

Teledentistry awareness, its usefulness, and challenges among dental professionals in Pakistan and Saudi Arabia

Digital Health
Volume 8: 1–10
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DOI: 10.1177/20552076221089776
journals.sagepub.com/home/dhj



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Abstract

Objectives: This study aims to describe the perception of dental professionals in Pakistan and Saudi Arabia (SA) towards the practice of teledentistry, its usefulness and challenges.

Methods: A cross-sectional study was carried out among 190 dentists from January 2021 to April 2021. The participants were included in the study using snowball sampling method. A 26-item adopted questionnaire was distributed using different social media channels. Chi-square test was used for analysis.

Results: Out of 190 participants, 46.3% were from Pakistan and 53.7% were from SA. The majority of participants in both countries agreed that teledentistry would enhance guidelines and advice (74.2%), improve peer-to-peer interaction (79.5%) and make patient's referrals more efficient (75.8%). For the usefulness, most participants agree that it is economical for the patients (61.1%), improves communication (74.7%), helps in educating the patients (86.3%), avoid unnecessary travel (76.8%), helps monitoring (71.6%), and benefits patients in remote areas (74.7%); however, more Pakistani participants perceived that time spent with the patient would increase compared to SA participants ($p < 0.001$) and a higher proportion of SA participants believe that it helps in communication and monitoring of patients ($p < 0.001$) than Pakistani participants. Regarding the challenges in the use of teledentistry, few participants think that it violates the patient's privacy (22.6%) or is difficult to use (14.7%) or have distrust towards the teledentistry equipment (24.2%).

Conclusion: The results indicated a high awareness and a positive attitude towards teledentistry, and its adaptation in their dental practice in both countries. However, limited infrastructure, set-up cost, and information technology (IT) literacy are the main challenges in integrating teledentistry which can be overcome by strategic government initiatives, policies, and programs.

Keywords

teledentistry, attitude, awareness, usefulness, challenges, dental professionals

Submission date: 28 July 2021; Acceptance date: 9 March 2022

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Introduction

Telehealth refers to the provision of health care and services using electronic and communication technologies.¹ It began to gain acceptance in the medical and dental field since the last decade as internet coverage becomes widely, easily, and rapidly accessible and tech gadgets such as smartphones and proprietary software applications are affordable and readily available.^{1,2} Teledentistry is the practice of dentistry using information and communication technology for the delivery of care, education, research, and management from a distant site.²

In teledentistry, dental information can be delivered and shared more efficiently, easily, quickly, and safely; thus, it can be of advantage in improving dental services. For example, to address the oral health needs in areas with limited access caused by unequal distribution of oral health care services.³ The greater concentration of dental specialists and general dental practitioners in the major urban cities compared to rural areas contribute to the oral health inequality in the population.⁴ Adopting teledentistry as an additional or alternative delivery method improves access to healthcare services and reduces the need to travel and cost of treatment.⁵ It benefits populations living in areas with poor infrastructure, shortage of dentist and dental specialists, and limited oral care services, particularly in developing and underdeveloped countries.^{3,6} Additionally, it encourages the use of the massive amount of readily available oral health education and promotion resources as tools to disseminate oral health knowledge across cultural, social-economic, and geographical boundaries.⁷ The ongoing Covid-19 pandemic adds a further advantage to the use of teledentistry.⁸⁻¹² The spread of infection within oral health care facilities can be reduced through contactless consultations between patients and oral health professionals with the use of audio-visual telecommunication technology.⁹ The types of care and services that can be done online include, but are not limited to, an initial assessment/preliminary diagnostic to determine the severity of a dental condition and scheduling an appointment, providing oral health education counseling, and reviewing cases.^{1,2} Consultations can be done in a live interactive or recorded session with the aid of previous dental records such as radiographs, photographs, and digital impressions. Despite the potential, teledentistry is not adapted as well as telemedicine; dentists are somewhat apprehensive and hesitant to adapt and apply teledentistry as part of their routine practices.¹³

Saudi Arabia (SA) has set a reformation roadmap to transform the country to become an ambitious nation with a vibrant society and thriving economy via its Vision 2030; one of the objectives is to offer a fulfilling and healthy life through the transformation of the health sector and quality of life programs.^{14,15} In that perspective, including teledentistry as part of the reform would seem to

be a strategic and important move; adopting e-government to improve the healthcare services and the quality of care to the citizens. In Pakistan, the similar initiative undertaken by the government, via the National Health Vision 2025 with the aims to improve health by enhancing access to essential and better-quality health services and use of information technology, communication, and digitalization in the health sector, opens up opportunities for developing teledentistry in the country.¹⁶

To achieve the desired results of these visions in oral health care, it is important to understand the current state of knowledge, awareness, and attitude towards teledentistry of dental professionals and their perceived challenge of its implementation. However, research in teledentistry is lagging in both countries compared to the medical fraternity and most of the teledentistry studies are from the developed European countries, leaving a wide gap in knowledge on the issues in the Asian and developing countries. Therefore, this study was aimed to describe the perception of dental professionals in Pakistan and Saudi Arabia towards the practice of teledentistry, its usefulness, and challenges.

Methods

This cross-sectional study was carried out on dentists in Pakistan and SA between January to April 2021. The ethical approval of this study was obtained from the Ethical review board of the School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University (Reference no. F.105/21/SOD/ERB). The inclusion criteria were having a degree in dentistry and actively practicing, having access to the internet, able to understand the English language. Participants were recruited using the snowball sampling method by sending an online link to the investigators' contact list through emails, WhatsApp, Facebook, and other social media channels and, encouraged them to forward the link to their contacts. Respondents who clicked on the link were directed to an information sheet that explains the purpose of the study and a consent form. Those who agreed to participate were directed to another online page that collected sociodemographic information. Thereafter, the participants were asked to complete a five-section questionnaire that appeared sequentially.

The first, second, third, and fifth section of the questionnaire was adapted from Al-khalifa et al., (2020),⁷ and the fourth section, from Murererehe et al., (2017).⁶ The questionnaires were developed for online administration using Google forms and were face validated by a panel made of 15 general dentists. Minor changes were made based on the feedback from the panel before the final distribution to the participants. The first section has six items and assesses the perception of whether teledentistry can

improve dental practice, that is, providing an accurate diagnosis, helping shorten the waiting list, etc. The second section assesses the perceptions about the usefulness of teledentistry in a dental practice (six items), that is, reducing costs for the dental practices, enhancing clinical training and continuing education, etc; the third, about the usefulness of teledentistry for patients (seven items), that is, avoiding unnecessary travel to dental clinic, save money for patients, etc; and the fourth, about the challenges in using teledentistry (six items), that is, patient's privacy, lack of infrastructure, trust on teledentistry equipment, etc. The response for each item above was recorded as agree, disagree, and neutral. The fifth section asked the participants to indicate which branch of dentistry, teledentistry can be applied the most.

Statistical analysis

The summary statistics were obtained for all variables. The chi-square test was used to compare the perception of capability, usefulness, and challenges in the use of teledentistry between participants in the two countries. All analysis was carried out in IBM SPSS software version 25.0 (SPSS Institute, Chicago, IL, USA), and a p value of <0.05 was considered statistically significant.

Results

From a total of $N = 190$, 46.3% were from Pakistan, and 53.7%, from SA. The summary of sample characteristics is presented in Table 1. The sample included more specialists and consultants, and participants with longer work experience and longer working hours from SA compared to those from Pakistan ($p < 0.05$). Fewer participants were working in the private sector in the SA than in Pakistan ($p < 0.05$). Most of the study participants use the internet for four hours or less a day in their dental practice ($p < 0.05$). Participants from Pakistan preferred calling on the phone and meeting in-person as the communication tool in dental practice whereas those from SA preferred forum, videoconference and email are preferred (Figure 1).

In terms of capabilities, most participants from Pakistan (70.5%) and SA (77.5%) agreed that teledentistry would enhance guidelines and advice, improve peer-to-peer interaction (80.7% and 78.4%) and make patient's referral more efficient (73.9% and 77.5%). Only a small proportion of participants (23.7%) agree that TD would provide an accurate clinical diagnosis, but larger proportions agree that it would shorten the waiting list (75.2%), and provide a safe atmosphere for practising dentistry during the pandemic (74.2%); of which most were from Pakistan ($p < 0.05$).

Regarding the usefulness, the majority of participants in Pakistan (60.2%) and Saudi Arabia (67.6%), agree that teledentistry would enhance clinical training and continuing

education. Similarly, 71.6% Pakistani and 77.7% Saudi participants agreed that teledentistry can save time compared with a referral letter; however, a very low percentage of participants in both the countries (20%) agreed with the statement that teledentistry would be too expensive to set up. More Pakistani (44.3%) compared to Saudi (14.7%) participants perceived that the time spent with the patient would increase ($p < 0.05$) (Table 2).

For the usefulness of teledentistry for patients, most participants in both countries agree that it is economical for the patients (61.1%), improves communication (74.7%), helps in educating the patients (86.3%), and benefits patients in remote areas (74.7%). More Pakistani participants (85.2%) compared to Saudi (69.6%) agree that teledentistry helps to avoid unnecessary travel, but a high proportion of SA (80.4%) compared to Pakistani (61.4%) participants believe that it helps in communication and monitoring of patients ($p < 0.05$). Regarding the challenges in the use of teledentistry, very few participants from Pakistan (11.4%) think that it violates the patient's privacy compared to Saudi participants (32.4%); however, on the other hand more Pakistani participants (36.4%) can't trust teledentistry equipment to work compared to Saudi participants (13.7%) ($p < 0.05$). More Pakistani participants (73.9%) felt that literacy, poverty, and lack of infrastructure are the major challenges to teledentistry implementation compared to just 42.2% of Saudi participants ($p < 0.05$). Similarly, slightly more Pakistani participants (67.0%) think that the barriers to the use of teledentistry among dental professionals are the lack of awareness about teledentistry benefits and applications compared to Saudi (45.1%) ($p < 0.05$) (Table 3). Most dental professionals felt that teledentistry would be suitable for use in community dentistry (33.7%) followed by oral medicine (24.2%) and oral radiology (10.0%) (Figure 2).

Discussion

This study had investigated the perception of Saudi Arabian and Pakistani dental practitioners about the usefulness and challenges in adopting teledentistry. Overall, the majority of the participants in both countries agreed and are positive about adopting teletechnology in dentistry. Teledentistry is a relatively new field and is slowly adopted by dental professionals around the world. It has begun to change and transform the way oral health care services are provided to patients, owing to advancing technologies.¹⁷

From the perspective of clinical practice, teledentistry could help shorten the waiting time and time elapse between appointments. Compare to the traditional paper referral which takes a longer time, the online referrals process between clinics or dental professionals is faster as patients' status and needs are shared earlier and patients will be assigned to a dental specialty clinic based on an early informed decision and need.^{2,17} Teledentistry also

Table 1. Description of sociodemographic and professional characteristics of participants.

Characteristics	<i>N</i> (%), <i>N</i> = 190	Pakistan, <i>N</i> (%) 88 (46.3)	SA, <i>N</i> (%) 102 (53.7)	<i>p</i> value
Age				0.078
20–34	77 (40.5)	44 (50.0)	33 (32.4)	
35–44	57 (30.0)	20 (22.7)	37 (36.3)	
45–54	31 (16.3)	13 (14.8)	18 (17.6)	
55–64	25 (13.2)	11 (12.5)	14 (13.7)	
Gender				0.45
Male	107 (56.3)	47 (53.4)	60 (58.8)	
Female	83 (43.7)	41 (46.6)	42 (41.2)	
Qualification				<0.05
Consultant/Specialist	75 (39.5)	23 (26.1)	52 (51.0)	
General dental practitioner	52 (27.4)	37 (42.0)	15 (14.7)	
PGR/Resident/Graduate student	63 (33.2)	28 (31.8)	35 (34.3)	
Work experience (in years)				<0.05
0–5 years	91 (47.9)	52 (59.1)	39 (38.2)	
6–10 years	46 (24.2)	27 (30.7)	19 (18.6)	
11–15 years	20 (10.5)	5 (5.7)	15 (14.7)	
>16 years	33 (17.5)	4 (4.5)	29 (28.4)	
Location of practice				0.34
Major city/Urban	173 (91.1)	82 (93.2)	91 (89.2)	
Remote area/Rural	17 (8.9)	6 (6.8)	11 (10.8)	
Type of practice				<0.05
Private	35 (18.4)	29 (33.0)	6 (5.9)	
Governmental	115 (60.5)	29 (33.0)	86 (84.3)	
Both (private & governmental)	40 (21.1)	30 (34.1)	10 (9.8)	
Working hours per week				<0.05
1–19 h	54 (28.4)	15 (17.0)	39 (38.2)	
20–34 h	54 (28.4)	15 (17.0)	39 (38.2)	
35–49 h	62 (32.6)	44 (50.0)	18 (17.6)	
50 + h	20 (10.5)	14 (15.9)	6 (5.9)	
Daily use of the internet for general-purpose (in hours)				0.301
<1	6 (3.2)	3 (3.4)	3 (2.9)	
2–4	84 (44.2)	42 (47.7)	42 (41.2)	
5–7	66 (34.7)	25 (28.4)	41 (40.2)	
8–10	25 (13.2)	15 (17.0)	10 (9.8)	
>11	9 (4.7)	3 (3.4)	6 (5.9)	
Daily use of the internet in dental practice (hours)				<0.05
<1	67 (35.3)	44 (50.0)	23 (22.5)	
2–4	84 (44.2)	25 (28.4)	59 (57.8)	
5–7	22 (11.6)	13 (14.8)	9 (8.8)	
8–10	11 (5.8)	6 (6.8)	5 (4.9)	
>11	6 (3.2)	0	6 (5.9)	

allows for multi-participants conferencing to discuss a case, hence the interaction between health professional helps improve the quality of service that benefit the patients.³ Consequently, a discussion between a referring general

practitioner and a specialist also enhances clinical training and continuing education.

There is, however, a concern among most participants regarding the accuracy of clinical diagnosis made during

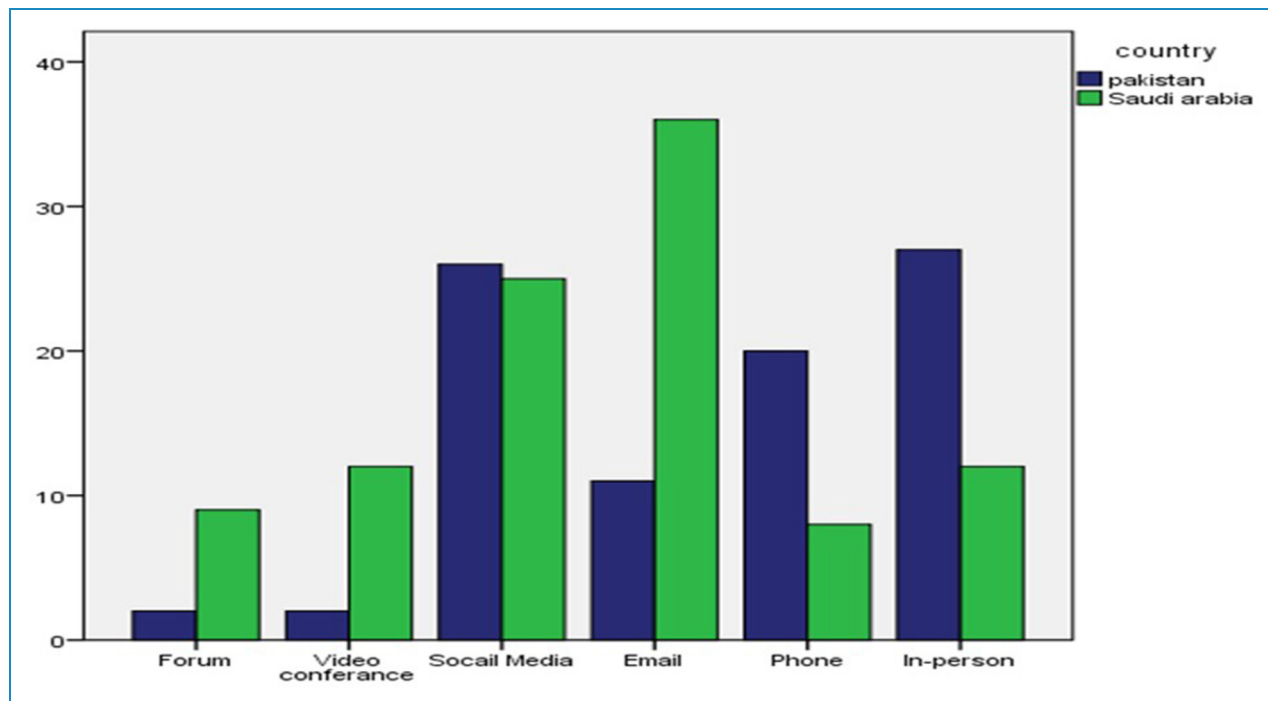


Figure 1. Preferred communication tools among dental practitioners.

teledentistry consultation, particularly among those with higher qualifications. A systematic review on the accuracy of diagnosis to detect dental caries using teledentistry showed it is reliable and almost equivalent to the non-telemedicine alternatives.¹⁸ Nevertheless, the interpretation and accuracy of oral diagnostic in teledentistry likely depends upon the quality of the equipment, images, and training.^{19,20}

Many participants agreed that teledentistry would provide a safe atmosphere for practicing dentistry during an infectious epidemic such as the COVID-19 pandemic; many dental practitioners shifted to teledentistry as an additional effort to minimise contact and risk of infection while continuing to provide care to patients.^{21–23}

Studies in Turkey and Rwanda show that the majority of the participants irrespective of qualification and experience (83% and 79%) think that teledentistry would save time and reduce the time spend with patients.^{6,24} That contrasts to the current study (28%) and more Pakistani than SA participants viewed that teledentistry would increase the time spent with the patient. Many specialists and postgraduate residents in this study do not think that teledentistry will increase treatment time compared to general practitioners. The general dentists have been reported to demonstrate some resistance toward new technology because of lack of experience or misunderstanding of the concept; they are also still in the process of navigating their way into building their career and might be resistant to the technology not to lose their patients pool.^{7,25}

Teledentistry can benefit patients in several ways. Most current study participants believe that it is more economical for the patients; because consultations can be done online it avoids unnecessary travel and this would be advantageous especially for patients in remote areas. The cost of patient assessments using teledentistry was reported to be lower compared to conventional methods but in India, only 21% of dental professionals believe that it reduces the cost of dental practices.²⁶ Correspondingly, it is time-efficient; there is less time spent on traveling, waiting for the appointment, and waiting at the clinic. In India, only 33.3% of respondents think that teledentistry saves time but other studies have shown that efficient time management and cost-saving are influential in gaining the trust of patients and encouraging them to use teledentistry, hence the main driver to implementation of telehealth in dental practice.^{24,26} Another benefit of teledentistry for the patients is improvement in patient–dentist communication. One aspect of communication is monitoring the progress patient’s condition through constantly sharing information and materials by the patient to the dentist.²⁴ This finding of this study is similar to another study in Turkey whereby 81% of participants are happily monitored the patients’ conditions using teledentistry but only 44% of dental professionals in India feel that they can monitor patients effectively using teledentistry.^{24,26}

Lack of infrastructure, lower socioeconomic conditions, and low literacy rate is a major challenge to implementing teledentistry; these are more likely the case in Pakistan

Table 2. Perceptions about the capability and usefulness of teledentistry to improve practice (N= 190).

Perceptions about the capability of teledentistry to improve practice		Pakistan, N (%)	SA, N (%)	p value
Teledentistry would provide accurate diagnosis in a clinical setting.	Agree	27 (30.7)	18 (17.6)	<0.05
	Disagree	22 (25.0)	19 (18.6)	
	Neutral	39 (44.3)	65 (63.7)	
Teledentistry would help shorten the waiting list	Agree	77 (87.5)	66 (64.7)	<0.05
	Disagree	1 (1.1)	5 (4.9)	
	Neutral	10 (11.4)	31 (30.4)	
Teledentistry would enhance guidelines and advice	Agree	62 (70.5)	79 (77.5)	0.072
	Disagree	10 (11.4)	3 (2.9)	
	Neutral	16 (18.2)	20 (19.6)	
Teledentistry would improve the interaction between peers	Agree	71 (80.7)	80 (78.4)	0.868
	Disagree	1 (1.1)	2 (2.0)	
	Neutral	16 (18.2)	20 (19.6)	
Teledentistry would provide a safe atmosphere for practicing dentistry (e.g. COVID-19 Pandemic)	Agree	72 (81.8)	69 (67.6)	<0.05
	Disagree	1 (1.1)	14 (13.7)	
	Neutral	15 (17.0)	19 (18.6)	
Teledentistry would make patient's referral more efficient	Agree	65 (73.9)	79 (77.5)	0.565
	Disagree	0	0	
	Neutral	23 (26.1)	23 (22.5)	
Perceptions about the usefulness of teledentistry for dental practice				
Teledentistry would enhance clinical training and continuing education	Agree	53 (60.2)	69 (67.6)	0.456
	Disagree	11 (12.5)	8 (7.8)	
	Neutral	24 (27.3)	25 (24.5)	
Teledentistry would reduce costs for the dental practices	Agree	46 (52.30)	54 (52.9)	0.430
	Disagree	12 (13.6)	20 (19.6)	
	Neutral	30 (34.1)	28 (27.5)	
Teledentistry would increase treatment time spent with the patient.	Agree	39 (44.3)	15 (14.7)	<0.05
	Disagree	16 (18.2)	31 (30.4)	
	Neutral	33 (37.5)	56 (54.9)	
Teledentistry would save time compared with a referral letter	Agree	63 (71.6)	79 (77.5)	0.061
	Disagree	3 (3.4)	9 (8.8)	
	Neutral	22 (25.0)	14 (13.7)	
Teledentistry would be too expensive to set up	Agree	18 (20.5)	21 (20.6)	0.753
	Disagree	38 (43.2)	39 (38.2)	
	Neutral	32 (36.4)	42 (41.2)	
Teledentistry would provide adequate diagnostic information	Agree	43 (48.9)	53 (52.0)	0.348
	Disagree	9 (10.2)	16 (15.7)	
	Neutral	36 (40.9)	33 (32.4)	

compared to Saudi Arabia. Similar challenges have been reported in other developing countries like Rwanda.⁶ Advanced telecommunication infrastructure that provides

fast and reliable internet is a determinant of the success of teledentistry and it is available to the majority of dental professionals who are located in the urban area, but the services

Table 3. Perceptions about the usefulness of teledentistry for patients and challenges to the use of teledentistry (N= 190).

Perceptions about the usefulness of teledentistry for patients		Pakistan, N (%) 88 (46.3)	SA, N (%) 102 (53.7)	p value
Teledentistry would save money for patients	Agree	57 (64.8)	59 (57.8)	0.619
	Disagree	7 (8.0)	10 (9.8)	
	Neutral	24 (27.3)	33 (32.4)	
Teledentistry would improve communication with patients	Agree	63 (71.6)	79 (77.5)	<0.05
	Disagree	17 (19.3)	0	
	Neutral	8 (9.1)	23 (22.5)	
Teledentistry would be helpful patient education	Agree	76 (86.4)	88 (86.3)	0.138
	Disagree	3 (3.4)	0	
	Neutral	9 (10.2)	14 (13.7)	
Teledentistry would help in avoiding unnecessary travel to Dental clinic	Agree	75 (85.2)	71 (69.6)	<0.05
	Disagree	4 (4.5)	3 (2.9)	
	Neutral	9 (10.2)	28 (27.5)	
Teledentistry would help in monitoring patient's condition	Agree	54 (61.4)	82 (80.4)	<0.05
	Disagree	16 (18.2)	3 (2.9)	
	Neutral	18 (20.5)	17 (16.7)	
Teledentistry would be convenient and well received by patients	Agree	47 (53.4)	56 (54.9)	0.976
	Disagree	11 (12.5)	12 (11.8)	
	Neutral	30 (34.1)	34 (33.3)	
Teledentistry would be useful for patients in remote areas	Agree	65 (73.9)	77 (75.5)	0.347
	Disagree	10 (11.4)	6 (5.9)	
	Neutral	13 (14.8)	19 (18.6)	
I think teledentistry can violate the patient's privacy.	Agree	10 (11.4)	33 (32.4)	0.002
	Disagree	37 (42.0)	38 (37.3)	
	Neutral	41 (46.6)	31 (30.4)	
I am worried about data entry mistakes.	Agree	46 (52.3)	48 (47.1)	0.635
	Disagree	15 (17.0)	16 (15.7)	
	Neutral	27 (30.7)	38 (37.3)	
I can't trust teledentistry equipment to work.	Agree	32 (36.4)	14 (13.7)	<0.05
	Disagree	18 (20.5)	31 (30.4)	
	Neutral	38 (43.2)	57 (55.9)	
I think the equipment used in teledentistry is difficult to use.	Agree	15 (17.0)	13 (12.7)	0.107
	Disagree	25 (28.4)	44 (43.1)	
	Neutral	48 (54.5)	45 (44.1)	
In Pakistan/ Saudia Arabia, major challenges in teledentistry are illiterates, population below the poverty line and lack of infrastructure.	Agree	65 (73.9)	43 (42.2)	<0.05
	Disagree	0	20 (19.6)	
	Neutral	23 (26.1)	39 (38.2)	
I think the barriers to the use of TD among dental professionals is the lack of awareness about teledentistry benefits and applications.	Agree	59 (67.0)	46 (45.1)	<0.05
	Disagree	3 (3.4)	4 (3.9)	
	Neutral	26 (29.5)	52 (51.0)	

can be limited in rural areas which are inhabited by the less affluent with low literacy rate. The type and affordability of internet prices and IT gadgets such as computers or

smartphones determine the quality of internet connection and communication and interaction between patients and dental professionals; these can limit the type of consultation

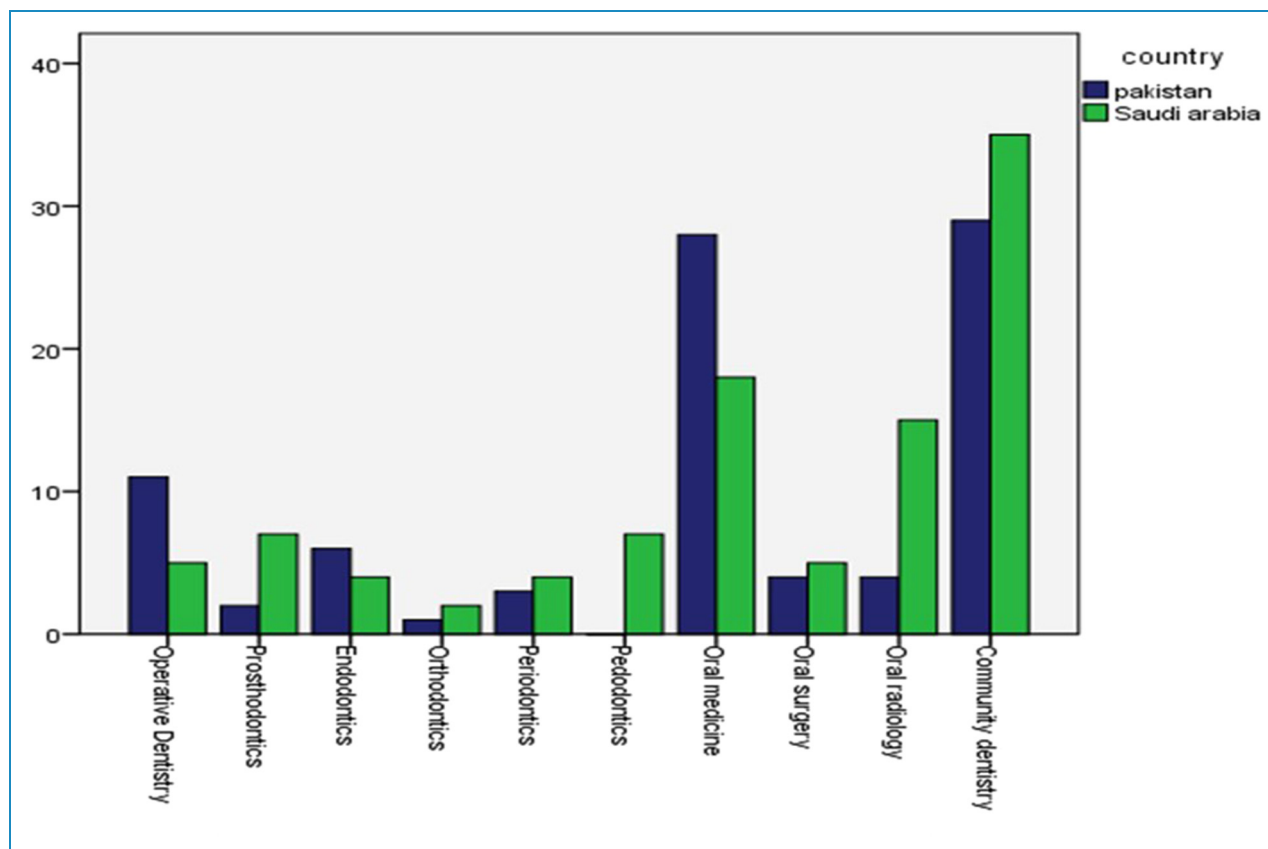


Figure 2. Preferred dental speciality for application of teledentistry.

that can be done.^{6,27} In addition, the issue of information technology literacy rate can be higher among the older generation in the rural area although the younger population quickly adapts to changing trends.²⁸ These challenges are also reflected through the choice of communication methods, more Pakistani dental professionals still preferred in-person communication and half of the participants (50%) use less than one hour of internet daily for practice-related use.

Studies have shown that dental professionals working in the private sector are more accepting of teledentistry as it has better and reduces the workload.^{29,30} However, in this study, a higher number of participants from SA (84.3%) were working in the public sector having fewer working hours (<34 h) but still more willing to adopt teledentistry compared to Pakistani dentists. teledentistry may also have the same effect on government services, thus, initiatives to improve and facilitate the adoption rate of teledentistry should be encouraged. This may include the provision of infrastructures such as computers and servers, applications, training, and incentivize the adaptation of teledentistry.

This study has some limitations. Data collection during the COVID-19 pandemic whereby there are restrictions and precautionary measures still in place in both countries

which can influence the thinking of the dental professionals and maybe they are more inclined towards adopting teledentistry. Generalization and external validity are limited because the samples are not representative of the population. There is no information on whether a participant practices teledentistry or had any experience using it, hence, there is possible bias from participants who do not know its potential. Future studies should explore the issue and expectations of a dental professional regarding the implementation. Studies should also explore patients' perspectives and expectations of the use of teledentistry and evaluate the effectiveness of the current usage.

Conclusion

The results of this study indicated a high awareness and a positive attitude towards teledentistry, and its adaptation in their dental practice in both countries; however, there is further need to improve the knowledge and promote teledentistry in these countries. There are main challenges in integrating teledentistry into the current dental practice are limited infrastructure, set-up cost, and IT literacy which can be overcome by strategic government initiatives, incentives, policies, and programs.

Authors' Note: The raw data used to support the findings of this study are included in this published article and its supplementary information files.


Conflict of interest: The authors no conflicts of interest to declare.


Contributorship: FAC and BA researched literature and conceived the study. MQJ, AAS.AF, and MMJ were involved in protocol development, gaining ethical approval, patient recruitment and data analysis. FAC and MKL wrote the first draft of the manuscript. BA and SM reviewed and edited the final version. All authors approved the final version of the manuscript.

Ethical approval: The ethical review board of the School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University approved this study (Reference no. F.105/21/SOD/ERB).

Funding: The authors received no financial support for the research, authorship, and/or publication of this article.

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