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PERCEPTIONS ON UTILITY AND PRACTICES OF TELE-DENTISTRY AMONG DENTAL PRACTITIONERS IN COVID-19 PANDEMIC

Farah Afroz Khan, FCPS II resident, Operative Dentistry, Sindh Institute of Oral Health Sciences, J.S.M.U
Syed Yawar Ali Abidi, Professor, H.O.D, Operative Dentistry, Sindh Institute of Oral Health Sciences, J.S.M.U
Maham Muneeb Lone, Assistant Professor, Operative Dentistry, Sindh Institute of Oral Health Sciences, J.S.M.U
Samira Adnan, Assistant Professor, Operative Dentistry, Sindh Institute of Oral Health Sciences, J.S.M.U

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ABSTRACT

Objective: To explore the perceptions of tele-dentistry benefits in improving dental practice and patient care among the dental professionals of Karachi in COVID-19 pandemic. **Study Design:** Cross-sectional survey-based study **Setting:** Dental professionals of Karachi. **Period:** Jan 2020 to jun 2020. **Material and Method:** Questionnaire was distributed among three hundred dental professionals through social media. The inclusion criteria included post-graduation residents, general dental practitioners and dental specialists. Dentists with less than 1 year of clinical experience were excluded from the survey. Data was analyzed using SPSS, version 21.0. *p*-value<0.05. **Results:** Responders were 191(57%) general dentists, 84(30%) postgraduate trainees, 8(3%) dental specialists. A large majority 236 (83.4%) of responders were afraid of getting infected even with proper SOPs. 146(76.4%) general dentist, 77(91.7%) postgraduate trainees and 8(100.0%) consultants agreed that tele-dentistry will help in decrease in spreading the infection during this pandemic. **Conclusion:** In the current study, it was observed that majority of participants accepted the idea of tele-dentistry but due to limited availability of technology it is limited in practice. In Australia, dentists denied the usefulness of technology in clinical diagnosis. Various studies conducted worldwide supports the result of our study and agreed upon the fact that tele-dentistry favors adequate consultation in different fields of dentistry.

Correspondence Address
Farah Afroz Khan
Operative Dentistry,
Sindh Institute of Oral Health Sciences, J.S.M.U
farah.afroz@jsmu.edu.pk

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INTRODUCTION

An unusual pneumonia appeared in Wuhan, China, in December 2019. The etiological factor was determined to be a new virus named Coronavirus, which the World Health Organization (WHO) renamed as "Coronavirus disease 2019" (Covid-19). Transmission of SARS-CoV-2 has been found to occur through direct, indirect or close contact with infected people as well as contaminated surfaces and objects, through saliva and respiratory droplets, coughs or sneezes.[1,2] Within a limited span of time, the disease spread rapidly all across China and crossed borders to become a pandemic. The first case of coronavirus was reported in Karachi, Pakistan on February 26, 2020.[3,4] There was rapid spread of the disease across Pakistan from then onwards, and the number of confirmed cases rose to 7,025 in only two months[5,6] raising an alarming situation nationwide. In order to curtail the outbreak of COVID-19, complete lockdown was implemented in Pakistan on 23rd March 2020.[7,8] At the time of composing this article, there are 893,461 confirmed cases of Covid-19 in Pakistan.[9]

The lock down ensuing after rise in the pandemic not only effected the daily routine of life but also brought about a negative impact on regular

dental practices. An article published in New York Times on 15 March 2020 with the title "The Workers Who Face the Greatest Coronavirus Risk" described that the dental health care workers are more exposed and at greater risk of being affected by COVID-19, and therefore makes dentists can be potential carriers of the disease.[10,11]

Centre of Disease Control and Prevention (CDC) presented some guidelines regarding dental procedures and dental visits.[12] Because the recommendations for limited dental procedures to be conducted in order to curtail the rapid spread of the coronavirus, many patients may suffer from dental diseases that can lead to dental or medical emergencies.[13] Tele-medicine" or "E-Health" is a blanket term for the support of long-distance clinical healthcare, health-related education, public health and health administration.[14] It is a novel facet of overall patient care that is rapidly increasing in popularity and value.[15]

It is considered a viable management option for primary care doctors who can assist their patients with the best of their expertise through teleconsultation.[16] Another facet of telemedicine is Tele-dentistry, which combines telecommunications with dentistry, involving the exchange of clinical information and images over far-off distances for dental consultation and treatment planning. It helps patients to get consultation even in a remote or rural areas where specialists may not be available[17] and distance poses a big hurdle to seek medical or dental treatment[18] Conditions that do not require emergency treatment and are not an immediate threat to the well-being of the patient can be effectively managed through tele-dentistry.[10] Tele-dentistry is also the most appropriate option for patients with 'acute' dental problems those who are under quarantine or cannot attend clinic due to Covid-19 illness or are suspected of Covid-19 disease, as well as elderly, immunocom promised and pregnant women.[19]

There is limited literature addressing the perception of using tele-technology for consultation and interacting with patients among dental health care professionals. As the pandemic was an ideal situation for maximum utilization of tele-dentistry, we conducted this survey to explore the perceptions of the advantages of tele-dentistry in improving dental practice and patient care in COVID-19 pandemic, among the dental professionals of Karachi.

MATERIAL AND METHODS

The study was conducted after the approval of the protocol by the Ethical Review Committee (JSMU/IRB/2019/-257) of Jinnah Sindh Medical University, Karachi. This was a cross-sectional survey-based study conducted on 300 dental professionals working in private dental clinics and dental OPDs of different hospitals and institutes of Karachi, Pakistan. The data collection instrument was a questionnaire with items assessing the awareness and application of tele-dentistry by dental professionals practicing in the city of Karachi. A study conducted by-Husain MW et al[20] was considered most similar to our study objectives and therefore, the relevant items were used for data collection in this study. The inclusion criteria included post-graduation residents, general dental practitioners and dental specialists. Dentists with less than one year of clinical experience were excluded from the survey.

The questionnaire was composed in English language on Google Form which consists of three sections. The first section collected demographic and professional information of the respondents. The second section consisted of ten close-ended questions related to the knowledge of participants regarding tele-dentistry. The third section consisted of six questions based on the awareness and attitude of the participants towards tele-dentistry during the pandemic of corona virus.

Initially, the questionnaire was piloted on thirty dentists to evaluate the questionnaire for logical flow, organization, language, syntax, and content. The items were also evaluated by two dental specialists for validity of the content. After the

modifications made to the questionnaire from the feedback received, it was distributed among 300 dental health care professionals who fulfilled the inclusion criteria via email, Whats App and Facebook. Participants were asked to consent to be a part of the study at the start of the survey questionnaire. All data was used anonymously as all identifiable information was kept confidential and was accessible only to the principal investigator.

Data was analyzed by using the Statistical Package for the Social Sciences (SPSS) software program, version 21.0 (IBM, Armonk, New York). Descriptive data included mean (m), standard deviation (SD) and proportions. The differences in responses according to the designation and working place of participants was analyzed using Chi-square test and statistical significance was set at a *p*-value of <0.05.

RESULTS

A total of 300 dental practitioners were invited to participate in this study, out of which 283 professionals gave consent to participate in the study, giving us a response rate of 94.3%. Demographic data showed that the majority of the respondents were females (n=241,85.2%) compared to males (n=42, 14.8%). Demographic

Table 1. Socio-demographic details:

Age		27.02 ± 3.59 years
Gender	Male	241
	Female	42
Qualification	General dentist	191
	Postgraduate trainees	84
	Consultants	8
Practicing place OPD	General dentist	73
	Postgraduate trainees	52
	Consultants	0
Private clinic	General dentist	96
	Postgraduate trainees	4
	Consultants	0
Both	General dentist	22
	Postgraduate trainees	28
	Consultants	8

Table 2. Responses of the participants regarding the perception about Tele-dentistry
***p-value <0.05 was considered as statistically significant.**

Items	Yes	Unsure	No	p-value
1.Patients are afraid of receiving dental treatment in pandemic				
·General dentist	161(84.3%)	10(5.2%)	20(10.5%)	0.04*
·Postgraduate trainee	60(71.4%)	12(14.3%)	12(14.3%)	
·Consultant	6(75.05)	0(0.0%)	2(25.0%)	
·Total	227(80.2%)	22(7.8%)	34(12.0%)	
2.There is a greater risk of getting infected irrespective of maintaining proper SOPs				
·General dentist	161(84.3%)	17(8.9%)	13(6.8%)	0.01*
·Postgraduate trainee	71(84.5%)	4(4.8%)	9(10.7%)	
·Consultant	4(50.0%)	0(0.0%)	4(50.0%)	
·Total	236(83.4%)	21(7.4%)	26(9.2%)	
3.What is your opinion about the usefulness of Tele-dentistry in this pandemic time?				
·General dentist	124(64.9%)	26(13.6%)	41(21.5%)	0.002*
·Postgraduate trainee	74(88.1%)	4(4.8%)	6(7.1%)	
·Consultant	6(75.0%)	0(0.0%)	2(25.0%)	
·Total	204(72.1%)	30(10.6%)	49(17.3%)	
4.Due to the pandemic, the patients would be comfortable to the idea of tele-dentistry				
·General dentist	89(46.6%)	50(26.2%)	52(27.2%)	0.41
·Postgraduate trainee	37(44.0%)	24(28.6%)	23(27.4%)	
·Consultant	4(50.0%)	4(50.0%)	0(0.0%)	
·Total	130(45.9%)	78(27.6%)	75(26.5%)	

details are shown in table 01.

More than half of the responders, 171 (60.4%) did not work during the pandemic. A large majority, 236 (83.4%) of responders were afraid of getting infected even with proper standard operating protocols (SOPs). Responses of the participants regarding the perception and usage of tele-dentistry are shown in table 1 and 2 respectively.

DISCUSSION

This survey focuses on drawing attention towards the lag in advanced oral health services, education and provision. According to the dental practitioners of Karachi, tele-dentistry was found to be a useful tool in this pandemic as patients were anxious of receiving their treatment performed in the dental clinics during the rapidly spreading pandemic. A study conducted in Indonesia also concluded that patientswere

5.Tele-dentistry should be a part of regular dental practice				
·General dentist	103(53.9%)	28(14.7%)	60(31.4%)	0.001*
·Postgraduate trainee	66(78.6%)	8(9.5%)	10(11.9%)	
·Consultant	6(75.0%)	2(25.0%)	0(0.0%)	
·Total	175(61.8%)	38(13.4%)	70(24.7%)	
6.Tele-dentistry will be helpful in educate patients on oral hygiene procedures				
·General dentist	133(69.6%)	28(14.7%)	30(15.7%)	0.00*
·Postgraduate trainee	80(95.2%)	2(2.4%)	2(2.4%)	
·Consultant	8(100%)	0(0.0%)	0(0.0%)	
·Total	221(78.1%)	30(10.6%)	32(11.3%)	
7.Tele-dentistry can play a significant role in prevention of spread of disease in this pandemic				
·General dentist	146(76.4%)	15(7.9%)	30(15.7%)	0.002*
·Postgraduate trainee	77(91.7%)	7(8.3%)	0(0.0%)	
·Consultant	8(100.0%)	0(0.0%)	0(0.0%)	
·Total	231(81.6%)	22(7.8%)	30(10.6%)	
8.Tele-dentistry can play a significant role in prevention of spread of disease in this pandemic				
·General dentist	146(76.4%)	15(7.9%)	30(15.7%)	0.002*
·Postgraduate trainee	77(91.7%)	7(8.3%)	0(0.0%)	
·Consultant	8(100.0%)	0(0.0%)	0(0.0%)	
·Total	231(81.6%)	22(7.8%)	30(10.6%)	
9.Tele-dentistry would be helpful in providing dental consultation to patients having other contagious diseases like Hepatitis or HIV				
·General dentist	145(75.9%)	10(5.2%)	36(18.8%)	0.24
·Postgraduate trainee	60(71.4%)	9(10.7%)	15(17.9%)	
·Consultant	8(100.0%)	0(0.0%)	0(0.0%)	
·Total	213(75.3%)	19(6.7%)	51(18.0%)	
10.Tele-dentistry saves time as compared to routine dental consultation				
·General dentist	89(46.6%)	34(17.8%)	68(35.6%)	0.002*
·Postgraduate trainee	50(59.5%)	2(2.4%)	32(38.1%)	
·Consultant	6(75.0%)	2(25.0%)	0(0.0%)	
·Total	145(51.2%)	38(13.4%)	100(35.3%)	
4.Do you anticipate using Tele-dentistry in the future as a regular part of your dental practice?				
·General dentist	82(42.9%)	46(24.1%)	63(33.0%)	0.00*
·Postgraduate trainee	57(67.9%)	13(15.5%)	14(16.7%)	
·Consultant	8(100.0%)	0(0.0%)	0(0.0%)	
·Total	147(51.9%)	59(20.8%)	77(27.2%)	

hesitant to approach health care services including dental clinics and thus decided to either discontinue their dental treatment or delay it during the COVID-19 pandemic.[21] According to the results of our study, majority of dental health practitioners in Karachi agreed that tele-dentistry plays a significant role in preventing the spread of disease by reducing the contact between patient and dentist in the ongoing pandemic of COVID-19. Another study concluded that tele-dentistry has proved to be beneficial for dentists in providing effective dental consultations and maintaining oral health of their patients in times of this lockdown.[22] Bokolo AJ[23] exemplified the use of WhatsApp in making differential diagnosis of various oral lesion during the pandemic situation. A study stated that various oral lesions can be directly visualized by dental photographs and can be identified and diagnosed through tele-dentistry, thereby reducing close examination and preventing the spread of infection of diseases that spread by close proximity.[24] Similar results were seen in a study where tele-dentistry was shown to close the gap between patients and consultants and was deems a safer option to use to provide health services, while reducing the chances of spread of infection.[25] A study conducted in India also agreed to the results of our study and accepted that tele-dentistry is the best alternative for detection and consultation of dental health even in remote areas.[26] Most of the *practitioners found that there is* no statistical difference existed between the ability of evaluators to identify periapical bone lesions using conventional radiograph interpretation of images by a video teleconferencing system.[27]

Table 3. Response of participants regarding the usage of Tele-dentistry in pandemic
***p-value <0.05 was considered as statistically significant.**

Questions If you used Tele-dentistry,	Yes	No	I didn't use Tele-dentistryp-value	p-value
1.Did you find it helpful in providing dental care in lockdown period?				
·General dentist	121(63.4%)	8(4.2%)	62(32.5%)	0.003*
·Postgraduate trainee	35(41.7%)	4(4.8%)	45(53.6%)	
·Consultant	2(25.0%)	0(0.0%)	6(75.0%)	
·Total	158(55.8%)	12(4.2%)	113(39.9%)	
2.Did you feel any difficulty in explaining or giving dental consultation?				
·General dentist	69(36.1%)	60(31.4%)	62(32.5%)	0.00*
·Postgraduate trainee	24(28.6%)	11(13.1%)	49(58.3%)	
·Consultant	2(25.0%)	0(0.0%)	6(75.0%)	
·Total	95(33.6%)	71(25.1%)	117(41.3%)	
3.Did you feel patients were comfortable with the consultation?				
·General dentist	81(42.4%)	54(28.3%)	56(29.3%)	0.001*
·Postgraduate trainee	21(25.0%)	19(22.6%)	44(52.4%)	
·Consultant	2(25.0%)	0(0.0%)	6(75.0%)	
·Total	104(36.7%)	73(25.8%)	106(37.5%)	

Most of the participants of our study agreed that tele-dentistry can be a better platform in disseminating oral hygiene instructions in order to spread awareness regarding oral health. Deokar R et al[28] had results similar to our study and emphasized thesuccess of tele-dentistry in educating mothers to maintain the oral health needs of their childrenby the help ofamobile-phone application.

Almost half the participants of our study agreed that tele-dentistry provides comfortable consultation while almost a third of them were unsure about the comfort of dental consultation with tele-dentistry**.** In a study conducted in Australia[29] participants were unclear about the usefulness of tele-dentistry in providing a valid diagnosis compared to diagnosis in clinical settings. A literature review published in India[17]

states that after getting all relevant information, patients can receive medicinal treatment of their pain or any non-emergency dental disease without travelling to a specialist. Some minor orthodontic procedures such as rubber ligature displacement or advice regarding irritation due to orthodontic appliances can be provided through video consultation thus limiting the visits of the patients to dental office.[30] Orthodontic management or orthodontic treatment plans can also be prepared using digital patient models.[31] Study on pediatric consultation through tele-dentistry validates quality alternative for fearful children and also helps in reducing their anxiety in the future when they would visit the dentist for clinical examination.[32] In the field of Prosthodontics tele-dentistry also plays a major role, digital impressions can be taken and sent to the laboratory for the prosthesis fabrication without involving patient visits.[33] tele-dentistry has been considered as an acceptable platform for correct diagnosis, thus accepting this technique as an suitable tool for detecting oral diseases.[34] In our study, about 107(56.0%) of general dentist, 62 (73%) postgraduate trainees and 8 (100%) of dental consultants agreed that tele-dentistry is a financial and effective tool for dental consultation. Around 84(44.0%) general dentists and 22(26.2%) postgraduate trainees did not consider tele-dentistry as financially viable. Participants of another study also accepted that it reduces the costs of management and increases the availability of urgent help to all patients[35], thus less intimidating and easier way to connect with dentistry in assessing and diagnosing dental queries.[36]

Our survey showed that in Karachi 28(22.4%) dentists working in dental OPDs and 54(54.0%) dentists working in private dental clinics in covid-19. Furthermore 95(33.6%) dentists found difficulty in using the technology among them 69(36.1%) were general dentist, 24(28.6%) were postgraduate trainee and 2(25.0%) were dental consultant. 62(32.5%) of general dentist, 45(53.6%) of postgraduate trainee and 6(75.0%) of dental consultants didn't use it before. Similar results were showed in a study conducted in Islamabad, Pakistan.[10] Comparison between the availability of technology in Islamabad and Karachi is shown in fig 03.

According to two studies, respondents explained that tele-dentistry require some computer skills to use and these trainings are not available anywhere in Pakistan.[37,38] Other studies also supported the results of our study.[30,31]

Our study is the first in our setting to report the usage of tele dentistry among dental professionals of Karachi in this pandemic. Our study encompassed dentists from different strata, thereby giving us a fair idea of the perception of dentists to the use of tele-dentistry for dental consultations. A few limitations of our study have been identified. Only dental professionals practicing in Karachi were included in this study, therefore the results of the study cannot be generalized to the dental practitioners of the rest of the country. The data collected was based on quantitative responses and further study may be required to find out the possible reasons for all responses.

CONCLUSION

In the current study, it was observed that majority of participants had fair awareness related to tele-dentistry and consider it as a prodigious and useful alternative technology for providing dental care in community specially in COVID-19 pandemic. But there is a limited practice of tele-dentistry due to limited availability and also neglect of conduction of specific training programs on technology used in tele-dentistry.

COFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author's Full Name	Contribution to the paper	Author's Signature
1	Farah Afroz Khan	writing of paper data collection data analysis	
2	Syed Yawar Ali Abidi	Evaluate the data analysis reviewed the final report	
3	Maham Muneeb Lone	Help in data analysis review and co-edited the report	
4	Samira Adnan	Help in data analysis review and co-edited the report