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10.4103/jehp.jehp_363_18

Knowledge, awareness, and attitude regarding teledentistry among postgraduate dental students of Kanpur city, India: A questionnaire study

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Received: 29-10-2018

Accepted: 05-02-2019

Abstract:

BACKGROUND: Teledentistry is a rapidly forming subset of dentistry being used extensively in urban as well as rural areas addressing problems related to cost-effectiveness, efficiency, and quality in delivering oral health-care services. The present study aims to evaluate the knowledge, awareness, and attitudes regarding teledentistry among the dental postgraduates of Kanpur city, India.

MATERIALS AND METHODS: A cross-sectional descriptive survey was carried out on a total of 120 postgraduate students. A pretested, self-structured, close-ended questionnaire was administered that consisted of 20 questions were included. The data collected was compiled in a systemic manner and analyzed in terms of frequency (yes/no).

RESULTS: Only 77 postgraduate students responded, and it was observed that 74.4% of students had knowledge regarding teledentistry and 79.2% of students contemplated to practice teledentistry in the future. The overall awareness and attitudes regarding teledentistry were found to be 71.7%.

CONCLUSION: The knowledge, awareness, and attitudes were found to be satisfactory among the postgraduate dental students.

Keywords:

Awareness, dental care, technology, teledentistry

Introduction

Health care has encountered a theatrical change with the epoch of telecommunications and computers. Dental care is likewise being transformed gradually due to the opportunities provided by the technology. Teledentistry is a rapidly growing branch with a combination of dentistry combined with telecommunication.^[1] Teledentistry has become a part of telemedicine. It is derived from the Greek word "Tele" meaning distance and Latin word "Mederi" meaning

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to heal.^[2] In 1997, Cook defined Teledentistry as, "The practice of using video-conferencing technologies to diagnose and provide advice about treatment over a distance."^[3,4]

Teledentistry is not only based on telecommunication but also involves the exchange of clinical information and data in rural as well as urban areas. Due to the technological growth, it has the potential to modify the current scenario of routine dental practice. It has an assortment of uses that include as follows:

1. For underserved populations
2. Helps in increasing the accessibility of specialists

How to cite this article: Pradhan D, Verma P, Sharma L, Khaitan T. Knowledge, awareness, and attitude regarding teledentistry among postgraduate dental students of Kanpur city, India: A questionnaire study. J Edu Health Promot 2019;8:104.

3. Cost efficient and saves time
4. Helps in communication with other dentists or health-care providers.

Teledentistry can be used in all the specialties of dentistry.^[5] Berndt *et al.* conducted a study on underprivileged children, wherein orthodontic treatment was being monitored from a distance through teledentistry and the results were found to be promising.^[6] Another study by Park *et al.* stated that the advances and availability of smartphone technology could lead to the use of telemedicine in oral and maxillofacial surgery.^[7] Furthermore, effective results were also found in cases of tobacco cessation counseling through teledentistry in a study conducted by Myung *et al.*^[8]

The process of teledentistry incorporates consultation, diagnosis, and treatment planning away from a dental office setup through computers, cameras, printers, and Internet.^[9] It comprises two techniques chiefly: real-time consultation and technique of store and forwards. Real-time consultation comprises videoconferencing where the dentist and the patients communicate with each other using ultra-high bandwidth network connections. The technique of store and forward incorporates the exchange of clinical knowledge and images stored inside the telecommunication device.^[10,11]

However, there are limited studies conducted in India among the postgraduates for the evaluation of knowledge, awareness, and attitudes regarding teledentistry. Hence, the present study was conducted among the postgraduate students of Kanpur city to assess their knowledge and awareness regarding teledentistry.

Materials and Methods

Study design and study population

The present study is a descriptive cross-sectional survey. A pretested, self-administered, close-ended questionnaire consisting of 20 questions were included to evaluate the knowledge, attitudes, and awareness among the postgraduates. The study population comprised 120 postgraduates from all the 9 specialties of dentistry who were invited to participate in the study.

Inclusion and exclusion criteria

All the students willing to participate in the study were considered in the inclusion criteria. The exclusion criterion included students absent on the predecided days (up till 1 month) of the study and students who did not give consent to participate in the study.

Pilot study and pretesting of the questionnaire

Pilot study was conducted among 10 students to determine the feasibility of the study. Cronbach's coefficient was

found to be 0.78 which signifies an acceptable internal reliability of the questionnaire. For testing the validity, the content validity ratio was also calculated by using item-rated content validity indices. This was achieved by taking the responses on the dichotomous scales where the academicians indicated whether an item is favorable (score of + 1) or unfavorable (score of 0). The content validity ratio was found to be as 0.86 by the panel of four academicians. In addition, there were no changes required in the questionnaire as a result of pretest.

Ethical approval and informed consent

The study protocol was approved by the Institutional Review Board and ethical approval was obtained. A written informed consent form was also obtained from all the participants.

Data collection and analysis

The questionnaire was distributed by a single investigator. The students were told to approach the investigator immediately in case of any doubts regarding any of the questions in the questionnaire. The questionnaire comprised of three parts which included as follows:

- Part 1: Sociodemographic details
- Part 2: Questions relating to knowledge regarding teledentistry
- Part 3: Questions relating to assess the awareness and attitudes regarding teledentistry.

The study was conducted between the time period of April 2016 to May 2016. The data were collected, compiled, arranged in a systematic manner, and analyzed in terms of frequencies (yes/no) using SPSS Version 17.0 (SPSS Inc., Chicago, IL, USA).

Results

A total of 120 postgraduates from all the 9 specialties of dentistry were invited to participate in the study, but only 77 students responded or gave their consent to participate in the study. Thus, the response rate was 64%. The mean age among the postgraduates was found to be 30.9 with a standard deviation of 3.2. Demographic data showed that the majority of the respondents were males (55.8%) when compared to females (44.2%) [Table 1].

Majority of the postgraduate students (96.1%) had knowledge and awareness regarding teledentistry. About 96.2% of students were familiar about the fact that teledentistry is the practice of use of computers, Internet, and technologies to diagnose and provide advice about treatment over a distance. Similarly, 79.2% of students contemplated to practice teledentistry in the future. Most of the respondents (58.4%) believed that teledentistry helped to consult with an expert about specific patient's problem. About 66.2% of students were of the opinion

that teledentistry is useful in improving the access to oral health care. High response (68.8%) was obtained for the question: "Teledentistry can be an addition to the regular care to which the dentists provide?" Majority of the respondents had positive attitudes toward teledentistry practice in the future (79.2%). Similarly, 87% students agreed to the question "Will you support a government initiative whereby patients could obtain advice on treatment need from a central facility such as Primary Health Care Center (PHC) connected via teledentistry?" In contrary, 79.2% of students suggested that the major challenges in teledentistry are illiterates, population below the poverty line, and lack of infrastructure [Table 2].

Discussion

Owing to advancing technology, there has been a radical change in conveying oral health care to the

Table 1: Sociodemographic characteristics

Sample characteristics	Frequency (%)
Age (years)	
20-30	60 (77.9)
30-40	15 (19.5)
40-50	2 (2.6)
Mean age	30.9±3.2
Sex	
Males	43 (55.8)
Females	34 (44.2)

Age value represents mean±SD. SD=Standard deviation

Table 2: Responses in knowledge, awareness, and attitude-related questions

Knowledge, awareness and attitude related questions	Yes (%)	No (%)
Q1. Have you heard about teledentistry?	96.1	3.9
Q2. Do you know what teledentistry is?	96.1	3.9
Q3. Is teledentistry about the practice of use of computers, Internet, and technologies to diagnosis and provide advice about treatment over a distance?	96.2	3.8
Q4. Does teledentistry helps to consult with an expert about specific patient's problem?	58.4	41.6
Q5. Do you think that teledentistry is good for dental education over Internet and for training primary health-care dentists?	77.9	22.1
Q6. Does teledentistry helps to monitor the patient's oral health?	55.8	44.2
Q7. Can teledentistry be applied in any branch of dentistry?	46.8	53.2
Q8. Is teledentistry useful in improving the access to oral healthcare?	66.2	33.8
Q9. Do you think that teledentistry is a good tool for oral hygiene training?	77.9	22.1
Q10. Can teledentistry will be able to monitor your patient's condition well?	72.7	27.3
Q11. Do you think that dental examinations are accurate via computers and intraoral camera as in the traditional office setting?	72.1	27.2
Q12. Do you think that teledentistry is a convenient form of oral health-care delivery that makes dental examination easier?	61.0	39.0
Q13. Teledentistry can be an addition to the regular care to which the dentists provide?	68.8	31.2
Q14. Does teledentistry can help in reducing costs for the dental practices?	59.7	40.3
Q15. Do you think that teledentistry saves time for the dentist?	71.4	28.6
Q16. Do you think that teledentistry can increase accessibility of the specialists to rural and underserved communities for their dental needs?	72.7	27.3
Q17. In India, major challenges in teledentistry are illiterates, population below the poverty line, and lack of infrastructure?	79.2	20.8
Q18. Do you trust the teledentistry equipment to work?	66.2	33.8
Q19. Will you support a government initiative whereby patients could obtain advice on treatment need from a central facility such as PHC connected via teledentistry?	87.0	13.0
Q20. In the future, will you practice teledentistry?	79.2	20.8

PHC=Primary Health care Centre

patients. One such change is because of the budding field of teledentistry. It can be of different types such as: patient–dentist, dentist–specialist, dentist–data storage bank, students–dental education, and dentist–research center. Teledentistry has been developing since 1994 as a means to allow dental professionals to communicate with one another over long distances, allow collaboration by multiple practitioners, and involve the exchange of clinical information and images over remote distances for dental consultation and treatment planning.^[1]

In the present study, the knowledge and awareness regarding teledentistry was assessed among the postgraduates. About 96.1% of postgraduates were aware about teledentistry but few implemented into their daily practice. Teledentistry is a recent conception and requires gadgets such as smartphones and media, which is apparently, used more by younger generation when compared to the elderly. Various studies conducted by Cooper and Engeswick, Purohit *et al.*, Tomar *et al.*, Murererehe *et al.*, and Latif *et al.* also revealed similar demographic details, but lesser values were found by Ata and Ozkan.^[12-17]

Majority of students (77.9%) were aware of the fact that teledentistry is a good tool for oral hygiene training. In addition, 59.7% respondents believed that teledentistry helps in reducing costs for the dental practices. Similar results were seen in a study conducted by Bauer *et al.* (2001).^[17] The question concerning the use of

teledentistry to consult an expert about the patient's problem had been agreed by 58.4% respondents. Similar results have been obtained in other studies regarding the same.^[18,19]

About 79.2% of postgraduates agreed that major challenges in teledentistry are illiterates, population below the poverty line, and lack of infrastructure in India which was in accordance with Sen *et al.*^[20] Significant differences were found for the questions like, "Is teledentistry useful in improving the access to oral healthcare (66.2%)," "Do you think that teledentistry can increase accessibility of the specialists to rural and underserved communities for their dental needs (72.7%)," "Will you support a government initiative whereby patients could obtain advice on treatment need from a central facility such as PHC connected via teledentistry (87.0%)," and "In the future, will you practice teledentistry (79.2%)."

All these intend to bring about efficiency, provide access to underserved population, improve quality of care, and reduce oral disease burden. Therefore, it is essential to have knowledge and awareness regarding the use of the Internet and computers in dental school. In addition, studies have proved that dental students believe the usage of the Internet and computers will help them in teledentistry in the future.^[21,22] Amid the developing technologies in the field of teledentistry, dentists may eventually link up to virtual dental health setups and an entirely novel era of dentistry will be created.

In the present study, it was found that 74.4% of students had knowledge regarding teledentistry. In addition, the overall percentage for awareness and attitudes regarding teledentistry was found to be 71.7%. Ever since the demand for dental tourism in India has risen considerably, apt measures to reach dentistry to widespread metropolitan cities have become a requisite. Teledentistry can be a supportive aid in accomplishing this criterion, which was also the outlook of most of the respondents in our present study.^[21,22]

Dentists who are affianced in teledentistry must make every effort to ensure the security of their systems as well as of any data that they may transmit. For example, data encryption, password protection, and user access logs can help in dissuading most of the people and in protecting patient confidentiality. Dentists are encouraged to remain aware of the legal needs in their states of practice and remain vigilant about the parliamentary changes in this rapidly developing field.^[20]

Conclusion

The results of the present study indicated a satisfactory knowledge, awareness, and attitudes regarding

teledentistry among the postgraduates, and hence, there is a further need to improve the knowledge and promote teledentistry. This can be achieved by conducting continuing dental education programs and awareness campaigns/programs which will help in professional advancement. If properly tackled, teledentistry could lead to the betterment of oral health-care delivery to the rural populations specially.

Acknowledgment

The authors would like to thank the study participants for their participation and kind cooperation throughout the study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Boringi M, Waghay S, Lavanya R, Babu DB, Badam RK, Harsha N, *et al.* Knowledge and awareness of teledentistry among dental professionals – A cross sectional study. *J Clin Diagn Res* 2015;9:ZC41-4.
2. Jain A, Bhaskar DJ, Gupta D, Agali C, Gupta V, Karim B. Teledentistry: Upcoming trend in dentistry. *J Adv Med Dent Sci* 2013;1:112-5.
3. Khan SA, Omar H. Telemed: Teledentistry in practice: literature review. *Telecare* 2013;19:179-83.
4. Balsaraf SV, Chole R. Knowledge, awareness, and attitude among practicing dentists. *J Indian about teledentistry in Indore, Central India Assoc Public Health Dent* 2015;13:434-7.
5. Vijaykumar N, Shoba S, Reddy C, Shankaran D, Singh A. Knowledge and attitudes regarding teledentistry among dentists practicing in private dental clinics of Bengaluru, India. *Int J Oral Health Med Res* 2016;2:21-7.
6. Bhambal A, Saxena S, Balsaraf S. Teledentistry: Potentials unexplored! *J Int Oral Health* 2010;2:1-6.
7. Latif N, Alam A, Abdullah S. Knowledge and attitude of dentists towards tele-dentistry in Pakistan. *Pak Oral Dent J* 2016;36:205-9.
8. Ramesh N, Pankaj A, Archana JS, Kailash A, Mridula T, Piyush P, *et al.* Teledentistry: Knowledge and attitudes among dentists in Udaipur, India. *Oral Health Dent Manag* 2013;12:138-44.
9. Berndt J, Leone P, King G. Using teledentistry to provide interceptive orthodontic services to disadvantaged children. *Am J Orthod Dentofacial Orthop* 2008;134:700-6.
10. Park W, Lee HN, Jeong JS, Kwon JH, Lee GH, Kim KD, *et al.* Optimal protocol for teleconsultation with a cellular phone for dentoalveolar trauma: An *in vitro* study. *Imaging Sci Dent* 2012;42:71-5.
11. Myung SK, McDonnell DD, Kazinets G, Seo HG, Moskowitz JM. Effects of web- and computer-based smoking cessation programs: Meta-analysis of randomized controlled trials. *Arch Intern Med* 2009;169:929-37.
12. Cooper BR, Engeswick LM. Knowledge, attitudes, and confidence levels of dental hygiene students regarding teledentistry: A pilot study. *Internet J Allied Health Sci Pract* 2007;5:1-4.
13. Purohit BM, Singh A, Dwivedi A. Utilization of teledentistry as a tool to screen for dental caries among 12-year-old school children in a rural region of India. *J Public Health Dent* 2017;77:174-80.

14. Tomar D, Menon I, Tyagi U, Singh A, Goyal J, Singh RP, *et al.* Assessment of awareness about teledentistry among dentists in a private dental college of Muradnagar, Ghaziabad. *J Dent Spec* 2018;6:8-12.
15. Murererehe J, Uwambaye1 P, Isyagi M, Nyandwi T, Njunwa K. Knowledge, attitude and practices of dental professionals in Rwanda towards the benefits and applications of teledentistry. *Med Health Sci* 2017;4:39-47.
16. Latif N, Alam NA, Abdullah S. Knowledge and attitude of dentists towards tele-dentistry in Pakistan. *Pak Oral Dent J* 2016;36:205-9.
17. Ata SO, Ozkan S. Information Technology in Oral Health Care: attitudes of Dental Professionals on the Use of Teledentistry in Turkey. *European and Mediterranean Conference on Information Systems*. Available from: <http://www.sid.ir/fa/VEWSSID/Jpdf/61613930110.pdf>. [Last accessed 2017 Aug 20].
18. Daniel SJ, Wu L, Kumar S. Teledentistry: A systematic review of clinical outcomes, utilization and costs. *J Dent Hyg* 2013;87:345-52.
19. Torres-Pereira C, Possebon RS, Simões A, Bortoluzzi MC, Leão JC, Giovanini AF, *et al.* Email for distance diagnosis of oral diseases: A preliminary study of teledentistry. *J Telemed Telecare* 2008;14:435-8.
20. Torres-Pereira CC, Morosini Ide A, Possebon RS, Giovanini AF, Bortoluzzi MC, Leão JC, *et al.* Teledentistry: Distant diagnosis of oral disease using e-mails. *Telemed J E Health* 2013;19:117-21.
21. Sen N, Bhat N, Mandal A. Knowledge, attitude and awareness among dental students about teledentistry in Kolkata, West Bengal, India – A cross sectional study. *Int J Recent Sci Res* 2017;8:15952-6.
22. Gupta P, Gupta S, Ankola A, Jindal V. Computer use among post graduate dental students in India. *J Oral Health Community Dent* 2014;8:135-2.