Original Study

# IMPLEMENTATION OF TELEDENTISTRY IN POSTGRADUATE DENTAL EDUCATION DURING COVID-19 PANDEMIC IN SAUDI ARBIA

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**ABSTRACT**

Access to dental treatment, is still a big concern in this extraordinary situation owing to the coronavirus pandemic. Therefore, non-conventional approaches such as teledentistry can help to overcome the problem. This study aims to measure the levels of knowledge, awareness, attitudes, and practices of teledentistry among postgraduate dental students during the COVID-19 pandemic in Saudi Arabia. A cross-sectional descriptive survey using an online google form was conducted to assess the knowledge, awareness, attitudes, and practices of teledentistry among 102 (Male=69, Female=63) postgraduate dental students by using a validated self-administered questionnaire. Descriptive statistics of frequency distribution and chi-square test applied to assess the relationship between categorical variables. Data analysis was performed by using IBM-SPSS (Version 25, Armonk; NY: USA).
102 study participants, 79% heard about teledentistry before, and 69% were aware of teledentistry, while 70.5% never used teledentistry before the COVID-19 pandemic. The majority of the respondents want to practice teledentistry shortly. No statistical difference was found regarding the gender and telemedicine items, except for the significantly higher proportion of females than males who believed that teledentistry can be applied in any dentistry (p=0.020). Similarly**,** no significant difference was found regarding the age and telemedicine items, except that significantly higher respondents in the age group 31-36 had attended a lecture /course about teledentistry (p=0.016). The research participants agreed that COVID-19 would allow dental education on the Internet as the best option (P=0.034). Findings indicate adequate knowledge and awareness about teledentistry among postgraduate dental residents during the COVID-19 pandemic in Saudi Arabia.

**Key words:** Teledentistry, Telemedicine, Covid-19, Postgraduate, Residents.

## Introduction

A new beta coronavirus associated with pneumonia was discovered in December 2019, in Wuhan, China [1-3]. It was named severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) [4] in January 2020 and was found to be responsible for causing coronavirus disease-2019 (COVID-19). Because of newness and rapid national and international dissemination, the World Health Organization declared the disease a Public Health Emergency of International Concern on January 30, 2020. COVID-19 was declared a pandemic on March 11, 2020 [5].

To delay the spread of SARS-CoV-2, the Government of Saudi Arabia announced several containment and mitigation measures. These included; suspension of operations in many government agencies, temporary closure of the schools and universities with a switch to virtual learning mode, suspension of markets, and malls. Prohibition of public gatherings in malls, parks, beaches, and resorts. Only take-away services from the restaurants. Pharmacies and grocery stores served through governmental assigned online delivery applications and systems. All the inbound and outbound international flights, domestic flights, bus, taxi, and train transportation were suspended. A nationwide 7 p.m.–6 a.m. curfew was imposed all over the country [6].

Due to the lockdown and social distancing measures during the pandemic, all routine non-emergency general and oral healthcare were temporarily suspended, creating a challenge for patient communication and access to healthcare problems, including dental care [6, 7]. Hence it is essential to use non-conventional, more advanced information technology such as telehealth and teledentistry to address the health care access problems while limiting the direct contact between doctor and patient [8, 9].

Teledentistry is a form of telehealth that utilizes a combination of telecommunications and dentistry and involves the interchange of clinical information and relevant imaging over remote distances for consultation and treatment plans [10]. Others defined teledentistry as telecommunications and technology in dental care and dental education interactions over a distance [11, 12]. Teledentistry was first tested in 1996 at Fort Gordon, Georgia, by the US Army [13]. The first report was

published in 2001 on implementing an advanced system of weekly videoconferences with orthodontic consultants that guided the general dentists in their treatment plan [14].

Recent studies conducted among dental professionals' understanding and use of teledentistry indicated broad scope, high knowledge, and favorable attitudes towards teledentistry [15, 16]. Others believe that teledentistry is a great innovation and demands forward-thinking; though it would not substitute in-person clinical dental care, it can provide some advantage [17].

Teledentistry is an essential concept in the context of Saudi Vision 2030, as it may significantly contribute to the strategic goals to Improve healthcare service, develop e-government and Improve the quality of services provided to citizens [8]. A study conducted by Almazrooa et al. [18] pointed out that only 50% of the dentists had applied teledentistry to their clinical practice. Only 33% of the dental professionals from Abha heard of teledentistry, and more than half willing to practice teledentistry in the future [19]. Another study conducted among the dental students in Makkah province demonstrated little knowledge of teledentistry, and they were ready to learn and use it [8].

Riyadh Elm University (REU) is a privately owned and funded educational institution based in Riyadh city, Saudi Arabia that provides several academic programs in health sciences through its different colleges. The college of dentistry provides undergraduate, postgraduate, and Saudi Board residency programs. Due to the COVID-19 pandemic and sudden announcement of lockdowns, REU was temporarily shut down all in campus activities and switched to an online educational platform. Previous studies investigations on teledentistry mainly focused on dental professionals, undergraduate dental students, or dental faculties from Saudi Arabia. However, to the best of our understanding, no study was conducted to measure the levels of knowledge, awareness, attitudes, and practices of teledentistry among postgraduate and Saudi board residents in Saudi Arabia.

Hence, this study aimed to assess the current levels of knowledge, awareness, attitudes, and teledentistry practices among postgraduate and Saudi board residents from a private university in Riyadh city, Saudi Arabia.

## Materials and Methods

*Study design and participants*

It was a descriptive cross-sectional survey among the postgraduate and Saudi Board residents from all dentistry specialties studying in a private University in Riyadh, Saudi Arabia.

*Inclusion and exclusion criteria*

All the residents willing to participate in the study were considered in the inclusion criteria. The residents who did not give consent to participate in the study were excluded.

*Ethical approval and informed consent*

The study protocol was submitted to the REU research center, and ethical approval was obtained from the institutional review board (FPGRP/2020/496/262/255). Informed consent to participate in the study was obtained from the residents.

*Questionnaire design, development, and administration*

A structured, close-ended, and self-administered questionnaire was prepared based on the previously published literature on teledentistry [20]. The questionnaire was made up of 21 questions in which six questions were related to the demographic information of the study participants (age, gender, dental program, dental specialty, residency level, and main workplace). The remaining fifteen questions evaluated the knowledge, attitudes, and practices of the teledentistry. The questionnaire's face validity was established by sending it to the teledentistry expert academician (DA). Moreover, the questionnaire demonstrated acceptable reliability (Chronbach's alfa=0.852).

An electronic version of the questionnaire was prepared using google forms, and a link was created to submit it to the subjects. An email explaining the study purpose and containing a questionnaire link was sent to 130 residents pursuing postgraduate and Saudi Board programs at REU. The study was conducted from August 17 to October 1. After the end of the study period, the study participants' responses were downloaded in a Microsoft excel sheet and subjected to further analysis.

*Statistical Analysis*

Descriptive statistics of frequency distribution and percentages were calculated for the study participants' characteristics and questionnaire items. The Chi-square test and Fisher's exact tests were applied to assess the relationship between the variables. All the data were analyzed by using IBM-SPSS (Version 25, Armonk; NY: USA). A value of $p<0.05$ is considered significant for all statistical purposes.

## Results and Discussion

Of the 130 residents invited to participate in the study, 102 responded to the online questionnaire. Thus giving a response rate of 78.5%. Demographic data showed that most of the respondents were males (61.8%) than females (38.2%), aged 31-36 years (59.8%), followed by 25-30 years (25.5%) and >36 years (14.7%). Most of the study participants were in the master's (82.4%) program compared to the Saudi board program (17.6%). A large percentage of endodontic (22.5%), followed by orthodontic (15.7%), pedodontic (15.7%), AEGD (15.7%), restorative (12.7%),

periodontics (9.8%) and prosthodontic (7.8%) residents participated in the study. The majority of the residents were in R2 (37.3%). Although respondents belonged to the various regions of Saudi Arabia, based on their primary workplace, they were classified from Riyadh (62.7%) and outside Riyadh (37.3%). The demographic characteristics of the study participants are displayed in (**Table 1).**

**Table 1.** Characteristics of the study participants

| Characteristics | | n | % |
|---|---|---|---|
| Gender | Female | 39 | 38.2% |
| | Male | 63 | 61.8% |
| | Total | 102 | 100.0% |
| Age (Years) | 25-30 | 26 | 25.5% |
| | 31-36 | 61 | 59.8% |
| | >36 | 15 | 14.7% |
| | Total | 102 | 100.0% |
| Dental Program | Saudi Board | 18 | 17.6% |
| | Master | 84 | 82.4% |
| | Total | 102 | 100.0% |
| Dental Specialty | Orthodontics | 16 | 15.7% |
| | Prosthodontics | 8 | 7.8% |
| | Pedodontics | 16 | 15.7% |
| | Periodontics | 10 | 9.8% |
| | AEGD | 16 | 15.7% |
| | Endodontics | 23 | 22.5% |
| | Restorative Dentistry | 13 | 12.7% |
| | Total | 102 | 100.0% |
| Residency level | R1 | 32 | 31.4% |
| | R2 | 38 | 37.3% |
| | R3 | 21 | 20.6% |
| | R4 | 6 | 5.9% |
| | R5 | 5 | 4.9% |
| | Total | 102 | 100.0% |
| Main Workplace | Riyadh | 64 | 62.7% |
| | Outside Riyadh | 38 | 37.3% |
| | Total | 102 | 100.0% |

The majority of the residents (78.4%) were heard of the term teledentistry, while 68.6% were knowledgeable about teledentistry. When enquired about the use of teledentistry before and during the COVID-19 pandemic, only 29.4% and 49% responded positively. More than half (54.9%) of the study participants had a consultation with a patient using a smartphone and its camera. Less than half (43.1%) attended a lecture or course about teledentistry. About 87.3% of residents perceived teledentistry as using computers, the Internet, and technologies to diagnose and provide advice about treatment over a distance. Nearly less than three-fourths (72.5%) of the participants agreed that during COVID-19 dental education over the Internet is the best option. Almost (62.7%) participants viewed that teledentistry could be applied to any branch in dentistry. More than three-fourth (75.5%) of the respondents agreed that teledentistry helps monitor the patient's oral health. While only (36.3%) participants agree that the dental examination is accurate via computers, and more than half (58.8%) of the residents thought that teledentistry makes dental examination easier. Nearly three-fourths (74.5%) of the residents agreed that teledentistry could reduce the costs of dental practices. Nearly 60.8% of residents would trust the working of teledentistry equipment, and more than three-fourths (77.5%) would like to practice teledentistry in the future (**Table 2**).

**Table 2.** Teledentistry item responses based on gender, age, and dental program of the study participants (n=102)

| **Questionnaire items/Responses** | | **Gender** | | | **Age** | | | | **Dental Program** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Female** | **Male** | **P** | **25-30** | **31-36** | **>36** | **P** | **SBD** | **Master** | P |
| | | % | % | | % | % | % | | % | % | |
| Have you heard about teledentistry? | Yes | 79.5 | 77.8 | 0.838 | 65.4 | 82.0 | 86.7 | 0.160 | 88.9 | 76.2 | 0.235 |
| | No | 20.5 | 22.2 | | 34.6 | 18.0 | 13.3 | | 11.1 | 23.8 | |
| Do you know what teledentistry is? | Yes | 74.4 | 65.1 | 0.326 | 53.8 | 72.1 | 80.0 | 0.143 | 77.8 | 66.7 | 0.357 |
| | No | 25.6 | 34.9 | | 46.2 | 27.9 | 20.0 | | 22.2 | 33.3 | |
| Have you ever used a teledentistry system before COVID 19 Pandemic? | Yes | 28.2 | 30.2 | 0.833 | 23.1 | 29.5 | 40.0 | 0.519 | 44.4 | 26.2 | 0.123 |
| | No | 71.8 | 69.8 | | 76.9 | 70.5 | 60.0 | | 55.6 | 73.8 | |
| 10/ Have you ever used teledentistry during the COVID-19 pandemic? | Yes | 53.8 | 46.0 | 0.443 | 34.6 | 57.4 | 40.0 | 0.114 | 66.7 | 45.2 | 0.099 |
| | No | 46.2 | 54.0 | | 65.4 | 42.6 | 60.0 | | 33.3 | 54.8 | |
| Have you ever had a consultation with a patient using a smartphone and its camera? | Yes | 64.1 | 49.2 | 0.142 | 46.2 | 60.7 | 46.7 | 0.362 | 72.2 | 51.2 | 0.104 |
| | No | 35.9 | 50.8 | | 53.8 | 39.3 | 53.3 | | 27.8 | 48.8 | |
| Have you attended a lecture /course about teledentistry? | Yes | 41.0 | 44.4 | 0.735 | 19.2 | 52.5 | 46.7 | **0.016*** | 55.6 | 40.5 | 0.241 |
| | No | 59.0 | 55.6 | | 80.8 | 47.5 | 53.3 | | 44.4 | 59.5 | |
| | Yes | 87.2 | 87.3 | 0.986 | 80.8 | 86.9 | 100.0 | 0.204 | 94.4 | 85.7 | 0.313 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Is teledentistry about the practice of use of computers, the Internet, and technologies to | No | 12.8 | 12.7 | | 19.2 | 13.1 | 0.0 | | 5.6 | 14.3 | |
| Do you think that covid-19 makes dental education over the Internet the best option? | Yes | 79.5 | 68.3 | 0.217 | 57.7 | 82.0 | 60.0 | **0.034*** | 83.3 | 70.2 | 0.259 |
| | No | 20.5 | 31.7 | | 42.3 | 18.0 | 40.0 | | 16.7 | 29.8 | |
| 15/can teledentistry be applied in any branch of dentistry? | Yes | 76.9 | 54.0 | **0.020*** | 73.1 | 60.7 | 53.3 | 0.393 | 66.7 | 61.9 | 0.705 |
| | No | 23.1 | 46.0 | | 26.9 | 39.3 | 46.7 | | 33.3 | 38.1 | |
| Do you think that teledentistry helps to monitor the patient's oral health? | Yes | 66.7 | 81.0 | 0.103 | 65.4 | 80.3 | 73.3 | 0.326 | 94.4 | 71.4 | 0.066 |
| | No | 33.3 | 19.0 | | 34.6 | 19.7 | 26.7 | | 5.6 | 28.6 | |
| Do you think that dental examinations are accurate via computers | Yes | 35.9 | 36.5 | 0.950 | 30.8 | 41.0 | 26.7 | 0.466 | 38.9 | 35.7 | 0.799 |
| | No | 64.1 | 63.5 | | 69.2 | 59.0 | 73.3 | | 61.1 | 64.3 | |
| Do you think that teledentistry makes dental examination easier? | Yes | 61.5 | 57.1 | 0.661 | 50.0 | 63.9 | 53.3 | 0.432 | 72.2 | 56.0 | 0.203 |
| | No | 38.5 | 42.9 | | 50.0 | 36.1 | 46.7 | | 27.8 | 44.0 | |
| Does teledentistry help in reducing costs for dental practices? | Yes | 74.4 | 74.6 | 0.978 | 76.9 | 72.1 | 80.0 | 0.779 | 88.9 | 71.4 | 0.123 |
| | No | 25.6 | 25.4 | | 23.1 | 27.9 | 20.0 | | 11.1 | 28.6 | |
| Do you trust teledentistry equipment to work? | Yes | 61.5 | 60.3 | 0.902 | 61.5 | 62.3 | 53.3 | 0.813 | 72.2 | 58.3 | 0.273 |
| | No | 38.5 | 39.7 | | 38.5 | 37.7 | 46.7 | | 27.8 | 41.7 | |
| in the future, will you practice teledentistry? | Yes | 84.6 | 73.0 | 0.173 | 73.1 | 83.6 | 60.0 | 0.121 | 88.9 | 75.0 | 0.201 |
| | No | 15.4 | 27.0 | | 26.9 | 16.4 | 40.0 | | 11.1 | 25.0 | |

No significant difference was found regarding the gender and knowledge of the teledentistry application except that the significantly high percentage of female respondents believed that teledentistry could be applied in any specialty of dentistry (P=0.020). Significantly higher respondents in the age group of 31- 36years attended lectures/courses about teledentistry (P=0.016) and had the opinion that during the COVID-19 pandemic, dental education over the Internet was the best option (P=0.034)**.** Similarly, different residency levels indicated a statistically significant difference across the knowledge of teledentistry (p=0.020), use of teledentistry before (p=0.049), and during (p=0.038) COVID-19 pandemic. Similarly, the residency level was found to differ significantly in consultation with the patient using a smartphone and its camera (p=0.008) and monitoring the patient's oral health (p=0.034). A significantly higher percentage of Riyadh residents are more likely to attend the lecture/course about teledentistry (p=0.026) **(Table 3).**

**Table 3.** Teledentistry item responses based on residency level and main workplace (n=102)

| **Questionnaire items/Responses** | | **Residency level** | | | | | **Main Workplace** | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **R1** | **R2** | **R3** | **R4 & R5** | **p** | **Riyadh** | **Outside Riyadh** | **P** |
| | | **%** | **%** | **%** | **%** | | **%** | **%** | |
| Have you heard about teledentistry? | Yes | 75.0 | 73.7 | 81.0 | 100.0 | 0.280 | 76.6 | 81.6 | 0.551 |
| | No | 25.0 | 26.3 | 19.0 | 0.0 | | 23.4 | 18.4 | |
| Do you know what teledentistry is? | Yes | 65.6 | 55.3 | 81.0 | 100.0 | **0.020*** | 64.1 | 76.3 | 0.197 |
| | No | 34.4 | 44.7 | 19.0 | 0.0 | | 35.9 | 23.7 | |
| Have you ever used a teledentistry system before COVID 19 Pandemic? | Yes | 31.3 | 21.1 | 23.8 | 63.6 | **0.049*** | 34.4 | 21.1 | 0.153 |
| | No | 68.8 | 78.9 | 76.2 | 36.4 | | 65.6 | 78.9 | |
| Have you ever used teledentistry during the COVID-19 pandemic? | Yes | 40.6 | 39.5 | 61.9 | 81.8 | **0.038*** | 53.1 | 42.1 | 0.282 |
| | No | 59.4 | 60.5 | 38.1 | 18.2 | | 46.9 | 57.9 | |
| Have you ever had a consultation with a patient using a smartphone and its camera? | Yes | 40.6 | 55.3 | 52.4 | 100.0 | **0.008*** | 59.4 | 47.4 | 0.239 |
| | No | 59.4 | 44.7 | 47.6 | 0.0 | | 40.6 | 52.6 | |
| Have you attended a lecture /course about teledentistry? | Yes | 34.4 | 44.7 | 38.1 | 72.7 | 0.159 | 51.6 | 28.9 | **0.026*** |
| | No | 65.6 | 55.3 | 61.9 | 27.3 | | 48.4 | 71.1 | |
| Is teledentistry about the practice of use of computers, internet, and technologies to | Yes | 93.8 | 76.3 | 90.5 | 100.0 | 0.069 | 85.9 | 89.5 | 0 .605 |
| | No | 6.3 | 23.7 | 9.5 | 0.0 | | 14.1 | 10.5 | |
| | Yes | 71.9 | 73.7 | 66.7 | 81.8 | 0.832 | 75.0 | 68.4 | 0.472 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Do you think that covid-19 makes dental education over the Internet the best option? | No | 28.1 | 26.3 | 33.3 | 18.2 | | 25.0 | 31.6 | |
| Can teledentistry be applied in any branch of dentistry? | Yes | 65.6 | 57.9 | 61.9 | 72.7 | 0.808 | 67.2 | 55.3 | 0.228 |
| | No | 34.4 | 42.1 | 38.1 | 27.3 | | 32.8 | 44.7 | |
| Do you think that teledentistry helps to monitor the patients' oral health? | Yes | 78.1 | 60.5 | 90.5 | 90.9 | **0.034*** | 81.3 | 65.8 | 0.079 |
| | No | 21.9 | 39.5 | 9.5 | 9.1 | | 18.8 | 34.2 | |
| Do you think that dental examinations are accurate via computers | Yes | 46.9 | 39.5 | 19.0 | 27.3 | 0.187 | 37.5 | 34.2 | 0.738 |
| | No | 53.1 | 60.5 | 81.0 | 72.7 | | 62.5 | 65.8 | |
| Do you think that teledentistry makes dental examination easier? | Yes | 65.6 | 47.4 | 66.7 | 63.6 | 0.346 | 64.1 | 50.0 | 0.163 |
| | No | 34.4 | 52.6 | 33.3 | 36.4 | | 35.9 | 50.0 | |
| Does teledentistry help in reducing costs for dental practices? | Yes | 75.0 | 68.4 | 71.4 | 100.0 | 0.202 | 79.7 | 65.8 | 0.119 |
| | No | 25.0 | 31.6 | 28.6 | 0.0 | | 20.3 | 34.2 | |
| Do you trust teledentistry equipment to work? | Yes | 59.4 | 60.5 | 57.1 | 72.7 | 0.202 | 65.6 | 52.6 | 0.194 |
| | No | 40.6 | 39.5 | 42.9 | 27.3 | | 34.4 | 47.4 | |
| In the future, will you practice teledentistry? | Yes | 75.0 | 78.9 | 71.4 | 90.9 | 0.629 | 81.3 | 71.1 | 0.233 |
| | No | 25.0 | 21.1 | 28.6 | 9.1 | | 18.8 | 28.9 | |

Access to dental care is a problem in many areas worldwide due to a lack of dental and medical facilities, low population density, remoteness from large cities, and other factors. It affects the volume and quality of dental care provided; for these reasons, teledentistry is provided to help the patients in these isolated areas and prevent direct contact between the dentist and the patient in Pandemics. It also helps with the cross-communication between other specialists, which helps in better treatment planning [15]. Therefore teledentistry is now widely accepted in dental education, public awareness, and research activities in many dental disciplines [10]. To our knowledge, this is the first study that investigated teledentistry from a postgraduate resident's perspective from a private Saudi University.

The present study indicated adequate knowledge and awareness about teledentistry among the postgraduate residents from a private university in Saudi Arabia. Almost 78.4 % of the residents heard about teledentistry, and 68.6% were aware of teledentistry. A finding similar to the study reported in India, wherein 74.4% of postgraduate students knew about teledentistry [20]. However, our study finding is higher than the previously reported studies among dental students and interns from different Saudi Arabian regions [8, 19]. Most of the resident's workplace was Riyadh city, where information about technological advancements is readily available compared to those working outside Riyadh. Another explanation could be that the younger residents included in the study are more familiar with dental technological progress [18].

When compared teledentistry usage between before and during the COVID-19 pandemic, it increased from 29.4% to 49%. It could be attributed to the complete online switchover of postgraduate education during the lockdown due to the COVID-19 pandemic. It has been reported that the teledentistry at least can supplement the existing conceded dental system during the current pandemic [21].

The most popular teledentistry form is teleconsultation, where patients request telecommunications advice from dental specialists [22]. It was useful for consulting mentally and psychologically disabled, and patients from aged care institutions and jails [23, 24]. In the present COVID-19 pandemic, patients may be assisted to continue their therapy during quarantine and lockout by teleconsultations [21]. It is interesting to note that more than half of the respondents in our study performed dental consultations using smartphones and the camera. This finding is similar to the study reported by Aboalshamat [8], in which 56.05% of dental professionals did dental consultations with their patients using a smartphone and a camera. The previous study conducted among dental students in Saudi Arabia has shown an information gap regarding the potential benefits of the implementation of teledentistry in improving dental services. This was reflected by the fact that only 17.52% of students had ever attended a lecture about teledentistry. While in our study, 43.1% of residents had attended lectures or courses about teledentistry. It may be attributed to postgraduate dental students participating in teledentistry as part of their digital transition and increased smartphone and social media usage in their personal and professional lives.

However, Aboalshamat et al. [25] pointed out a few concerns related to the lack of suitable smartphone usage protocols regarding patient privacy. Therefore, it may be necessary to increase the number of teledentistry training courses with adequate professional contact and privacy criteria. Compared to Government College, students from private dental colleges were found to make substantially higher usage of smartphones for patient appointments and were also more willing to join teledentistry workshops. It reflects the variation in educational material between these college's styles when it comes to modern trends.

In the aftermath of the COVID-19 pandemic, face-to-face classroom education events for undergraduate and postgraduate dentistry students were almost disrupted

worldwide. Educators are struggling to respond to social distances. The quarantine and social isolation period are uncertain, and specific simulated solutions are being utilized to begin teaching practices [26]. In our study, 72.5% of the respondents claimed that COVID-19 made dental education the best choice via the Internet. This finding is higher than that reported by an Indian study [27].

Almost 62.7% of residents perceived that teledentistry could be applied in any dentistry specialty, while 63.7% questioned the accuracy of dental examination via computers, with 58.8% of residents agreed that teledentistry makes dental examination easy. On the contrary, an acceptable level of accuracy in diagnosing dental caries via teledentistry has been reported by Estai et al. [28].

The financial expense is another consideration associated with the regulation of teledentistry. In a recent study by Alsharif and Al-harbi [29], half of the sampled participants accepted that teledentistry could theoretically minimize costs, and two-thirds suggested that it might mitigate excessive costs incurred while traveling to hospitals. In line with this report, about three-quarters of the respondents think that teledentistry can reduce dental practice costs. On the other hand, 60% of Indian dentists perceived that teledentistry could not reduce the cost of care [27].

Almost 60.8% of the residents in our study trusted the teledentistry equipment, and 77.5% agreed to practice teledentistry in the future. This finding is in line with previously reported studies [8, 20].

The present study did not discuss non-technological, organizational, or political challenges related to teledentistry. A convenient sample of residents from a single private university may have limited external validity of the study. We recommend further studies on teledentistry by considering a nationally representative sample of dental residents from both government and private universities in KSA.

## Conclusion

This study indicates adequate knowledge and awareness about teledentistry among the postgraduate dental students in Saudi Arabia. However, there is a need to further increase awareness among postgraduate dental residents in Saudi Arabia on teledentistry as the future lies in technological advancement. Tele-dentistry can mark the beginning of a new era in dentistry. This can be achieved by conducting continuous dental education programs and awareness campaigns/programs that help various levels.

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**Conflict of Interest:** None.

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