

Denta Go Model: An Effective Approach to Improving Tooth Brushing Skills and Dental Hygiene Status of Preschool Children

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Abstract:- Background: According to Riskesdas, 63.7% of children aged 5 years have a dental caries experience number (def-t) ≥ 6 which is included in the category of severe early childhood caries. One of the factors that influence this is the low behavior in maintaining and maintaining oral hygiene. Therefore, through the innovation of the “*Denta Go*” Model, it is hoped that it can improve the tooth brushing skills and dental hygiene status of preschool children. **Research Objective:** To produce a “*Denta Go*” Model that is effective and feasible to implement in an effort to improve tooth brushing skills and dental hygiene status of preschool children. **Methods:** Research and Development (R&D) method with 5 stages, namely identification of needs, design, expert validation, feasibility test 1, and feasibility test 2. This study used a pre-experiment design with a one group pre-post test design. The sampling technique was purposive sampling which was given an intervention for 21 days with 3 stages, namely introduction, repetition, and practice. **Results:** The validity results of the “*Denta Go*” Model show that the model is feasible as a dental health education model (p 0.000). The “*Denta Go*” model is effective in improving tooth brushing skills (p 0.000) with a mean pretest score of 59.06 and posttest 94.64. The “*Denta Go*” model is effective in improving dental hygiene status (p 0.000) with a mean pretest score of 2.64 and posttest of 1.16. Feasibility test 2 showed that the model is feasible to be used independently by kindergarten teachers (p 0.000). **Conclusion:** The “*Denta Go*” model is effective and feasible to use as an effort to improve tooth brushing skills and dental health status of preschool children.

Keywords:- Education Model, *Denta Go*, Preschool, Tooth Brushing Skills, Dental Hygiene.

I. INTRODUCTION

Oral health is an important aspect of overall health. This means that when a person experiences health problems in the tooth and mouth, the impact can extend throughout the body, affecting things like speech, diet, school performance and work productivity. Oral health problems can include a range of conditions, from cavities and gum disease to the risk of oral cancer[1]. The importance of dental health in children is significant, as their baby tooth play a key role in the development of permanent tooth. Children's dental health can impact their ability to digest food properly and can interfere

with their growth process. Therefore, keeping children's tooth healthy as early as possible is a key asset to ensuring their development and well-being[2].

Oral health problems, especially dental caries, are a common condition experienced by half of the global population, which is around 3.58 billion individuals. Based on the results of the Basic Health Research (Riskesdas) in 2018, it was found that the most common dental health problem in Indonesia was cavities, which reached a level of 45.3%[3]. Dental caries is damage to tooth caused by various factors, one of which is the complex relationship between tooth and saliva as a host, bacteria in the oral cavity, and food that quickly ferments[4]. Dental health problems in preschool children tend to occur more often than in elementary school children, this is due to the limited ability of children to carry out tooth brushing activities independently[5]. Maintaining children's dental health from an early age is the best step to ensure that the mouth and tooth remain in a healthy condition. Dental care is important from infancy to toddlerhood (age 5 years) to avoid dental decay and disease as adults. In general, children tend to like sugary foods such as cotton candy and sweets, which are known as substrates favored by bacteria and can cause the dissolution of tooth structure[6]. The impact of caries is that more than 50 million hours per year are lost due to children missing school. This situation can have a negative impact on the level of intelligence and decrease the child's academic achievement.

Caries that often occurs in preschool children is called *Early Childhood Caries* (ECC), which is a dental hard tissue disorder that attacks baby tooth at preschool age. Milk tooth have a thinner enamel layer than permanent tooth, making them more susceptible to caries development. *Early childhood dental caries* (ECC) is a very common chronic disease, with nearly 1.8 billion new cases each year worldwide. ECC commonly affects approximately 55% of preschool children from low-income and minority backgrounds in the United States, resulting in both short- and long-term harmful effects on health and quality of life[7].

According to the Riset Kesehatan Dasar (Riskesdas) 63.7% of children aged 5 years have a dental caries experience number (def-t) ≥ 6 which is included in the severe early childhood caries category. The incidence of caries at the age of 5-6 years is still very high at 93%, meaning that

only 7% of Indonesian children are free from dental caries. The incidence of caries in children aged 5-6 years in Central Java is around 53.3%[8]. This indicates that children of this age are very vulnerable to oral and dental diseases and are at risk of caries[9]. This figure is still far from Indonesia's target to achieve caries-free status by 2030[10].

Oral health conditions are influenced by various factors, both internal and external. Internal factors include aspects such as physical, biological, and social conditions, known as the Host. In addition, streptococcus mutans bacteria acts as an Agent in causing oral problems. The quality of drinking water used by the community falls under the Environmental category. On the other hand, external factors involve oral health maintenance behavior owned by individuals[11]. Efforts made in the world and Indonesia in suppressing problems related to oral health are still not effective. because behavior in maintaining oral health is still lacking. Behavior has a considerable influence on health status, which is as much as 30%-35%. Oral health problems in the community are influenced by low behavior in maintaining and maintaining oral hygiene[12].

Behavior is an individual response to external stimuli which is divided into three aspects, namely knowledge, attitude, and action. Improved knowledge, attitudes and skills have a significant impact on children's oral hygiene. The way a person takes care of their oral health affects the actions taken to maintain oral health. Therefore, it is very important to shape this behavior from an early age.

The right strategy for preschool children in an effort to change behavior is to provide dental health education using learning methods and customized media development[5]. Media has a significant role in influencing the course of the health education process. As a tool, media facilitates the delivery of material, especially in the context of oral health education. It is important to arrange the learning media carefully, well-organized, interesting and involve many senses so that the information is easier to remember. The accuracy and suitability of the use of methods and media greatly affect the effectiveness and efficiency of the oral health education process. Media not only acts as an information provider, but must also be able to provide experience to students[13]. This principle is in accordance with Dale's Cone of Experience theory, which says that involving various senses in the educational process makes the material easier for students to accept and remember[14].

Several media have been used as dental health education media for preschool children, such as pillow books (books made of dacron cloth), dental health puzzles, and posters. However, these media still have shortcomings such as pillow books that have limited space to convey information so that it can make it difficult to cover all aspects of dental health in depth, puzzle media that some people may have difficulty understanding or solving puzzles so that

dental health messages are not conveyed effectively, and poster media that are static or less interactive so that users are not fully involved in the material presented[5][15]. In addition to the selection of appropriate educational media, the selection of methods that support the learning process is very important as well as programs that support children in changing their oral health behavior such as routine brushing activities every day at school[16].

There are methods that can be easily understood, more interesting, and fun for children, namely using educational games (learning while playing). Learning while playing is one of the effective methods to increase children's knowledge. Games are activities that are fun, interesting and carried out voluntarily without coercion with the aim of getting excitement during play. Involvement in play has an important role in child development so providing opportunities and means for play activities while learning is very important for children[17].

One of the efforts in improving tooth brushing behavior that can be done is the innovative development of tooth brushing programs in preschool children with the “*Denta Go*” Model, which is a learning media that involves children as subjects in the game. In this case the child acts as part of the game who is required to perform actions according to the rules of the game. The model is designed to improve the cognitive, affective, and psychomotor aspects of preschool children with the hope of improving tooth brushing skills and dental hygiene status supported by the school tooth brushing program.

The “*Denta Go*” model was tested at Putra Bangsa Kindergarten in Tanjung, Jepara. Based on direct observation, students are quite enthusiastic in the learning process and the material can be understood easily. This is relevant to the results of interviews with dentists at Pakis Aji Health Center, Jepara Regency that preschool children are happier to learn if they are actively moving compared to sitting listening to the material. From the results of the trial, several shortcomings were still found so it is necessary to develop the “*Denta Go*” Model through research.

Based on this background, the researcher is interested in proving that the innovative “*Denta Go*” model can improve tooth brushing skills and dental hygiene status of preschool children.

II. RESEARCH METHODS AND SAMPLE

This research uses the Research and Development (R&D) method of the ADDIE model through 5 steps, namely: 1) *Analysis*, 2) *Design*, 3) *Development*, 4) *Implementation*, and 5) *Evaluation*. The samples in this study were 35 students and 6 teachers as *end users* at TK III Pertiwi, Tembalang, Semarang.

III. RESULTS AND DISCUSSION

A. Validity Test

The validity test was conducted using the Interclass Correlation Coefisient (ICC) analysis to determine the feasibility of the model as a dental health education model.

Tabel 1 Uji Validitas Model “Denta Go”

Validator	N	F (%)	Rata-Rata	ICC	p-Value*
V1	10	96 %	94,5 %	0,969	0,000
V2	10	94 %			
V3	10	94 %			
V4	10	94 %			

In table 1, the average feasibility value is 94.5% with a very feasible category. The expert vaidation results show that the p-value = 0.000 which means that the model is declared feasible for trial. Based on the results of Average measures from the *Interclass Corelation Coefisient test*, the result is 0.969 with the Excelent Reability category.

B. Univariate Analysis

The research subjects in this pilot stage totaled 35 children. The results about the characteristics of the research subjects are presented in the following table:

Table 2 Data on Student Characteristics of TK III Pertiwi

No	Variable	N	%
1	Gender		
	Male	21	60
	Female	14	40
2	Umur		
	5 Years old	19	54,3
	6 Years old	16	45,7

Table 2 shows the frequency distribution data of the characteristics of research subjects who are male by 60% (21 students) and female by 40% (14 students). Meanwhile, based on age, the frequency of students aged 5 years was 54.3% (19 students) and students aged 6 years was 45.7% (16 students).

C. Normality Test

The normality test in this study used the *Shapiro Wilk test* because the sample subjects in this study were less than 50.

Table 3 Normality Test of PHMP Score Data and Student's Tooth Brushing Skills

Variable	p-Value	
	Pre Test	Post Test
PHPM index	0,016	0,001
Tooth brushing skills	0,000	0,000

Table 3 shows the results of the normality test for the PHPM index variable and students' tooth brushing skills have a p-value <0.05, meaning that the data is not normally distributed so that the effectiveness test is analyzed using non-parametric tests.

D. Bivariate Analisis

Paired data analysis using the *Wilcoxon test* to determine the effectiveness of the model.

Table 4 Percentage of Results of the “Denta Go” Model Effectiveness Test on Improving Tooth Brushing Skills

Variabel	Mean ±SD Pretest	Mean ±SD Postest	(Δ)	P-Value*
Student,s tooth brushing skills	59,07 ± 7,81	94,64 ± 7,98	35,57	0,000

Table 4 shows that the results of the effectiveness test of paired data on student's tooth brushing skills with a p-value of 0.000 (p <0.05), meaning that the “Denta Go” model is effective in improving students' brushing skills. There was an increase in students' skills before and after treatment, where before treatment the average value of student’s tooth brushing skills was 59.07 which fell into the “less” category, increasing to 94.64 which fell into the “very good” category. The difference between the initial data (pretest) and the final data (posttest) of students' tooth brushing skills amounted to 35.57.

Table 5 Test Results of the Effectiveness of the “Denta Go” Model on Reducing the PHPM Index

Variable	Mean ±SD Pretest	Mean ±SD Posttest	(Δ)	p-Value*
PHPM Index	2,64 ± 0,98	1,16 ± 0,40	1,48	0,000

Table 5 shows the results of the effectiveness test of paired data on students' PHPM index with a p-value of 0.000 ($p < 0.05$), meaning that the “Denta Go” model is effective in improving students' dental hygiene status. There was a decrease in students' PHPM Index before and after treatment, where before treatment the average value of students' PHPM Index was 2.64 which was included in the "moderate" category to 1.16 which was included in the "good" category. The difference between the initial data (pretest) and the final data (posttest) of the PHPM Index examination is 1.48. The lower the child's PHPM Index indicates that the better the dental hygiene status.

E. Feasibility Test 2 End User Use of Model

Table 6 Feasibility Test 2 of Using the “Denta Go” Model by End Users

Subject	N	F (%)	Average	ICC	p-value*
G1	18	86,11 %	85,41 %	0,984	0,000
G2	18	84,72 %			
G3	18	86,11 %			
G4	18	87,5 %			
G5	18	84,72 %			
G6	18	83,3 %			

Based on the results of the assessment of 6 TK III Pertiwi teachers obtained an average feasibility value is 85.41% with a very feasible category. The feasibility test results show that the p-value = 0.000 which means that the model is declared feasible to be used independently by kindergarten teachers as end users. This is in accordance with the results of observations made objectively during the application of the “Denta Go” Model. Based on the results of Average measures from the Interclass Correlation Coefficient test, the result is 0.984 with the Excellent Reliability category.

correctly because the “Denta Go” model is not only a learning medium but also an evaluation medium.

Implementation of the “Denta Go” Model and brushing tooth together is done twice a week at school and brushing tooth twice a day at home which is done every day by filling out a tooth brushing calendar. This took place within a span of 21 days. Behavior change theory reveals that it takes 21 days to change a person's habits, so a constant period of conditioning is needed for the person to change their habits[19].

IV. DISCUSSION

A. “Denta Go” Model Trial

The trial in this study was conducted on 35 preschool students using the “Denta Go” Model to improve tooth brushing skills and dental hygiene status of preschool students. The following is a description of the tests that have been conducted by researchers

B. Effectiveness of the “Denta Go” Model on Improving Student’s Tooth Brushing Skills

Children's tooth brushing skills have increased because the intervention model “Denta Go” is a game that involves children directly as subjects in the game. Giving quizzes during the game can provide quick feedback and remain safe even if mistakes occur, because if the child answers incorrectly it will be corrected directly by the teacher who acts as a facilitator in the game.

Relevant research states that other advantages of board games provide direct feedback to children, this feedback is done by discussing the answers to the questionnaires that have been given in order to evaluate the answers of each respondent so that the truth of the information received by respondents can be immediately understood and digested[18]. In the process of the game, children become more responsive to information about dental health and how to brush well and

C. Effectiveness of Denta Go Model on Improving Dental Hygiene Status of Preschool Children

The results of statistical test analysis, paired test showed the average value of students' PHPM scores before and after treatment from 2.64 to 1.16 with a p-value of 0.000 ($p > 0.005$). The lower the students' PHPM index indicates that the better their dental hygiene status. Based on these results, it can be concluded that the “Denta Go” Model is effective in improving the tooth brushing skills of preschool children so that it can have an impact on the dental hygiene status of children.

Relevant research states that the better the tooth brushing skills, the better the oral hygiene, which will reduce dental problems[20]. Brushing tooth is a mechanical way to clean plaque on the tooth. Brushing tooth aims to clean soft deposits on the surface of the tooth and is a preventive measure towards optimal oral hygiene. The ability of children to brush their tooth properly and correctly is a very important factor in maintaining oral hygiene[21].

D. Feasibility of the “Denta Go” Model for Independent use by Kindergarten Teachers

After the teacher conducts dental health education using the “Denta Go” Model for a period of 21 days, the feasibility test of the model is carried out to be used independently by the teacher as an end user. The assessment is seen from the level of difficulty of the teacher in implementing the “Denta Go” Model based on the preparation aspect, the implementation aspect, and the evaluation aspect.

Teachers are given education in advance about dental health such as how to maintain oral health, how to brush tooth properly, and how to use the “Denta Go” Model so that teachers can implement the “Denta Go” Model independently. Teachers in implementing learning should have knowledge about educational game tools that can be used as a means or a game tool that contains educational value and can improve tooth brushing skills and dental health status of preschool children[22].

REFERENCES

- [1]. D. Septiani, D. Sughesti, D. Susanti, M. T. P. Sihombing, and S. Novitasari, “Pentingnya Menjaga Kesehatan Gigi Dan Mulut Di Era Pandemi Covid’19, Demi Kelangsungan Aktivitas Usaha,” *Dedik. Pkm*, vol. 3, no. 1, p. 56, 2021, doi: 10.32493/dedikasipkm.v3i1.14607.
- [2]. N. N. Kasihani, Ngatemi, and T. Purnama, “Determinans of Parental Behavior in Maintaining Deciduous Teeth in Early Childhood : A Cross Sectional Study,” *Eur. J. Mol. Clin. Med.*, vol. 8, no. 2, 2021, [Online]. Available: gale.com/apps/doc/A698523931/AONE?u=anon~9e1ad90f&sid=googleScholar&xid=a9ef6315
- [3]. Kementerian Kesehatan RI, “InfoDATIN Pusat Data dan Informasi Kementerian Kesehatan RI,” *Pusdatin Kemenkes RI*, pp. 1–10, 2019, [Online]. Available: <https://pusdatin.kemkes.go.id/download.php?file=download/pusdatin/infodatin/infodatin-gigi.pdf>
- [4]. N. K. Sholekhah, “Hubungan Pengetahuan Ibu tentang Kesehatan Gigi dan Mulut dengan Kejadian Karies Gigi pada Anak,” *Indones. J. Dent.*, vol. 1, no. 1, pp. 20–23, 2021, doi: <http://dx.doi.org/10.26714/ijd.v1i1.6813>.
- [5]. T. Purnama, B. Santoso, A. Suwondo, D. Fatmasari, and C. Author, “Tedi’s behavior change model as an efforts for brushing teeth behavior in preschool children,” *Int. J. Allied Med. Sci. Clin. Res.*, vol. 7, no. 3, pp. 715–721, 2019, [Online]. Available: <https://ijamscr.com/ijamscr/article/view/725>
- [6]. T. Ermawati, “Peningkatan Kesehatan Gigi dan Mulut dengan Pendekatan Art Therapy pada Siswa Taman Kanak-Kanak di Jember,” *War. Pengabdian*, vol. 17, no. 1, p. 1, 2023, doi: 10.19184/wrtp.v17i1.29205.
- [7]. J. Xiao, J. Luo, O. Ly-Mapes, T.-T. Wu, and T. Dye, “Assessing a Smartphone App (AICaries) That Uses Artificial Intelligence to Detect Dental Caries in Children and Provides Interactive Oral Health Education: Protocol for a Design and Usability Testing Study,” *JMIR Publ.*, vol. 10, no. 10, 2021, doi: <https://doi.org/10.2196/32921>.
- [8]. Kementerian Kesehatan Republik Indonesia, *Laporan Nasional Riskesdas 2018*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan, 2019.
- [9]. Badan Penelitian dan Pengembangan Kesehatan 2019, *Laporan Provinsi Jawa Tengah RISKESDAS 2018*. Jakarta, 2018. [Online]. Available: <https://dinkesjatengprov.go.id/v2018/storage/2019/12/CETAK-LAPORAN-RISKESDAS-JATENG-2018-ACC-PIMRED.pdf>
- [10]. I. H. Y. Siregar and W. Haryani, “Kesehatan Gigi Siswa Menuju Indonesia Bebas Karies Tahun 2030,” *Community Dev. J.*, vol. 4, no. 5, pp. 11125–11128, 2023.
- [11]. H. Umamei, E. Purwaningsih, and S. Hadi, “Systematic Literature Review : Faktor-Faktor Yang Mempengaruhi Kesehatan Gigi,” *J. Ilm. Keperawatan Gigi*, vol. 4, no. 1, pp. 14–30, 2023.
- [12]. S. Notoatmodjo, *Kesehatan masyarakat, ilmu, dan seni*. Rineka Cipta, 2011.
- [13]. B. Santoso, M. C. Anwar, and M. Muliadi, “Monopoly Game As Android-Based Dental Health Education Media,” *J. Appl. Heal. Manag. Technol.*, vol. 1, no. 1, pp. 7–15, 2019, doi: 10.31983/jahmt.v1i1.5305.
- [14]. P. Sari, “Analisis Terhadap Kerucut Pengalaman Edgar Dale dan Keragaman Gaya Belajar Untuk Memilih Media Yang Tepat Dalam Pembelajaran,” *MUDIR (Jurnal Manaj. Pendidikan)*, vol. 1, no. 1, 2019, doi: <https://doi.org/10.55352/mudir.v1i1.7>.
- [15]. S. I. Sinaga and S. Eriyani, “Pengembangan Poster Edukasi Untuk Menumbuhkan Pengetahuan Tentang Pentingnya Menjaga Kesehatan Gigi Pada Anak Kelompok A Di Tk Negeri Pembina Lahat,” *Innov. J. Soc. Sci. Res.*, vol. 3, no. 2, p. 14463, 2023.
- [16]. T. Purnama, N. Ngatemi, R. Sofian, N. N. Kasihani, P. R. RE, and S. Nurbayani, “Model 5 Gosgi Days Sebagai Upaya Pembentukan Kemandirian Menggosok gigi Anak Usia Dini Di Sekolah,” *Qual. J. Kesehat.*, vol. 14, no. 1, 2020, [Online]. Available: <https://ejournal.poltekkesjakarta1.ac.id/index.php/adm/article/view/96>
- [17]. A. R. Hutami, N. M. Dewi, N. R. Setiawan, N. A. P. Putri, and S. Kaswindarti, “Penerapan Permainan Molegi (Monopoli Puzzle Kesehatan Gigi) Sebagai Media Edukasi Kesehatan Gigi Dan Mulut Siswa Sd Negeri 1 Bumi,” *J. Pemberdaya. Masy. Univ. Al Azhar Indones.*, vol. 1, no. 2, p. 72, 2019, doi: 10.36722/jpm.v1i2.341.
- [18]. R. Sitanaya, H. Lesmana, S. Irayani, and B. Septa, “Simulasi Permainan Ular Tangga Sebagai Media Peningkatan Pengetahuan Kesehatan Gigi dan Mulut Anak Usia Sekolah Dasar,” *Media Kesehat. gigi*, vol. 20, no. 2, pp. 28–33, 2021, doi: 10.1016/s0242-6498(04)93936-3.
- [19]. C. A. Maher, L. K. Lewis, K. Ferrar, S. Marshall, I. De Bourdeaudhuij, and C. Vanderlanotte, “Are health behavior change interventions that use online social networks effective? a systematic review,” *JMIR Publ.*, vol. 16, no. 2, 2014, doi: <https://doi.org/10.2196/jmir.2952>.

- [20]. D. Ratna, M. Djamil, T. Wiyatini, S. Supriyana, and L. Sunarjo, "A Mobile App (Smart Dental Alarm) on Improving Tooth Brushing Skills among Early Childhood," *Int. J. Nurs. Heal. Serv.*, vol. 4, no. 1, pp. 37–41, 2020, [Online]. Available: <http://ijnhs.net/index.php/ijnhs/home><http://doi.org/10.35654/ijnhs.v4i1.376>
- [21]. L. N. Hamidah, I. E. Sarwo, and H. Pranowo, "Gambaran Pengetahuan Dan Perilaku Tentang Menggosok Gigi Pada Anak Tahun 2020," *J. Ilm. Keperawatan Gigi (JIKG)*, vol. 2, no. 1, pp. 108–114, 2021, [Online]. Available: <http://ejurnal.poltekkestasikmalaya.ac.id/index.php/jikg/index>
- [22]. Y. Anggraini, D. Suryadi, and Indrawati, "Peran Guru dalam Pemanfaatan Alat Permainan Edukatif Di TK Gugus Lavender Kecamatan Singaran Pati Kota Bengkulu," *Pena Paud*, vol. 2, no. 1, pp. 1–17, 2021.