

Effectiveness of the novel teledentistry “HI BOGI” an android -based oral health application on increasing oral health knowledge in elementary school children

Rina Putri Noer Fadilah^{1*}, Ari Prayogo Pribadi², Rizki Wisnu Aji³, Ramadani Kusaeri¹

¹ Department of Dental Public Health, Faculty of Dentistry Jenderal Achmad Yani University, Indonesia

² School of Public Health, Epidemiology & Biostatistics, Environmental Research Group of the Faculty of Medicine Imperial College London, United Kingdom

³ Private Dental Practitioner, Bandung, Indonesia

ABSTRACT

Introduction: Knowledge is the domain of behaviour, a person’s good oral health behaviour must meet the elements of good oral health knowledge. Lack of oral health knowledge is one of the causes of oral dental disease. The most common oral disease, particularly in elementary school, is dental caries. One of the efforts to improve oral health knowledge is to be obtained from health promotion. The COVID-19 pandemic has led to many online health promotion media. One of the health promotion media is through an Android-based oral health application combined of teledentistry and telesurvey at the same time. It has the advantages as a media to reduce the presence of caries, particularly in children. The purpose of this study was to introduce and determine the effectiveness of the novel “HI BOGI” application of oral health on knowledge of oral health in elementary school children during the COVID-19 pandemic.

Methods: An observational analytic method with a cross-sectional design used in his study. The sampling technique used is simple random sampling. The research instrument is a questionnaire via Google form and the “HI BOGI” application. Analysis of the data used is the Wilcoxon test. **Results:** The study was conducted on 143 elementary school students in Cimahi City. 55.2% are female, and 36.4% are 12 years old. The level of knowledge of oral health before downloading this “HI BOGI” application was in the moderate category and became good after downloading the application. There was a significant value of knowledge before and after downloading the HI BOGI application with using Wilcoxon with a significance value of $p < 0.05$. **Conclusion:** The effectiveness of using the HI BOGI application can be seen after being among student in elementary school.

Keywords: HI BOGI application; oral health; Teledentistry; Telesurvey

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*Corresponding author: Rina Putri Noer Fadilah, Department of Dental Public Health, Faculty of Dentistry Jenderal Achmad Yani University, Indonesia. Jalan Terusan Jenderal Sudirman, Cimahi, West Java, 40531, Indonesia. Phone: +62 811-228-205; e-mail: rina.putri@lecture.unjani.ac.id

INTRODUCTION

The development of today's very dynamic era has made technology a critical sector. It is undeniable that technological developments have spread to various aspects of everyday life, making people adapt to these technological changes. Growing technology will undoubtedly make our lives easier, one of which is in the health sector. The development of information and communication technology will affect developments in various aspects of human life including oral health. Social media is experiencing a very rapid development at this time, especially during the COVID-19 pandemic.¹

The Basic Health Research (Riskesdas) results in 2018 stated that the proportion of dental and oral problems in Indonesia was 57.6%, with the population receiving services from dental, medical personnel only 10.2%. The proportion of proper tooth brushing behaviour in the population in West Java is only 2.8% which is the same proportion as in Indonesia. The prevalence of dental caries at primary school age, which is 5-9 years, is 92.6%, and the prevalence of dental caries in West Java is 79.7%.² One of the cities in West Java that have quite similar caries percentage to national prevalence of dental caries is Cimahi city. The prevalence of dental caries in children aged 5-6 years in Cimahi City is 92.5% in rural areas, and 91.5% in urban areas. The prevalence of caries in grade 1 students at the Mandiri Padasuka Elementary School, Cimahi City, West Java is 96.9%. Cimahi City is an administrative city in West Java, Indonesia.³

The government has implemented a program to reduce oral dental disease in elementary school children through the School Dental Health Business (UKGS). Oral dental health efforts through UKGS include oral dental check-ups, dental health education, shared toothbrushes, fluoridation of drinking water, and light and accessible dental care.⁴ UKGS is under the guidance of puskesmas, but not all schools have UKGS, as seen from 14 elementary schools under the guidance of the Padasuka Health Center, Central Cimahi District, West Java, only one school has UKGS Phase I.

One of the causes of UKGS implementation's ineffectiveness is limited human resources, especially in carrying out dental health education.⁴ Implementation of oral health education through UKGS is oral health counselling. The purpose of

routine oral health counselling is to increase knowledge of oral dental health. The effectiveness of UKGS in children is that it can increase knowledge, improve oral dental health, change behaviour to maintain oral health, decrease plaque index, and other things.⁵

Limited human resources encourage the community and health workers to create solutions and innovations so that these activities can run effectively. The Indonesian government has made efforts to improve dental and oral health by introducing technology to the public. It aims to make it easier for the public to get health information. Currently, not all people can take and receive the benefits of technological developments. It is hoped that the current technological developments will have a positive impact on all circles. During the COVID-19 pandemic, activities through social media have increased rapidly. Almost all activities, including education, are carried out online, and UKGS activities as well. The implementation of UKGS for a year since the COVID-19 pandemic has decreased. UKGS activities routinely carried out are oral health counselling, oral examinations, shared toothbrushes, and primary dental care as the UKGS Phase 3. During the pandemic, UKGS activities are carried out online via Zoom® meeting, which gives advantages and disadvantages. The advantage of the Zoom® application is that counselling can be done interactively, but the disadvantage is that it charges a high internet quota. In addition, with the Zoom® application, it is not easy to perform a dental examination. Therefore, this application cannot be used primarily for counselling or educational media because of the limitation in time and cost.

Based on this, it requires an application that is easily accessible, with minimal difficulty of use and low quota. Furthermore, the application expected to reduce the number of caries cases in Indonesia, particularly in the area of study, which was conducted in elementary school in Cimahi city. We introduce a novel dental health application "HI BOGI is Hello Indonesia with Dentists" that is an application regarding oral dental health education, a "self-assessment" of dental health independently, and online consultation with a dentist. HI bogi application is currently based on android which will later be developed for IOS.

The purpose of this study was to determine the effectiveness of the "HI BOGI" application on the increase of knowledge of oral health in Elementary School Children in Cimahi City.

METHODS

The research method used was observational analytic, with a descriptive research design. The sampling technique in this study was simple random sampling. This study obtained the sample according to the inclusion criteria through a simple random sampling technique. The research subjects were elementary school children aged 6-12 years in elementary schools under the target area of the Puskesmas, Central Cimahi District, during the

research period until the predetermined sample size was obtained. Sampling by simple random sampling was done first by knowing the number of elementary schools in the targeted area of the Puskesmas, then looking for the population of children aged 6-12 years in each elementary school, then calculating and selecting randomly to find out the research subjects based on the number of samples. In this study, to determine the magnitude of the disease or the prevalence of dental caries in children aged 6-12 years in Cimahi City, it is necessary to know the magnitude of the disease in the area. However, because there has been no research in that area, the proportion in this study is 0.5. Thus, to obtain the sample size, the following calculations are carried out:

$$\text{Minimum sample} = \frac{(\text{degree of freedom}) \cdot \text{estimated proportion} (1 - \text{estimated proportion})}{(\text{absolute precision})^2}$$

$$\text{Minimum sample} = \frac{(1.96)^2 \times 0.5 \times (1 - 0.5)}{0.1^2} = 96.04 \sim 96 - 100 \text{ Person}$$

The inclusion criteria for this study were the age group 6-12 years, willing to participate in the study, living in the research area, having an Android-based cell phone. In addition, exclusion criteria in this study were permanent molars that had not erupted, respondents who did not complete their participation in the study until they were finished. The Setiamanah Mandiri I Public Elementary School was found as the target area of the Padasuka Health Center. There were 160 students in Grades 1-6. The current research subjects based on the inclusion and exclusion criteria above were 143 children.

The research instrument used is the Google form and the HI BOGI application, which can be downloaded at the following link <https://play.google.com/store/apps/details?id=com.rizkiwisnuaji.hibogi>. The procedure of this research is that the researcher makes an android-based HI BOGI application. In the application, there are menus: Teledentistry, Telesurvey, tooth brushing alarm, dental and oral health e-posters, and videos on how to maintain oral health as Telepromotion and Teleprevention. First, researchers screened research subject data. After getting the research subjects according to the inclusion criteria, the researcher invited the children in WhatsApp groups to make it easier to coordinate. Then

the researcher gave a questionnaire through the google form at the following link <https://bit.ly/3m25sC6>. After the children filled out the online questionnaire, they were given socialisation and guidance to download the HI BOGI application within seven days. Children who have been given socialisation on using the HI BOGI Application then fill out a Telesurvey on the application.

The data was obtained in oral health knowledge before and after being using the HI BOGI application. The result of knowledge in the form of scoring. The data results were tested for normality if the data were normally distributed using a dependent t-test and not normally distributed using the Wilcoxon test with a significance value of $p < 0.05$. This research has obtained ethical clearance with NO. 054/UM2.12/2020 published by the Health Research Ethics Commission, Faculty of Medicine, Universitas Jenderal Achmad Yani of Cimahi. In this study, there is a level of knowledge before and after the study. There are two categories, namely moderate and good. Moderate has a range of 40-85 while good is 85 and above.

RESULTS

The results of the research conducted at the Setiamanah Mandiri I Public Elementary School

in the target area of the Padasuka Health Center were 160 students in Grades 1-6. Subjects included in the inclusion criteria were 143 children. This research was conducted online due to the COVID-19 pandemic. This research was conducted online using WhatsApp and android applications, namely HI BOGI “Hello Indonesia with Dentist”. Based on the study results, most of the gender of the students of the Setiamanah Mandiri I Elementary School were female, with a percentage of 55.2%. The age of most of the students was 12 years, as much as 36.3%. Most of the respondents in this study were in the 4th grade elementary school, namely 42%.

Table 1. Characteristics of elementary school children

Characteristics	Number	Percentage (%)
1. Sex		
Male	64	44.8
Female	79	55.2
2. Age (years)		
6	6	4.2
8	1	0.7
9	16	11.2
10	47	32.9
11	21	14.7
12	52	36.4
3. Class		
1	6	4.2
3	3	2.1
4	60	42.0
5	21	14.7
6	53	37.1

Knowledge of oral health was one of the domain factors for forming behavior in maintaining oral health. Therefore, good knowledge of oral health can reflect good oral health conditions. This study was describing the knowledge of oral health in elementary school children before and after being given the HI BOGI application intervention using descriptive methodology.

Table 2. Oral health knowledge of Elementary School Children

Knowledge level	Median	Category	Minimum-Maximum
Before intervention	60	Moderate	40-85
After intervention	85	Good	40-100

The results showed that the level of knowledge before being given intervention with the HI BOGI application was moderate, and after being given an oral health promotion intervention using the HI BOGI application, it was in a good category.

Application of oral health as one of the media apart from teledentistry, telesurvey, and a medium for promoting oral health. This study aims to see the effectiveness of the application of oral health on increasing knowledge of oral health in elementary school children. Based on the study results using Wilcoxon test, there was the effectiveness of the application of oral health on increasing knowledge of oral health with a p-value of 0.000 pada taraf kepercayaan 95%.

Table 3. Effectiveness of oral health knowledge on the increase of oral health knowledge of Elementary School Children

Knowledge level	Median	P-value
Before intervention	60(40-85)	0.000
After intervention	85(40-100)	

Figures below shows the preview of HI BOGI Application on Android based. Currently HI BOGI application is only available in Bahasa. Therefore, the application will be developed and will be available in IOS and English version.



Figure 1. Preview of HI BOGI application preface which displayed oral health e-posters, oral health articles, HI BOGI quizzes, and user oral health report card

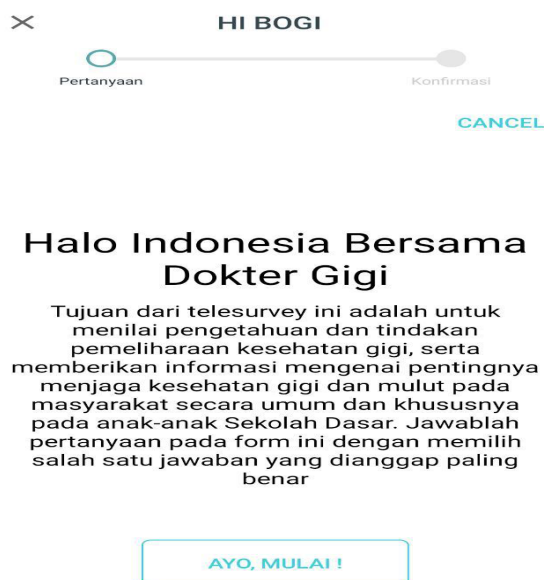


Figure 2. Start menu of HI BOGI telesurvey. This survey meant to assess knowledge and practice of oral health, as well as giving information regarding the oral health care importance for the society. The user should choose the correct answer on the given form.

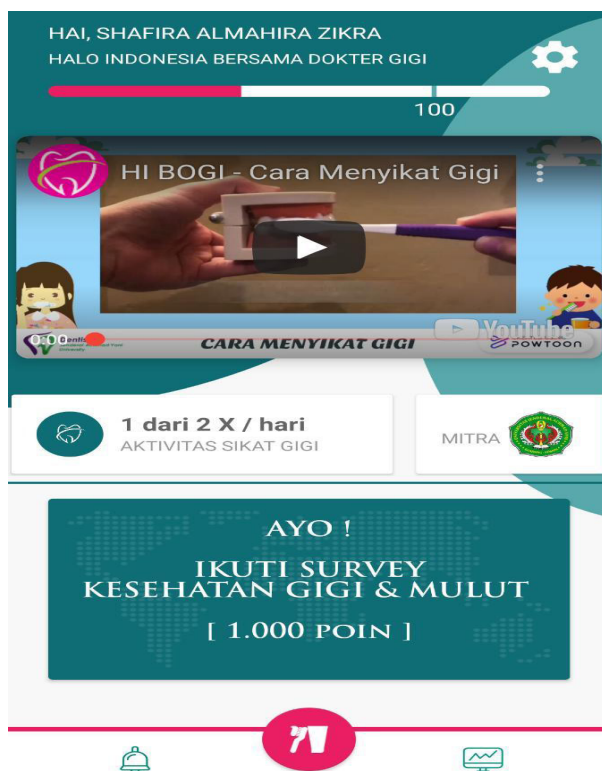


Figure 3. Telesurvey menu and tutorial video. After finishing the telesurvey, the user will be given a tutorial video and additional 1,000 point that will be added to their report card

DISCUSSION

Applications on mobile phones have increased in recent years. The increase in the use of

smartphones has led to explosive growth in the use of smartphone applications aimed at promoting health status and behaviour in maintaining health. In 2019, a systematic search on smartphone applications found 612 applications related to dental and oral health. Another systematic review shows that the Mobile-health strategy can serve as an additional instrument or media in improving oral hygiene, especially in preventing oral diseases such as caries and periodontal disease. The Mobile-health application also aims to improve oral health knowledge.⁶

In this study, an application created was called HI BOGI (Hello Indonesia with Dentists) to function as teledentistry, telesurvey, telepromotion and teleprevention in the occurrence of oral disease to support behaviour improvement in maintaining oral health (knowledge, attitudes, and practice). These four methods are considered very useful in the development of digital technology 4.0. In addition, it can provide considerable benefits for patients and dentists.

There are several menus in the application: teledentistry for an independent oral examination, telesurvey to see the level of knowledge and attitudes in maintaining oral health, tooth brushing alarm, telepromotion and teleprevention oral health. Various kinds of literature showed that teledentistry can be the newest solution in dental practice.^{7,8,9,10,11}

The results showed that elementary school children's level of oral health knowledge before being given intervention or downloading the HI BOGI application was included in the moderate category. However, the level of knowledge of oral health in elementary school children after downloading the HI BOGI application was found in the good category. This result was similar to the study conducted by Bonabi et al.¹² which stated that the knowledge score increased significantly after being given a smartphone application intervention. Previous research by Zolfaghari et al.⁶, stated that after one month the application was downloaded, there was an effect in increasing knowledge and attitudes in maintaining dental and oral hygiene. Another study on pregnant women showed that Android Based Dental and Oral Health Effective education (E-Kgm) improves the correct behaviour of brushing teeth in pregnant women.^{13,14,15}

This study found the effectiveness of the HI BOGI application on improving oral health in elementary school children. This study is similar to previous research that using the same an Android-based application. Study showed that adolescent knowledge of school children increased after being given an intervention using an Android-based application.¹⁶

Knowledge means that the individual has all the data needed to understand dental and oral diseases and the occurrence of these dental diseases and understand the protective measures that need to be taken. This knowledge, in theory, will cause changes in attitudes to bring individuals to make changes in everyday life. So, in the case of dental caries, the individual knows that brushing the wrong teeth can cause caries, and this information results in a positive attitude towards brushing teeth every day, thereby changing the behaviour of brushing teeth.

Several previous studies have shown that increasing knowledge about risk factors for oral diseases and strong knowledge of oral health indicate better dental and oral abilities in treatment practices promoting oral health. In addition, school children with less knowledge of oral health are twice as likely to experience caries as school children with good knowledge.

Therefore, an effective promotion and prevention program is needed for school children. However, it is essential to evaluate the current status of oral health knowledge before designing an effective prevention program. Based on this, the promotion and prevention of oral disease through the HI BOGI Mobile phone application based on Android is expected to increase oral health knowledge, especially in elementary school children and maintain everyone's oral health.

With an interactive menu and easy to use. It is hoped that this application can have a positive impact on its users. After testing on elementary school children. They have showed an enthusiasm to use some of the menus, such as, the toothbrush reminder menu in the morning and evening, as well as quizzes with prizes. In addition, students can access the video on how to brush their teeth properly and practicing at home. Furthermore, the teledentistry menu can be used by students and parents to conduct online consultations with dentists. The procedure for taking photos has also

been given in the video available in the application. With several interesting menus available, there was quite a lot of enthusiasm among elementary school student and also improve their knowledge regarding the oral and health.

CONCLUSION

The conclusion in this study is that there is an effect of the HI BOGI application on improving oral health in elementary school children. In addition, the HI BOGI application is considered to be effective as an online educational media.

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