to practice in the simulation models after the teachers' demonstration. In this current scenario, this part has to be done using modern digital techniques. However, current facilities are not good enough, and also the procedure and the final work need to be checked by the teachers step by step. Thus, the simulation of preclinical classes needs close contact between teacher and student. Moreover, students from the third year onwards start to work on real patients, an essential component of clinical skill training in dental education. [7]To comprehend this new reality and suggest new approaches to improve online dental education quality, we aimed to critically discuss the current and future dental education perspectives in the Covid-19 era. To the best of our knowledge, this is the first study among prosthodontic dental faculties to assess the feasibility and ease of knowledge dissemination through online teaching.

Our study's findings suggested that student-teacher interactions were not effective during online classes, and e-learning could not enhance conceptual learning in dentistry. This finding was in contrast with the study conducted by Schlenz et al. [8], where he reported that lecturers had a predominantly positive perspective on the implementation of online learning and providing the chance to use online learning even beyond Covid-19 in the future dental curriculum. This difference can be due to the reporting of perceptions of the prosthodontic faculty alone in our study, whereas Schlenz et al. [8] considered reporting dental educators' perception in all the specialities. E-Learning could be a source of internal motivation for students was agreed by most faculties, according to the study conducted by Rodrigues et al. [9], where e-learning had shown to improve student motivation and concentration levels. In our study, most of the faculties agreed that more time and effort had to be devoted to content development, according to the study conducted by Yang et al. [10], where many teachers considered the use of existing online education platforms as somewhat difficult. In this study, most prosthodontic faculties (61.38%) suggested that simulatory tools could not complement this speciality's hands-on experience. Similar findings were reported by Schlenz et al. [8]. He stated that training on models in the preclinical curriculum and patient treatment in the clinical curriculum is inevitable for dental education, which implies that online learning is more suited for theoretical learning content. A majority stated that they need more training in various outcome assessment tools in these e-learning platforms. Most of them opted for an interdepartmental and intercollegiate collaboration to improve dental education quality by incorporating e-learning.

This study's limitations were the subjective nature of outcome assessment that reflected perception towards online learning among prosthodontic faculty alone. This study's results should be discussed and interpreted with caution because of the paucity of published literature. The findings obtained in our study is still uncertain, and any definitive conclusion should be avoided at this stage. However, our study's findings revealed that online teaching was feasible and helped in the dissemination of knowledge but was not effective in delivering clinical and technical skills needed for moulding a future dentist.

Figure 1: Gender distribution

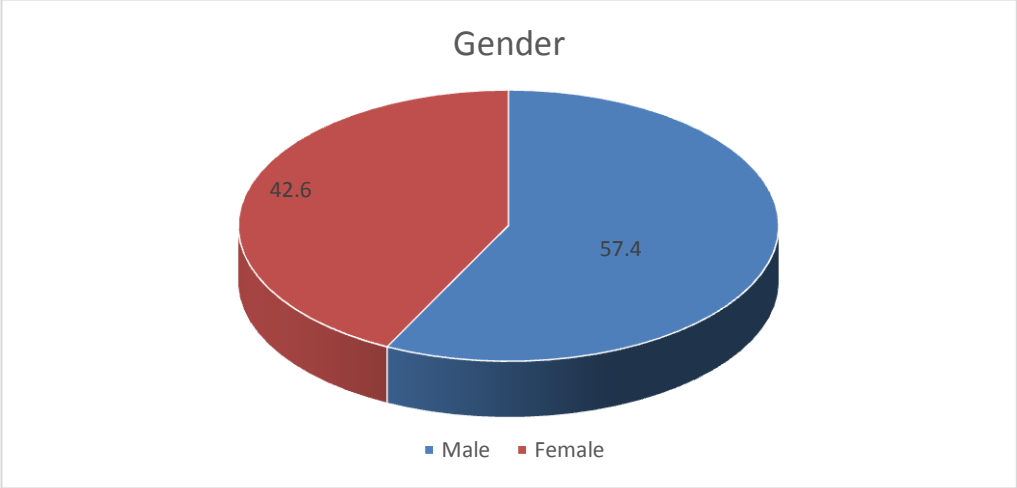


Figure 2: Age distribution

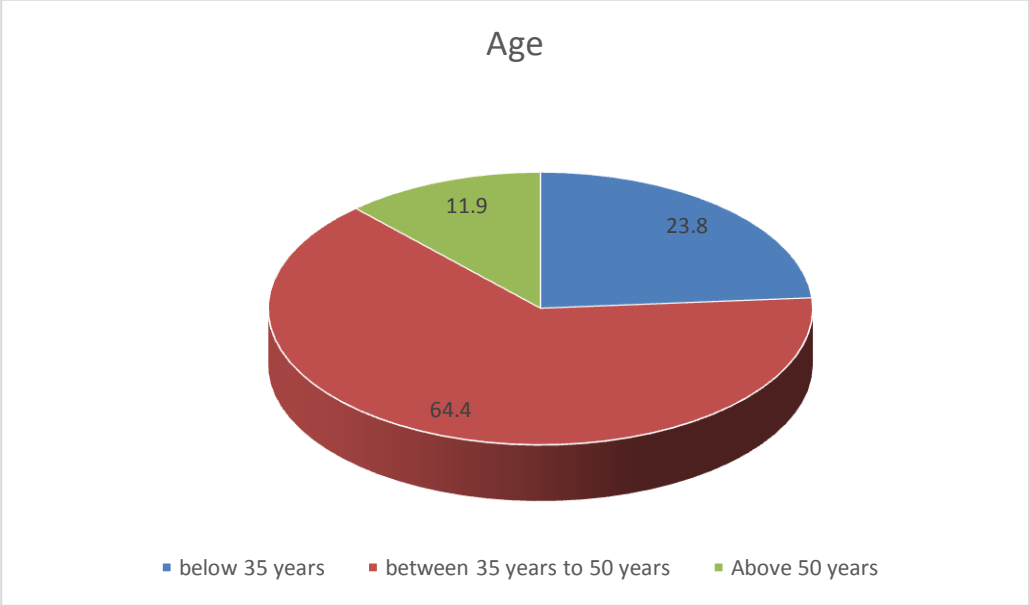


Figure 3: Years of experience in teaching

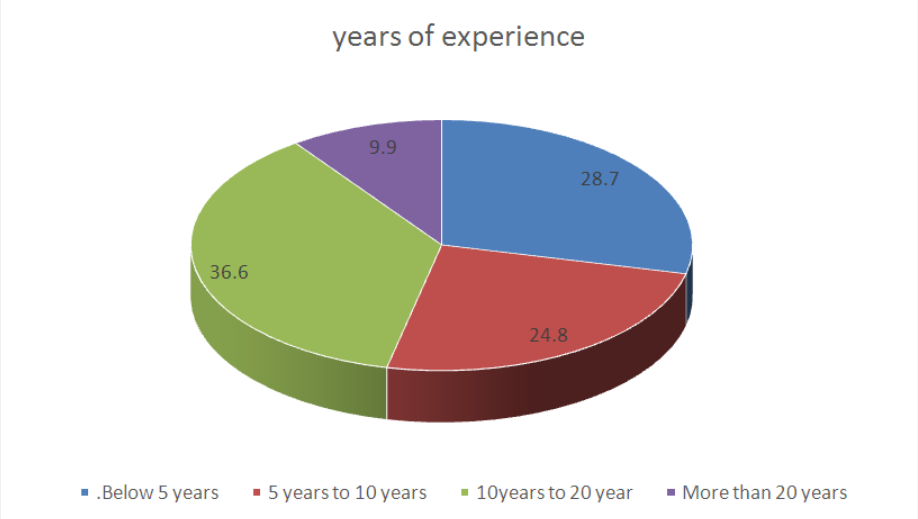
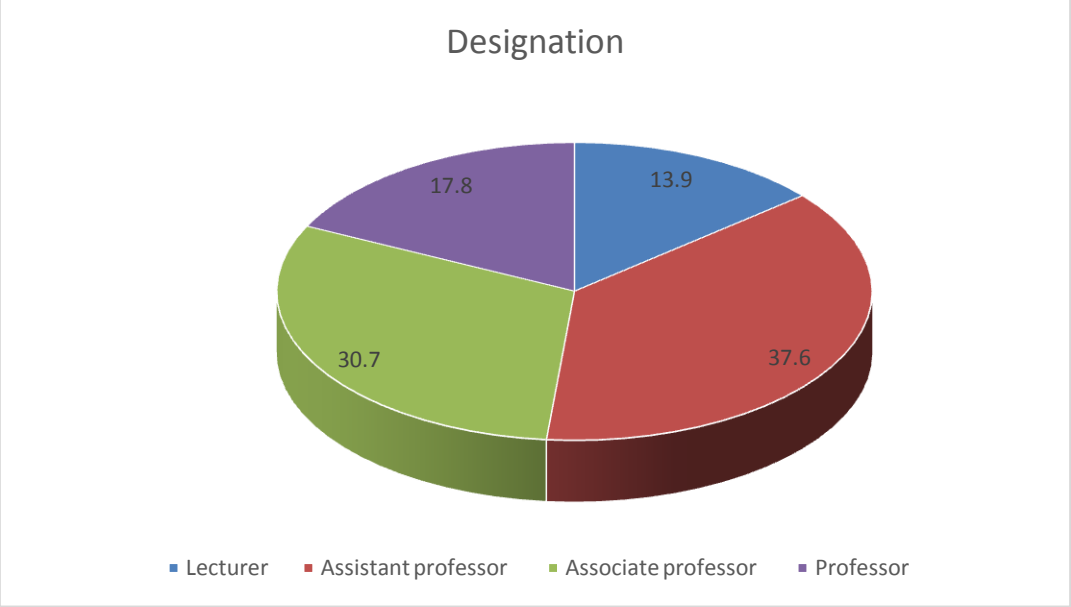


Figure 4: Designation



Si No	Questions	Responses	Frequency
1.	Preferred time period for effective knowledge dissemination for each class?	Up to 45 min	75 (74.26%)
		Up to 60 min	23 (22.77%)
		More than 60 min	3 (2.97%)
2.	Do you agree that the student teacher interactions are effective during online classes?	Strongly disagree	17(16.83%)
		Disagree	36(35.64%)
		Don't know	26 (25.74%)
		Agree	21 (20.79%)
		Strongly agree	1 (0.99%)
3.	Do you agree that students are interested in online learning?	Strongly disagree	7 (6.93%)
		Disagree	23 (22.7%)
		Don't know	41(40.59%)
		Agree	29 (28.71%)
		Strongly agree	1(0.99%)
4.	Do you agree that e-learning /virtual learning can enhance conceptual learning in dentistry? (By conceptual learning, we mean learning from examples.)	Strongly disagree	13 (12.87%)
		Disagree	19 (18.81%)
		Don't know	3(2.97%)
		Agree	36 (35.64%)
		Strongly agree	30 (29.7%)
5.	Do you agree that e-learning /virtual learning can be a source of internal motivation for students by searching for analogies, relating to previous knowledge, and theorizing about what is learned?	Strongly disagree	3 (2.97%)
		Disagree	15 (14.85%)
		Don't know	23 (22.77%)

		Agree	46 (45.54%)
		Strongly agree	14 (13.86%)
6.	Preferred session for online teaching?	Morning	80 (79.21%)
		Afternoon	2 (1.98%)
		Evening	19 (18.81%)
7.	Which type of online teaching method do you prefer?	Content uploaded	10 (9.9%)
		Recorded video	13 (12.87%)
		Live class	78 (77.23%)
8.	How confident are you in organizing and managing the content for e-learning?	Not at all	5 (4.95%)
		Somewhat confident	76 (75.25%)
		Very much	20 (19.8%)
9.	What kind of digital skills do you expect from the students to have to make the e-learning classes effective?	Minimum knowledge about the technology platform used	38 (37.62%)
		Typing and communicating skills	14 (13.86%)
		Analytical thinking skills	12 (11.88%)
		Knowledge management skills	30(19.8%)
		Ethical and responsible behavioral skills	13(12.87%)
		All of the above	4(3.96%)
10.	Your perception about the time and effort to be devoted for content development in e- learning platforms as compared to conventional teaching?	Less time and effort	6 (5.94%)
		More time and effort	70 (69.31%)
		Almost equal time and effort	25 (24.75%)
11.	Are you confident that in spite of physical limitations of virtual environment, you can make the classes lively and interactive?	Not at all	23 (22.7%)
		Somewhat confident	70(69.31%)
		Very much	8 (7.92%)
12.	Do you agree that simulatory tools can complement the hands-on experience in some subjects of dentistry?	Strongly disagree	30 (29.7%)
		Disagree	32 (31.68%)
		Don't know	18(17.82%)
		Agree	18 (17.82%)
		Strongly agree	3 (2.97%)
13.	Are you aware of the various outcome assessment tools of e-learning platforms?	Not aware of	26(25.74%)
		Aware and confident of using it	18(17.82%)
		Need more training in such tools	57 (56.44%)
14.	What are the limitations that you foresee in making use of e-learning platforms?	Technical knowledge	5 (4.95%)
		Lack of devices to connect	3(2.97%)
		Network connectivity issues	35 (34.6%)
		Financial concerns especially with devices and data packages	1(0.99%)

		All of the above	57(56.44%)
15.	Do you feel that interdepartmental and intercollegiate collaboration can be effective in bringing out a structured dental curriculum incorporating the best of e-learning facilities?	Strongly disagree	5 (4.95%)
		Disagree	5 (4.95%)
		Don't know	16 (15.84%)
		Agree	65 (54.46%)
		Strongly agree	20 (19.8%)
16.	Do you feel that such collaborations can reduce the burden in terms of the limitations listed in the previous question?	Strongly disagree	4 (3.96%)
		Disagree	3(2.97%)
		Don't know	18(17.82%)
		Agree	58(57.43%)
		Strongly agree	18(17.82%)

V. Conclusion

The Covid-19 pandemic is ongoing and will remain to interrupt dental education and training. Online training and virtual clinical experience are the right solutions needed to reduce this disruption. The E-learning process needs drastic improvements, emphasizing clinical skill development through innovative electronic methods of learning and training the faculties in various outcome assessment tools in e-learning**.**

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