

## ORIGINAL ARTICLE

# Knowledge and Experience of Teledentistry among urban population of Lahore - A Cross-Sectional Study

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## ABSTRACT

**Background:** The specialty of dentistry was being reassembled in its response to Covid-19 pandemic. Teledentistry proved to be a promising way to reach the marginalized population, therefore providing effective substitute of physical dentist-patient interaction with minimal risk of cross infection.

**Aim:** To assess the level of knowledge regarding teledentistry among urban population of Lahore. Moreover it was also focused to analyze the experience and satisfaction of patients regarding the use of virtual dental platforms.

**Methodology:** A cross-sectional study was conducted from April 2022 to June 2022 among 125 general dental patients visiting University Dental Hospital, University of Lahore who have used the virtual dental platforms. The sampling was done with non-probability convenience sampling technique. A self-structured questionnaire with 21 close ended questions was used. Questionnaire was divided into two sections. The first section consisted of 5 questions regarding patient's demographic data, how did they get to know about teledentistry and for who did they used teledentistry platform.

**Results:** A total of 125 patients participated in the study, out of which 38(30.4%) were male and 87(69.6%) were female. A large majority 120(96%) of patients were in the age category of 20-40 years. In reference to education, majority of the participants were graduates 107(85.6%). According to our study 14(11.2%) participants were extremely familiar with the term teledentistry compared to 42(33.6%) who were slightly familiar and only 12(9.6%) were extremely unfamiliar. Regarding familiarity about different platforms of teledentistry (e.g., Marham, Oladoc etc. 30(24%) were moderately familiar 13(10.4%) were extremely familiar and 30(24%) were extremely unfamiliar. About satisfaction, majority 62(49.6%) of people were satisfied with the increasing trend of teledentistry.

**Conclusion:** The majority of the survey participants expressed positive responses towards teledentistry in all domains. This study found high levels of patient satisfaction with virtual consultation. There is a further need to improve the knowledge and promote teledentistry.

**Keywords:** Teledentistry, Telecommunication, Oral healthcare, knowledge, experience

## INTRODUCTION

As the world goes through a generational shift, it is important that we acclimatize to digital dental practices. Also the emerging pandemic in the world necessitates the need for pivoting to a digital model for the entire dental industry. As the dental zone reassemble in its response to the Covid-19 (corona virus disease 2019) pandemic, new ways of reaching the community were identified through new and often innovative approaches, such as administering virtual workflows<sup>1</sup>. In such state of affairs teledentistry has proven itself to be a stroke of luck; it has dodged the traditional face to face dentist-patient interaction by providing effective substitute of virtual consultation with minimal risk of cross infection<sup>2</sup>. It appears to be a promising paradigm since it bridges socioeconomic division and geographic distances using the resources now available in affluent nations<sup>3</sup>. Teledentistry will be crucial for both urban and suburban populations as well as rural areas pertaining to the possible shortage of dentists in future<sup>4</sup>. Some of the most important methods utilized in contemporary dental practice are telediagnosis, teleconsultation, patient's electronic records, and electronic patient referrals<sup>5</sup>. The use of telephone consultations and video consultations allows the clinicians to continue communication with their patients without physical interaction. Furthermore, both healthcare workers and patients can feel safe by reducing non-essential contact and the psychosocial effects of fear and anxiety<sup>6</sup>. To engage in teledentistry, one must meet several prerequisites including data privacy, proper training and internet<sup>5</sup>. There is an inadequate published evidence to manifest knowledge and experience of teledentistry services among population<sup>7</sup>. The literature currently available on care providers' acceptance of teledentistry is sparse<sup>8-12</sup>.

Received on 17-07-2022

Accepted on 26-11-2022

The research conducted in Pakistan on the use of teledentistry among general population is also sparse. Therefore it is difficult to assess the knowledge and awareness regarding teledentistry in Pakistani community. Hence we designed a patient survey to assess the level of knowledge regarding teledentistry among urban population of Lahore and to evaluate experience and satisfaction of patients regarding use of virtual dental platforms. This study will offer a platform to bridge the gap between urban and rural population for provision of quality oral healthcare.

## MATERIALS AND METHOD

A cross sectional study was conducted at Lahore, from April 2022 to June 2022 on patients who have used the virtual dental platform. The data was collected through non probability convenience sampling technique. The research was conducted following the approval of Institutional Ethical Committee, University of Lahore. Informed consent was taken from all participants. Inclusion criteria comprised of people who have used the virtual dental platform while those who never used virtual platform were excluded. A total of 125 structured questionnaires were distributed to participants fulfilling the inclusion criteria.

**Questionnaire:** The questionnaire contained 21 close ended and self-constructed questions. The questionnaire was divided into two sections. The first section comprised of questions regarding (i) demographics (ii) how did they get to know about teledentistry and (iii) for whom they used teledentistry platform. The second section was comprised of sixteen questions with five-point Likert-scale assessing three domains with reference to teledentistry; 1) knowledge of patients 2) experience and 3) Patient's satisfaction. Data entry and analysis was done by using SPSS

version 25. Mean±SD was used to present quantitative data while frequency and percentage was used to present qualitative data. Reliability analysis of the questionnaire revealed Chronbach's alpha value of 0.869. Chi-Square test was used to see association between qualitative variables. P-value ≤ 0.05 was considered statistically significant.

**RESULTS**

**Demographic data and Study participants characteristics:** Out of 125 patients, 38(30.4%) were male and 87(69.6%) were female. This ratio is representative of general gender distribution in our population. A large majority 120(96%) of the patients were in the age category of 20-40 years while 5(4%) were above 40 age. In reference to education, most of the participants were graduates 107(86%) followed by postgraduates 12(9.6%), intermediate 4(3.2%) and secondary education holders 2(1.6%). On inquiring the participants regarding how did they get to know about teledentistry platform, greater proportion of respondents 61(48.8%) believed they got to know through social media, followed by friends/family 52(41.6%), print media 9(7.2%) and lastly broadcast media 3(2.4%). In response to the question for whom did the participants responded that they used virtual platform, nearly half of the participants used it for their children 56(44.8%) followed by those who used it for friends 26(20.8%), relatives 23(18.4%) and elders in the family 12(9.6%).

**Knowledge of patients about tele-dentistry:** Present study showed that 14(11.2%) participants were extremely familiar with the term teledentistry compared to 42(33.6%) who were slightly familiar and only 12(9.6%) were extremely unfamiliar. In terms of familiarity with various platforms relevant to teledental care, results revealed that number of respondents who were moderately familiar 30(24%) with them was exactly the same to those who were completely unfamiliar 30(24%) (Fig.1). Striking statistically significant association was seen between familiarity of teledentistry with education (P-value=0.000) (Table 2).

**Experience:** Concerning the ability to subscribe and book appointment on virtual platform, lesser number of participants 30(24%) responded they can do so occasionally while few participants 14(11.2%) answered they are unable to subscribe or book an appointment. Regarding the ability of expression during virtual consultation, a considerable number of respondents 44(35.2%) responded they could do so to a limited extent and a fewer number of participants 19(15.2%) responded they are not at all able to express. When asked if participants could hear and talk to clinician uninterrupted, a greater number of participants 46(36.8%) stated they could do it sometimes and only 13(10.4%) expressed that they were able to do it once in a while. Related to feasibility of virtual platforms in some emergency situations, maximum people 49(39.2%) acknowledged its feasibility sometimes and 6%(n=7.5) responded it is not at all feasible. When asked about the reduction in stress 24(19.2%) of the participants said it almost always helps to reduce stress and lesser number of people 14(11.2%) said never. When questioned, did the virtual clinic meet the needs, 48(38.4%) agreed, 6(4.8%) strongly agreed, and 5(4%) disagreed. About user friendliness of the virtual platforms, a bulk of participants 44(35.2%) believed that virtual platform is somewhat user friendly while very few participants (n=4.3, 2%) were of the opinion that this platform is not at all user friendly. Almost half number of participants (n=51, 40.8%) were of the opinion that it saved some time.

About expense reduction, fewer respondents 29(23.3%) were of the opinion that expense is reduced very much in virtual clinic, however a larger number of participants 50(40%) responded that expenses are reduced to some extent. On inquiring about cost effectiveness of virtual clinic, there was preponderance of respondents 46(36.8%) who were of the opinion that it is somewhat cost effective and very few participants 3(2.4%) believed that virtual clinic is not at all economical. When

questioned if teledentistry minimized the spread of covid-19, nearly half of the respondents 61(48.8%) agreed to the statement and a lesser number of participants 3(2.4%) disagreed (Table 1).

Statistically significant relationship was appreciated concerning the ability to express effectively during virtual consultation with gender (P-value=0.013) and with level of education (P-value=0.015). Remarkable statistical association was seen with reference to the ability to hear and talk to clinician uninterrupted in terms of technical grounds with gender (P-value=0.018) and with level of education (P-value=0.023). Significant statistical association was noticed regarding feasibility of teledentistry in emergency situation with level of education (P-value=0.028). Statistically significant relationship was observed between reduction of anxiety in virtual consultation and gender (P-value=0.020) and with level of education (P-value=0.039). Prominent association was seen concerning time saving in virtual clinic with gender (P-value=0.051) (Table 2).

**Satisfaction:** Nearly half of the participants 62(49.6%) were satisfied with the increasing trend of teledentistry. About preference of virtual clinic over in-person consultation in future, almost half of the participants 58(46.4%) believed they would prefer it sometimes while only 4(3.2%) responded that they would never prefer this practice. In response to peer recommendation of virtual platform, a greater percentage of respondents 52(41.6%) were hesitant and proclaimed that they would somewhat encourage others to use virtual clinic whereas 41(32.8%) affirmed that they will definitely recommend it to other people while only 3(2.4%) cleared up that they will not at all recommend teledental care to other people in future (Fig.2).

Significant statistical association was observed regarding recommendation of virtual platform to other people with age (P-value=0.022) and with level of education (P-value=0.009). (Table 2)

Figure 1: Level of participant's familiarity towards tele-dentistry and its various platforms

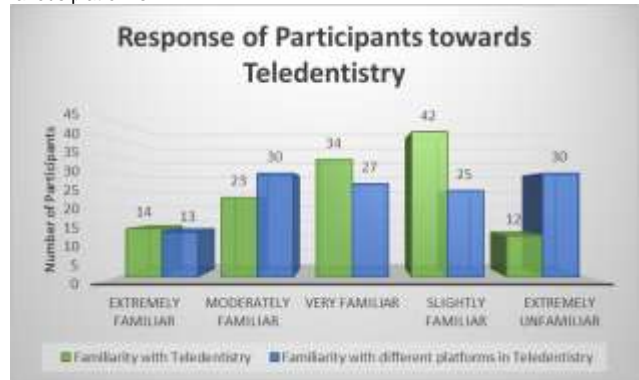


Figure 2: Participant's satisfaction level with the trend of tele-dentistry

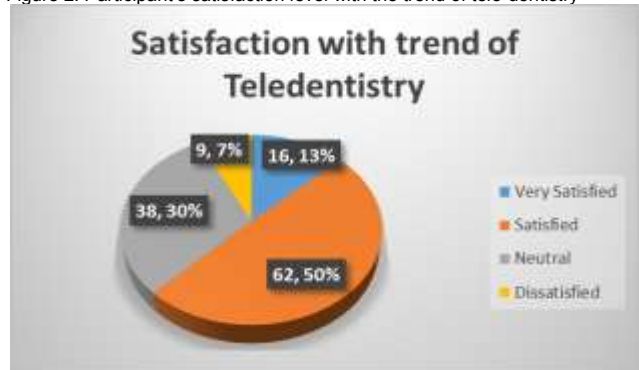


Table 1: Frequency and percentage distribution of participant's knowledge and attitude towards teledentistry

Questions	Responses n (%)				
	Almost Always	Sometimes	Once in a while	Rarely	Never
1. Were you able to subscribe and book an appointment on virtual clinic platform?	21 (16.8%)	30 (24%)	29 (23.2%)	14 (11.2%)	31 (24.8%)
2. Were you able to express yourself effectively during virtual consultation?	<b>Very Much</b>	<b>Somewhat</b>	<b>Undecided</b>	<b>Not really</b>	<b>Not at all</b>
	21 (16.8%)	44 (35.2%)	21 (16.8%)	20 (16%)	19 (15.2%)
3. Could you hear and talk to clinician uninterrupted in terms of technicals?	<b>Almost Always</b>	<b>Some times</b>	<b>Once in a while</b>	<b>Rarely</b>	<b>Never</b>
	19 (15.2%)	46 (36.8%)	13 (10.4%)	24 (19.2%)	23 (18.4%)
4. Do you think that teledentistry is feasible in emergency situations specifically related to dental pain?	<b>Very Much</b>	<b>Somewhat</b>	<b>Undecided</b>	<b>Not really</b>	<b>Not at all</b>
	31 (24.8%)	49 (39.2%)	21 (16.8%)	17 (13.6%)	7 (5.6%)
5. Did virtual clinic help to reduce anxiety which otherwise is experienced with physical environment of dental clinic?	<b>Almost Always</b>	<b>Sometimes</b>	<b>Once in a while</b>	<b>Rarely</b>	<b>Never</b>
	24 (19.2%)	48 (39.4%)	18 (14.4%)	21 (16.8%)	14 (11.2%)
6. Did virtual clinic meet your needs?	<b>Strongly Agree</b>	<b>Agree</b>	<b>neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
	6 (4.8%)	48 (38.4%)	59 (47.2%)	7 (5.6%)	5 (4%)
7. Was the tele-dentistry platform user friendly?	<b>Very Much</b>	<b>Some what</b>	<b>Undecided</b>	<b>Not Really</b>	<b>Not at all</b>
	27(21.6%)	44 (35.2%)	39 (31.2%)	11 (8.8%)	4 (3.2%)
10. Did virtual clinic save your time?	33 (26.4%)	51 (40.8%)	28 (22.4%)	11 (8.8%)	2 (3.2%)
8. Did virtual clinic save your expenses which otherwise are implicated in case of physical visits to dental clinic?	29 (23.2%)	50 (40%)	28 (22.4%)	14 (11.2%)	4 (3.2%)
9. Did you find virtual clinic economical as compared to physical one?	24 (19.2%)	46 (#6.8%)	36 (28.8%)	16 (12.8%)	3 (2.4%)
10. Do you agree that teledentistry minimized the spread of covid 19?	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
	23 (18.4%)	61 (48.8%)	38 (30.4%)	3 (2.4%)	0 (0%)

Table 2: Association of Teledentistry with age, gender and education

Questions	Gender	Age	Education
1. Familiarity with teledentistry	0.622	0.8585	0.000*
2. Familiarity with different platforms related to teledentistry (eg, Marham,Oladoc)	0.269	0.494	0.594
3. Ability to subscribe and book an appointment on virtual clinic platform	0.149	0.162	0.078
4. Ability to express effectively during virtual consultation	0.013*	0.422	0.015*
5. Ability to hear and talk to clinician uninterrupted on technical grounds	0.018*	0.815	0.023*
6. Feasibility of tete dentistry in emergency situations specifically related to dental pain	0.732	0.617	0.028*
7. Reduction in anxiety through virtual clinic which otherwise is experienced with physical environment of dental clinic	0.020*	0.670	0.039*
8. Fulfillment of needs by virtual clinic	0.157	0.126	0.650
9. User friendliness of tele dentistry platform	0.182	0.699	0.199
10. Time saving by virtual clinic	0.051*	0.854	0.794
11. Expense saving by virtual clinic which otherwise are implicated in case of physical visits to dental clinic?	0.628	0.142	0.092
12. Cost effectiveness of virtual clinic	0.467	0.627	0.532
13. Minimization of cross infection by teledentistry	0.407	0.511	0.904
14. Satisfaction with increasing trend of teledentistry	0.862	0.542	0.582
15. Preference of virtual consultation over in-person consultation in future	0.246	0.185	0.215
16. Recommending virtual clinic to other people	0.614	0.022*	0.009*

\*p-value < 0.05 is considered statistically significant

## DISCUSSION

Tele-dentistry is an innovative method of dental service delivery that can aid triaging of patients as well as keeping track of follow-up patients<sup>13</sup>. Tele-health programs overcome physical barriers to provide patients and caregivers access to convenient medical care. Healthcare systems with telehealth platform assert to sustain the continuity of outpatient care during the pandemic outbreaks. Additionally, telehealth is beneficial for patient care, particularly in balancing the availability of clinical services with the increase in demand across physical or geographic boundaries<sup>14,15</sup>.

The goal of the current study was to assess Lahore's urban population's level of knowledge about teledentistry. Additionally, it was intended to examine patients' opinions regarding their experience and satisfaction with the use of virtual dental platforms.

Considering the demographic information, most of the participants in the present study were also female corresponding to the finding of Menhadji et al where more than half of the participants were also female<sup>16</sup>. This study revealed that majority of the participants 42(33.6%) were slightly familiar with the teledentistry. However those who used the virtual platforms showed good experience. This finding was comparable to the study of Rahman et al. with total sample size of 52, a sizable majority of participants 47(91%) affirmed they could comprehend and utilize the system<sup>1</sup>. Concerning the ability to subscribe and book an appointment on virtual platform maximum participants 30(24%) in subject study were able to do it sometimes while 21(16.8%) responded they do it almost always. In response to the question regarding the ability to express themselves effectively during virtual consultation, less proportion 21(16.8%) was very much able to express themselves while a fairly large number of participants 44(35.2%) indicated that they could effectively communicate to some extent during virtual consultation. This finding is quite similar

to the result of the study conducted by Zhu C et al where large number of patients 170(91%) responded that they were able to communicate with their health care providers as effectively as a clinic visit<sup>17</sup>.

In response to the question whether the participants could hear and talk to clinician uninterrupted on technical grounds, nearly half of the participants 46(36.8%) settled on sometimes which was contrary to the findings of P. Menhadji et al where a bulk of respondents 176(70.7%) strongly agreed that the video consultation ran smoothly without any technical interruption<sup>16</sup>. On inquiring about reduction in anxiety through virtual clinic, a higher proportion 48(39.4%) of the participants in subject study responded that it does so occasionally, and 24(19.2%) asserted that virtual clinic almost always help reducing anxiety. These findings were in contrast to the result of P. Menhadji et al, where bulk of the patients 183(73.6%) revealed that they rarely feel any anxiety towards video consultations they had a prior experience of video consultation<sup>16</sup>. In this study, large number of the patients 48(38.4%) agreed to that fact that virtual clinic met their needs, similar to the findings of Rahman et al where a sizeable majority 50(97%) of the study participants felt that virtual clinic satisfied their demands<sup>1</sup>.

Nearly half of the respondents 51(41%) in the subject study proclaimed that virtual clinic saved their time which is contrary to the result of Rahman et al where all 52 study participants agreed or strongly agreed with statements indicating that the teledentistry system saves time on travelling, car parking and in waiting room<sup>1</sup>. According to the present results, around 50(40%) of the respondents believed that virtual clinic is somewhat cost effective than visiting a dental clinic in person which is similar to the finding of Willard et al where 50% of the respondents reported that telemedicine visits prevented an additional physical visit to a clinician<sup>18</sup>. The risk of COVID-19 transmission is minimized by the

fact that teledentistry can reduce the need and in-person attendance at care facilities. This verity is endorsed by current study as almost half of the participants 61(49%) agreed to the statement that teledentistry minimized the spread of covid-19. Similar results were seen in study performed by Zhu c et al where 45% of the participants stated that the most common factor in choosing a telemedicine appointment over a clinic was avoiding the risk of COVID-19 transmission<sup>17</sup>. Half of the participants 62((50%) in the current study felt satisfied after experiencing virtual clinic which is nearly similar to the finding of P. Menhadji et al where 139(55.8%) of respondents were extremely satisfied with the service of videoconsultation<sup>(16)</sup>. However this finding was in contrast to the result of Rahman et al where a major bulk (97%) of the participants felt satisfied with the virtual clinic and was willing to use it again for consultations or follow-up appointments<sup>(1)</sup>. Larger number of respondents 58(46.4%) in the present study stated that they would sometimes prefer video consultation over in person consultation in future which is in contrast to the findings of Surenson et al and Dusseja et al where 60% and 80% of the participants would consider using teledentistry in future respectively as they believed it is a reliable method for dental consultation in inconvenient situations<sup>19,20</sup>. In response to recommending the virtual platform to others, almost 52(41.6%) of the participants in the subject study stated they would recommend it sometimes and 41(32.8%) stated that they would definitely recommend it to others which is contrary to the result of P. Menhadji et al where a larger number of participants 197(79.3%) on the basis of their experience and level of satisfaction with virtual platform stated that they would recommend the video consultation to others<sup>16</sup>.

Tele-dentistry is a relatively a new concept, it depends on technology like smart phones and media, which the educated group seems to utilize more frequently, whereas older people, people coming from low-income families, lower level of literacy and people with special needs may have trouble getting access because of these factors<sup>21,22</sup>. The use of this technology can also facilitate patients to seek early access to specialist health care, minimize time of work and reduce travel over variable factors such as long distances to receive consultations, cost as well as risk of cross infection<sup>23,24</sup>.

## CONCLUSION

The findings of the present study significantly revealed high levels of patient satisfaction with virtual consultation. Large number of the participants expressed positive responses towards teledentistry in all domains. However there is a further need to improve the knowledge regarding teledentistry. This can be achieved by conducting awareness campaigns and programs. If properly tackled, teledentistry could lead to the betterment of oral health care.

**Conflict of interest:** Nothing to declare

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