ORIGINAL RESEARCH

Effectiveness of Online Learning vs Traditional Learning during COVID-19 Pandemic in Chennai: A Questionnaire Study

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Abstract

Background: Digitalization of education became a need of the hour when the COVID-19 pandemic affected the traditional modalities of learning, and it was widely implemented in various fields including dentistry.

Aims: The aim of this study was to assess the effectiveness of online learning against traditional learning systems among dental students in Chennai.

Methods and materials: A Google Form questionnaire comprising 29 dental learning-based questions was designed and distributed to dental students across colleges in Chennai using online distribution platforms. The study responses were closed after the stipulated period of 1 month. The data were analyzed using SPSS software version 17.

Results: The survey was answered by 834 participants comprising 76.9% females and 22.3% males. Of the total study population, 71.1% of them did not have previous online learning experiences. Approximately, 15.5% of the study population were not satisfied with the facilities provided by the online learning platforms. Also, one-third of the study population reported difficulty during the presentation. Three-fourths of the study participants did not prefer online learning over traditional learning and reported that the attention span and communication between the students and teachers were lower in online classes. Overall, 43% of the study participants rated the quality of online video-based learning to be good and 8.5% found it to be poor.

Conclusion: Online-based learning systems are evolving and can provide a wide array of knowledge from global experts. However, structured planning and technique may be needed for the dental curriculum.

Keywords: Dental learning, Online platforms, Questionnaire, Traditional learning.

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Introduction

The coronavirus infectious pandemic (COVID-19) in 2019 has been a challenge to mankind that has almost uprooted the foundations of every individual's livelihood. It emerged as a public health crisis and began manifesting in Hubei province in China from December 2019.[1] Among all those affected throughout the world, the educational sector is one of the worst affected. Hence, there was an immediate shift from a scenario of traditional classroom learning to various e-learning platforms.

Unlike many other careers, dentistry is an alloy of three major components: theoretical, laboratory, and clinical practice. In dentistry, there often exists a need for good teacher and student interaction which is highly essential to imbibe good treatment clinical practices. Therefore, it is obligatory for every educator to take steps to cultivate up-to-date teaching skills. With the social dissemination of information and communication technologies (ICT), the growth of internet users, and the fast evolution of a wide variety of mobile electronic devices, the concept of e-learning has gained substantial recognition in dentistry.[2] It has been discussed that the traditional e-learning platforms, despite their large diffusion and consolidation, need to widen the range of possibilities required by the users.

E-learning includes a variety of modalities and terms such as online learning, mobile learning, blended learning, computer-assisted instruction, distance learning, e-teaching, mediated

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learning, simulation-based learning, and virtual learning, each one of these having their own operative differences but all being a part of the digital learning ecosystem.[2] Online e-learning applications such as Zoom, Google meetings, and Webex meet are currently used platforms thus facilitating in the continuous learning process during the present COVID era.[3]

Most higher educational institutions consider online learning as an important part of their educational strategy. Parsazadeh et al. considered that the success factors in using online learning are defined in terms of ease of access for students and teachers, student satisfaction, and the provision of a variety of online tools.[3] Teachers' expertise in online teaching, students' readiness to move online, and quality of online content and design are also defined as online learning success factors.[3] More research is required to uncover and understand the success factors that are critical to implement successful online learning. Therefore, this study aims at highlighting and understanding the students' perception of online/remote learning in the field of dentistry.

Materials and Methods

Study Design

The survey was approved by the Institutional Review Board of Meenakshi Ammal Dental College in Maduravoyal, Chennai, granted ethical approval for the study (IRB number-MADC/IEC-I/027/2020) with the objective of understanding students' perception and feedback regarding online e-learning platform systems in dental curriculum learning. The survey was conducted online through Google Forms and was subjected to validity and reliability tests.

Study Setting

The survey was designed based on the accessibility, feasibility, acceptability, proficiency of the working scenario between the study period from June 1 to June 30, 2020, based on which the questionnaire was constructed and validated by five expert panel members. The questionnaire was initially distributed to 900 subjects online who included undergraduate and postgraduate dental students of all academic years and academicians across various colleges and dental practitioners in Chennai, of which only 834 participants responded to the survey. The exclusion criteria included those students who participated in the initial questionnaire designing and a part of initial reliability tests, and those who did not give their consent to take part in the survey. The survey was constructed using Google Forms and distributed to the participants through their respective email ids. The survey questionnaire was also put forth in various social media platforms such as Facebook, Instagram, and WhatsApp applications. The responses recorded were maintained anonymously. Participation in the survey took place online using a device and browser of their choice, and at a time and place convenient to their schedules.

Data Collection and Analysis

The questionnaire comprised initial questions for demographic parameters, following which there were 29 e-learning based questions. All 29 questions were multiple choice answers based and 3 out of them comprised of fill-in options. The multiple-choice answer options provided were based on the questions framed, for example, yes/no/I do not know. The study responses were closed after the stipulated period of 1 month. For statistical analysis, data were entered into Microsoft Excel spreadsheet and analyzed using SPSS software version 17.

Results

The survey was answered online by 834 participants with a response rate of 92.6%, of which 76.9% were females and 22.3% were males (Fig. 1A). The study population comprised 96% dental students, 2% practitioners, and 2% academicians (Fig. 1B). Demographic details showed 65.8% of the study participants belonged to the age range of 20–30 years, 30.7% of them to the age range of 10–20 years which comprised the undergraduate dental students, 2.5% belonged to the age range of 30–40 years comprising academicians and dental practitioners and 1% to the 40–50 years group (Fig. 1C). In our study population, 28.9% of them did not have any online learning experience prior to the COVID-19 pandemic (Fig. 1D).

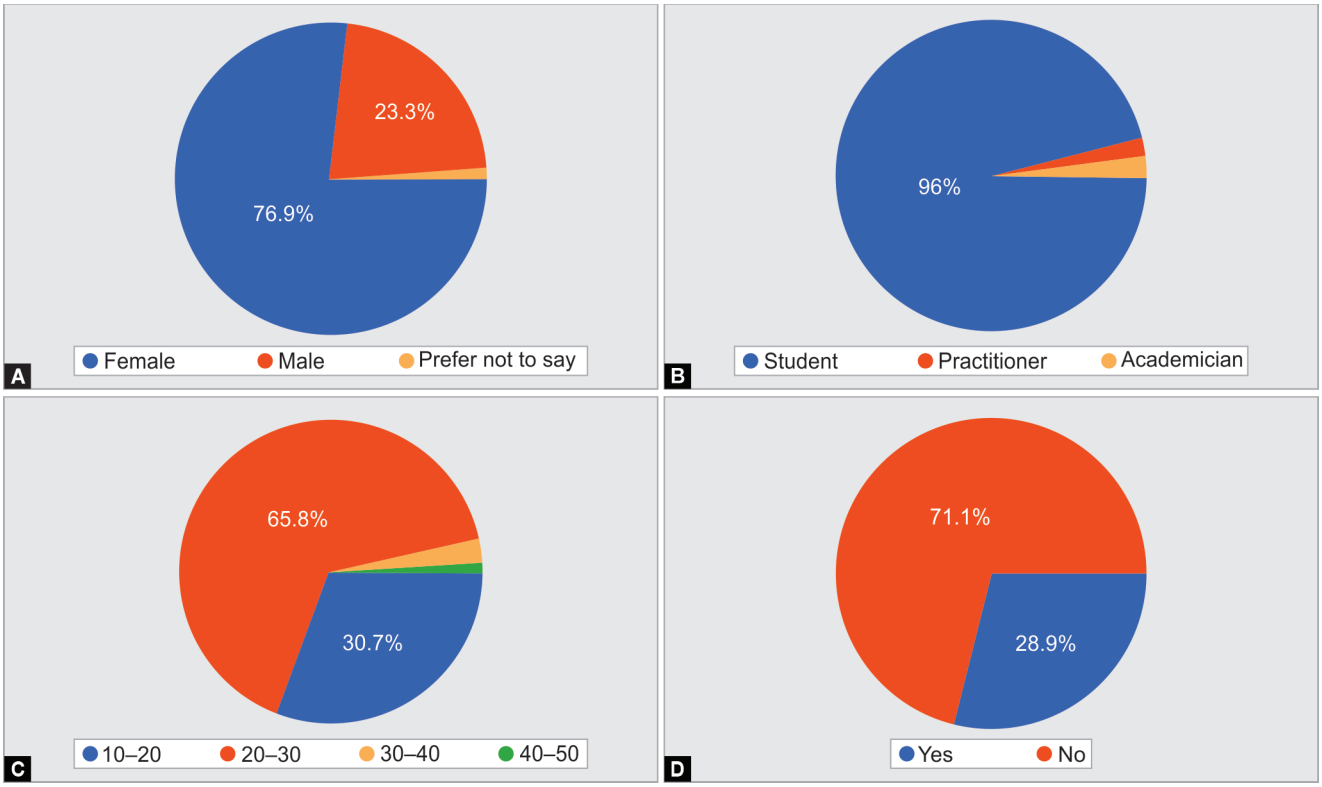
The participants were asked if they thought that online learning was ideal and 26.7% of them thought it was ideal (Fig. 2A) but 15.5% of participants were not satisfied with the facilities provided by the online platforms (Fig. 2B). When queried about how confident they felt in understanding a subject through video-based learning, 34.7% provided a confident response and 25.3% gave a nonconfident response (Fig. 2C). Figure 2D depicts the data of responses from the participants when they were questioned about the safety features that mainly included a privacy breach or a data leak while using online class facilities for education and 23.6% felt that it was safe (Fig. 2D).

The participants were then questioned about the application they used for online classes and majority (80.9%) of them used the Zoom app (Fig. 3A). The next section of questions was based on various features of the online applications. 50.6% of the study population reported that scheduling classes was easy for them (Fig. 3B) and 60.3% found it easy to join them (Fig. 3C). However, 26.6% of the population reported difficulty in interaction in online classes with teachers and peers (Fig. 3D).

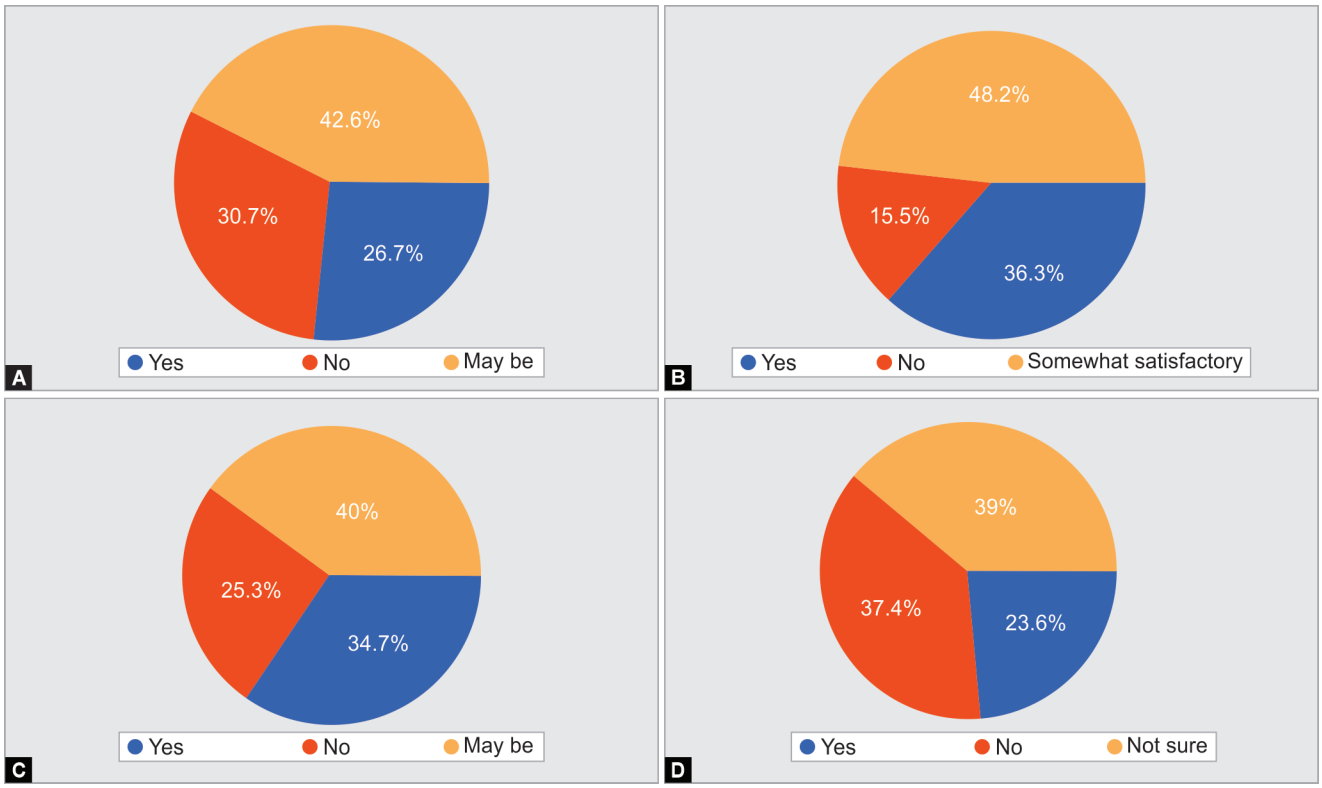
Data compiled in Figure 4A show 57% of the participants were satisfied with the clarity of presentations and 54.6% found it graphically appealing (Fig. 4B). When the participants were asked regarding the difficulty of presenting their subjects using online video classes, which included students of all academic years, 72.2% of them said that they did not encounter any problems, whereas 27.8% of them found it difficult to present (Fig. 4C). Also, 75.2% did not find video-based learning better than classrooms (Fig. 4D).

When questioned regarding the attention span in online classes, 68.9% reported that it was higher in traditional classroom learning than online classes (Fig. 5A) and 68% reported it as difficult to communicate (Fig. 5B). Question on whether online classes were useful to the participants in order to overcome their stage fright problem revealed 33.3% of them agreeing to it and 37.5% not agreeing to the question (Fig. 5C). Among the study population, 79% of the participants felt traditional learning gave them a more realistic learning experience compared to online-based learning (Fig. 5D).

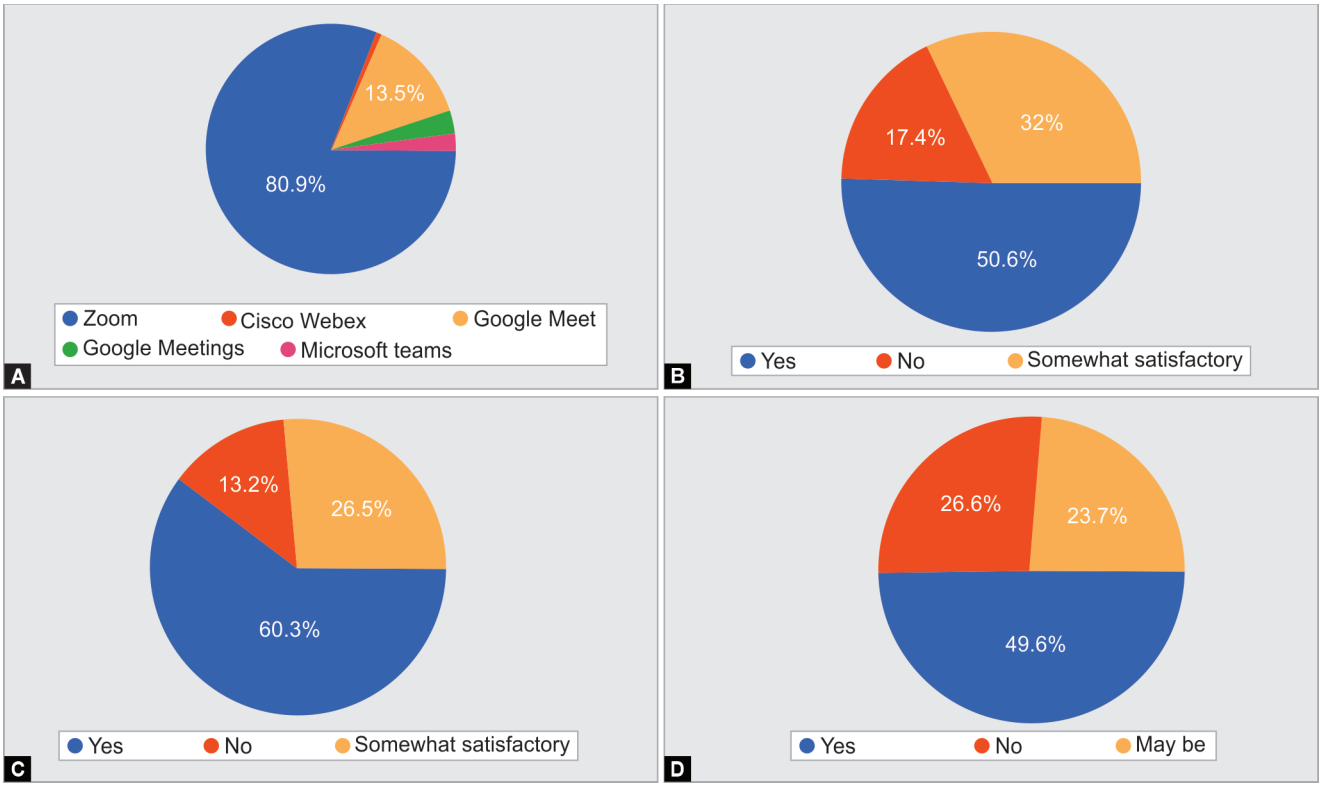
Then, the participants were queried if the video-based learning posed more distraction to them than the regular class method and 64.9% agreed to this (Fig. 6A). Two-fifths of the participants agreed that the main advantage of online learning was that it allowed them to learn subjects from various fields across the globe (Fig. 6B). When questioned regarding the frequent problem faced during the online classes, the maximum problem reported was disconnection



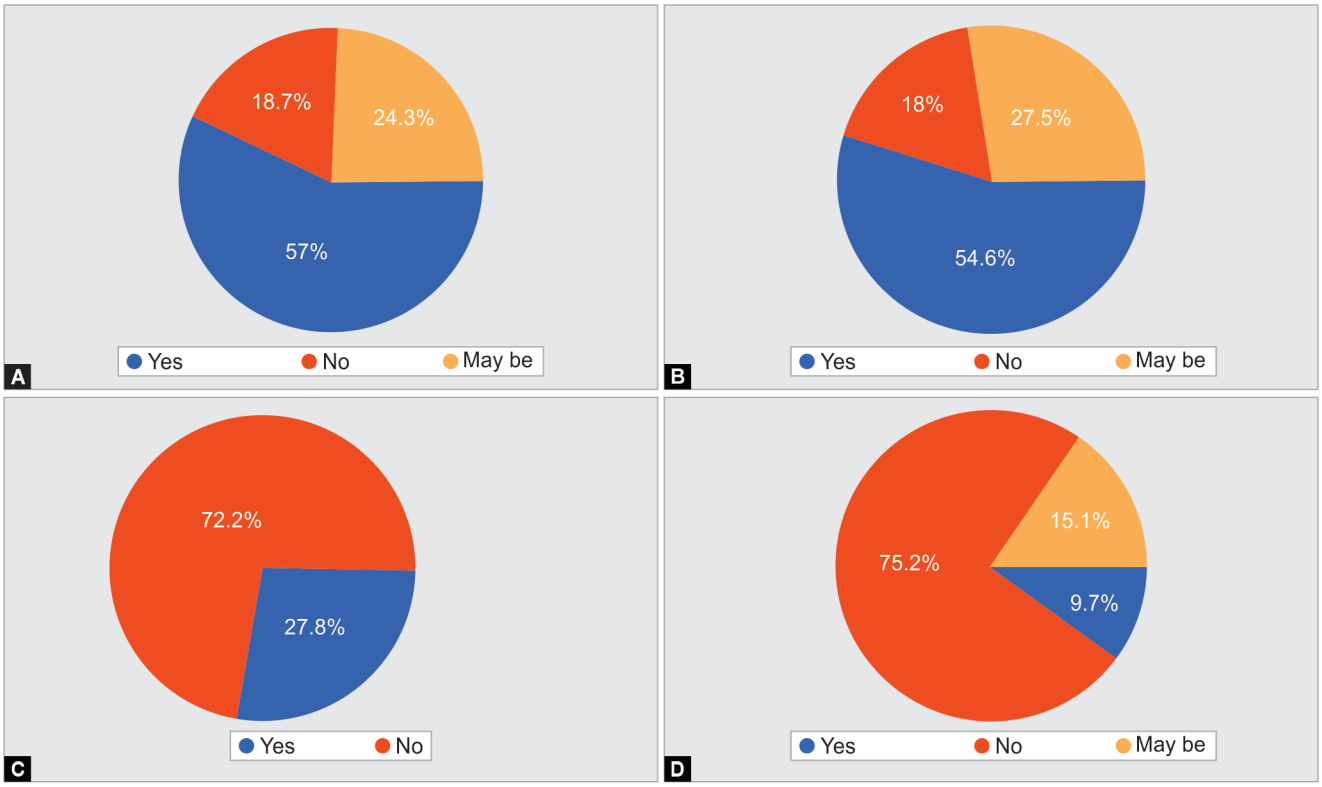
Figs 1A to D: (A) Graph depicting the gender of the participants; (B) Graph depicting the qualification of the participants; (C) Graph depicting the age of the participants; (D) Graph depicting the exposure of the participants to online learning prior to COVID-19 pandemic



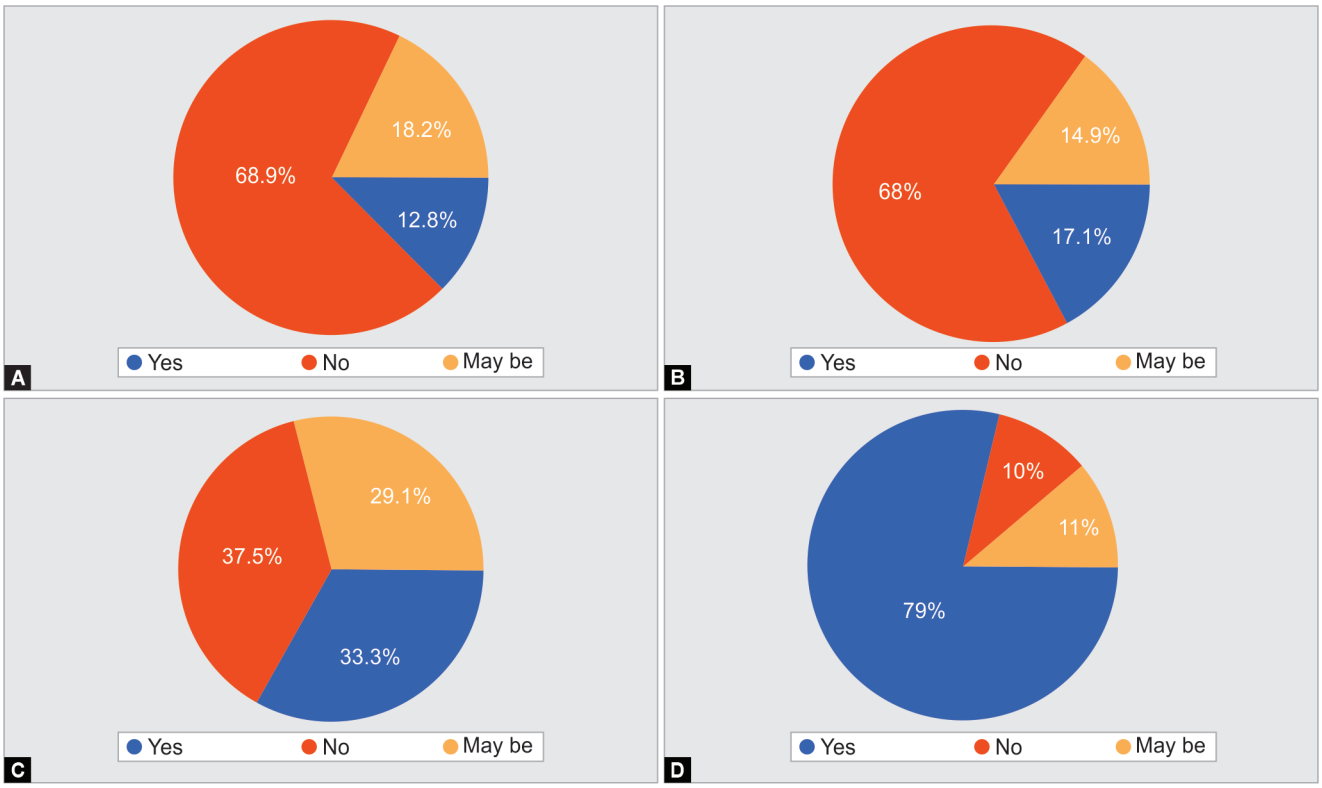
Figs 2A to D: (A) Graph depicting the opinion of participants regarding the online learning; (B) Graph depicting the participants responses regarding the facilities provided during online learning; (C) Graph depicting the response of the participants regarding the confidence gained during online learning; (D) Graph depicting the response of the participants regarding the safety issues during online learning



Figs 3A to D: (A) Graph depicting the response of the participants regarding the preferred app used for online learning; (B) Graph depicting the participants responses regarding the ease of scheduling online classes; (C) Graph depicting the response of the participants regarding the ease of joining online classes; (D) Graph depicting the response of the participants regarding the quality of interaction with teachers during online learning



Figs 4A to D: (A) Graph depicting the response of the participants regarding the clarity of presentations during online classes; (B) Graph depicting the participants responses regarding the quality of graphical display in the online class sessions; (C) Graph depicting the response of the participants regarding the difficulty to present in online classes; (D) Graph depicting the response of the participants regarding the comparison of learning between online vs classroom sessions



Figs 5A to D: (A) Graph depicting the response of the participants regarding the attention span during online class sessions; (B) Graph depicting the participants responses regarding the quality of communication in the online class sessions; (C) Graph depicting the response of the participants regarding the presence or absence of stage fright in online classes compared to classroom learning sessions; (D) Graph depicting the response of the participants regarding the comparison of realistic learning experience between online vs classroom sessions

issues (65%) followed by 59.6% who stated audio disturbances (Fig. 6C). Likewise, 67% of them reported disconnection due to internet connectivity issues (Fig. 6D) and 38.7% found it easy to reconnect (Fig. 7A).

The participants were questioned regarding the undesirable effects of online classes on health, to which 50.7% replied yes (Fig. 7B). When asked to specify the health problem encountered 76.1% reported eye-related issues. The participants were asked about their recommended duration of these online classes and 54.1% gave a time limit of 45 minutes to 1 an hour being the most ideal period which fell within the time range of 0–1 hour (Fig. 7C). When asked for suggestions to improve the online learning systems, 11.8% suggested shortening the class duration (Fig. 7D).

Finally, the participants were asked to provide their overall rating for the quality of the video-based learning system to which, 3.7% rated it as excellent, 43% rated it good, 44.8% rated the system fair, and 8.5% of the participants rated it as poor (Fig. 8).

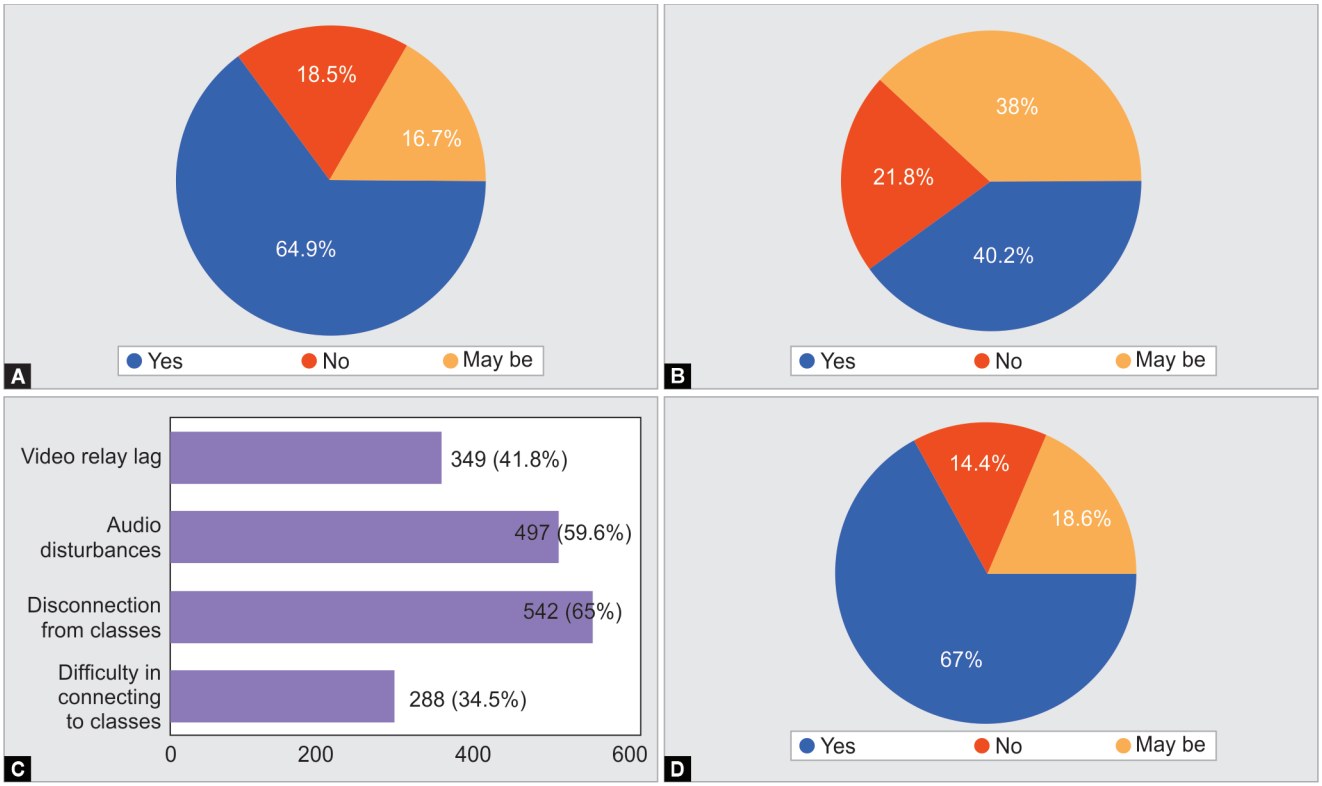
Discussion

Educational reforms to improve sustain and continue teaching and learning have been one of the main institutional goals of every country and dentistry is no exception. The fact that the increasing usage of e-learning platforms after this pandemic has increased, dentistry was also compelled for a transition from the traditional to e-learning systems. Several attempts in changing dental education approaches had been made before ranging from problem-based and case-based approaches for teaching and learning to technology-assisted distance learning.[4,5] The nature of medical and dental education demands that the content be updated and evidence-based and that educational methods be highly pragmatic and experimental.[6,7]

Past studies in the literature have attempted to compare traditional classroom teaching/learning techniques to online e-learning systems through various systematic reviews and research studies. A systematic review by Gopinath and Nallasamy explored the most effective method of teaching dentistry and concluded that video-based learning methods provided a better outcome as an adjunct with the other teaching methods.[8] Another study concluded that saved teaching video clips can be used as an adjunct when combined with other teaching methods whether online or offline.[9]

Two methods of learning (virtual vs traditional) were compared by Moazami et al. and they found that virtual learning systems were more feasible and provided a more mean knowledge score than traditional systems.[10] However in the study, they have used a specifically designed courseware package, which consisted of online and offline materials. A study on similar lines was performed by Fayaz et al. to compare video-based learning vs traditional method for teaching fabrication of complete dentures and concluded that instructional videotapes are as effective as the traditional teaching system.[11]

The above-said studies were pre-planned and well designed. But in the present scenario, online teaching and learning were implanted due to the unforeseen circumstances caused by the pandemic. Hence, there was no curriculum designed or developed specifically for the compulsory virtual teaching and learning by



Figs 6A to D: (A) Graph depicting the response of the participants regarding the distraction levels in online classes vs classroom learning; (B) Graph depicting the participants responses regarding the sources of information gained via online learning; (C) Graph depicting the response of the participants regarding the most frequent problems encountered during online class sessions; (D) Graph depicting the response of the participants regarding the quality of Internet available during online classes

the statutory bodies or the universities and it was carried out in a trial and error method. Therefore, the present study was designed as a feedback for the dental e-learning systems which were implemented during the COVID-19 pandemic.

In our study, the attitude of the dental students in coping with the new mode of distant e-learning by feedback, generated through a questionnaire collected from 834 participants, to improve the online teaching/learning modalities was analyzed. Of the total study population, 71.1% of them did not have any previous online learning experiences (Fig. 1D). Similar study results were obtained by Moazami et al., where most of the study population did not have previous exposure to e-learning systems.[10] Hence, this was a major need for performing the current study as these groups of individuals were first-time e-learners.

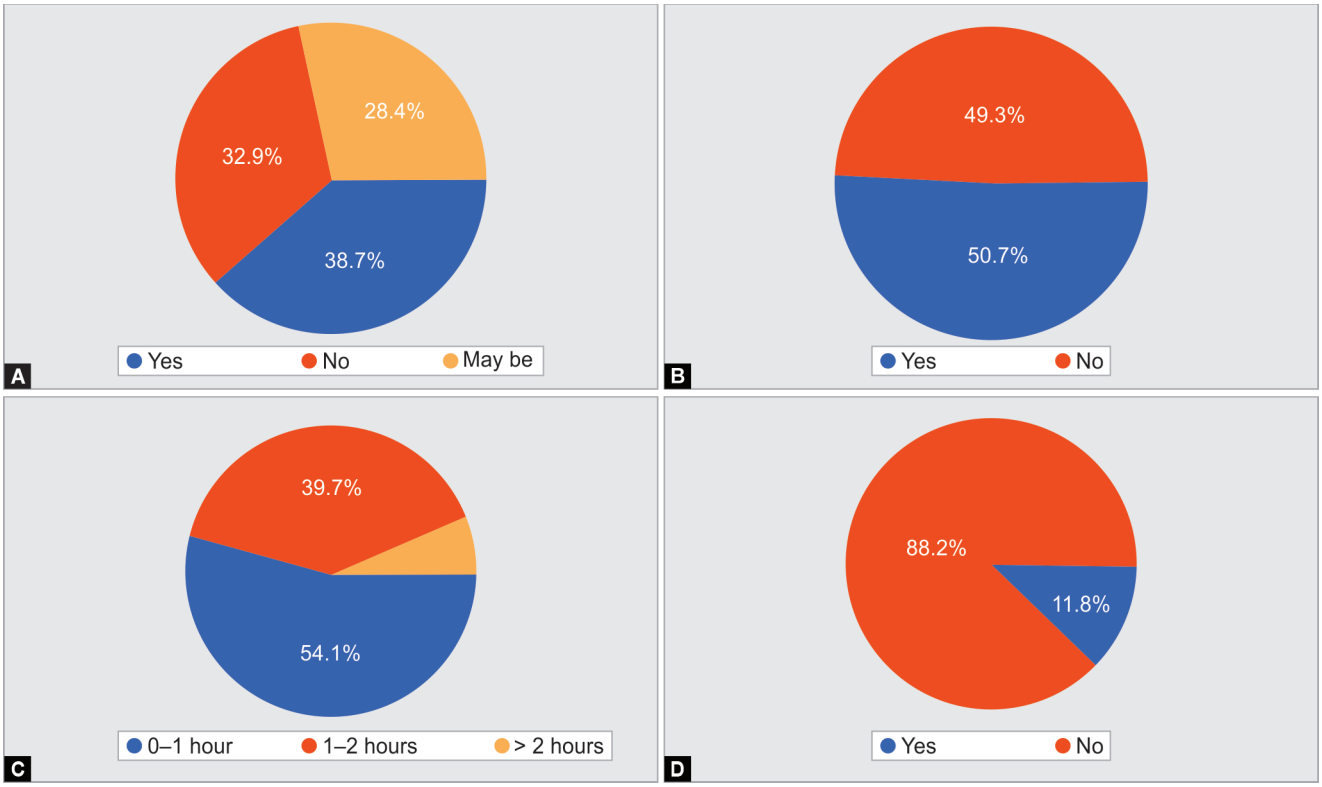
When questioned regarding the efficacy of online classes for student learning, 15.5% of them were not satisfied with the facilities provided by the online learning platforms (Fig. 2A). Their results were concomitant with a study done by Van Doren et al., who studied students' perception of dental education in the COVID-19 pandemic and concluded that the participants were not satisfied with online learning due to a lack of hands-on preclinical and patient care experiences.[12] In a similar study performed by Hattar et al., participants felt that online assessment was not a good method for evaluation and they felt less motivated and engaged to learn.[13] On the contrary, 71.0% of students reported that online teaching courses were very effective in a study done by Hung et al.[14]

The next section of questions focused on specific aspects of online platforms such as joining, attending, and presenting for which more than half the participating population gave a positive response. One-third of the study population reported difficulty during presentation mainly attributed to network connectivity problems (Figs 2D to 3C). Contrary to the present findings, no student reported being uncomfortable with technology in the study done by Hung et al.[14]

In our study, the next segment of six questions was mainly centered on students' perceptions regarding traditional vs online learning. Three fourth of the study participants did not prefer online learning over traditional learning and reported that the attention span and communication between the students and teachers were markedly lower in online classes. They validated that the traditional methods of learning provided a more realistic study environment and found it less distracting than online classes (Figs 3D to 5A). Contrasting results were obtained in the study by Hattar et al. were 67.1% of participants preferred online lectures when compared to face to face lectures.[13]

Half of the study population reported online classes affecting their health (50.7%), the most common being eye-related fatigues (Fig. 7C). A study done by Hung et al. study reported restless sleep as the most encountered health-related issue with online learning platforms.[14] Similar results were obtained by Van Doren et al., where the students reported exhaustion from virtual learning as the major deceit.[12]

The final array of questions focused on student feedback and suggestions. In the study population, 11.8% of the wanted shorter duration classes with intermittent breaks between sessions to reduce fatigue (Fig. 7C). However, when a similar question was



Figs 7A to D: (A) Graph depicting the response of the participants regarding the ease of reconnecting into online classes; (B) Graph depicting the participants responses regarding the undesirable effects on the health due to online learning; (C) Graph depicting the response of the participants regarding the recommended duration for online classes; (D) Graph depicting the response of the participants regarding suggestions to improve the online learning sessions

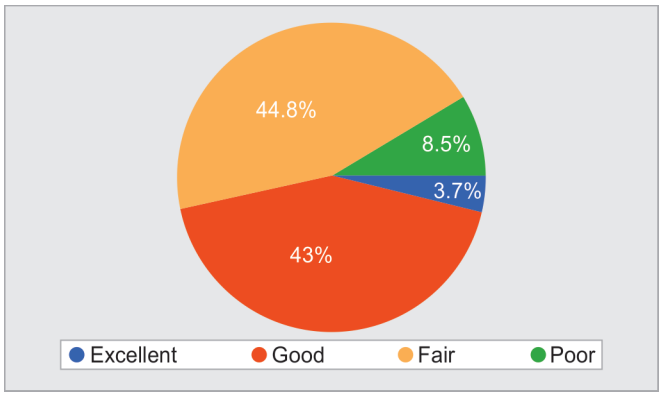


Fig. 8: Graph depicting the response of the participants regarding the quality of video-based learning system

posed in the study by Van Doren et al., students suggested the usage of accessory tools such as dental procedures videos, recorded lectures, and hands-on exercises to improve hand skills from home.[12] Overall, in our study, 43% of the study participants rated the quality of online-based learning to be good. Similarly in the study by Hung et al., 73.1% of students thought it was online classes were effective.[14]

The main advantages of the online learning systems as reported by respondents of this present study were that they could overcome their stage fright while presenting and this method of learning allowed them to gain knowledge from experts across the globe. Similarly, 73.1% of the students rated online learning as effective for remote distant education in a study by Hung et al.[14] Other benefits included the reduced cost of learning, learning at any time outside the classroom, access to global content, and distant learning experiences. This can lead to a dynamic shift of the learning process from passive teacher-centered learning to active student-centered learning.

Despite the above-mentioned advantages with e-learning platforms, there are certain challenges that can be seen in health sciences education. It leads to poor motivation for the learners due to lack of students' self-discipline, lack of a structured online curriculum, and limited use of technology in education in the current educational scenario. In addition to this, the untrained population who lack computer skills may have a major roadblock through e-learning systems. Hence, dental education may require extensive course development strategies. The drawbacks of this study are mainly the small size of the study population and a restricted geographic location. A larger sample size representing a wider sector of the population has to be performed in the future for a better and more validated outcome.

Conclusion

The COVID-19 pandemic jeopardized the routine lifestyle including education and many reforms were devised since then. Online teaching-learning has many advantages and that alone was being the only possibility in the pandemic scenario. It can be concluded from the results of the present study that despite its advantages online or e-learning cannot be a substitute for

traditional learning methods unless a special curriculum is devised and structured for dentistry. A virtual demonstration may not provide a real-time experience to the students, but these may augment the traditional teaching methods. Another important concern is the time spent by the teachers and students in front of the electronic display, which can have a negative impact on general health. The continued growth and improvement of dentistry will lead to further technological advancements and global learning platforms.

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