



Teledentistry Awareness among Dental professionals in Dental Colleges of Haryana- A Cross Sectional Survey

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ABSTRACT

COVID 19 has led to greater unrest across all health care setups and dental care too has been extensively disturbed. Telecommunication has seen immense utility in healthcare setups like medical and dental setups with the pertinent scope of convenient, crisp and secure ways to deliver positive health information. To determine Knowledge, Attitude, Practice and barriers towards teledentistry among dental professionals working in different dental colleges of Haryana. A cross-sectional descriptive survey was conducted among postgraduate students and faculty members in dental colleges. Out of 10 dental colleges in the state of Haryana, three dental colleges were selected using Simple random sampling method. Data was collected through an online survey method using questionnaire. A self-administered 24-item questionnaire in Google document format was developed to assess their knowledge, attitude, practice and barriers towards teledentistry. This survey was carried out for two months from August to September 2021. The responses were subjected to statistical analysis using the Chi-square, ANOVA test and the level of significance was kept at $p < 0.05$. A total of 152 dental professionals participated in this questionnaire study, out of which 63.8% were females. Majority of dentists 102(67.1 percentage) felt that teledentistry is useful for imparting oral care education and upskilling oral professionals over conventional methods. On the basis of duration of work experience among dental professionals, mean score of their knowledge, attitude, practice 24.8, 23.2 and 24.2 respectively towards teledentistry came out to be statistically significant. Majority of oral health care professionals are informed and possess a positive attitude towards the concepts of teledentistry. Thus, in this unique time of crisis this component of digital dentistry needs to be integrated into the routine dental practice.

Key Words: Attitude, Knowledge, Dental professionals, Practice, Teledentistry.

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INTRODUCTION

Cook in 1997 defined "Teledentistry" as the practice of using video-conferencing technologies to diagnose and provide advice about treatment over a distance [1]. Present-day era of Innovations and technological developments have caused various changes in every sector of life. Health Care Science has not been far behind, and new advancements have seen medicine grow with newer delivery methods being used for medical services [2]. Teledentistry is a field that synergizes telecommunication technology with dental care [3]. Teledentistry combines telecommunication and the profession of dentistry involving the sharing of clinical knowledge and inferences over far away locations. These programs are focusing only on basic advice of referral to the dental setup. Others do ensure some levels of learning, continuing education. An important area yet to be explored is of regulation of manpower or oral health care of the needy [4].

Teledentistry has been around the corner in India but the real application has been limited. In COVID times, teledentistry can play an important role in disseminating oral health education, aid in screening, provide nutritional counseling and provide home care oral health solutions. Applications of teledentistry can be broadly classified as teletraining, teleeducation, tele-diagnosis and teleconsultation [5]. Constant upgradation of technology in today's world has seen teledentistry too evolving to support and strengthen the current practice of oral health care. It has Derived from the science of tele-health, which has shown substantial effect on the healthcare profession. It can have wider applicability to the masses where still utilization of dental care is poor

Teledentistry can play a vital role in different specialties of dentistry. Teledentistry being an extension of Tele medicine is a useful platform for the patient and the dentist. Teledentistry has various further

applications like Teledentistry, Teleradiology, Telepathology, Teleoral steps and Teleorthodontics. Teledentistry, an upcoming area in the profession of dentistry, utilizes data-driven engagements and targeted communication modules to convey good oral health to the general population. Teledentistry utilizes modern telecommunications to allow offsite oral health care professionals belonging to different specialties to assist in providing the necessary care. These engagements could be direct [6] Teledentistry in today's world is considered a realistic and potentially cost-beneficial method. It helps overcome time zone barriers, and thereby improving access to healthcare services [7].

Telemedicine program was launched in 1994 by the United States military [8]. Telemedicine and allied information systems can cater to the health needs by connecting through an analog system and seeking treatment advice in a short time. It holds the answers to issues related to access, finances, efficiency, and standard of medical care [9]. Telehealth strives to allow the application of all avenues of the Science of Medicine and especially helps in overcoming barriers that cannot be taken care of without huge finances [10]

Community people are delivered health-care services through different information technologies in the form of teledentistry, a budding arena of dentistry. It can be useful for communicating among health professionals and even educating oral health care manpower. It helps impart basic awareness to people about oral health care, thus bettering their health-care understanding [11] It makes a significant contribution to bridging the gaps controlling the success of oral healthcare. Hence, the present study was conducted with the aim to determine teledentistry awareness among Dental professionals in dental colleges of Haryana.

MATERIAL AND METHODS

Design of the Study

A cross-sectional descriptive survey was organized amongst postgraduate students and faculty members in dental colleges of Haryana. There are 10 dental colleges in the state of Haryana, out of which government college is one and others are private dental colleges (nine) in the places mentioned in figure 1. Among all of them, 3 dental colleges were selected using Simple random sampling method.

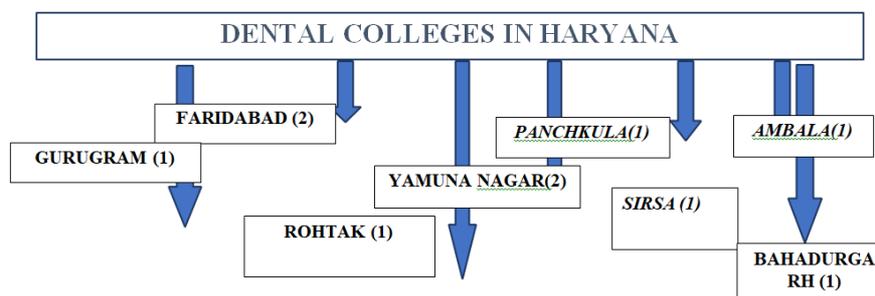


Figure 1 : Dental colleges in Haryana

Sampling Method

There are 10 dental colleges in the state of Haryana, out of which government college is one and others are private dental colleges (nine) in the places mentioned in figure 1.¹² Among all of them, 3 dental colleges were selected using Simple random sampling method.

Study Questionnaire

A self-administered 32 item questionnaire is divided into two sections, to collect the information as follows:

Section A comprises demographic details of the respondents – gender, age, working experience, usage of internet (hrs).

Section B includes 24 questions focusing on their knowledge, Attitude, Practice and barrier towards teledentistry.

Data was collected through an online survey method using questionnaire in the English language made in Google document format. Experts from the Department of Public Health Dentistry verified the Validity of the questionnaire. Reliability of the questionnaire was assessed by a pilot study.

Google forms were made in such a way that each participant was permitted to submit one response within three week from the time of link of assessment forwarded to them. A period of 3 weeks was given to all the participants from the time of link of assessment forwarded to them and reminder was sent in between if required.

Ethical Clearance

Within the Google format all the participants were informed regarding the purpose of study and consent required to be obtained. The survey protocol was presented and approved by the Institutional Ethical Committee.

Statistical Analysis

The recorded data entered in appropriate computer software was analysed for Descriptive and inferential statistics which included computation of percentage and means by using the Statistical Package of Social Sciences (SPSS) version 22 software (SPSS Inc., Chicago, IL, USA). To compare the mean of different educational qualification groups, a One-Way ANOVA test was used. $P < 0.05$ was considered statistically significant. SD: Standard Deviation; t test, anova test; * $p \leq 0.05$, (Statistically significant)

RESULTS

Table 1 shows the demographic details of the study population. A total of 152 dental professionals participated in the study. Among respondents, 55(36.2%), 97(63.8%) were males and females respectively. Out of all the participants, 20-30 years of age group were 98 (64.2%) whereas 31- 40 years of age group were 48(31.5%). Majority of the participants 69[45.4%] were postgraduate students; 57 (37.5%) were faculty; and 26 (17.1%) were Intern. 103 participants (67.8%) had lower than 5 years of work experience. Majority of them were from the department of public health dentistry (28.9%). Majority 75(49.4%) of the participants use the internet 3-6 hours per day.

Table 1: Demography of study group

Variable	Frequency	%
Gender		
Males	55	36.2%
Females	97	63.8 %
Age		
20-30 Years	98	64.5%
31-40 Years	48	31.5%
41-50 Years	3	2%
>50 Years	3	2%
Designation		
PG (Post Graduate Student)	69	45.4%
Faculty	57	37.5%
Intern	26	17.1%
Years of Experience		
<5 years	103	67.8%
5-10 years	45	29.6%
>10 years	4	2.6%
Department		
Public Health Dentistry	44	28.9%
Oral Medicine & Radiology	17	11.2%
Perio	16	10.5%
Prosthodontics	11	7.2%
Oral Surgery	10	6.6%
Cons	19	12.5%
Pedo	16	10.5%
OP	11	7.3%
Ortho	8	5.3%
Frequency of Internet usage/Day (in Hours)		
<3 hours	56	36.8%
3-6 hours	75	49.4%
>6 hours	21	13.8%

Table 2 shows Knowledge, Attitude, Practice and Barrier towards Tele dentistry among study participants. It was observed that the majority of the Participants felt teledentistry could be used in all branches of dentistry and also the majority of the participants agreed that this science could be used for oral health education and upskilling health care professionals over appropriate computer analogs. i.e. majority of the participants had good awareness about teledentistry. Majority i.e. 92(60.5%) of the participants agreed that videoconference (a medium of teledentistry) could be used to educate dental students effectively. Majority i.e. 114(75%) of the participants agreed that teledentistry includes usage of

smartphone applications for patient consultation. Majority i.e. 97(63.8%) of the participants felt there is Low literacy level among the general population to comply with teledentistry.

Table 2: Knowledge, Attitude, Practice and Barrier towards Tele dentistry among study participants (n=152)

Questions	Participants' n (%)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
KNOWLEDGE					
1. Do you feel teledentistry is useful in all branches of dentistry?	46 (30.3)	76 (50.0)	26 (17.1)	4 (2.6)	0
2. Do you feel current dental practices could be accomplished through teledentistry?	36 (23.7)	71 (46.7)	34 (22.4)	11(7.2)	0
3. Can oral health care access be improved by teledentistry?	42 (27.6)	87 (57.2)	19 (12.5)	4 (2.6)	0
4. Do you feel teledentistry is useful for dental education and upskilling health care workers over the internet?	28 (18.4)	102 (67.1)	18 (11.8)	3 (2.0)	1 (0.7)
5. Do you feel teledentistry is useful in diagnosis and management of oral diseases?	24 (15.8)	68 (44.7)	48 (31.6)	9 (5.9)	3 (2.0)
6. Do you feel teledentistry would help in consulting an expert about patient's specific problem effectively.	37 (24.3)	89 (58.6)	23 (15.1)	2 (1.3)	1 (0.7)
ATTITUDE					
7. Do you feel you can monitor the patient's condition.	24 (15.8)	82 (53.9)	35 (23.0)	11 (7.2)	0
8. Do you feel teledentistry could be a way of oral health care delivery?	14 (9.2)	67 (44.1)	50 (32.9)	20 (13.2)	1 (0.7)
9. Do you feel teledentistry could makes dental examination easier?	17 (11.2)	81 (53.3)	25 (16.4)	27 (17.8)	2 (1.3)
10. Do you feel teledentistry could reduce the cost of dental services?	23 (15.1)	61 (40.1)	51 (33.6)	13 (8.6)	4 (2.6)
11. Do you feel videoconference (a medium of teledentistry) could be used to educate dental students effectively?	25 (16.4)	92 (60.5)	23 (15.1)	10 (6.6)	2 (1.3)
12. Do you feel teledentistry could improve accessibility of the specialists to outlying communities for their oral needs.	38 (25.0)	76 (50.0)	31 (20.4)	3 (2.0)	4 (2.6)
Practice					
13. Do you feel patients would provide consent to share their dental reports through teledentistry to another dentist?	31 (20.4)	80 (52.6)	38 (25.0)	2 (1.3)	1 (0.7)
14. Do you feel usage of teledentistry would support an initiative for Vision 2030 on national level?	28 (18.4)	77 (50.7)	45 (29.6)	2 (1.3)	0
15. Does teledentistry includes usage of smartphone application for patient consultation?	19 (12.5)	114 (75.0)	15 (9.9)	3 (2.0)	1 (0.7)
16. Do you feel teledentistry is easy to use ?	18 (11.8)	77 (50.7)	43 (28.3)	14 (9.2)	0
17. Do you feel hands-on training is required in using teledentistry?	26 (17.1)	91 (59.9)	27 (17.8)	8 (5.3)	0
18. Do you feel a lecture/course is required to learn about teledentistry?	29 (19.1)	95 (62.5)	24 (15.8)	3 (2.0)	1 (0.7)
Barrier					
19. Do you feel patient compliance and satisfaction require dentist's physical presence?	29 (19.1)	68 (44.7)	49 (32.2)	6 (3.9)	0
20. Do you feel there is any fear of violating patient privacy by using teledentistry?	25 (16.4)	61 (40.1)	42 (27.6)	24 (15.8)	0
21. Do you feel there is Low literacy level among general population to comply for teledentistry?	26 (17.1)	97 (63.8)	23 (15.1)	5 (3.3)	1 (0.7)
22. Do you feel there is High cost involved in teledentistry related infrastructure?	17 (11.2)	69 (45.4)	52 (34.2)	14 (9.2)	0
23. Do you feel time is required to upskill and apply the technology amongst oral care personnel	18 (11.8)	75 (49.3)	41 (27.0)	15 (9.9)	3 (2.0)
24. Do you feel there are any chances Inappropriate charges from patients to justify teledentistry?	19 (12.5)	58 (38.2)	53 (34.9)	19 (12.5)	3 (2.0)

Table 3 shows Mean values of Knowledge, Attitude, Practice and Barrier towards tele dentistry based on demographic variables. The mean±SD for knowledge, Attitude and Practice was found to be high in 5-10 years of working experience and results were found to be statistically significant. The mean±SD for Attitude was found to be high among less than 3 hours of internet usage per day and results were found to be statistically significant (0.02). Table 4 shows correlation analysis of knowledge attitude and practice towards teledentistry was found to be statistically significant.

Table 3: Mean values of Knowledge, Attitude, Practice and Barrier towards tele dentistry based on demographic variables

Demographic variable		Knowledge Mean (SD)	Attitude Mean (SD)	Practice Mean (SD)	Barrier Mean (SD)
Gender	Male	23.9 ± 3.8	22.7 ± 3.6	23.5 ± 2.7	22.0 ± 2.9
	Female	23.6 ± 2.9	21.8 ± 3.1	23.1 ± 2.3	21.8 ± 2.9
	p value	0.6	0.09	0.3	0.7
Designation	PG Student	23.8 ± 3.4	22.1 ± 3.4	22.9 ± 2.5	21.4 ± 3.4
	Faculty	23.6 ± 3.2	21.9 ± 3.5	23.1 ± 2.6	22.2 ± 2.4
	Interns	23.9 ± 2.6	22.7 ± 2.3	24.2 ± 1.5	22.3 ± 2.3
	P value	0.9	0.5	0.06	0.2
Work Experience	<5 years	23.3 ± 3.5	21.7 ± 3.5	22.8 ± 2.6	21.7 ± 3.0
	5-10 years	24.8 ± 2.1	23.2 ± 2.7	24.2 ± 1.8	22.0 ± 2.6
	>10 years	22.5 ± 2.3	21.2 ± 2.0	22.5 ± 1.2	24.0 ± 3.5
	p value	0.01*	0.03*	0.003*	0.3
Department	PHD	24.2 ± 3.0	22.4 ± 3.9	23.5 ± 2.7	22.1 ± 3.3
	OMR	24.8 ± 1.6	22.7 ± 2.5	23.8 ± 1.3	21.7 ± 1.8
	Perio	23.9 ± 3.2	22.4 ± 2.4	23.8 ± 1.9	21.3 ± 2.1
	Prosth	23.6 ± 2.9	23.0 ± 2.4	22.8 ± 2.8	22.2 ± 3.2
	OS	21.9 ± 5.8	20.2 ± 3.9	21.9 ± 3.3	22.4 ± 3.5
	Cons	24.6 ± 3.9	22.5 ± 3.2	23.5 ± 2.8	22.0 ± 2.8
	Pedo	23.0 ± 2.5	21.7 ± 3.3	22.5 ± 1.9	21.1 ± 2.9
	OP	22.5 ± 2.9	20.8 ± 3.2	23.0 ± 2.2	22.6 ± 3.2
	Ortho	22.0 ± 1.8	21.5 ± 3.5	22.3 ± 1.5	21.3 ± 3.4
	P value	0.1	0.4	0.3	0.9
Frequency of Internet usage/Day (in Hours)	<3 hours	24.2 ± 3.2	22.9 ± 3.1	22.9 ± 3.1	23.6 ± 2.7
	3-6 hours	23.7 ± 2.8	21.9 ± 2.9	23.1 ± 2.1	22.0 ± 3.0
	>6 hours	22.4 ± 4.3	20.6 ± 4.6	22.4 ± 2.6	20.9 ± 3.1
	P value	0.09	0.02*	0.1	0.1

SD: Standard Deviation; t test, anova test; *p ≤ 0.05, (Statistically significant)

Table 4: Correlation Analysis of Knowledge, Attitude and Behaviour among study participants

Variable	Knowledge		Attitude		Practice		Barrier	
	r	p value	r	p value	r	p value	r	p value
Knowledge	-	-	-	-	-	-	-	-
Attitude	0.534	0.001*	-	-	-	-	-	-
Practice	0.676	0.001*	0.599	0.001*	-	-	-	-
Barrier	0.172	0.03*	0.047	0.5	0.328	0.001	-	-

Pearson correlation; *p ≤ 0.05 (Statistically significant)

DISCUSSION

Teledentistry is the science which is being used in oral health care to help assist faster information transfer and awareness to people seeking oral care. It can help the dental workforce to increase and widen their scope of dental practice and cater to oral health care needs of the people especially in COVID 19 or similar pandemic times. Constant improvisations in the field of technology have been a boon to the field of Health Care too. In the dental profession interactions are ensued between dentist & patient, dentist & specialist, the dentist & students. These all can be actively achieved by the Science of Teledentistry. Engagements may be ensued by the dentists with data research centers and also for continuing dental education programs. The present study determined teledentistry awareness among Dental professionals in dental colleges of Haryana.

In the present study, out of 152 dental professionals, 55(36.2%) were males and 97(63.8%) were females which is in contrast with the study population in a study by Al-Khalifa [13] in which 56.3% were males

and 43.7% were females. Present study showed that 76(50%) of dental professionals aligned to the fact that teledentistry is applicable to all branches of dentistry. This result was similar to studies done by Sanjeev and Shushantin which 92 (89.3%) agreed to teledentistry's application to nine specialist branches of dentistry[14].

Seventy three percent (73%) of students considered teledentistry to be a good tool for health education amongst masses. Further, 20% of students believed that it reduces the costs & control finances in dental practice. Similar results were not seen in studies conducted by and Ata and Ozkan[15]. In the present study, 69(45.4%) Post graduate students, Faculty 57(37.5%) and Intern 26(17.1%) dental professionals were able to monitor patient's conditions well by using teledentistry this study was similar to previous reports in which 53(71.6%) post graduate students and 21(28.4%) dental professionals were able to monitor patient's conditions well by using teledentistry. In the present study 102(67.1%) dental professionals agreed to teledentistry being a good platform for dental education and for training. about 61(40.1%) of dental professional considered teledentistry for reducing financial expenses related to dental practice. This study was administered over academic institutions with specific age group. This group forms the future Dental professionals and should look forward to adapt teledentistry in their daily routine. In especially people who do not have easy access to oral care, it will go a long way in answering their needs.

Dentists with greater than 10 years of work experience possessed poor knowledge in comparison to those with less than 5 years and 5-10 years of work experience. These results was similar to results achieved by Nagarajappa et al[16] and in the present study the result showed that very few of participants 4 (2.6%) had knowledge among years of work experience more than 10 years. Present study showed that 87(57.2%) of dental professionals felt accessibility to oral health care could be improved by teledentistry this result was contrast with another study done by Boringi *et al* [17].The present study showed that most of the dental students 77(50.7%) felt that teledentistry is easy to use this result was contrast with a study done by Sen [18] in which less number (23.7%) of the participants felt that teledentistry is easy to use.

LIMITATION

The study was administered to students of academic institutions and hospital who are already in a learning environment, hence the results of the study cannot be generalized to the whole

CONCLUSION

Teledentistry is an upcoming branch with futuristic potentials. Its usage and applicability need to be implemented through various policies and implementation needs to be ensured by the whole oral health care professionals' community. The engagement of the science of dentistry with the science of technology can go a long way in reducing the burden of dental problems in our country.

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REFERENCES

1. Ramesh N, Pankaj A, Archana J S, Kailash A, Mridula T, Piyush P, Nikhil B. (2013). Teledentistry: knowledge and attitudes among dentists in Udaipur, India. *Oral Health Dent Manag.* 12(3):138-44. PMID: 24352304.
2. Al-Shaya M, Farsi D, Farsi N, Farsi N. Perception, (2021). Awareness, and Knowledge of Dental Professionals About Teledentistry in Saudi Arabia - A Systematic Literature Review. *Biosc.Biotech.Res.Comm.*14(4).101-108
3. Sahu D, Tandon S, Khurana C, Bali E. (2018). Awareness of e health and M health among dental students – a questionnaire study. *University J Dent Scie.* 4 (2): 48-51.
4. Verma K, Bhaskar DJ, Kaur N, Yadav P, Sharma V, Gupta H. (2019). Knowledge, Attitude and Practices Regarding Teledentistry Among Dental Professionals of Mathura City India. *Univ Jof Dent Sciences.* 5(3):49-52.
5. Bhargava A, Tandon S, Chand S, Singla S. (2020). Teledentistry in times of pandemic-a utility for health concerns and needs. *Indian Journal of Health Sciences and Care.*;7(si1):67-72.
6. Alsharif AT, Al-harbi SS. (2020). Dentists' Self-perception on Teledentistry: The Changing Landscape Driven by Technological Booming in the 21st Century. *The Open Dentistry Journal* 16:14(1).
7. Bhargava A, Sabbarwal B, Jaggi A, Chand S, Tandon S. (2019). Teledentistry: A literature review of evolution and ethicolegal aspects. *J Global Oral Health*;2(2):128-33.
8. Rocca MA, Kudryk VL, Pajak JC, Morris T.(1999). The evolution of a teledentistry system within the department of defence. *Proc AMIA Symp* ;921:4-8.
9. Balsaraf SV, Chole RH. (2015). Knowledge, awareness, and attitude among practicing dentists about teledentistry in Indore, Central India. *J Indian Assoc Public Health Dent*;13:434-7

10. Murererehe J, Uwambaye P, Isyagi M, Nyandwi T, Njunwa K. (2017). Knowledge, attitude and practices of dental professionals in Rwanda towards the benefits and applications of teledentistry. *Rwanda Journal*. ;4(1):39-47.
11. Aravind, N.Ganapathy, Dhanraj. (2020). Awareness of teledentistry among dental students. *Drug Invention Today*;14(7).
12. Dental colleges in Haryana Available from <http://www.collegesindia.net/dci-approved-dental-colleges-in-haryana/state>. Last accessed on 21 Jan 2021.
13. Al-Khalifa KS, AlSheikh R. (2020). Teledentistry awareness among dental professionals in Saudi Arabia. *PloS one*. 15:15(10):e0240825.
14. Sanjeev M, Shushant GK. (2011). Teledentistry a new trend in oral health. *Int J Clin Cases Investig*;2:49-53.
15. Ata SO, Ozkan S.(2009). Information technology in oral health care: Attitudes of dental professionals on the use of teledentistry in turkey. *Eur Mediterr ConflnSyst* ;13-14:1-8.
16. Nagarajappa R, Aapaliya P, Sharda AJ, Asawa K, Tak M, Pujara P, Bhanushali N. (2013). Teledentistry: Knowledge and attitudes among dentists in Udaipur, India. *Oral Health Dent Manag*.12(502):2.
17. Boringi M, Waghray S, Lavanya R, Babu DB, Badam RK, Harsha N, Garlapati K, Chavva S. (2015). Knowledge and awareness of teledentistry among dental professionals–A cross sectional study. *Journal of clinical and diagnostic research: JCDR*. ;9(8):ZC41.
18. Sen N. (2017). Knowledge, Attitude & Awareness Among Dental Students About Teledentistry In kolkata, West Bengal, India – A Cross Sectional Study. *Int J Recent Sci Res*. 8(3): 15952-15956.

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