

**ORIGINAL ARTICLE**

## **Teledentistry in Oral Medicine Practice: Knowledge Among Dental Students and Dentists in Jakarta, Indonesia**

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### **ABSTRACT**

**Background:** The utilisation of teledentistry in oral medicine practice can solve the problem of the limited number of oral medicine specialists and general practitioners in rural communities, specifically with geographic and economic barriers. **Objectives:** to investigate the knowledge level of dental students and dentists regarding teledentistry by assessing their knowledge in oral medicine practice. **Methods:** Using a self-administered structured questionnaire, a descriptive cross-sectional study consisting of 8 items was conducted at the Faculty of Dentistry X University for dental students and dentists in the Province of Jakarta. **Results:** Three hundred two respondents (210 dental students and 92 dentists) responded to the questionnaire. The present study found that 30.4% of dental students and 64.1% of dentists had a good knowledge of oral medicine. All dentists without postgraduate qualifications had less than 5 years of work experience (68.5%). **Conclusion:** The dental students had low knowledge of teledentistry in oral medicine, and most dentists had a good knowledge of teledentistry in oral medicine.

**Keywords:** dental students, dentists, knowledge, oral medicine, teledentistry

### **INTRODUCTION**

Teledentistry is a developing area in dentistry which links dental providers, institutions, and health administration to their patients using electronic information and telecommunication technologies.<sup>1-3</sup> Teledentistry has been applied in several countries to advance access, time, cost, manage and provide screenings and referrals for vulnerable and underserved communities in regions such as school and kindergarten conditions, nursing homes and rural facilities.<sup>4,5</sup> It is also used to exchange information and knowledge between patients, general practitioners, and specialists for more precise treatment planning, results, and continuing education for health professionals.<sup>2,4,5</sup> Eventually, teledentistry can enhance patient compliance, comfort, prognosis, and satisfaction by comparing pre- and post-treatment images.<sup>2,3</sup>

Teledentistry has been applied by general practitioners in every specialist branch and practice, especially in Oral Medicine. Teledentistry was performed before the COVID-19 pandemic and should be more common since the new clinical practice era.<sup>2</sup> Although telemedicine has some benefits, face-to-face consultation and examination are still preferred during the Covid-19 pandemic.<sup>6</sup> General practitioners often require opinions from oral medicine specialists when treating complicated orofacial lesions, including oral malignant and recalcitrant lesions, particularly in rural communities.<sup>2,6,7</sup>

To overcome the gap between oral care services and the population and counter the pandemic of Covid-19, teledentistry can be applied to support dental services, particularly in oral medicine<sup>3</sup> and helps general practitioners in rural communities with geographic and economic barriers to managing patients at a distance or over remote distances.<sup>3,5,7,8</sup>

Several studies about the role of teledentistry in oral medicine practice were conducted among dentists in Indonesia. Still, none of these studies included the knowledge level of dentists and dental students to the best of our knowledge. To generate knowledge of teledentistry in oral medicine practice for the future generation of dentists, it is also crucial to assess the knowledge of the present dental students. Hence, the present study was conducted among dental professionals (including dental students) to know the knowledge levels regarding teledentistry in oral medicine practice.

## METHODS

This cross-sectional study, utilizing questionnaires, was conducted on undergraduate dental students of the Faculty of Dentistry, Moestopo University from first to fourth years (academic students) and five to sixth years (dental professional students)<sup>9</sup> and dentists in the Jakarta, Bogor, Depok, Kota Bekasi (Jabodetabek) region from July until October 2021. The participants were explained the study's objectives and methods, and informed consent was obtained. It was explicitly stated that their participation would be voluntary. Respondents were asked to fill out the questionnaires using Google Forms.

The scientific and ethical approval for conducting the research was granted by the Faculty of Dentistry Ethical Committee of Universitas Prof Dr Moestopo (Beragama) (Protocol No:040/KIP/FKGUPDMB/V/2021) on 5<sup>th</sup> July 2021 and all searches were completed on 24<sup>th</sup> October 2021. All the participants also signed an informed consent form.

A structured and close-ended questionnaire with only one answer was used to assess the respondents' knowledge level. Respondents must answer all questions before the questionnaire can be submitted. Questionnaires were distributed to 1000 undergraduate students and 200 dentists. Each questionnaire's validity and reliability were tested on 30 respondents by online administration. After the questionnaire validation test, a few questions were modified based on participants' feedback, and afterwards, the survey was distributed electronically via Google Forms. The questionnaire included questions regarding age, gender, and study year, and for dentists, it included length of clinical experience and frequent cases being treated. Eight questions were posed to assess knowledge related to common oral medicine practice. The respondents had to choose only one of the options, 'Agree' or 'Disagree'. The questions were so designed that 'Agree' happened to be the correct answer for all the items and scored 1 point, while the wrong answer had no score. The participants' knowledge was calculated by adding the scores of all items, dividing by 8, and expressing them in percentages. The knowledge of the respondents was graded as 'good' (>75%), 'fair' (56-75%), and 'poor' (<56%) based previous published study.<sup>9</sup>

### Data analysis

The data were being input into a programmed statistical analysis. Descriptive statistics (frequencies, percentages, and mean) were used to summarise the data. The chi-square test was used to determine the significant difference in proportions. All the tests were performed after checking all the assumptions at 5% significance levels with a 95% confidence interval. A probability level of less than 0.05 was statistically significant.

## RESULTS

A total of 302 questionnaires were completely answered and considered for statistical analysis. This comprised questionnaires answered by 110 first to fourth-year undergraduate students (academic student), 100 fifth-year undergraduates (dental professional programme student),<sup>10</sup> and 92 dentists. These division was convenience based on the Dental School Educational Years. Table 1 shows the demographic details of the respondents. The study's mean age of first to fourth undergraduate students was 20.26±1.36 years, fifth and sixth undergraduates were 23.5±1.24 years, and dentists were 26.25±11.9 years. Out of 210 dental students, 31 were males and 169 were females, whereas 9 were males and 83 were females for the dentists. The response rate was 21% for dental students and 46% for dentists. All dentists without postgraduate qualifications had less than 5 years of work experience (68.5%) and had never treated oral medicine patients.

Table 2 shows the distribution of dental students' and dentists' questionnaire responses. More than 50% of general dentists and 5th-6th grade dental students agreed on items 1,3 and 4. The percentage of correct answers was more than 50% of the respondents acknowledged the statements for items 2,6,7,8. Half the dentists and almost 50% of dental students provided wrong answers and displayed poor knowledge of item 5.

**Table 1.** Demographic characteristics of participants

Characteristics	Dental Students					
	Year of Study					
Age (in years)	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>
Mean±SD	20.26±1.36			23.5±1.24		
<b>Gender</b>						
Males	4	4	2	4	6	11
Females	22	23	23	28	51	32
<b>General Dentists</b>						
Age (in years)	20-30		30-40		41-50	51-60
Mean±SD:26.25±11.9	76		6		6	4
<b>Gender</b>						
Males	9					
Females	83					
Experience (year)	< 1		1 – 2		3 – 5	> 5
N	26		26		22	18
<b>Frequent cases</b>						
N	Conservative	Prosthetic	Paediatric	Oral Surgery	Periodontic	Orthodontic
	60	3	5	6	17	1

**Table 2.** Distribution of responses among dental students and dentists based on items questionnaire.

No	Questions	Choices	Dental Students Grade				General Dentists	
			1 <sup>st</sup> – 4 <sup>th</sup>		5 <sup>th</sup> -6 <sup>th</sup>		n	
			n		n		n	
			(% total)		(% total)		(% total)	
			% gender		% gender		% gender	
			Male	Female	Male	Female	Male	Female
1	Teledentistry in oral medicine is the practice of dentistry using computers, the Internet, and intraoral camera technology to provide remote consultations.	Agree	6 (5.45)	33 (30)	16 (16)	77 (77)	7 (7.61)	80 (86.95)
		Disagree	42.85 (7.27)	34.38 (57.27)	94.1 (1)	92.77 (6)	77.8 (2.17)	96.38 (3.26)
			57.15	65.62	5.9	7.23	22.2	3.62
2	Teledentistry reduces isolation and helps increase the accessibility of general dentists and oral medicine specialists to rural and underserved communities for oral health care	Agree	10 (9.09)	64 (58.18)	12 (12)	66 (66)	9 (9.78)	82 (89.13)
		Disagree	71.43 (3.63)	66.67 (29.09)	70.59 (5)	79.52 (17)	100 (1.08)	98.8 (1.08)
			28.57	33.33	29.41	20.48	-	1.2
3	Teledentistry helps in the initial consultation of oral soft tissue disease with an oral medicine specialist after examination with a camera/photo.	Agree	5 (4.54)	47 (42.72)	10 (10)	69 (69)	7 (7.6)	78 (84.78)
		Disagree	35.7 (8.18)	52.2 (44.55)	58.82 (7)	83.13 (14)	77.8 (2.2)	93.97 (5.43)
			64.3	47.8	41.18	16.87	22.2	6.03
4	Teledentistry helps make informed decisions about oral disease management and referral to an oral medicine specialist.	Agree	6 (5.45)	26 (23.63)	12 (12)	62 (62)	7 (7.6)	67 (72.83)
		Disagree	42.86 (7.27)	27.1 (63.63)	70.59 (5)	74.7 (21)	77.8 (2.2)	80.7 (17.39)
			57.14	72.9	29.41	25.3	22.2	19.3
5	Teledentistry helps general dentists conduct laboratory examinations of patients according to the direction of an oral medicine specialist	Agree	4 (3.63)	53 (48.18)	6 (6)	50 (50)	4 (4.35)	42 (45.65)
		Disagree	28.57 (9.09)	55.2 (39.09)	64.7 (11)	60.24 (33)	44.4 (5.43)	50.6 (44.57)
			10	43	11	33	5	41

			71.43	44.8	35.3	39.76	55.6	49.4
6	Teledentistry helps general dentists in diagnosing oral soft tissue disease.	Agree	9	70	12	56	8	70
			(8.18)	(63.63)	(12)	(56)	(8.69)	(76.09)
		Disagree	64.28	72.9	70.59	67.47	88.89	84.3
			(4.54)	(23.63)	(5)	(27)	(1.08)	(14.13)
		35.72	27.1	29.41	32.53	11.11	15.7	
7	Teledentistry helps general dentists provide drugs prescriptions and instructions for treatment of oral soft tissue disease with the direction of oral medicine specialist	Agree	11	89	14	73	7	53
			(10)	(80.9)	(14)	(73)	(7.6)	(57.6)
		Disagree	78.57	92.7	82.35	87.95	77.8	63.86
			(2.72)	(6.36)	(3)	(10)	(2.2)	(32.6)
		21.43	7.3	17.65	12.05	22.2	36.14	
8	Teledentistry supports observation of the patient's condition according to the direction and opinion of an oral medicine specialist.	Agree	8	69	15	70	9	81
			(7.27)	(62.72)	(15)	(70)	(9.78)	(88.04)
		Disagree	57.14	71.875	88.23	84.34	100	97.6
			(5.45)	(24.54)	(2)	(13)	-	(2.17)
		42.86	28.125	11.77	15.66		2.4	

Table 3 shows the distribution of qualification, gender, and level of knowledge of participants; 5<sup>th</sup>-6<sup>th</sup> years dental students showed a better level of knowledge than the 1<sup>st</sup> to 4<sup>th</sup> years dental students. The difference was statistically significant ( $p=0.000$ ), as indicated by the Chi-square test. The mean score of male students for all the questions was 62.9, male participants, including dental students and dentists, were 66.87, while female participants were 72.95. Male and female dental students from 5<sup>th</sup>-6<sup>th</sup> years displayed a good level of knowledge better than in 1<sup>st</sup>-4<sup>th</sup> grade. The difference between the level of knowledge and the gender of dental students shown was not statistically significant ( $p=0.115$ ) as indicated by the Chi-square test. The difference between the level of knowledge and the gender of all participants was not statistically significant ( $p=0.07$ ), as indicated by the Chi-square test. There was a statistically significant difference between the qualification of participants with a level of knowledge ( $p = 0.000$ , Chi-square test).

**Table 3.** Gender study Participants' distribution (n) by Good, Fair and Poor Category of knowledge.

Qualifications	Gender	Level of Knowledge		
		Good (%)	Fair (%)	Poor (%)
Dental Students (1 <sup>st</sup> – 4 <sup>th</sup> grade)	Male	0 (0)	5(4.5)	9(8.2)
	Female	6(5.5)	52(47.2)	38 (34.6)
Dental Students (5 <sup>th</sup> -6 <sup>th</sup> grade)	Male	7(7)	6(6)	4(4)
	Female	51(51)	21(21)	11(11)
Total of Dental Students	Male	7 (3.3)	11(5.2)	13(6.2)
	Female	57 (27.1)	73 (34.8)	49 (23.4)
Dentists	Male	6(6.5)	2(2.2)	1(1.1)
	Female	53(57.6)	25(27.2)	5(5.4)
Total of Dental Students & Dentists	Male	13(4.3)	13(4.3)	14(4.6)
	Female	110(36.4)	98(32.5)	54(17.9)

## DISCUSSION

Teledentistry in oral medicine can support oral lesions and medication management, including exchanging clinical information, past and recent history, relevant imaging, determining remote diagnosis, procedures and oral health services.<sup>3,6,11</sup> Oral medicine specialists have also used teledentistry recently and can diagnose and treat oral lesions<sup>6,12</sup> and prevent transmission of SARS-CoV-2.<sup>6</sup> To the best of our knowledge, this is the first study which determines the level of knowledge about teledentistry in oral medicine in Indonesia. The present cross-sectional study has uncovered an interesting and new point concerning advanced dentistry technologies among dentists and dental students in Jakarta City, Indonesia.

The 62.8 % of dental students and 94.6% of dentists in this study agreed that teledentistry in oral medicine is the practice of dentistry using computers, the internet, and intraoral camera technology to provide remote consultations. Teledentistry, with its application in oral medicine, has been evaluated in developed countries.<sup>13,14</sup> A Study conducted in India showed that the majority (88.6%) of dentists

believed that teledentistry is the practice of using computers, the internet, and intraoral camera technologies for diagnosis and to provide advice about treatment over a distance. Teledentistry increases the rate of document exchange and interaction among dental health providers by utilising oral health documents, advanced technology of telecommunications and teleconferences, digital imaging, and the Internet. Jian Hu et al. stated that most dental health professionals were implementing computers in daily practice.<sup>12,15,16</sup> Dentists can anticipate revolutionary transformation as a result of digital advances.<sup>15</sup> In developing countries, the utilization of smartphone cameras has increased, and they are used to take images of oral lesions in remote settings and diagnose lesions made in distant locations. This was demonstrated in a previous study that showed intraoral camera as a reliable tool for screening for oral lesions.<sup>17,18,19</sup> Dentists' lower perceptions of teledentistry utilization were related to diagnostic precision and the time required to take clinical images which would require additional session to take the photos.<sup>20</sup> The use of an intra-oral camera with a qualified program can shorten the time from taking pictures to transferring and storing the images into a medical record application.<sup>21</sup>

One of the benefits of teledentistry for patients is that it facilitates and accommodates consultations with specialists.<sup>22</sup> It was about 72.38% of dental students and 98.9% of dentists in this study showed good knowledge that teledentistry reduces isolation and helps increase the accessibility of general dentists and oral medicine specialists to rural and underserved communities for oral health care.<sup>12</sup> The majority of oral medicine specialists work in academic settings in urban areas, making it challenging for patients living in rural areas to easily access oral medicine services, for example, in dental schools or academic medical centres.<sup>12</sup> The total number of oral medicine specialists in Indonesia is 230 persons and increasing, but mostly located in Java and Sumatera islands, and this condition is similar to other developing countries.<sup>6</sup>

Most dental students (62%) and dentists (92%) in this study agreed that teledentistry helps in the initial consultation of oral soft tissue disease with an oral medicine specialist after examination with a camera/photo, and 70% of dental students and 85% of dentists for teledentistry helps increase the accessibility of general dentists and oral medicine specialist to rural and underserved communities for oral health care.<sup>13</sup> According to the study conducted by Raja et al., 60% of dentists admitted to the capability of teledentistry to help patients.<sup>23</sup> Moreover, 70% of the dentists also showed agreement with its usefulness among patients in rural and remote areas.<sup>15,23</sup>

In oral medicine practice nowadays, online video consultations (WhatsApp, Zoom, Teams, Skype videoconferencing software), qualified photos or videos of suspected malignant oral lesions can be performed, clinical notes, health records and oral medicine specialists can establish a provisional diagnosis, advice or urgent referral.<sup>3,15,24</sup> Follow-up of patients after initiation of treatment, such as in chronic therapies based on systemic corticosteroids or immunosuppressive (dosage adjustment and adverse event), can be done via telemonitoring, and the specialist can assess the patient and determine the next course of management.<sup>17</sup>

Half of the dental students and 79% of the dentists in this study agreed that teledentistry helps make informed decisions about oral disease management and referral to an oral medicine specialist. Teledentistry can minimize unnecessary referrals to specialists. Carrard et al. reported the potential of teledentistry service in determining the diagnosis of oral medicine and reducing the referral of cases considered simple and that could be treated in the primary care system.<sup>25,26</sup> Teledentistry improves the quality of management remotely, detects the risk or possibility and assesses the suspected premalignant and malignant lesions.<sup>27</sup> Villa et al. Confirmed that most of the physicians in US studies referred patients with oral lesions to an oral medicine specialist.<sup>28</sup> On the contrary, the study by Friesen et al.<sup>29</sup> and Schleyer et al.<sup>30</sup> showed more than 50% of oral medicine patients were referred by the dentist.

A total of 54.3% of dentists in the present study agreed that Teledentistry helps general dentists order laboratory examinations and investigations of patients according to the direction of an oral medicine specialist. In teledentistry, the patient does not need to be present during the consultation. The dentist can receive radiographs, graphical representations of oro-facial tissues, laboratory results, tests, remarks, photographs, and other information transported through multiple providers.<sup>15,23</sup> Study conducted by Alsafwani et al. reported that laboratory studies were ordered in three (2%) patients on their first tele(oral)medicine visit.<sup>13</sup>

Teledentistry helps general dentists in diagnosing oral soft tissue disease, and 79.3% of dentists agreed with this statement. Since 2005, dentists and doctors have practised teledentistry to refer patients to the Regional Oral Medicine Consultant in Northern Ireland. Oral medicine specialists can triage and

treat patients with oral mucosal lesions without tactile examination.<sup>17</sup> The outcomes of several studies explained teledentistry can aid dentists in detecting and making remote diagnoses of oral lesions.<sup>25,31,32</sup> Photographs and videos of oral lesions are the principal diagnostic value in oral medicine and one of the fundamental aspects to determine the provisional diagnosis, following advice or crucial referral.<sup>24,33</sup> Tele(oral)medicine has been proven to be an effective tool to assess oral mucosal disorders promptly and address orofacial pain conditions or postoperative complications that may not necessarily require a face-to-face consultation, thus reducing the risk of potential exposure to COVID-19.<sup>13</sup> Most of the general practitioners have difficulties in discovering, identifying, diagnosing and treat of suspected oral lesions.<sup>22</sup> Deferred diagnosis oral cancer and suspended oral medicine treatment due to COVID-19 may lead to alteration clinical result, treatment and prognosis.<sup>24</sup> Early detection of oral cancer using teledentistry has been shown in several studies.<sup>15,34</sup> Teledentistry had excellent sensitivity (93.8%) and specificity (94.2%) for diagnosing dental pathologies among elderly nursing home residents.<sup>27</sup>

Almost all of the dentists in this study (91.3%) accepted that teledentistry is a useful tool for general dentists to provide drug prescriptions and instructions for treating oral soft tissue disease with the direction of an oral medicine specialist. The study in England recommends teleconsultation for prescribing long-term therapies to patients using systemic corticosteroids or immunosuppressive drugs (dosage adjustment, untoward events).<sup>24</sup> Teledentistry supports the interaction between the dentist and the patient in a follow-up to evaluate the healing progress and medication therapeutic drug administration.<sup>35</sup>

Only 4.3% of dentists did not agree with one of the benefits of teledentistry in supporting observation of the patient's condition according to the direction and opinion of an oral medicine specialist. Teledentistry can be a useful tool for dentists in remote observation, investigation, and evaluation of patients, especially during the COVID-19 pandemic.<sup>35,36</sup> Follow-up using teledentistry for patients with oral pain significantly reduced oral pain, according to 65% of self-reported improvement in oral symptoms.<sup>13</sup>

Most of the knowledge about teledentistry in oral medicine of study participants was fair, and this could relatively be described by impediments such as the demand to expand additional knowledge and skills in digital systems for the implementation of teledentistry.<sup>37</sup> More than half of the dentists in this study had good knowledge about teledentistry in oral medicine, although their experience was less than 5 years. Fresh graduate dentists with less work experience might be more literate with new technology.<sup>15</sup> On the contrary, dental specialists with more than a decade of experience were significantly more capable of implementing teledentistry than general dental practitioners and those with under 10 years of experience.<sup>37-39</sup>

Dentists with more than a decade of work experience had lower levels of knowledge about teledentistry than those with less than 5 and 5-10 years of work experience. Technology literacy could influence the acquisition and implementation of the recommended information and communications technology system. The dental students were adaptive and enthusiastic with a new adaptation of computer-based information systems into the dental curricula, dental health records and management of clinics.<sup>16</sup> Lack of knowledge among dentists in the earlier study was due to the absence of teledentistry in dental curricula and no dental continuing education programs on teledentistry,<sup>23,40,41</sup> and this finding will most probably be the matter in many developing countries.<sup>17</sup> Similar to previous studies, dental students and dentists nowadays use technology in daily life and practice, for example, online class teaching and exams, webinars, dental health records, paperless laboratory and radiography results, and teledentistry.<sup>23</sup>

In the recent study, most dentists had a good knowledge of teledentistry in oral medicine, although restorative and endodontic treatments were the most frequently performed treatments, followed by periodontic, extraction, pedodontics, prosthodontic and orthodontic. Corroborating with the earlier studies reported, most of the participants were endodontists and orthodontists, and these professionals were more adhered to teledentistry.<sup>33</sup> The limitation of this study is there is no data obtained for age/years and experience differences and information and technology mastery capabilities; limited sample size and the possibility of not knowing which participants have positive or negative tendencies towards the study objectives can result in response bias.

## CONCLUSION

Finally, these findings revealed that dental students had low knowledge of teledentistry in oral medicine, while most dentists had good knowledge. The lack of knowledge among participants could be overcome by introducing teledentistry into the dental curricula and continuing education programs.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this research report.

## REFERENCES

1. The Baheti MJ, Bagrecha SD, Toshniwal NG, Misal A. Teledentistry: A Need of the Era. *Int J Dent Med Res* 2014;1(2):80-91.
2. Boringi M, Waghray S, Lavanya R, Babu DBG, Badam R, Harsha N, et al. Knowledge and Awareness of Teledentistry among Dental Professionals – A Cross-Sectional Study. *Journal of Clinical and Diagnostic Research* 2015;9(8): ZC41-ZC44.
3. Fourie J, Masenge A. The Practice of Oral Medicine in South Africa. *S. Afr. dent. j.* 2022; 77: 352-9. 1
4. Weintraub JA, Edwards LR, Brame JI, Lampris L, White A, Adatorwovor R, et al. Teledentistry Knowledge and Attitudes: Perspectives on the role of dental hygienists. *J. Dent. Hyg* 2020 Aug;94(4):13-21.
5. Joda T, Yeung AWK, Hung K, Zitzmann NU, Bornstein MM. Disruptive Innovation in Dentistry: What It Is and What Could Be Next. *J. Dent. Res.* 2021;100(5):448–453
6. Amtha R, Gunardi I, Astoeti TE, Roeslan MO. Satisfaction level of the oral medicine patients using teledentistry during the COVID-19 pandemic: a factor analysis. *J Int Soc Prevent Communit Dent* 2021;11: 414-20.
7. Almazrooa SA, Mansour GA, Alhamed SA, Ali SA, Akeel SK, Alhindi NA, et al. The application of teledentistry for Saudi patients' care: A national survey study. *J Dent Sci.* 2021 Jan;16(1):280-286.
8. Iyer P, Anantha S, Griffith A, Farrand C. Teledentistry 101: A Primer for Dental Professionals for the New Normal. *CDA Journal* 2020 Oct;8(10):547-552
9. Hasmunir, Maulidian MOR. Students' Knowledge Level about Earthquake and Tsunami in Disaster and Non-Disaster Alert School in Banda Aceh. *The 7 ix g th AIC-ICMR on Social Sciences 2017 – Syiah Kuala University*:1005-13
10. Badan Legislasi Dewan Perwakilan Rakyat Republik Indonesia. Naskah Akademik Rancangan Undang – Undang Tentang Pendidikan Kedokteran. Jakarta. 2021: 115
11. Sohail K, Ilyas S, Choudhary UJ, Kiyani A. Exploring the Scope of Teledentistry Using WhatsApp Image in Diagnosing Oral Conditions. *Found Univ J Dent.* 2023;3(2):82-87
12. Alawwad SM, Zakirulla M, Alasmari NM, Alamri MM, Alshahrani RA. Perceptions of Teledentistry among Dental Professionals in Saudi Arabia. *Ann. Trop. Med. Public Health.* October 2019;22(VI):1-9
13. Alsafwani Z, Caroline Shiboski C, Villa A. The role of telemedicine for symptoms management in oral medicine: a retrospective observational study. *BMC Oral Health.* 2022; 22:92
14. Haron N, Zain RB, Nabillah WM, et al. Mobile phone imaging in low resource settings for early detection of oral cancer and concordance with clinical oral examination. *Telemed J E Health* 2017;23(3):192–9.
15. Giudice A, Selene Barone S, Muraca D, Averta F, Fedeica Diodati F, et al. Can Teledentistry Improve the Monitoring of Patients during the Covid-19 Dissemination? A Descriptive Pilot Study *Int. J. Environ. Res. Public Health.* 2020; 17:1-9
16. Lin, G.S.S.; Koh, S.H.; Ter, K.Z.; Lim, C.W.; Sultana, S.; Tan, W.W. Awareness, Knowledge, Attitude, and Practice of Teledentistry among Dental Practitioners during COVID-19: A Systematic Review and Meta-Analysis. *Medicina* 2022, 58, 130
17. Tella AJ, Olanloye O.M, Ibiyemi O. Potential of Teledentistry in The Delivery of Oral Health Services in Developing Countries. *Ann Ibd. Pg. Med* 2019;17(2):115-123
18. Pentapati KC, Mishra P, Damania M, et al. Reliability of intra-oral camera using teledentistry in screening of oral diseases – Pilot study *Saudi Dent J.*2017;29(2):74-77
19. Lv N, Sun M, Polonowita A, Mei L, Guan G. Management of oral medicine emergencies during COVID-19: A study to develop practise guidelines. *J Dent Sci.* 2021 Jan;16(1):493-500.
20. Soegyanto AI, Wimardhani Y, Maharani D, Tennant M. Indonesian Dentists' Perception of the Use of Teledentistry. *Int. Dent. J.* 2022;72(5):674-81.

21. Priambodo R. Rekam Medis Elektronik Menggunakan Sistem Penyimpanan Foto Intraoral Gigi untuk Aplikasi Teledentistry berbasis Internet of Things. *Jurnal INOVTEK Polbeng*. 2019;4(2):121.
22. Rahman N, Nathwani S, Kandiah T. Teledentistry from a patient perspective during the coronavirus pandemic. *Br. Dent. J.* 2020 Aug;229(3): 1-4
23. Raja KP, Pal A, Nayak SU, Pai K, Shenoy R. Teledentistry: a new oral care delivery tool among Indian dental professionals – a questionnaire study F1000 Research. 2022; 11:2-11
24. Dziedzic A, Varoni EM. Challenges Of Oral Medicine Specialists at the Time of Covid-19 Pandemic. *Oral Dis.* 2020; 00:1–4.
25. da Costa Flores AP, Lazaro SA, Molina-Bastos CG, de Oliveira Guattini VL, Umpierre RN, Gonçalves MR, et al. Teledentistry in the diagnosis of oral lesions: A systematic review of the literature. *J Am Med Inform Assoc.* 2020;27(7):1166–72.
26. Carrard VC, Roxo Gonçalves M, Rodriguez Strey J, Pilz C, Martins M, et al. Telediagnosis of oral lesions in primary care: The EstomatoNet Program. *Oral Dis.* 2018; 24(6):1012–9.
27. Queyroux A, Saricassapian B, Herzog D, Müller K, Herafa I, Ducoux D et al. Accuracy of Teledentistry for Diagnosing Dental Pathology Using Direct Examination as a Gold Standard: Results of the Tel-e-dent Study of Older Adults Living in Nursing Homes. *JAMDA* 2017;18: 528-32
28. Villa A, Stock S, Aboalela A, Lerman MA, Woo SB, Sonis ST, et al. Oral Medicine referrals at a hospital-based practice in the United States. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2015 Apr;119(4):423-9.
29. Friesen R, McGaw T, Peters E, Lai H. A retrospective analysis of referral patterns to a university oral medicine clinic. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2019 Oct;128(4):381-5.
30. Coppola N, Baldares S, Blasi A, Bucci R, Spagnuolo G, Mignogna MD, et al. Referral Patterns in Oral Medicine: A Retrospective Analysis of an Oral Medicine University Center in Southern Italy. *Int. J. Environ. Res. Public Health* 2021; 18:1-10.
31. Priyanka BS, Reddy LV, Parlapalli V, Pydi SK, Pottam N, Rachuru YS. Teledentistry: Knowledge, attitude, and perception among undergraduate and postgraduate dental students. *J Indian Assoc Public Health Dent* 2022;20:393-7
32. McFarland KK, Nayar P, Chandak A, Gupta N. Formative evaluation of a teledentistry training programme for oral health professionals. *Eur J Dent Educ* 2018;22 (2):109–14
33. Soegyanto AI, Wimardhani YS, Diah Ayu Maharani DA, Marc Tennant M. Indonesian Dentists' Perception of the Use of Teledentistry. *International Dental Journal* 2022: 1-8
34. Soegyanto AI, Siregar KN, Maharani DA, Wimardhani YS. Teledentistry for Improving Oral Medicine Diagnosis: A Systematic Review. *J Int Dent Med Res* 2022; 15(1):365-369
35. Joshua Macapagal J, Tablarin SGA. Implicated Guidelines of Cost-efficient Teledentistry during the COVID-19 Pandemic for a Developing Country: A Narrative Review. *Appl. Med. Inform.* 2021;43(4): 112-23
36. Alsharif AT, Al-harbi SS. Dentists' Self-perception on Teledentistry: The Changing Landscape Driven by Technological Booming in the 21<sup>st</sup> Century. *Open Dent. J.* 2020; 14:291-297
37. Raucci-Neto W, de Souza Pereira M, Cerqueira NM, Louzada VG, de Castro Raucci LMS, Leoni GB. Knowledge, Perception, and Experience of Dentists About Teledentistry. *Int. Dent. J.* 2022; 72:456–462
38. Akbari N, Raeesi V, Khazaei T, Ramezanzadeh K, Ebrahimipour S. Evaluation of general dentists' and dental specialists' knowledge about oral cancer in South Khorasan-Iran 2014. *Asian Pac J Cancer Prev* 2015; 16:6987–90
39. Ziegeler C, Wasiljeff K, May A. Nondental orofacial pain in dental practices—diagnosis, therapy and self-assessment of German dentists and dental students. *Eur.J.Pain* 2019;23:66–71.
40. Alkadi L. Dental Education in the COVID-19 Era: Challenges, Solutions and Opportunities. *Open Dent. J.* 2021, 15, 17-24
41. Sahni S, Chandel, Howell S. Advancing Dental Education by Integrating Teledentistry Teaching and Learning into the Predoc Curriculum. *J Dent Rep.* 2021;2(1):1-3