

TELE-DENTISTRY AWARENESS

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ABSTRACT

Healthcare provision and dental care is always subject to transformation by technology and tele-communication. An archetype shift towards better inter-professional connection can certainly yield better health services outcome. A relatively new term tele-dentistry is emerging that employs electronic methods and communications for the transfer of dental health data and statistics for remote health-care, thereby evolving as a major milestone in dentistry abreast such technological developments. This study was conducted in Hamdard Medical and Dental College, Karachi aimed to ascertain tele-dentistry awareness among dental professionals. Practicability and viability of tele-dentistry was also analysed in this study. A pre-structured questionnaire was prepared and circulated among dental professionals' i.e. undergraduate BDS students in different years of their course and postgraduate MCPS and FCPS trainees in Hamdard Medical and Dental College, Karachi. Resultant data were statistically evaluated using SPSS version 19 with application of Chi-square test and results were obtained. It was concluded that tele-dentistry cognizance was lesser in BDS students in initial years (26.7% in 1st year BDS) of their training as compared to final year BDS students (80%) and post graduate trainees (80%) while most of them had a basic insight into tele-dentistry practices and prospects but it needed further deliberation and perceptual enhancement.

Keywords: Tele-dentistry, Communications, Healthcare, Undergraduates, Postgraduates.

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INTRODUCTION

“Telemedicine” is an emerging term these days which uses information technology and latest communication schemes to provide healthcare across distant and inaccessible regions.¹ Telemedicine can improve and augment the worth and productivity of health care.^{2,3} Telemedicine today is practiced in academic institutes, public hospitals and also employed at international level to connect rural and remote areas in developing countries to centers of excellence. Recent advances in digital communication and internet offer an unparal-

leled prospect for provision of remote access to medical care.^{4,5}

Dental well-being is part and parcel of general health. The term Tele-dentistry was introduced towards end of 20th century and now it is transforming into a robust and operative mash of technology and dentistry. It comprises fast and efficient transferal of patient information via electronic tools over remote distances enabling doctors and consultants in yielding improved treatment designs and consequences. So far it has been stressing upon only patient referral systems, education and consultations rather than provision of direct patient care.⁶ Today we are witnessing upgradation in utilization of computers, telecommunication technology, digital diagnostic imaging services and software's for scrutiny and follow-up.^{7,8} These upgrades have not only improved the quality of treatment of dental patients, but also warranted it partially or completely at massive distances from tertiary care centers and competent dentists.⁹

Innovation and adaptation is basis of progression of any field and thus development in the arenas of information and technology has resulted in enormous advancement in healthcare services. Tele-dentistry can be practiced in many forms such as “real-time consultation/video conferencing” that enables doctor-patient communication using an audio-visual system. Second-

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ly “store and forward method” can be employed that involves the interchange of patient’s data including history, photographs, physical examination record etc with the consultant for expert analysis and treatment forecasts.⁷ “Remote monitoring method,” is yet another approach in which patients are monitored distantly at a hospital or a private setup.^{8,10}

So far very limited data is available about tele-dentistry with regards to dental professionals in our region. To indoctrinate the practice of tele-dentistry in upcoming dentists it is imperative to ascertain the existing awareness levels amongst dental students. Therefore, this study was carried out in dental professionals including students aimed at establishing the knowledge and awareness levels about tele-dentistry.

MATERIALS AND METHODS

This study was conducted at Hamdard Medical and Dental College, Karachi over a period of nine months from 20th Feb 2017 to 25th Nov 2017. Study procedure was beforehand appraised by the ethical committee of hospital and there was no legal concern highlighted. A pre-tested self-structured questionnaire was prepared according to different studies pertaining to data required for this survey. During college working hours the questionnaire was provided to dental professionals in order to assess their knowledge and awareness about tele-dentistry. Surveyed dental professionals included undergraduate students of 1st year, 2nd year, 3rd year and final year of BDS and postgraduate FCPS and MCPS trainees. Completed questionnaires were then collected and subjected to statistical analysis using SPSS version 19. The quantitative variables were presented as mean and standard deviation. Chi-square test was applied to ascertain null hypothesis and determine significant difference between variables. A p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 100 subjects were recruited according to WHO calculator in the study and their responses to the questionnaire were recorded and later statistically analyzed. 1st year BDS students were 30% of total recruits, 20% were 2nd year BDS students, 15% 3rd year BDS students, 15% final year BDS students and another 20% were postgraduate FCPS students (Table 1).

According to this study final year BDS students and Postgraduate students showed much higher level of tele-dentistry awareness i.e. 80% as compared to BDS students in early years of their course. 1st year students had least awareness level of 27%. Majority of recruits in each group had a concept that tele-dentistry works via media rather than phone but analysis proved it to be statistically insignificant having p-value of 0.398. A total of 62% recruits showed their intent to practice tele-dentistry in future as compared to 38% but again this co-relation was statistically insignificant having a p-value of 0.310 (Table 1).

Overall 35% recruits had an opinion that tele-dentistry can be a useful practice as compared to 20% having a reciprocal opinion while remaining 45% opined that it can have significant medico-legal implications. Majority of recruits’ i.e. 64% believed that tele-dentistry can be a useful tool for mass education and similar percentage of respondents’ i.e. 62% believed that tele-dentistry can be a convenient aid in oral healthcare training (Table 1).

As far as financial feasibility of tele-dentistry is concerned 52% of respondents agreed to its viability, however 29% assumed it to be impracticable while 19% participants were not sure about it but this correlation didn’t prove to be statistically significant. Time-domain analysis yielded that overall 67% recruits thought it to be more time consuming option than routine consultation procedures but this result was statistically insignificant.

DISCUSSION

Tele-dentistry can be an extremely helpful tool for both the patients and doctors as it decreases the time domain for multiple opinions and consultations and has turned out to be more economical. Real essence of medicine i.e. early detection and prevention can be achieved via application of tele-dentistry.⁸

Bradley M *et al.* efficaciously demonstrated its use in oral medicine in a community based dental model in Ireland, by means of a prototype tele-dentistry system.⁹ Similarly, Torres-Pereira *et al* proposed that distant diagnosis can be a real-time alternative in the diagnosis of oral lesions via transmission of digital images.¹⁰ Duka M *et al* have also established teledentistry to be comparable to real-time assessment for clinical diagnoses.¹¹ According to Kopycka-Kedzierawski *et al.*, teledentistry has been demonstrated to be a real-world and economical method to improve oral health care for rural and underprivileged children.¹² Alabdullah JH and Daniel SJ found tele-dentistry to be comparable to face-to-face evaluation for oral screening particularly in rural areas and remote access areas.²² Similarly, Purohit BM *et al* documented on their study that tele-dentistry examination is analogous to clinical examination in screening of dental caries in school children.²³

Vinayagamorthy K *et al* and Estai M *et al* studied the effect of tele-dentistry assisted screening of patients and concluded that it resulted in better service for patients.^{14,15} Similarly, Ignatius E *et al* evaluated the role of teledentistry in diagnosis and treatment planning of patients requiring prosthetic rehabilitation and established that video-consultation can enhance provision of dental services.¹⁶

According to current study tele-dentistry awareness levels were higher among Post graduates trainees as compared to BDS students which is not in accordance with Boringi M *et al* at who reported lower awareness levels amongst postgraduates.¹⁷ Moreover, an increasing trend in this awareness level was observed in the present study as compared to available regional statistics. 83.3% of the participants had an opinion that tele-den-

TABLE 1: GROUP WISE ANALYSIS IN ACCORDANCE TO ANSWERS OF QUESTIONNAIRE

Q u e s - t i o n s	1st Yr BDS (%) (n = 30)	2nd Yr BDS (%) (n = 20)	3rd Yr BDS (%) (n = 15)	Final Yr BDS (%) (n = 15)	PGs (%) (n = 20)	Total (%) (n = 100)	Chi- square	p-value
Have you heard about Tele-dentistry?								
Yes	26.7	65.0	66.7	80	80	59	20.008	0.000
No	73.3	35.0	33.3	20	20	41		
What do you understand how Tele-dentistry works?								
Via Phone	16.7	15	20	40	20	21	4.059	0.398
Via Media	83.3	85	80	60	80	79		
Do you intend to practice Tele-dentistry in future?								
Yes	53.3	35	33.3	33.3	25	38	4.782	0.310
No	46.7	65	66.7	66.7	75	62		
What is your general opinion about Tele-dentistry?								
Useful	53.3	10	46.7	33.3	25	35	21.602	0.006
P a r t i a l U s e	33.3	65	46.7	33.3	25	20		
Legal Is- sues	13.3	25	6.7	33.3	50	45		
Can Tele-dentistry help in health education of masses?								
Yes	70	40	60	100	55	64	27.154	0.001
No	10	25	26.7	0	45	21		
Not Sure	20	35	13.3	0	0	15		
Can Tele-dentistry be employed effectively for oral hygiene training? ng?								
Yes	56.7	45	66.7	93.3	60	62	16.294	0.038
No	16.7	35	33.3	6.7	30	24		
D o n o t k n o w	26.7	20	0	0	10	14		
Is Tele-dentistry a financially viable tool?								
Yes	43.3	45	46.7	60	70	52	6.933	0.544
No	26.7	35	40	26.7	20	29		
D o n o t k n o w	30	20	13.3	13.3	10	19		
Is Tele-dentistry time consuming as compared to routine consultation?								
Yes	73.3	63	60	73.3	60	67	8.787	0.361
No	6.7	20	33.3	26.7	25	20		
Not Sure	20	15	6.7	0	15	13		

tistry works by means of various broadcasting options that is in agreement with Chhabra N *et al.*¹⁸ Similarly majority of the participants agreed that tele-dentistry can be an effective tool in mass education which is in accordance with Ata SO where more than 90% agreed about tele-education.

In present study it was observed that majority of BDS students (75.48%) had an insight into tele-dentistry as already established by Nagarajappa R *et al* in their study in which nearly 70% agreed that it can help in

inculcation of healthier dental hygiene practice.⁵ Most of 1st year and 3rd year BDS students in this study believed that tele-dentistry is a time saving approach (73.3% each) but majority of postgraduates (70%) thought it is not financially feasible which is not in accordance with Ata SO and Ozkan S who concluded that it requires lesser time and is a more economical option. Bulk of participants in current study (62%) did not show intent to practice tele-dentistry in their future practice which can be attributed to their lack of its operational mechan-

ics. Parallel results were observed by Latif N *et al*; who acknowledged in their study that no respondent had practiced tele-dental health although 38.1% approved for operability of e-health and 39.35% suggested that tele-dentistry is a viable and practicable approach in Pakistan.²⁴ Brullmann D *et al*, Ireland N *et al* and Khan SA *et al* have elaborated in their studies about various methods used in tele-dentistry which can be employed depending upon the situation at hand. Commonly practiced options include automated health records, digital referral systems, teleconsultations, and tele-diagnosis.^{13,19,20} McFarland KK *et al* have suggested that tele-dentistry has the prospect to improve oral health outcomes, particularly for rural and underprivileged populations via easy consultation, referral and disease management.²¹ Summarily it can provide easy access to the deprived populations, enhance quality of care and decrease disease load on already cramped healthcare delivery system in Pakistan even from long distances.

CONCLUSION

In current study, it was observed that sufficient awareness exists about tele-dentistry among dental professionals. Postgraduates and final year BDS students had more knowledge about tele-dentistry as compared to 1st year BDS, 2nd year and 3rd year BDS students. It was also established that tele-dentistry is a practicable and viable tool but supplementary studies having a broader context will be necessary to authenticate various aspects of tele-dental applications.

REFERENCES

- Roine R, Ohinmaa A, Hailey D. Assessing Telemedicine: A Systematic Review of the Literature. *CMAJ* 2001; 165:765–71.
- Kuszler PC. Telemedicine and integrated health care delivery: compounding malpractice liability. *Am J Law Med* 1999; 25(4):297- 26.
- Pradhan D, Verma P, Sharma L and Khaitan. Knowledge, Awareness and attitude regarding teledentistry among post-graduate dental students of Kanpur city, India: A questionnaire study. *J Educ Health Promot* 2019; 8:104.
- Zimlichman E. Telemedicine: Why the delay? *Isr Med Assoc J* 2005; 7:525-26.
- Nagarajappa R, Aapaliya P, Sharda AJ, Asawa K, Tak M, et al. Teledentistry: Knowledge and attitudes among dentists in Udaipur, India. *Oral Health Dent Manag* 2013; 12:502.
- Reddy KV. Using teledentistry for providing the specialist access to rural Indians. *Indian J Dent Res* 2011; 22:189.
- Weerasinghe JU. Clinical trials on computer based telemedicine - A systematic review. *Sri Lankan J Biomed Inform* 2010; 1:12-20.
- Branko Mihailovic, Milan Miladinovic, Biljana Vujicic. Advances in Telemedicine: Applications in various medical disciplines and geographical regions. InTech, China. 2011. Chapter 11, Telemedicine in Dentistry (Teledentistry); pp.215-30.
- Bradley M, Black P, Noble S, Thompson R, Lamey PJ. Application of Teledentistry in oral medicine in a community dental service. *Br Dent J* 2010; 209:399–404.
- Torres-Pereira C, Possebon RS, Simoes A, Bortoluzzi MC, Leao JC, Giovanini AF. Email for distance diagnosis of oral diseases - A preliminary study of teledentistry. *J Telemed Telecare* 2008; 14:435-38.
- Duka M, Mihailovic B, Miladinovic M, Jankovic A, Vujicic B. Evaluation of Telemedicine systems for impacted third molars diagnosis. *Vojnosanit Pregl* 2009; 66:985–91. PubMed PMID: 20095519.
- Kopycka-Kedzierawski DT, McLaren SW and Billings RJ. Advancement of teledentistry at university of Rochester's Eastman institute of oral health. *Health Aff* 2018; 37(12):1960-66.
- Brullmann D, Schmidtman I, Warzecha K, d'Hoedt B. Recognition of root canal orifices at a distance - A preliminary study of Teledentistry. *J Telemed Telecare* 2011; 17:154-57.
- Vinayagamoorthy K, Acharya S, Kumar M, Pentapati KC and Acharya S. Efficacy of a remote screening model for oral potentially malignant disorders using a free messaging application: A diagnostic test for accuracy study. *Aust J Rural Health* 2019; 27(2):170-76.
- Estai M, Bunt SM, kanagasingam Y, Kruger E and Tennant M. A resource reallocation model for school dental screening: taking advantage of teledentistry in low-risk cases. *Int Dent J* 2018; 68(4):262-68.
- Ignatius E, Perala S, Makela K. Use of Video-conferencing for consultation in dental prosthetics and oral rehabilitation. *J Telemed Telecare* 2010; 16:467–70.
- 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:ZC41-44.
- Chhabra N, Chhabra A, Jain RL, Kaur H, Bansal S. Role of teledentistry in Dental education: Need of the era. *J Clin Diagn Res* 2011; 5(7):1486-88.
- Khan SA, Omar H. Telemed: Teledentistry in practice: literature review. *Telecare*. 2013; 19(4):179-83.
- Ireland N, Bradley M, Black P, Noble S, Thompson R, Lamey R, et al. Application of teledentistry in oral medicine in a community dental service. *Br Dent J*. 2010; 209(8):399-404.
- McFarland KK, Nayar P, Chandak A, Gupta N. Formative evaluation of a teledentistry training programme for oral health professionals. *Eur J Dent Educ*. 2018 May;22(2):109-114. PubMed PMID:28294493.
- Alabdullah JH, Daniel SJ. A Systematic Review on the Validity of Teledentistry. *Telemed J E Health*. 2018 Aug;24(8): PubMed PMID: 29303678.
- 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 Mar;77(2):174-180. PubMed PMID: 28035658.
- Latif N, Alam NA, Abdullah S. Knowledge and attitude of dentists towards tele-dentistry in Pakistan. *Pak Oral Dent J* 2016; 36(2): 205-9.

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