

## RESEARCH ARTICLE

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# Impact of the Android-Based Dental Guard Application on Enhancing Dental Caries Knowledge Among 5<sup>th</sup> Grade Students at SDN Ngagel 1 Surabaya

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**ABSTRACT** Dental caries and periodontal diseases are common oral health issues in the community, with a particularly high prevalence of caries among children. This study aimed to determine the effect of the Android-based Dental Guard application on improving knowledge of dental caries among 5th grade students at SDN Ngagel 1 Surabaya. The research utilized a pre-experimental design with a One-Group Pretest-Posttest approach. Data were collected through questionnaires administered before and after the health education session. The data analysis showed a significant improvement in students' knowledge of dental caries after using the Dental Guard application, with a significance value of 0.000, which is less than  $\alpha < 0.05$ . Prior to using the Dental Guard application, the students' knowledge was categorized as moderate, but after using the application, it improved to a good level. The findings indicate that the Dental Guard application effectively enhanced the knowledge of dental caries among 5th grade students at SDN Ngagel 1 Surabaya..

**INDEX TERMS** Knowledge, students, dental caries, applications

## I. INTRODUCTION

According to [1] health is a healthy state of teeth and mouth hard and soft tissues and various related elements in the oral cavity, which allows a person not to experience difficulty eating, speaking and social interaction, aesthetic disturbances, and discomfort due to disease, occlusion disorders and tooth loss so that they can be socioeconomically productive. Oral health is very important for everyone including children because damage to teeth and gums can cause pain, difficulty chewing, and other health problems [2].

In [3] concluded that oral health is influenced by several factors, including environmental heredity, behavior, and oral health services. Behavior is important in oral health, the behavior carried out depends on the knowledge possessed. According to [4] Increasing the dental and oral health knowledge of elementary school children can be done through UKGS. The definition of UKGS is dental health service efforts in schools ranging from promotive, curative, and preventive. The aim of UKGS is to improve the degree of dental health of

school students in accordance with. The establishment of UKGS is an effort to maintain health at school as a first aid at school [5].

Based on [6] Oral health cases that are commonly found in the community are dental caries and periodontal disease. Dental caries is a pathological condition that results in permanent damage to tooth enamel, leading to the formation of cavities. The etiology of dental caries can usually be attributed to inadequate oral hygiene practices, as well as the consumption of sugary substances and drinks [7].

Dental caries or also called cavities is a problem with the hard tissues of the teeth, involving enamel (the outermost hard layer), dentin (the bottom of the enamel / enamel), and cementum (hard connective tissue). The state of dental and oral hygiene of children tends to be worse than that of adults. This is caused by low public awareness in maintaining oral health. Low knowledge about oral health is also a factor that affects this condition [8].

According to Basic Health Research (RISKESDAS) data in 2018, the prevalence of caries was 88.8%, while in children aged 5-9 years it was 92.6% and aged 10-14 years it was 73.4%. According to [9] that the UKGS 2020 long-term target is a caries-free rate (mixed teeth)  $\geq 50\%$ .

Loss of chewing power and digestive problems are some of the effects of dental caries in children, which can lead to other health problems. Caries can also cause children to lose focus on learning. In early childhood, dental caries can cause serious effects, such as brittle teeth and cavities. Caries can get deeper and wider, and even break, if left untreated. This can lead to children being unable to chew and problems with their digestion [10].

Primary school children are the next generation that will determine the future of the state and country. The next generation will develop and grow according to the growth and development process of each student. [11].

Elementary school children have several characteristics including an interest in practical and concrete life, realistic curiosity and learning, children face tasks freely and try to complete themselves, have a sense of concern for report cards, and finally like to form groups with peers who are usually made to play and learn together [12]. Caries prevention according to [13] can be done through diet selection, oral hygiene instruction, and treatment with fluoride.

According to [14] Primary school children show characteristics such as a greater tendency to engage in fun activities, physical movement, collaborative work, and a preference for hands-on experience. Characteristics of high grades include interest in daily life routines, high curiosity and learning, interest in specific subjects, attempts to solve problems independently, understanding of report cards, and enjoyment of playing in groups with fellow students. [12].

According to [8] the development and improvement of advanced science and technology in the telecommunications sector, especially devices with comprehensive functions, make it easier for students to access a large amount of information available worldwide. This helps students in finding information related to learning materials. According to [8] students involvement in playing online games is usually observed after school hours, in the afternoon, and at night before going to bed. Some people are even reported to engage in gaming activities before entering school. It is known that electronic devices not only serve as communication tools but also have multifunctional capabilities. Gadgets can improve behavioral health for the better. [15].

Berdasarkan hasil pemeriksaan awal di kelas 5B SDN Ngagel 1 Surabaya, 9 out of 10 students had caries or (90%) and the number of students who were not affected by dental caries was 1 student or (10%). This shows that students in class 5B SDN Ngagel 1 Surabaya have a low percentage and is not in accordance with what is stated in the UKGS 2020 long-term target point A that the caries-free rate (mixed teeth) is  $\geq 50\%$ , so the problem found by researchers is the high percentage of caries in children in class 5B SDN Ngagel 1 Surabaya.

According to [16] that attitudes and practices based on knowledge will not last as long as human life, while knowledge will have no meaning if it is not balanced by consistent attitudes and practices. Some students tend to ignore oral health problems due to lack of knowledge about dental caries [17]. In addition, the environment affects oral health. SD has a program that collaborates with local health workers, namely the UKGS program. There are differences in the prevalence of dental caries cases and knowledge in students who get UKGS and schools that do not have UKGS [18]. Diet also affects students oral health. Children at school age are vulnerable to caries because they often snack on food and drinks as they wish without considering the risks [19].

Parents' knowledge affects the level of dental caries in students, because parents consider dental caries to be something natural for young children to do and are underestimated because it is rarely life-threatening. As a result, parental knowledge affects the level of dental caries in students. [18]. Parents have an important role in dental caries rates in students, the level of parental concern for children's dental health can be seen through attitudes and attention to student health. The results of a study say that parental psychosocial factors have been shown to have a negative impact on students' oral health [20].

Not only that, teachers also have a role in the percentage of dental caries rates in children in class 5B SDN Ngagel 1 Surabaya. If there is a lack of knowledge about how to maintain good oral health such as knowledge about caries, the teacher cannot provide good knowledge for students. Teachers serve as educators and teachers who are an important factor in the success of students in maintaining oral health at school because students put their trust in teachers [21].

If the role of teachers is active and supportive in improving the ability to live a healthy life for their students including maintenance of oral hygiene. At school teachers act as counselors, instructors and motivators in showing good things, for example in maintaining dental health [21]. Students aged 6-12 years are the age of changing baby teeth to permanent teeth, so the role of health workers as an effort to prevent oral health problems is highly recommended in that phase [22].

In this study, researchers limited the problem to be studied, namely knowledge about student caries, using android-based application media. Media is a way to transmit messages or information to other people. This can be done through hardware or software. [23].

Health promotion media is a medium used by message senders to display information or messages to message recipients, both through print and electronic media. [16]. According to Sekarwati (2022), smartphones today can not only be used to communicate, but they can do many other things. They can help improve health behaviors. Cell phone applications can increase assessment confidence and reduce initial assessment time. [24]. Dental Guard is a breakthrough application that is in the field of health education. Dental Guard itself means a dental shield, which means that the

application has content that is used to maintain dental health and the main thing is the dental caries factor.

The purpose of this study was to determine the use of the Android-based Dental Guard application to increase the knowledge of dental caries of students in class 5B SDN Ngagel 1 Surabaya.

## II. METHODS

The type of research used in this study is *Pre Experiment* with One-Group Pretest-Posttest design. The researcher gave a pretest to students before counseling and gave a posttest after the study [25]. This type of research is intended to determine the increase in knowledge about dental caries in class 5B students of SDN Ngagel 1 Surabaya after being given counseling with the *Dental Guard* application.

The target of the research used was class 5B students of SDN Ngagel 1 Surabaya, totaling 31 students. The population was 31 people and the sample was 31 people. The sampling technique used by researchers is total sampling. If the population is relatively small (less than 100 people), the entire population should be used as research subjects [26]. The criteria for respondents are divided into 2, namely, inclusion criteria and exclusion criteria.

This research will be conducted at SDN Ngagel 1 Surabaya, Jl Ngagel 221-A Surabaya. Ngagel, Wonokromo District, Surabaya City, East Java Province. The research will be conducted from November 2023 to March 2024. The method used to collect data was a questionnaire sheet before and after counseling. The instrument used by researchers in data collection is using an instrument in the form of a sheet/paper questionnaire.

The distribution of data that has been obtained is processed by the Wilcoxon test which means that it does not require assumptions about the normal distribution of the data. It is also known that the researcher's data is ordinal (good, sufficient, and lacking) and nominal (there is an increase in knowledge or no increase in knowledge).

## III. RESULT

The study involved 31 students of class 5B SDN Ngagel 1 Surabaya, with 30 students as samples, aiming to determine the effect of the Android-based Dental Guard application on increasing dental caries knowledge. The results of data collection were carried out using a questionnaire sheet instrument that had been filled in by respondents, namely class 5B students of SDN Ngagel 1 Surabaya.

### A. Age Characteristics of Students in class 5B SDN Ngagel 1 Surabaya.

TABEL 1

Frequency distribution of student age at SDN Ngagel 1 Surabaya

Student age	frequency	Percentage (%)
10	18	58
11	13	42
Total	31	100%

Based on TABLE 1, it is known that there are 18 students aged 10 years (58%), 13 students aged 11 years (42%).

### B. Gender characteristics of students in class 5B of SDN Ngagel 1 Surabaya.

TABEL 2.

Frequency Distribution of Gender of Students of SDN Ngagel 1 Surabaya

Student Gender	Frequency	Percentage (%)
Male	13	42
Female	18	58
Total	31	100%

Based on TABLE 2, it is known that out of 31 students, most of the students are female, totaling 18 students (58%) and 13 students (42%) are male.

### C. Data Collection Results

TABEL 2

Recapitulation of the Results of Class 5B Students' Knowledge of Dental Caries Before Using the Dental Guard Application

No	Knowledge criteria	Number of students	Percentage (%)
1	Good	8	27%
2	Enough	19	63%
3	Less	3	10%
Total		30	100%

Based on TABLE 3 shows that the knowledge of class 5B students at SDN Ngagel 1 Surabaya before using the Dental Guard application was in the sufficient category as many as 19 students (63%) and the rest were in the good and deficient categories.

TABEL 3

Recapitulation of the Results of Class 5B Students' Knowledge of Dental Caries Before Using the Dental Guard Application based on age

No	Knowledge criteria	Number of students		Percentage (%)
		10 Years	11 Years	
1	Good	7	1	27%
2	Enough	10	9	63%
3	Less	0	3	10%
Total		17	13	100%

Based on TABLE 4 shows that the knowledge of students aged 11 years has good knowledge criteria as many as 1 student, enough 9 students and less 3 students. The number of students aged 10 years with good criteria is 7 students, enough 10 students and less 0 students.

Based on TABLE 5 shows that the knowledge of female students has good knowledge criteria as many as 4 students, 13 students and 1 student less. The number of male students

with good criteria is 4 students, 6 students are sufficient and 2 students are lacking.

**TABEL 4**

**Recapitulation of the Results of Class 5B Students' Knowledge of Dental Caries Before Using the Dental Guard Application based on gender**

No	Knowledge criteria	Number of students		Percentage (%)
		Female	Male	
1	Good	4	4	27%
2	Enough	13	6	63%
3	Less	1	2	10%
Total		18	12	100%

**TABEL 5**

**Recapitulation of the Results of Class 5B Students' Knowledge of Dental Caries After Using the Dental Guard Application**

No	Knowledge criteria	Number of students	Percentage (%)
1	Good	27	90%
2	Enough	3	10%
3	Less	0	0%
Total		30	100%

Based on **TABEL 6**, it shows that the knowledge of grade 5B students at SDN Ngagel 1 Surabaya after using the Dental Guard application with a sufficient category of 3 students (10%) and a good category of 27 students (90%).

**TABEL 6**

**Recapitulation of the Results of Class 5B Students' Knowledge of Dental Caries after Using the Dental Guard Application based on age**

No	Knowledge criteria	Number of students		Percentage (%)
		10 Years	11 Years	
1	Good	15	12	90%
2	Enough	2	1	10%
3	Less	0	0	0%
Total		17	13	100%

Based on **TABEL 7** shows that the knowledge of students aged 11 years has good knowledge criteria as many as 12 students, enough 1 student and less 0 students. The number of students aged 10 years with good criteria is 15 students, 1 student is sufficient and 0 students are lacking.

**TABEL 7**

**Recapitulation of Class 5B Students' Knowledge Results About Dental Caries After Using the Dental Guard Application based on gender**

No	Knowledge criteria	Number of students		Percentage (%)
		Female	Male	
1	Good	14	13	90%
2	Enough	3	0	10%
3	Less	0	0	0%
Jumlah		17	13	100%

Based on **TABEL.8** shows that the knowledge of female students has good knowledge criteria as many as 14 students, enough 3 students and less 0 students. The number of male

students with good criteria was 13 students, 0 students and 0 students.

#### **D. Data Analysis of the use of the Android-Based Dental Guard Application on Increasing Knowledge of Dental Caries of Class 5B Students of SDN Ngagel 1 Surabaya.**

Based on the results of the data collection presented, namely the results of the pretest and posttest on dental caries. The data presented has been tested for normality and obtained abnormal data results, then the data is analyzed by the Wilcoxon test to determine the use of the Android-based Dental Guard application to increase dental caries knowledge of class 5B SDN Ngagel 1 Surabaya students.

**TABEL 8**

**Results of the analysis of the use of the Android-based Dental Guard application on increasing dental caries knowledge of SDN Ngagel 1 Surabaya students**

No	Variable	Category			P value
		Good	Medium	Bad	
1	Pre-Test	8	19	3	0.000
2	Post-Test	27	3	0	

Based on **TABEL 9**, Wilcoxon test analysis results, the sig value = 0.000 is obtained, which means it is smaller than  $\alpha < 0.05$ . This can also be interpreted that the use of the Dental Guard application can increase knowledge about dental caries in class 5B students of SDN Ngagel 1 Surabaya

## **VI. DISCUSSION**

Based on the results of the study, it was found that the dental caries knowledge of class 5B SDN Ngagel 1 Surabaya students increased after using the Dental Guard application. The results of the study are in accordance with research conducted [15] that android-based applications have an effect on increasing target knowledge, apart from increasing knowledge, respondents also easily access the information needed. Today's cell phones can not only be used to communicate, but they can do many other things. They can help improve health behavior. This is influenced by the rapid development of technology, with increasingly sophisticated technological advances so that information is easily obtained by everyone including school students to increase the knowledge of each individual.

Based on the results of the study, it shows that before the use of the Dental Guard application, the knowledge of dental caries of students in class 5B SDN Ngagel 1 Surabaya was in the moderate category.

Dental caries or cavities are disorders of the hard tissues of the teeth, involving enamel (the outermost hard layer), dentin (the bottom of the enamel / enamel), and cementum (hard connective tissue) [8].

Knowledge of dental caries of class 5B students of SDN Ngagel 1 Surabaya in the moderate category before using the Dental Guard application can be influenced by several



factors including age and gender because the research survey conducted by the researcher shows that there are differences. The influence of facilities also affects the knowledge of dental caries.

Based on the results of the study, it shows that after using the Dental Guard application, the knowledge of dental caries of class 5B students of SDN Ngagel 1 Surabaya is in the good category.

The results of the study are in accordance with the results of research [15] that knowledge increased to a good category after using an Android-based application. Cell phone applications have the potential to provide confidence in assessment and the time required is shorter for initial assessment. The use of the Dental Guard application can facilitate efforts to increase knowledge about dental caries because the application is suitable for 5th grade elementary school students who still like games and simple animations.

Based on the results of the study, it was found that the dental caries knowledge of class 5B students of SDN Ngagel 1 Surabaya increased after using the Dental Guard application. The category of knowledge of 5th grade students of SDN Ngagel 1 Surabaya before using the Dental Guard application was sufficient, after using the Dental Guard application, students' knowledge increased to good.

The results of the study are in accordance with research [15] obtained the effect of android-based applications with an increase in knowledge in respondents before and after giving the application.

Promotive efforts in the health sector emphasize increasing the ability of the community to make health efforts independently through health education. In other words, promotive efforts are a form of learning process because the goal is to change society towards a healthier lifestyle education and care applications.

## VII. CONCLUSION

This study aims to evaluate the use of the Android-based Dental Guard application in improving the knowledge of dental caries among 5th grade students of SDN Ngagel 1 Surabaya. Prior to using the Dental Guard application, students' knowledge was categorized as moderate, influenced by factors such as age, gender, and available facilities. After utilizing the application, students' knowledge improved to a good category, indicating the effectiveness of the application in supporting learning about dental caries. The use of educational applications like Dental Guard could be expanded to cater to different age groups and other health-related topics. Future studies are recommended to develop more interactive application features and evaluate their long-term impact on students' health behaviors.

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