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Dental Health E-Book Program to Improve Knowledge and Oral Hygiene for Elementary School Students

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ABSTRACT

Background: Riskesdas 2018 appear that the biggest rate of dental issues in Indonesia is dental caries (45.3%). The arrangement of dental wellbeing administrations in school is carried out through UKGS. Counseling strategy and tooth brushing demonstrations to advance dental wellbeing are routinely carried out for elementary school students. This strategy is utilized to alter the behavior of keeping up dental wellbeing by brushing teeth appropriately and accurately. With current innovative improvements, the utilize of Android is common in learning exercises. Android applications can be media that's favored by children. The instructive program named "E-Book Dental and Oral Health Maintain " with an Android application is an innovative way to extend the behavior of keeping up dental and verbal cleanliness in children. The investigate objective was to decide the impact of e-book program with an Android application on the support of dental wellbeing in children, as well as the part of parents. The test comprised of 100 understudies of 5th grade elementary school. **Results:** The increase of knowledge and the role of parents in improving dental health was significantly different between before and after the intervention, where p-value = 0.001. Investigate concluded that knowledge and parents' role is imperative in progressing children's dental wellbeing

Keywords: Android-Based Dental Health Ebook, Dental and Oral Hygiene of elementary school students, Parent



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Introduction

The Ministry of Health reports that the prevalence of cavities in early childhood is very high, reaching 93%, which means that only 7% of Indonesian children are free of cavities. This number is still far from the target of the World Health Organization (WHO), which targets that 93% of children aged 5-6 years are caries free. The average number of cavities in children aged 5-6 years is 8 teeth or more (Kemenkes RI, 2018). According to the results of the 2018 Basic Health Survey (Riskesdas), the largest proportion of dental problems in Indonesia are damaged/cavities/sick teeth (45.3%). Most of the Indonesian population experience dental and oral health problems due to swelling of the gums and/or abscesses (14%). In Indonesia, the prevalence of cavities is 88.8% and the incidence of cavities at the roots of the teeth is 56.6% (Kemenkes RI, 2019).

96.5% of the Indonesian population aged 10-14 years have brushed their teeth every day, but only 2.1% brush their teeth twice a day at the right time, in the morning and at night before going to bed (Riskesdas, 2018c). From the data on the proportion of dental and oral health problems and treatment by dental medical personnel based on the age group in Indonesia, it is known that 55.6% of the population aged 10-14 years experiences dental and oral problems and only 9.4% receive treatment from dental medical personnel (Riskesdas, 2018a). The 2018 Riskesdas showed that the DMF-T in children aged 12 years was 1.9, an increase compared to the 2013 Riskesdas results which stated the DMF-T was 1.4. This means that there was an increase in the DMF-T index of 0.5 from 2013 to 2018. This is not in accordance with the DMF-T

target stated by WHO in the Global Goals for Oral Health 2020, which is < 1. Caries incidence in the 12 years old group in Indonesia also still high at 72% (Kemenkes RI, 2018).

Dental and oral health in children is a factor that must be considered as early as possible, because tooth decay in childhood can affect the growth of teeth in the future. Dental and oral health services are important for maintaining and improving the health status of the community, in the form of improving dental health, preventing, and treating dental disease and restoring dental health in an integrated and sustainable manner (Ramos-Jorge 2014, Oktrina et al., 2017). Cavities and toothache are the biggest problems in Indonesia, occurring in 45.3% of the Indonesia's population. Another oral health problem experienced by Indonesians is swollen gums and/or abscesses, amounting to 14% (Kemenkes RI, 2020). According to Riskesdas, the representation of the population providing dental and oral health care increased from 23.2% to 25.9% in 2007 and 2013. 93.8% of children aged ≥ 10 years brush their teeth every day. The problem is, most residents (79.7%) still brush their teeth in the morning and evening while bathing. Data released by the Ministry of Health shows that 94.7% of Indonesians brush their teeth every day, but only 2.8% brush their teeth at the right time, after breakfast and before going to bed (Riskesdas, 2018b). Public awareness of dental and oral hygiene is still not good. There are remote areas that contribute to a lack of health information. DKI Jakarta and Denpasar, Bali (98.5%), West Java (95.8%) and East Kalimantan (95.5%) are provinces with good dental health outcomes. The provinces of NTT (74.7%) and Papua (58.4%) are provinces with



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low achievement in brushing their teeth (Riskasdas, 2018). Bali Province is one of the provinces in Indonesia that has a higher prevalence of dental caries than the national prevalence, which is 68.2%. Parents, especially mothers, have an important role in developing children's positive behavior towards dental and oral health. Parents' participation in maintaining children's dental and oral health can be implemented by paying attention to children's behavior regarding dental and oral health and children's eating patterns. Mother's knowledge, attitudes and behavior significantly influence children's knowledge, attitudes, and behavior (Yi G, 2009, Mentari et al., 2016).

Dental and oral health is related to knowledge, attitudes, and behavior closely. The environment has an important role in the formation of attitudes and behavior in preschool-aged children (kindergarten children). The closest environment where preschoolers are located is the family (parents and siblings) and the school environment. The role of parents and teachers is crucial in changing children's attitudes and behavior in maintaining oral health (Schroth R, 2010, Suratri et al., 2016). The Global Burden of Disease Study (2016) states that dental and oral health problems, especially dental caries, are a disease experienced by almost half of the world's population (3.58 billion people). In Indonesia, the prevalence of dental caries reaches 88.8% with a tendency for an average individual caries experience (DMF-T = Decay Missing Filling-Teeth) ranging from 7.0-7.2, which means that on average Indonesian people have as many dental caries as 7 per person, while WHO has set the DMF-T index of 3 (Kemenkes RI, 2018). Dental and oral disease is exacerbated by attitudes or behaviors that

ignore dental and oral hygiene because they are not aware of the importance of maintaining healthy teeth and mouth, such as being lazy to brush their teeth and often eating sweet foods and drinks (Senjaya and Yasa, 2019). Dental caries is the most common oral cavity disease in children, adolescents, adults, and the elderly (Kristianto, 2018).

Self-care is a basic skill for children to maintain healthy teeth and mouth. Personal hygiene is an effort to keep teeth and mouth clean. The goal of dental and oral hygiene is to keep the oral cavity, tongue and teeth clean from all food residue by brushing the teeth at least twice a day, the aim is to free the mouth from disease and tooth decay (Saldūnaitė, 2014, Pitaloka, 2018). Dental and oral health education in early childhood is very important for various health problems in children, such as dental caries. Methods and approaches are needed to create the knowledge, attitudes and behaviors needed to maintain oral health (Kristianto, 2018). The aim of the study was to obtain a comparative description of the debris index and knowledge about dental and oral health for 5th grade elementary school students in Jakarta and Denpasar, Bali, after counseling was carried out through the dental health e-book training program.

Researchers are interested in further research in DKI Jakarta and Denpasar, Bali, because both are provinces whose residents have a good record of brushing their teeth. Based on Riskasdas 2018, 97.8% of DKI Jakarta residents have brushed their teeth well, while in Bali the percentage reached 92.89%. Researchers compared the debris index and knowledge about oral health of 5th grade elementary school students in Jakarta and Denpasar, Bali. The



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research is expected to be useful in efforts to improve dental and oral health, and the result is an innovative counseling intervention program in the form of an Android application "E-Book Dental and Oral Health Maintain", which can be used as an educational tool for dental health workers in to maintain dental and oral hygiene of the community, in this case the UKGS program in elementary schools. The educational program "E-Book Dental and Oral Health Maintain" with an Android application is expected to reduce the burden of dental health costs in the community. This program also improves the skills of parents to prevent dental caries in children as early as possible by brushing their teeth regularly. The program "E-Book Dental and Oral Health Maintain" with an Android application can be used as a guide for maintaining community dental health, in line with dental health program policies, namely dental and oral health services in promotive and preventive efforts. The aim of this intervention is to strengthen families in the community and increase knowledge about oral health, both in rural and urban communities.

METHOD

This research method is a new method using the educational program "E-Book Dental and Oral Health Maintain" with an Android application that is intended to improve dental and oral hygiene. This study is a follow-up to a previous study conducted in 2021 at elementary schools in Jakarta and Denpasar, Bali. The research was conducted in 2022 targeting 5th grade elementary school students in Jakarta and Denpasar, Bali. A group of 50 people was given dental health education in the form of a demonstration of brushing teeth using a dental phantom with the "E-Book Dental and Oral

Health Maintain" program with an Android application. The main sources needed for this research are: 1) toothbrushes and dental phantoms; 2) elementary school students; 3) elementary school teachers; 4) parents of students; and 5) the "E-Book Dental and Oral Health Maintain" program with an Android application.

The "E-Book Dental and Oral Health Maintain" program with an Android application is the result of collaboration with the State Electronics Polytechnic Surabaya (PENS) which has been tested for validity and reliability on elementary school students in Denpasar, Bali, and has been used by elementary school students in Manado. This program has also received legalization as a copyright (HAKI) with registration letter number 00039789 dated November 1 2022 issued by the Ministry of Law and Human Rights.

The multi-step research protocol includes: 1) Evidence-based education and delivery of the "E-Book Dental and Oral Health Maintain" with an Android application training program; 2) Enhancing the skills of elementary school teachers and parents to actively participate in the use of the "E-Book Dental and Oral Health Maintain" program with an Android application; 3) Monitoring teeth brushing activities with the "E-Book Dental and Oral Health Maintain" program with an Android application; 4) Direct testing with field studies; and 5) Conclusions and suggestions.

DISCUSION

The results of the study concluded that counseling and tooth brushing demonstrations using the "E-Book Dental and Oral Health Maintain" program with an Android application



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can improve the level of dental and oral hygiene for 5th grade elementary school students in Jakarta and Denpasar, Bali. Another factor is the role of parents and teachers who have shown a strong interaction with students' knowledge to improve dental and oral health. This study shows that the role of health educators and dental health workers, dental cadres or teachers and parents who actively participate in conducting education and educational innovation with the help of the "E-Book Dental and Oral Health Maintain" program with an Android application will improve skills in maintaining dental and oral health, which ultimately creates optimal dental and oral health for elementary school students. Therefore, it is necessary to increase the involvement of parents and teachers to increase dental and oral health knowledge in elementary school students in Jakarta and Denpasar, Bali.

The selection of the experimental method was based on the theory that dental health can be maintained by brushing teeth and demonstrating how to brush teeth using a dental phantom. Strengthening using the "E-Book Dental and Oral Health Maintain" program with an Android application greatly supports the improvement of dental and oral health. The community can play an active role as a companion, coach, or motivator, with teacher supervision and fostering student dental health behavior by parents, who play an important role in maintaining dental health of their children (Kristianto, 2021). Providing "E-Book Dental and Oral Health Maintain" educational program will increase students' knowledge of maintaining healthy teeth. Dental and oral health is influenced by student compliance and the intensity of parental assistance in maintaining dental and oral health (Kristianto, 2021). The

positive impact of the "E-Book Dental and Oral Health Maintain" program with an Android application is an increase in the dental and oral hygiene of students as seen from the decrease in the debris index in students who are given the educational, as shown in Table 1.

Table 1.

Mean Distribution of Debris Index (DI) Before and After Dental and Oral Health Education Using the "E-Book Dental and Oral Health Maintain" Program with Android Applications to 5th Grade Elementary School Students in Jakarta and Denpasar, Bali

Variable	Mean	Deviation Standard	Error Standard	p-Value	N
Debris Index Jakarta					
Measurement I	2.03	0.5275	0.0746	0.001	140
measurement IV	1.23	0.4716	0.0667		140
Debris Index Denpasar, Bali					
Measurement I	1.72	0.6091	0.0861	0.001	140
Measurement IV	1.83	0.2182	0.0308		140

Note. Adapted from "E-book Program for Elementary School" by Kristianto, 2022

The results of research in Jakarta and Denpasar, Bali showed a significant decrease in Debris Index score. Respondents in Jakarta experienced a decrease of Debris Index from 2.03 to 1.23, while respondents in Denpasar, Bali experienced a decrease from 1.72 to 0.83. The results of this study are significant by obtaining a p-value = 0.001.

This method, which is a combination of dental health care theory and tooth brushing with a demonstration using a dental phantom, equipped with "E-Book Dental and Oral Health Maintain" program with an Android application, achieves better results when compared to



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without the use of an Android application. Parental involvement is necessary for care, education, encouragement, and supervision. Parents, especially mothers, play an important role in maintaining the health of their children's teeth by developing positive behaviors and efforts to improve their children's dental health. Parents' attitudes and behavior in maintaining dental health have a significant impact on children's behavior (Kristianto, 2021). An e-book educational program about maintaining oral and dental health delivered through an Android application is proven to be able to improve the habit of maintaining healthy teeth and mouth, and in the end, children can brush their teeth better. Children's dental and oral health is greatly influenced by children's obedience and the intensity of parental assistance in maintaining dental and oral health (Kristianto 2021). Along with the development of the skills and commitment of parents to care for their children's teeth from an early age, it will have a positive impact by increasing knowledge about maintaining healthy teeth and mouth (Kristianto, 2021). The results can be seen in Table 2 below.

Table 2.

Mean Distribution of Knowledge Before and After Dental and Oral Health Education Using the "E-Book Dental and Oral Health Maintain" Program with Android Applications to 5th Grade Elementary School Students in Jakarta and Denpasar, Bali

Variable	Mean	Deviation Standard	Error Standard	p-Value	n
Knowledge Jakarta					
Before	12.2	2.9	0.04	0.001	140
After	21.5	2.2	0.03		140
Knowledge Denpasar, Bali					
Before	15.2	1.99	0.32	0.001	140
After	18.7	1.64	0.26		140

This study aims to find differences in the knowledge of respondents before and after the intervention with the "E-Book Dental and Oral Health Maintain" program with Android applications. Respondents' knowledge in Jakarta experienced very significant increase before and after treatment, with p-Value = 0.001 < 0.05, where the mean knowledge of respondents after receiving the "E-Book Dental and Oral Health Maintain" program with the Android application was 21.5 +/- 2.2, which is up from 12.2 +/- 2.9.

Respondents' knowledge in Denpasar, Bali increase significantly before and after treatment, with p-Value = 0.001 < 0.05, where the mean knowledge of respondents after receiving the "E-Book Dental and Oral Health Maintain" program with the Android application was 15.2 +/- 1.99 from the previous 18.7 +/- 1.64. Providing "E-Book Dental and Oral Health Maintain" program with an Android application can increase elementary school students' knowledge in maintaining oral and dental health.

The health education intervention program provides demonstrations and additional interventions in the form of an e-book program through an Android application, and will improve the skills of parents as a small group in the community as agents for early prevention of dental caries, with the habit of brushing their teeth regularly will improve skills in maintaining health teeth in elementary school students.



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Parents will accompany and monitor good and correct tooth brushing habits. The intervention program "E-Book Dental and Oral Health Maintain" with an Android application can be used as an innovation in dental and oral health services to carry out various promotive and preventive activities in the field of dental and oral health. Intervention programs increase family participation and capacity to maintain oral health through family community arrangements and dental and oral health services in rural and urban areas. The role of mother/parents in maintaining dental and oral hygiene influences improving children's dental and oral health (Kristianto, 2021). The results of the study are shown in Table 3.

Table 3.

Mean Distribution of Parental Roles Before and After Dental and Oral Health Education Using the "E-Book Dental and Oral Health Maintain" Program with Android Applications to 5th Grade Elementary School Students in Jakarta and Denpasar, Bali

Variable	Mean	Deviation Standard	Error Standard	p-value	n
Parents' Role Jakarta					
Before	4.7	0.86	0.16	0.001	140
After	6.6	0.63	0.12		140
Parents' Role Denpasar, Bali					
Before	5.73	1.015	0.185	0.001	140
After	6.77	0.858	0.157		140

Research in Jakarta succeeded in showing significant differences in the role of parents before and after the intervention of "E-Book Dental and Oral Health Maintain" program with an Android application, with a p-value = 0.001 <

0.05, where the mean role of parents reached 6.6 from initially 4.7. Research in Denpasar, Bali also showed significant differences in the role of parents of students before and after the intervention with the e-book education program, with a p-value = 0.001 < 0.05, where the mean role of the parents of students receiving the e-book program intervention reached 6.77 from 5.73 initially.

It can be concluded that the "E-Book Dental and Oral Health Maintain" program with an Android application is proven to be able to increase parents' role in maintaining dental and oral hygiene. In this study, the role of parents in Bali is higher than in Jakarta, although if it is accumulated, it can be seen that the increase in parents in Jakarta is better by 1.9 compared to Bali which is only 1.04.

In multivariate analysis with linear regression found 3 (three) variables related to the Debris Index, namely sex, knowledge, and parents' role. To create a multivariate model with 3 (three) variables, a bivariate chi square analysis was performed using the Debris Index as the dependent variable. Variables with $p < 0.25$ on the bivariate and of substantial significance can be used for inclusion in the multivariate model. The results of the bivariate analysis between the independent variables and the dependent variable are shown in Table 4.



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Table 4.

Results of Bivariate Analysis between Debris Index Variables, with Sex, Knowledge, and Parents' Role through the "E-Book Dental and Oral Health Maintain" Program with Android Applications to 5th Grade Elementary School Students in Jakarta and Denpasar, Bali

No	Variable	p-value	Related/Not Related
1	Sex	0,613	Not related
2	Knowledge	0,001	Related
3	Parents' Role	0,001	Related

Table 4 shows the bivariate relationship of the variables to be related to the Debris Index. Based on the table, only 2 variables are closely related, namely knowledge and parents' role, which have a p-value < 0.25, so they are candidate models.

Table 5.

Results of Advanced Analysis between Debris Index Variables and Knowledge and Parents' Role through the "E-Book Dental and Oral Health Maintain" Program with Android Applications to 5th Grade Elementary School Students in Jakarta and Denpasar, Bali

No	Variable	p-value	OR
1	Knowledge	0,001	68
2	Parents' Role	0,001	34

Table 5 shows that after multivariate testing using logistic regression, the two variables tested together have a significant effect in changing the Debris Index score, as

evidenced by the p-value = 0.001. For the variable included in the multivariate test, only one variable had a significant effect on the Debris Index, namely parents' role variable, which gave a decrease in the Debris Index score 68 times better than without parents' role, while knowledge variable provides a decrease in the Debris Index score 34 times better than in children with poor knowledge. In this study, a strong interaction between parental roles and knowledge was shown by an increase in oral hygiene as measured by the Debris Index.

The innovative "E-Book Dental and Oral Health Maintain" program with an Android application is a new step in implementing interactive media technology to improve dental and oral health of elementary school students in Jakarta and Denpasar, Bali. In this case, children's knowledge, and parents' role, represented by mother, about dental and oral health are important in shaping behavior that supports the maintenance of children's dental and oral health. Parents' lack of knowledge about maintaining children's dental and oral health will be a non-conductive predisposing factor to behavior to maintain children's dental and oral health (Lauris JR, 2012, Pitaloka et al., 2018). Parents are the main social force that influences children's development, including dental and oral health care (Bozorgmehr, 2013, Dini, 2018 and Dinea, 2018).

Health education is a simple and cost-effective approach (Chand, 2014, Garbin, 2015, Duguma FK, 2018). Education is equipped with real practice, and integrated with the "E-Book Dental and Oral Health Maintain" program with an Android application, will make it easier for children and parents, especially mothers, to expand their children's knowledge about



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maintaining healthy teeth and mouth. E-book program with Android application help children and mothers to always participate actively in maintaining their children's teeth and mouth health. The attention of parents, especially mothers, to maintaining children's dental and oral health from an early age makes healthy family behavior as a daily habit (Mirzaei Alavijeh 2013, Kristianto, 2021).

Parents' role is influential in maintaining their children's teeth and mouth health. By changing the parents' attitudes and behavior about the importance of maintaining healthy teeth and mouth, the family has an important role in improving children's dental and oral health. Families will create a healthy lifestyle environment, increase self-esteem, and help form good habits (Saldunaite, 2014, Suci 2016). Behavior and health practices are greatly influenced by the attitudes and behavior of parents when intervening the attitudes and behavior of children to maintain the dental health (Almaoudi, 2016, Kristianto 2021). The role of parents, especially mothers, can be role models for children when they learn to find idols whom they see and hear, as well as from their life experiences. Children learn by observing the activities of their parents or teachers. Children learn from what they hear from parents, teachers, and the environment. Children modify their parents' activities to gain experience from their life experiences (Gaub A, 2013, Kristianto, 2018, Dinea 2018). The more actively parents participate in their child's education, the better the child's positive behavior changes. Parents not only participate and contribute to the creation of a healthy lifestyle, but also improve dental health status due to the influence of health behavior factors, including factors related

to knowledge, attitudes, and practice (Qiu RM, 2016, Dinea, 2018, Kristianto, 2021). Therefore, the role of parents is very important in guiding, providing information, and providing the best role models so that children grow and develop properly. Parental responsibility and full attention to children are needed so that children can maintain good dental and oral health. Teachers can represent parents at school, and are the closest people to children at school, so teacher's role and behavior are also very important in maintaining and improving the dental and oral health of students (Susanne, 2009, Husna, 2016, Kristianto, 2021).

CONCLUSION

This study recommends an interactive educational method using the "E-Book Dental and Oral Health Maintain" program with an Android application, which is a new innovation to improve dental and oral hygiene for elementary school students in Jakarta and Denpasar, Bali. This method will be more effective when accompanied by a demonstration of brushing teeth to improve dental and oral hygiene. The results showed that the knowledge and parents' role influenced the increase of dental and oral hygiene of the respondents. The results showed that the Debris Index decreased significantly. The results of the study found that there was a significant difference between the Debris Index score before and after the intervention with the e-book program and the Android application. Submission of the e-book program increases the knowledge of dental and oral health in respondents. This study succeeded in proving that there were significant differences in dental and oral hygiene, knowledge, and parents' role before and after the intervention



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with "E-Book Dental and Oral Health Maintain" program with an Android application.

Conflict of Interest

The authors declare that there are no conflicts of interest associated with this research.

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