

# Knowledge and Awareness of Teledentistry among Dental Professionals – A Cross Sectional Study

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## ABSTRACT

**Background:** The use of technology in the form of smart phones and other electronic media in day to day life has become an integral part of life today. Technology today is seeing a paradigm shift towards better inter-professional communications which can help doctors, patients and the masses as a whole. Putting these technological advancements to good use evolves as a major milestone in medicine/ dentistry in the form of telemedicine/teledentistry.

**Aim:** The present study was aimed at knowing the knowledge and awareness of teledentistry among dental professionals of a dental college in India.

**Settings and Design:** The study was conducted in a dental college in India and was circulated among dental professionals.

**Materials and Methods:** A questionnaire was prepared to assess the knowledge and awareness of teledentistry and was circulated among dental professionals in a dental college. The data thus collected was statistically analysed and results obtained.

**Statistical analysis:** The data collected was statistically analysed using SPSS software.

**Results:** A total of 406 persons responded to the questionnaire. In the present study it was found that the knowledge and awareness about teledentistry was very low among post graduates (7.23%) and interns (9.38%) when compared to I & II BDS while most of them agreed that teledentistry is a practice of dentistry through various media options with limited application in dentistry without a legal issue.

**Conclusion:** In the present study, it was apparent that most of the respondents were lacking adequate knowledge and awareness on teledentistry. Hence, there is an immense need to create awareness among dental professionals on teledentistry as the future lies in technological advancement. Tele dentistry can mark the beginning of a new era in dentistry. This can be achieved by conducting CDE programs and awareness campaigns/programs which helps in various levels.

**Keywords:** Dental Care, Oral Health, Technology

## INTRODUCTION

In this era of modern medicine, dentistry has been constantly changing with the advent of information and technology. Teledentistry is a part of Telemedicine. Tele in Greek means distance and mederi in latin means to heal. Teledentistry has many branches like Telesomatology, Teleradiology, Telepathology, Tele oral surgery and Teleorthodontics. Teledentistry, a budding field in dentistry, uses information based technologies and communication systems to deliver health care services to the people. The basic provision of dental care information is carried out through the proper channels of digital communication. It can be a prominent source for inter professional communications and eventually can be used for better educational source among dental students. It also helps in imparting basic knowledge to patients about dental health care thereby improving the health care facilities to the patients [1-3].

Oral health is an integral part of general health. Teledentistry is a fast advancing branch which is an effective combination of technology with dentistry. It involves fast and effective transfer of information pertaining to patients through electronic gadgets over remote distances. This enables an effective exchange of information and knowledge between patient and doctor and among various specialists for a better treatment planning and outcome. Most teledentistry programs to date have focused upon distance management and administration of remote facilities, learning and continuing education, consultation and referral services rather than supervision of auxiliaries or direct patient care [4,5].

In 1997 "Teledentistry" was defined as the practice of using video-conferencing technologies to diagnose and provide advice about

treatment over a distance [5]. In other words teledentistry is the use of information technology and telecommunications for dental care, consultation, education and public awareness in the same manner as telehealth and telemedicine. Teledentistry can also be used to assist general dentists with speciality work and improve services to underserved populations such as in rural or less developed areas [6-8].

Teledentistry is a useful tool for both the patient and doctor it can be applied in various specialities of dentistry. It cuts down the time taken for multiple opinions by various specialists and thus works out more economic for the patient and the doctor. Prevention and early detection of any carious lesion or a soft tissue lesion is possible through teledentistry [9].

In Oral medicine and Radiology it helps in diagnosing and framing a treatment plan of difficult cases by easy access to various specialists through transfer of radiologic images of lesions. In maxillofacial surgery teledentistry may be helpful for appropriate treatment of complicated cases by analysis of advanced dental imaging techniques (like CBCT) which are often not available in one centre. While in Orthodontics it helps a great deal to take multiple opinions on routine cephalometric analysis for a better treatment outcome. Also, teledentistry can be used for better patient compliance and satisfaction by sharing pre and post treatment images. In endodontics it can be applicable for accurate diagnosis of periapical lesion and presence of any supplementary root canal. In Prosthodontics teledentistry along with various computer aided diagnostic tools (like CAD, CAM) can be a useful tool in designing inlays, onlays and in crown preparation also [9].

General Practitioners often require multiple specialists' opinion especially when dealing with complicated and recalcitrant cases. With the advent of teledentistry, these issues can be solved by making it easy for the general practitioners to contact and communicate about any faulty differential diagnosis with the specialists located in different areas thereby improving patient comfort and prognosis. The same also applies to specialists when they need opinion of other specialists in different fields of dentistry. Many studies were conducted to assess the knowledge and attitude levels amongst dentists but none of these studies included dental students, to the best of our knowledge.

To inculcate the knowledge and practice of teledentistry in the future generation dentists it is important to assess the awareness of the present dental students. Hence, the present study was conducted among dental professionals (including staff and students) to know the knowledge and awareness levels regarding teledentistry.

## MATERIALS AND METHODS

An anonymous survey was carried among dental professionals in a dental college, India to know the knowledge and awareness of teledentistry among dental professionals. The study protocol was reviewed by the Ethical Committee of Dental College and Hospital and was granted ethical clearance.

On the pre decided days, investigator visited dental college during college working hours for getting the questionnaire filled using a self administered questionnaire to know the knowledge and awareness among dental students [Table/Fig-1]. The completed questionnaire were collected and subjected to statistical analysis with SPSS software.

## RESULTS

A total of 406 persons responded to the questionnaire and the data were subjected for statistical analysis. Among them 24.14% were first BDS students, 18.23% were second BDS students, 10.10%

Questions	% of I BDS	% of II BDS	% of III BDS	% of IV BDS	% of Interns	% of PG	Total%	Chi-square	p-value
<b>1Q Have you heard about teledentistry?</b>									
Yes	33.67	52.70	19.51	41.30	9.38	7.23	27.34	59.0180	0.0000*
No	66.33	47.30	80.49	58.70	90.63	92.77	72.66		
<b>2Q What do you mean by teledentistry?</b>									
Through telephone	7.14	13.51	0.00	17.39	4.69	7.23	8.37	12.6380	0.0270*
Media	92.86	86.49	100.0	82.61	95.31	92.77	91.63		
<b>3Q In future do you practice teledentistry?</b>									
Yes	13.27	13.51	26.83	6.52	12.50	1.20	11.33	20.1361	0.0012*
No	86.73	86.49	73.17	93.48	87.50	98.80	88.67		
<b>4Q What is your opinion about teledentistry?</b>									
Very useful	24.49	35.14	39.02	17.39	32.81	0.00	23.40	76.6236	0.0000*
Limited in general dentistry	21.43	18.92	17.07	19.57	28.13	10.84	19.21		
Limited in dentistry	45.92	39.19	41.46	56.52	39.06	89.16	53.20		
Too many legal issue	8.16	6.76	2.44	6.52	0.00	0.00	4.19		
<b>5Q Do you agree that teledentistry can really in health education of masses?</b>									
Yes	72.45	54.05	63.41	56.52	62.50	0.00	50.00	181.4227	0.0000*
No	12.24	16.22	14.63	23.91	1.56	0.00	10.34		
Do not know	15.31	29.73	21.95	19.57	35.94	100.0	39.66		
<b>6Q Do you agree that teledentistry can be a good tool for oral hygiene training?</b>									
Yes	79.59	68.92	70.73	47.83	26.56	0.00	48.52	232.4594	0.0000*
No	8.16	14.86	17.07	30.43	28.13	0.00	14.29		
Do not know	12.24	16.22	12.20	21.74	45.31	100.0	37.19		
<b>7Q Do you agree that teledentistry is not financially feasible?</b>									
Yes	58.16	52.70	46.34	26.09	9.38	0.00	32.76	229.8575	0.0000*
No	31.63	22.97	48.78	10.87	12.50	0.00	19.95		
Do not know	10.20	24.32	4.88	63.04	78.13	100.0	47.29		
<b>8Q Do you think teledentistry is time saving?</b>									
Yes	76.53	56.76	90.24	28.26	18.75	0.00	44.09	254.4393	0.0000*
No	11.22	28.38	4.88	23.91	6.25	0.00	12.07		
Do not know	12.24	14.86	4.88	47.83	75.00	100.0	43.84		
<b>9Q Do you feel that teledentistry can help in dental tourism?</b>									
Yes	75.51	63.51	90.24	56.52	0.00	0.00	45.32	317.8434	0.0000*
No	11.22	21.62	0.00	30.43	0.00	0.00	10.10		
Do not know	13.27	14.86	9.76	13.04	100.0	100.0	44.58		
<b>10Q Do you agree that teledentistry is going to be a preamble to the robotic dentistry?</b>									
Yes	100.0	10.81	0.00	0.00	0.00	0.00	26.11	715.9787	0.0000*
No	0.00	89.19	9.76	0.00	0.00	0.00	17.24		
Do not know	0.00	0.00	90.24	100.0	100.0	100.0	56.65		
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0		

[Table/Fig-1]: Comparison of qualifications with their responses in each question

Qualifications	No of samples	% of samples
I BDS	98	24.14
II BDS	74	18.23
III BDS	41	10.10
IV BDS	46	11.33
Intern	64	15.76
PG	83	20.44
Total	406	100.00

**[Table/Fig-2]:** Distribution of samples by qualifications

were third BDS students, 11.33% were final BDS students 15.76% were interns and 20.44 were post graduate students [Table/Fig-2].

In the present study, majority of second BDS students were aware of teledentistry and among all the years the first BDS respondents (92.86%) and Interns (95.31%) could understand that teledentistry meant practice of dentistry from distant location through various media options. But, it was also found that most of the respondents in the study including all the BDS students and interns said they did not know how to inculcate teledentistry in practice in future [Table/Fig-1].

When enquired about the opinion on teledentistry, only few respondents of third BDS (39.02%) said that teledentistry is very useful method when compared to other volunteers in the study and most of the respondents (89.16% of postgraduates) said that it has limited application in dental emergencies while 28.13% of interns said it has limited applications in general dentistry. Only few respondents (i.e. 4.19%) said that teledentistry has too many legal issues [Table/Fig-1].

50.0% of participants agreed that teledentistry can really help in health education of masses among them majority were first year BDS (72.45%). Only few respondents (i.e. 10.34%) said teledentistry is not helpful tool in health education in community [Table/Fig-1].

Majority of respondents agreed that teledentistry can be a good tool for oral hygiene training. Only few respondents were of the opinion that teledentistry is not a financially feasible option. Also most of the dental professionals said that teledentistry is a time saving tool in dentistry [Table/Fig-1]. Majority of third and first BDS respondents felt that teledentistry can help in dental tourism. Half of the respondents had no idea that teledentistry could be a preamble to robotic dentistry [Table/Fig-1].

## DISCUSSION

Teledentistry is the provision of dental care to patients instead of directly contacting them. Developments in the fields of information and technology and has brought immense changes in the field of healthcare services. Teledentistry is of different types like it can be a Patient – dentist, Dentist – specialist, Dentist – data storage bank, Students – dental education and Dentist – research centre. Various internet modes like tele communications, video conferencing, through e-data.

In the present study the knowledge and awareness about teledentistry was very low among post graduates (7.23%) and interns (9.38%) when compared to first and second BDS which is in accordance with a study done by Nagarajappa R et al., at Udaipur [5]. Teledentistry is a recent concept and requires gadgets like smart phones and smart media, which is apparently, used more by younger generation when compared to others. Also, there is an increased exposure of technology among the younger generation than the older ones. Hence, in the present study it was revealed that the first and second BDS students were more aware of Teledentistry [5].

Most of the participants agreed that teledentistry is a practice of dentistry through various media options which is in accordance with that published by Chhabra N et al., [10].

Most of the first BDS students agreed that teledentistry can help in the education of masses. This is in accordance with a study done by Ata SO where >90% agreed about tele-education. This may be due to more awareness of tele-education among first BDS students at school levels [11].

Most of the first BDS students (79.59%) agreed that teledentistry can help in better oral hygiene training practices. This is in accordance with study done by Nagarajappa R et al., where nearly 70% agreed that it can help in training better oral hygiene practices [5].

Most of the third BDS students agreed that teledentistry is a time saving approach (90.24%) but is not financially feasible (46.34%). But in a study done by Ata SO and Ozkan S in Turkey they found that it is a time saving and cost effective approach [11]. Daniel SJ reviewed that Clinical outcomes were generally improved following a teledentistry intervention and satisfaction with teledentistry was consistently high [12]. Khan SA et al., Ireland N et al., and Brullmann D et al., reviewed that the key methods used in teledentistry are electronic health records, electronic referral systems, digitizing images, teleconsultations, and telediagnosis. All these aim to bring about efficiency, provide access to underserved population, improve quality of care, and reduce oral disease burden [8,13,14].

Since the demand for dental tourism in India has risen considerably in the recent past, appropriate measures to reach dentistry to wide spread metropolitan cities have become a necessity. Teledentistry can be a helpful aid in achieving this, which was also the opinion of most of the respondents in our study.

## LIMITATIONS

The study was administered over academic college and hospital hence the results of the study cannot be attributed to the whole dental population.

## CONCLUSION

A lack of knowledge of teledentistry among current dentists has suggested the need for awareness programs to revamp the niches in knowledge and improve the present practice situation. Our study emphasized the fact that although there is a need for teledentistry and a positive attitude of dentists towards using teledentistry, it is not practiced much among the health professionals. This could be attributed to the lack of knowledge about the usage of teledentistry which can be improved by increasing campaigns promoting teledentistry. The following recommendations have been stated for a better use of teledentistry among health professionals

### Recommendations to bring about awareness on teledentistry

- Awareness of teledentistry among health professional can be increased by conducting CDE programs and awareness campaigns/programs on technological advancements which will help in various levels of professional development, because future lies in technology.
- Dental communities should show interest and inculcate teledentistry in their day to day practice which can help in proper diagnosis and treatment plan accurately for various dental diseases.
- Setting up of associate clinics which includes Dental practitioners of various specialties to respond to the teledentistry should be encouraged so that the patients are at benefit.
- In case of noncompliance with consultation charges of the doctor due to various reasons, both the parties (including doctors and patients) should refer the problem to a grievance addresser unit which may address the problem in future.

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