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Understanding medico-legal issues in teledentistry: Knowledge and awareness among dental professionals

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Abstract:
The rapid expansion of teledentistry has introduced important medico-legal challenges, while gaps in legal and ethical knowledge may compromise safe digital dental practice. Therefore, it is of interest to assess the knowledge and attitudes of 299 dental professionals, including staff members and post-graduate students, regarding medico-legal aspects of teledentistry in India. Female participants and staff members showed significantly higher knowledge scores, with gender and professional category significantly associated with both knowledge and attitudes ($p<0.05$). Participants showed awareness of malpractice, security and appropriate diagnostic practices, while attitudes toward workshops, curricular integration, jurisdiction and record keeping were predominantly positive. Thus, data shows the need for structured medico-legal training and integration of teledentistry-related legal and ethical principles into dental education and professional practice.

Keywords: Teledentistry, medicolegal issues, ethics

Background:
Cook defines digital dentistry as "Teledentology" (using video conferencing for recommendations in applied sciences, diagnostics and telemetry in 1997) rather than stand-alone mechanical or electrical, any dental technology or equipment that uses digital or computer technology **[1]**. Teledentistry is the mixture of telecommunication and dentistry ,involving the trade of medical data and photos over remote distance for dental consultation and remedy planning It makes use of digital information to talk applied sciences to supply and help healthcare when distance separate the participate **[2]**. The major areas that are integrated with digital dentistry include Prosthodontics, using computer aided designs (CAD) and computer aided manufacturing (CAM) Technology both from the clinician and laboratory; shade matching using spectrophotometry; photography intraoral and extra-oral; occlusion and temporomandibular joint analysis; computer aided implant dentistry, including design and fabrication of surgical guide to full digital work flow; digital radiography, including cone beam computed tomography (CBCT) widely used in all the filled of dentistry; Laser; practice and patient record management; virtual patient training gear and so forth **[3]**. Although there is a huge amount of booklets on digital dentistry, the moral and medicolegal issues, which are related to the integration of this technology in everyday practice, had not been sufficiently discussed. The aim of the study is to assess the impact of digital technologies on dental experts, from the medicolegal perspective. Teledentistry is a term that refers to multiple methods of communication between patients and dental professionals. The medical consultation is done through video conferencing, which allows patients and dental professionals at different locations to interact directly and discuss clinical **[4]**. The store-and-forward approach enables the dentist to take and store clinical data (including images and records) and send them to a specialist for review without the patient being in the office **[5]**. Therefore, it is of interest to evaluate the knowledge and attitude regarding medicolegal issues in teledentistry amongst dental faculty and postgraduate students.

Materials and Methods:
It is an online based cross–sectional survey and the participants of this study include various dental faculty and post graduate students in a dental college to assess the medicolegal issues in teledentistry and its practices among dental practitioners. All the necessary relevant information is recorded on a special form. The self-administered questionnaire composed of two main sections in attitude and knowledge based assessment questions related to medicolegal issues in teledentistry. Questionnaires will be used as a tool for data collection and evaluation. Closed ended questions have a limited number of open questions to encourage free responses. The pilot study will be conducted consisting of all the dental professionals attending the dental college and hospital to check validity and reliability of the questionnaire. A convenient sampling method has been followed depending among the responses from the participants. The knowledge and attitude of study subjects will be assessed by using a questionnaire method. There are two reassess: Concept and research that can produce the object for this questionnaire. A total of 28 objects are included in the questionnaire to assess

knowledge and attitude. Total of 28 questions will be based on knowledge and attitude of the dental professionals towards medicolegal issues in teledentistry.

Results:

This cross-sectional study has 299 participants, which are dental professionals and post graduate students. The participants were evaluated on the basis of knowledge and attitude-based questions for medicolegal issues in teledentistry in India through Google forms online survey was done. Total 299 full replies were chosen for statistical analysis and a survey was made based on questionnaire. All the responses were included in the study and nothing was excluded. A form with 28 questions regarding medicolegal issues in teledentistry was given. The sample included 299 participants which are staff and post graduate students of which 130(43.5%) male and 169(56.5%) female. This cross-sectional study has 175 staff (58.52%) and 124 (41.47%) post graduate students. The distributions of knowledge and attitude scores were analyzed according to gender and professional category of the study participants. In terms of knowledge, the mean score for males was 1.41 ± 0.91, while females scored higher with a mean of 1.84 ± 0.88. The mean score of the participant groups was higher for staff (3.76 ± 0.58) than for PGs (2.97 ± 0.41). Likewise, the attitude score for males was 1.51 ± 0.76, while females had a higher score of 1.72 ± 0.69. As for the participant category, the staff had higher attitude scores (3.22 ± 0.82) than the PGs (2.51 ± 0.53). Therefore, it can be concluded that the overall knowledge and attitude scores of both female participants and staff members were better **(Table 1).** Evaluated by the performance scores, staff had a knowledge score of 100 and an attitude score of 75, while PGs had a knowledge score of 75 and an attitude score of 49 **(Figure 1).** The categorical distribution of scores showed that 55 (31.42%) of the staff had poor knowledge, 100 (57.14%) had fair knowledge and 20 (11.42%) had good knowledge. For attitude, 55 (31.42%) staff members were poor, 95 (54.28%) fair and 25 (14.28%) good scores. Among PGs, 49 (39.51%) demonstrated poor knowledge, 60 (48.38%) fair and 15 (12.09%) good knowledge. In terms of attitude, 40 (32.25%) PGs showed poor, 64 (51.61%) fair and 20 (16.12%) good responses **(Table 2).** The Chi-square (χ^2) test was used to evaluate the association of the demographic variables with knowledge and attitude of the study participants towards medico-legal issues in teledentistry in India. Demographic variables analyzed included gender and participant category (staff and PGs) as shown in Table 4.Analysis showed that there was a statistically significant association between knowledge and gender ($\chi^2 = 1.421$; $p = 0.004$) and between attitude and gender ($\chi^2 = 1.682$; $p = 0.038$). In the same way, there was a significant correlation between participant category and knowledge ($\chi^2 = 1.327$; $p = 0.032$) and participant category and attitude ($\chi^2 = 1.424$; $p = 0.041$). The results showed that gender and professional category are significant factors in the knowledge and attitude of the study subjects regarding medico-legal issues in teledentistry **(Table 3).** This was a cross sectional study using a structured questionnaire to evaluate the knowledge and attitude of the participants about medico-legal aspects of teledentistry in India. The knowledge-based section consisted of questions assessing the respondents' knowledge of important concepts and practices regarding teledentistry. The number of correct and incorrect responses to each knowledge-based question was noted and analyzed. Overall, 139 participants (46.5%) identified email as a convenient way to communicate for teledentistry. Likewise, 128 respondents identified real-time consultation as the easiest way of teleconsultation. In terms of clinical applicability, 119 participants (39.8%) answered correctly that front teeth can be used in endodontic diagnosis in teledentistry. Interestingly, there were no wrong answers for all 299 respondents (100%) who knew that there was a possibility of malpractice in teledentistry. 106 participants (35.5%) agreed that common people are mostly affected by medico-legal frauds, while 193 (64.5%) disagreed. Additionally, 87 participants (29.1%) correctly responded that appropriate diagnosis decreases media-related liability in teledentistry, while 212 (70.9%) responded incorrectly. Lastly, 115 respondents (38.5%) knew that treatment and diagnosis are the most important steps to take when dealing with medico-legal issues in teledentistry and 184 (61.6%) did not know that **(Table 4).** A total of eight items were used for the medico-legal issues with teledentistry in India, which were analyzed further based on attitude. Data were analyzed in terms of percentage of 'definitely yes' responses from participants. Of the 299 respondents, 41.5% strongly agreed that it is necessary to hold workshops on medico-legal issues related to teledentistry. Furthermore, 36.5% strongly agreed that this topic should be incorporated into the dental curriculum, while 36.8% strongly agreed that it is important to recognize the role of paramedical personnel in teledentistry practices. Participants universally agreed that it is important to have the right jurisdiction for teledentistry and to have accurate dental records to achieve medico-legal compliance, with 100% agreeing on both points. In relation to interprofessional working, 44.5% strongly agreed and 4.3% disagreed with coordinating with other health professionals. Similarly, 50.2% strongly agreed and 1.3% disagreed on the need for assessment of other professionals for preventive medico-legal practices. But only 1.7% strongly agreed that continuing education for dental professionals is important. The results showed positive attitude of the participants towards medico-legal aspects of teledentistry and high level of support for including the aspects in the dental curriculum and awareness workshops **(Figure 2).**

Table 1: Demographic variables and knowledge and attitude about medicolegal issues in teledentistry

Demographic variable		N (percent)	Knowledge		Attitude	
			Mean	SD	Mean	SD
gender	Male	130(43.5%)	1.41	0.91	1.51	0.76

	Female	169(56.5%)	1.84	0.88	1.72	0.69
participants	**Staff**	175(58.52%)	3.76	0.58	3.22	0.82
	PGs	124(41.47%)	2.97	0.41	2.51	0.53
Total		299	2.43	1.03	2.11	1.31

Table 2: Knowledge and attitude scores among study subjects

		Staff		**PG**	
Variables		N	Percentage of subjects	N	Percentage of subjects
knowledge	poor	55	(31.42%)	49	(39.51%)
	fair	100	(57.14%)	60	(48.38%)
	good	20	(11.42%)	15	(12.09%)
	total	175	(58.52%)	124	(41.47%)
Attitude	poor	55	(31.42%)	40	(32.25%)
	fair	95	(54.28%)	64	(51.61%)
	good	25	(14.28%)	20	(16.12%)
	total	175	(58.52%)	124	(41.47%)

Table 3: Correlation analysis of demographic variables with knowledge and attitude about medico legal issues in teledentistry among study subjects

Demographic variable		**Knowledge**		**Attitude**	
		X^2 value	**p-value**	**X^2 value**	**p-value**
Gender	Male	1.421	0.004	1.682	0.038
	Female				
Participants	Staff	1.327	0.032	1.424	0.041
	PGs				

Table 4: Knowledge based questions in medicolegal issues in teledentistry

S. No.	**Questions**	**Correct Response**		**Incorrect Response**	
		N	**%**	**N**	**%**
1	Which of the following is considered a commonly used method in teledentistry for remote dental consultation?	139	46.5%	160	53.3%
2	Most convenient method of teleconsultation	128	42.8%	171	57.2%
3	Teledentistry in endodontics can be succesfully utilized in the diagnosis of periapical lesions of the	119	39.8%	61	60.2%
4	What are the medicolegal issues related to security in teledentistry	105	35.1%	194	64.9%
5	Which are the medicolegal issues related to malpractice in teledentistry	299	100%	0	0%
6	Medicolegal frauds mostly happen with	106	35.5%	193	64.5%
7	Which thing reduces the medium associated liability of teledentistry practitioner	87	29.1%	212	70.9%
8	Which accurate measures can cause medicolegal issues in teledentistry	115	38.5%	184	61.6%

Discussion:

Teledentistry can be defined as the utilization of digital record and telecommunication technology to support and facilitate extended distance oral health care, patient and professional health related education, public health and health administration **[6, 7]**. 'Teledentistry' permits an entire new manner to offer expert advice. Via the usage of telecommunication and computer technologies, it's far now viable to offer interactive extra to professional opinions that aren't constrained through the constraints of both area and time **[8]**. According to present study 139 participants agreed that email is convenient for teledentistry. According to study by Irving *et al.* on ethic legal component of teledentistry concluded that teledentix is efficient as it's always updated and has limitless potential **[3]**. It is beneficial in lengthy-far away medical training and preserving with education, screening and dentist laboratory communication. In remote areas, where there is a shortage of professional, comprehensive and complex dental care, teledentistry can be used to augment care to distant patient populations at affordable costs and reduce the burden of a lack of specialized dental professional **[8, 9]**. According to present study 119 dental professionals and post-graduates considered front teeth can be utilized for endodontic diagnosis in teledentistry. Irving *et al.* study found that, as the day goes by, dentists around the world are increasingly interested in this new field, which will increase the level of professional support and improve the quality of dental care services **[3]**. But with less limitations and persistent attempts to fight them, teledentix has a completely auspicious destiny and an extended plan. The present study found that real-time consultation was the most convenient method used in teledentistry, as 128 participants found it to be. According to a study by Jampani *et al* concluded all the technological developments taking region with inside the field of teledentistry, practitioners may also eventually link up to digital dental health clinics and a completely new generation of dentistry may be created **[2]**. The future will also witness the remote telemedical management of robotized units in conditions of long-term unavailability of dental care, such as during area flights, on transoceanic ships and in many rural areas. The results achieved until are very encouraging, placing the road signs for future investigations. However various factors need to be addressed before teledentistry can rise to its peak **[10]**. Further research regarding involving greater quantity of participants could be required to validate the numerous elements of teledentix applications. Sujatha *et al.* results of the present study showed satisfactory knowledge and positive attitude regarding the medico-legal aspects of teledentistry, which is in line with the previous studies. Aktas *et al.* found that dental professionals had positive knowledge and attitudes about teledentistry. Likewise, Jebbeh *et al.* noted that there was good awareness but raised issues about patient privacy and legal obligations. Furthermore, Al-Khalifa and AlSheikh determined that demographic factors

played a role in acceptance and Morey *et al.* highlighted the need to enhance knowledge about ethical and legal issues concerning digital dental care. These results collectively support the importance of organized education and medical-legal guidance for successful implementation of teledentistry **[11-15].**

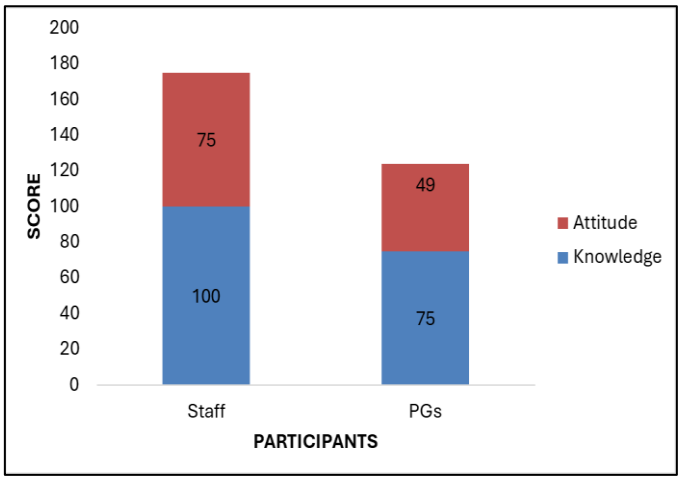

Figure 1: Knowledge and attitude scores among study subjects

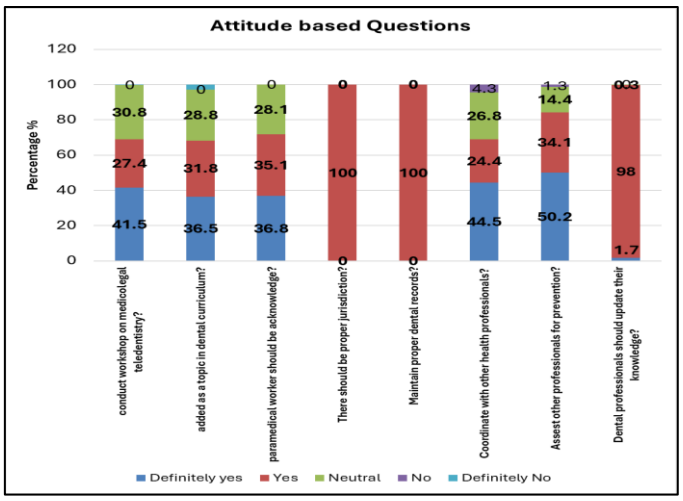

Figure 2: Attitude towards medicolegal issues in teledentistry in India

Conclusion:

Teledentistry is a new and expanding method in the modern dental practice. The participants showed good knowledge and positive attitude towards its medico-legal aspects, pointing to the importance of its incorporation into the dental curriculum and professional training. With the ongoing progress of technology, teledentistry has the potential to enhance the accessibility, communication and quality of oral health care services in India, as long as the proper legal structures and ethical guidelines are put into place and adhered to.

Advancement to Knowledge:

This study provides insight into the knowledge and attitudes of Indian dental professionals regarding medico-legal aspects of teledentistry. It identifies existing gaps in legal awareness, ethical preparedness and professional training requirements. The findings may help in developing structured educational programs and policies for safer implementation of teledentistry practices in India.

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