Effectiveness of Online Oral Health Education During the Covid-19 Pandemic

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Abstract

This study aims at analyzing the effectiveness of online public education about oral health during the COVID-19 pandemic. Studies show that humans touch their face 23 times in 1 hour and touch their mouth and its surroundings 4 times per hour with a duration of 1-12 seconds. This can cause the transmission of the virus through the oral, nasal, or conjunctival mucosa. How oral hygiene can contribute to reducing the risk of Corona Virus transmission between humans is the main focus of this study. Dental procedures carry high risk of exposure to Covid-19 through saliva, blood and other body fluids from patients, the use of high-speed instruments also increases the risk of infection in practice. The incubation period of 7-24 days exposes dentists and patients to cross-infection that can be transmitted through the oral cavity and respiratory tract. The study reveals that a great part of the population in Indonesia, especially in West is unaware of the transmission of the Corona Virus through dental procedures. Consequently, the study suggests that online oral education is suitable for raising the community's awareness of the Covid-19 pandemic.

***Keywords**: Oral Health Education, the Covid-19 Pandemic, Corona Virus, and Dental Procedures*

Introduction

Education is the process of providing knowledge to improve individual abilities in order to form behavior change.[1]Oral Health Education is to provide information about the condition of the oral cavity using educational aids.[1,2] Oral health education is carried out by considering age, level of education as well as social and cultural conditions around the individual.[1,3,4,5]

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Health education can be done face-to-face or online with various methods such as lectures, written media, demonstrations, and game simulations.[1,2,6] Educational materials in the form of technological media are called e-learning (online). The online method changes the system directly which has been established for more than 25 years.[7] The educational method used in this study is an online demonstration method for respondents through podcasts, videos, posters containing educational material distributed on various social media platforms.[8]

The advantage of using online media is that it is easy to access, can be seen repeatedly, the ability to connect individuals from various regions.[9] This is in line with the education trend according to Han et. al (2019) namely by utilizing technology.[10] Technology facilitates education so that it can be accessed anytime and anywhere easily via cellphone or computer. Edu54cational material made

in various forms of multimedia is more interesting and interactive than written form so that it can increase motivation and concentration in viewing educational material.[11] However, behind the many advantages of online methods, there are several limitations, namely the number of people who have limited access to technology, the possibility of technical errors, and difficulty understanding the exact intent of the speaker. Online education is a solution during a pandemic.[12]

The Corona Virus Pandemic (COVID-19) is an infectious disease caused by the novel coronavirus.[13,14] This disease started in Wuhan, China since December 12, 2019 and on January 30, 2020 the World Health Organization (WHO) declared COVID-19 as an epidemic on an international scale.[13] This disease has several main symptoms such as fever, persistent dry cough, and myalgia. Accompanying symptoms such as sputum production, headache, diarrhea, and hemoptysis were also found.[13,15]

Covid-19 transmission can be through coughing, sneezing and inhalation of droplets containing the virus.[13,14] Oral, nasal, and mucous contact with the eye membranes can also be contagious. There are various clinical manifestations of this disease, such as manifestations on the skin and mouth of the patient.[13] WHO recommends maintaining hand hygiene by washing hands with soap in running water for 40 - 60 seconds, or the use of sanitizer containing alcohol for 20 seconds.[14]

The WHO declaration regarding the COVID-19 pandemic condition makes dental services limited to emergency cases. March 25, 2020, the Chief Dental Officer (CDO) in the UK recommends that all dental care be carried out by applying dental emergency triage and providing analgesics and antimicrobial care without involving contact between the dentist and the patient.[13] The dental emergencies mentioned, such as severe uncontrolled pain in the teeth, recurrent and widespread dental infections, permanent dental avulsions, severe trauma to the teeth dental procedures such as permanent cementation of the crown, and a biopsy.[13,5]

According to studies, humans touch the face 23 times in 1 hour which can cause transmission of the virus through the oral, nasal, or conjunctival mucosa.[14,16] Based on Kwok's study, humans touch the mouth area 4 times per hour, with a duration of 1 - 12 seconds.[15] Like hand hygiene, oral hygiene must also be done to reduce the risk of virus transmission. The act of maintaining oral hygiene can be carried out personally at home or in a professional manner.[14] Oral hygiene procedures can be performed by brushing your teeth with toothpaste.[14] During the COVID-19 pandemic, it is recommended to brush your teeth before and after being outside the house,[14] the duration of brushing is 2 minutes.[14,17]

The textures of toothbrushes vary, namely hard, medium, soft, and extra soft.[17,18] For COVID-19 positive patients, they must have personal oral hygiene products and not mix with other people, namely, toothbrush with soft bristles, toothpaste, and personal mouthwash and must be replaced after the patient's condition improves. Toothbrush disinfection can be done by soaking the toothbrush in chlorhexidine solution for 20 minutes before and after use.[19] Oral hygiene equipment for COVID-19 positive patients must be disinfected regularly after use.[14]

Dental procedures are a procedure that carries a high risk of exposure to Covid-19 through saliva, blood and other body fluids from patients, the use of high-speed instruments also increases the risk of infection in practice. The incubation period of 7-24 days exposes dentists and patients to cross-infection that can be transmitted through the oral cavity and respiratory tract.[13,15]

During the pandemic, dental procedures are limited to emergency measures. A strict patient screening procedure must be implemented as a first step namely by measuring body temperature and the patient must complete a questionnaire to identify whether the patient has symptoms of COVID-19 such as fever, persistent cough, and shortness of breath for 2 weeks before the visit. Patients should also report whether they have had contact with 2 or more individuals who have symptoms of fever or shortness of breath 2 weeks prior to the visit. If the screening results indicate the potential for COVID-19 infection in the patient, the visit must be postponed and the patient is expected to self-isolate and visit the nearest health facility.[13,15]

Standard procedure during the COVID-19 pandemic in all health facilities, namely social distancing, must be implemented in the waiting room, patients must wear a mask. Patient appointments should

be scheduled between patients to reduce contact in the waiting room, all magazines or toys should be removed from the patient waiting room. If this step cannot be implemented, then patients are required to wait in their respective vehicles.[15] Hand hygiene procedures must be applied by both dentist and patient when performing the procedure. Dentists should wash their hands before examining patients, after dental procedures, and after touching non-sterile surfaces and tools. Hands should be washed after direct contact with the oral mucosa, blood, body fluids and saliva.[13] Oral hygiene measures in practice must also be applied. Patients are asked to rinse their mouth before performing dental procedures with povidone iodine.[13,15]

During the procedure, the patient must wear a rubber dam to reduce the risk of aerosol contamination.[13,15] Dentists must wear personal protective equipment such as gloves, masks (N-95 or FFP2), face shields, and waterproof gowns or jumpsuits to protect the dentist from aerosol or blood splashes.[15] Waste generated from the treatment of COVID-19 positive patients must be disposed of in a separate place.[13]

Methods

This research is an effort of the Faculty of Dentistry, Andalas University to educate the public about dental care procedures during the COVID-19 pandemic. This research was conducted using a questionnaire for data collection which was carried out online and was carried out from 1 July - 30 July 2020, with 67 volunteers of Thematic field study students of the Faculty of Dentistry, Andalas University. The total respondents for this study were 3500 people. Respondent characteristic data taken is based on age, education level, and occupation of the respondent. The questionnaire consisted of 22 questions that were given online to respondents. The pre-test was carried out on all respondents, then given an intervention in the form of online education, namely by means of interactive video calls, videos, podcasts and educational posters that were distributed to various media platforms to the respondents. Post-test is given to see the degree of understanding of the respondent after the intervention. The data that has been obtained are then processed statistically.

Results

Characteristics of Respondents

The description of the characteristics of respondents based on gender, education level, and occupation. Based on the data, respondents with male gender is 1190 respondents (33.4%) while female respondents are 2393 respondents (66.6%). Respondents with the most recent education level, namely Senior High School is as many as 1916 respondents (53.4%).

Univariate Analysis

Based on the data, the question 11 in the *post-test* section received the most correct answers from as many as 3449 respondents (96.1%). Most errors in the *post-test* section is in question number 4 with 1114 respondents (31.0%). Question number 21 shows the *pre-test* results with the highest error, namely 2315 respondents (64.5%).

Bivariate Analysis

Table 1.1 Relationship between Gender and Pre-Test Results

	Gender				Total		p-value
Pre-test	Male		Female				
	f	%	f	%	f	%	
Insufficient	41	39,4	63	60,6	104	100	**0,006**
Sufficient	701	36,2	1238	63,8	1936	100	
Good	339	30,8	768	69,2	1106	100	
Total	1081	34,4	2069	65,5	3150	100	

Based on table 1.1, it can be seen that as many as 41 respondents (39.4%) were male and 63 respondents (60.6%) were female with Good category pre-test. It is known that the p-value is 0.006, so there is no relationship between gender and the pre-test results.

Table 1.2 Relationship between Gender and Post-Test Results

	Gender				**Total**		**p-value**
Pre-test	**Male**		**Female**				
	f	**%**	**f**	**%**	**f**	**%**	
Insufficient	3	100	0	60,6	3	100	**0,006**
Sufficient	94	39,0	150	61,0	244	100	
Good	985	33,9	1918	61,1	2903	100	
Total	1082	34,4	2069	65,5	3150	100	

Based on table 1.2 it can be seen that as many as 985 respondents (33.9%) were male and 1918 respondents (66.1%) were female with a Good category pre-test. It is known that the p-value is 0.016, so there is no relationship between gender and the results of the post test.

Table 1.3 Relationship between Education and Pre-Test Results

	Pre-test								**p-value**
Pre-test	**Insufficient**		**Sufficient**		**Good**		**Total**		
	f	%	f	%	f	%	f	%	
Kindergarten	4	3,8	15	0,8	6	0,5	25	0,8	
Primary School	6	5,8	130	6,7	43	3,9	179	5,7	
Junior High	20	19,2	192	9,9	85	7,7	297	9,4	0,000
Senior High	54	51,9	1039	53,6	605	55,0	1698	54	
University	20	19,2	563	29,0	368	32,9	951	30,1	
Total	104	100	1039	100	1107	100	3150	100	

Table 1.3 suggests that as many as 6 respondents (0.5%) have a kindergarten education, 43 respondents (3.9%) have elementary school, 85 respondents (7.7%) junior high school, 605 respondents (55.0%) high school, 368 respondents (32.9%) universities with Good category pre-test results.

Table 1.4 Relationship between Education and Post-Test Results

	Pre-test								p-value
Pre-test	**Insufficient**		**Sufficient**		**Good**		**Total**		
	f	%	f	%	f	%	f	%	
Kindergarten	0	0	2	0,8	23	0,8	25	0,8	
Primary School	2	66,7	17	7,1	160	5,5	179	5,7	
Junior High	0	0	37	15,4	261	9,0	298	9,5	0,000
Senior High	1	33,3	123	49,8	1579	54,4	1700	54,0	
University	0	0	65	27,0	880	30,3	945	30,0	
Total	3	100	244	100	2903	100	3150	100	

The above table shows that as many as 23 respondents (0.8%) had a kindergarten education, 160 respondents (5.5%) Elementary School, 261 respondents (9.0%) Junior High School, 1579 respondents (54.4%) Senior High School, 880 respondents (30.3%) universities with Good category post test results.

Table 1.5 Mean Score of Interventions

Variable	Pre-test		Post-test		Difference	p-value
	Mean	± Primary School	Mean	± Primary School		
Intervention	16,06	3,631	19,85	4,172	2,79	0,000

Table 1.5 suggests that the results of the statistical test showed that the average difference in knowledge before and after the intervention was obtained p-value of 0.000 ($p < 0.005$), it can be concluded that there was an influence on the intervention that was carried out.

Table 1.6 Interpretation of NGain

	Class	N	Mean	Standard Deviation	Standard Error Mean
NGain Percent	Intervention	3150	78,11	34,467	0,614

Based on table 1.6, it can be seen that the average (mean) value of NGain Percent for the intervention class is 78.11 or if rounded to 78%. Based on the category table of interpretation of the NGain value (%) above, it can be concluded that the method used is effective.

Discussion

The educational background of each respondent affects the level of knowledge. The results of the respondents' pre-test showed that high school and college education had good knowledge of oral health during the COVID-19 pandemic. This shows that the level of education plays a role in individual knowledge regarding oral health. This is consistent with the 2015 Gomes study and the 2020 Chen study, namely individuals with low educational degrees will have low health literacy,

poor diet, and poor oral health behaviors.[20,21] According to Passalacqua (2012), the level of education affects the level of knowledge about dental and oral health because the higher the level of individual education, the higher the possibility of the individual being exposed to dental and oral health promotion programs.[22]

Of all the pre and post test questions, question number 11 about masks is the result with the smallest percentage of errors. The educated community has understood the function of masks. The transmission of COVID-19 can be through droplets, direct contact and aerosols. Face-to-face conversation, breathing, coughing and sneezing can release droplets up to 1 meter away so that they can enter the mucosal surface. According to Wang (2020), the use of masks is the main effective preventive measure against the transmission of COVID-19 Virus infection.[23]

Question number 4 regarding the procedure for storing toothbrushes shows the highest error results. This illustrates that people who are educated do not understand that COVID-19 transmission is through toothbrushes. Toothbrush can be a medium for the development of microorganisms so it must be replaced periodically within 3 months.[13,17,18,19] Store the toothbrush in a dry place in an upright position until reuse.[18] Check the bristles regularly, if the bristles have been damaged before 3 months of use then the toothbrush must be replaced.[13,18] Bristles that are damaged too quickly (before 3 months) indicate that the individual is brushing their teeth too hard, while a toothbrush that does not break after more than 3 months of use indicates that the individual has not brushed his teeth properly and correctly.[13,17] Toothbrush replacement is also recommended if the individual has recovered from an infectious disease.[17]

Of all the pre-test questions, question number 21 regarding the maximum time to get oral therapy, the results of the pre-test answers have the highest error rate in the community. After education has been carried out, it can be seen that the increase in public knowledge about the timing of oral therapy during the COVID-19 pandemic. Oral therapy carries a risk of SARS-CoV-2 infection because of the procedure, which involves face-to-face communication with the patient and frequent exposure to saliva, blood and other body fluids, as well as the use of sharp tools. The corona virus can be transmitted within a distance of less than 2 meters and the duration of exposure is more than 15 minutes.[24] According to Bizocca (2020), the corona virus can survive in aerosol form and can survive on objects' surfaces. The corona virus becomes inactive indoors within 10-15 minutes.[25,26]

In the bivariate analysis of this study, gender did not affect knowledge about oral health. This is consistent with Azodo's 2015 study, namely the role of gender on perceptions of oral health, oral health problems, and oral health status.[27] However, the results of this study contradict the 2019 Etetafia study, which states that gender has an influence on knowledge of dental and oral health.[28] In this study, it was stated that women in Africa tended to have more knowledge about oral health than men.[28] This is due to the social role of women who are responsible for family health, so that women tend to be more interested in seeking health information.[28,29]

Education has an influence on respondents' knowledge. This is in accordance with the Halawany study in 2018 and Angelopolou in 2015 regarding dental education interventions in children.[30,31] Education about oral health aims to improve health literacy and provide changes in attitudes to individuals.[32,33,34,35] There are two aspects to the educational process, namely the perception and motivation of the individual.[33]

The method of providing education can be based on Dale's cone of experience.[2,36] Giving lectures, demonstrations, and simulations is an educational method that can be given the use of digital platforms such as social media as an educational medium can also be done to educate the public.[5,36] The percentage level of individual understanding will vary and depends on the teaching method used, individuals taught by the lecture method will remember 10% - 30% of the information provided, individuals taught by the demonstration method will remember 30% - 50% given, and individuals who taught by the simulation method will be able to remember 70% - 90% of the information given.[36] The success factors for a health education consist of the presentation of material based on the needs of the community as an educational target, techniques for providing materials tailored to the community's abilities such as effective planning of educational programs, the active role of the community during education, and a

comprehensive evaluation of the educational programs provided.[2,36,37,38]

Dental education should be provided in a way that is easy to understand and adapted to each level of the respondent's age group.[32,33] The application of an educational method must consider the values, culture, language, emotional and social needs of each respondent.[33] Each individual has different characteristics in processing the information received. This difference must be taken into consideration, so that education must be provided according to individual characteristics in order to be effective in achieving an understanding related to oral health.[20,35]

Education given by the lecture method must use simple and easy to understand sentences, avoid using health terms, and speak slowly. Education that is given personally can also use the personal experience of the target to facilitate understanding of the material.[39,40] Meanwhile, the education given on a demonstration is good to use simple pictures to make it easier for respondents to understand and to help focus on the material.[39,38]

Health education can also fail due to obstacles encountered during the process, such as the presenters do not have sufficient ability to educate respondents, the presenters do not consider patient characteristics in understanding information, language, culture, socioeconomic factors, and the education level of respondents also plays a role as a barrier to health education.[38,40,41]

Evaluation of oral health promotion based on Nutbeam consists of four levels, namely actions taken on oral health promotion such as education, outcomes - the consequences of education, namely health literacy, intermediate health outcomes - behaviors that are formed after health literacy, health and social outcomes- examination of health indicators such as plaque scores.[30,32] In this study, NGain's results were 78% so that online education methods were effective on respondents' knowledge. Increased knowledge of public oral health carried out online is suitable for the COVID-19 pandemic conditions. Oral health education is very important for the public to minimize the oral transmission of COVID-19.

Conclusion

Online education methods are effective on respondents' knowledge. Online oral education is suitable for the COVID-19 pandemic conditions. Oral education is very important for the community to break the chain of COVID-19. The results of this research show that there is public ignorance about toothbrushes as a medium for transmitting COVID-19. The study also reveals that there is public ignorance about the limitation of time for oral therapy during the COVID-19 pandemic. However, the study notes that the community's understanding of the function of masks to protect themselves from the transmission of COVID-19 was obtained.

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