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The Effectiveness of Puppets as an Educational Tool to Enhance Dental Health Knowledge Among Elementary School Students in Surabaya, Indonesia

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ABSTRACT The incidence of oral health problems in Indonesia continues to rise, especially among elementary school children. This study aims to enhance understanding of oral health maintenance among second-grade students at SDN Bendul Merisi Surabaya using dental puppets as an educational medium. An experimental design with a pretest-posttest method was employed involving 52 students. Data were collected using a questionnaire that assessed students' knowledge before and after the intervention with dental puppets. Analysis results indicated a significant improvement in students' understanding of oral health maintenance after the educational intervention. Before the intervention, most students exhibited low knowledge (46.92%), but post-intervention, 90.48% demonstrated good understanding. The Wilcoxon test yielded a significant value of 0.000, indicating a significant difference between pre- and post-intervention knowledge. Thus, the use of dental puppets proved effective in raising awareness and knowledge of oral health among students. This study recommends incorporating dental puppets in oral health education programs in elementary schools

INDEX TERMS Dental education, Puppetry, Elementary Students, Oral Health Maintenance

I. INTRODUCTION

Oral health is a fundamental aspect of overall well-being, particularly among children, who are especially vulnerable to oral hygiene issues. Unfortunately, oral hygiene is often neglected, leading to a significant prevalence of dental problems in this demographic (WHO, 2018). According to the Basic Health Research (Riskesdas) of Indonesia in 2018, the proportion of individuals experiencing oral health issues has seen a troubling increase, rising from 25.9% in 2013 to 56.7% in 2018. Despite 94.7% of Indonesians claiming to brush their teeth daily, only 2.8% do so at the appropriate times—immediately after breakfast and just before bed. Among children aged 5 to 9 years, although 93.2% exhibit good brushing habits, only 1.4% brush at the recommended times. This indicates that while there is a concerted effort to maintain oral hygiene, proper practices remain severely lacking.

Poor oral hygiene can lead to various dental issues, including cavities, bad breath, and gum infections.

Furthermore, a lack of awareness and knowledge regarding proper oral care can exacerbate these conditions. Children often do not know how to brush their teeth correctly, which is a primary contributing factor to the prevalence of oral health problems among them. Therefore, education about oral health is crucial, especially for elementary school children (aged 6-12 years), during which they begin to develop habits that will have long-term impacts on their dental health [20].

One effective approach to enhance children's knowledge and awareness of oral health is through educational media. In this regard, dental puppets have been chosen as a teaching tool. Dental puppets can capture children's attention and convey important messages about oral hygiene in a fun and interactive manner. These puppets are designed to demonstrate proper tooth brushing techniques and the significance of maintaining oral cleanliness. By using dental puppets, it is anticipated that children will learn how to care for their teeth in a more engaging and easily understandable way [25]. Kesgilut

problems afflict the majority of elementary school students. This is caused by a lack of knowledge about tooth brushing [4].

A person's ability to maintain good oral and dental health will determine their overall health (Saputri, 2021). A healthy diet that limits sugary foods and drinks, frequent dental check-ups, Dental damage can be maintained by using the correct brushing technique, as well as by brushing your teeth frequently and at the right time [16]. In addition, it also conducts socialization about maintaining oral hygiene through programs that aim to improve oral health through education (Wijayanti & Rahayu, 2019).

In health education, counseling is a common approach. Choosing the right counseling delivery strategy is very important for the success of efforts to change target behavior (Notoatmodjo, 2014). Because this age is vital for dental growth and intellectual development, kesgilut education in elementary school students (6-12 years) is very important. This also requires a methodical approach in producing correct knowledge, attitudes and behaviors, especially regarding kesgilut. As the media plays an important role in increasing oral health awareness among students and supporting the learning process, it is not possible to isolate the success of oral health education initiatives for school-aged children from these factors. Media may present messages that are easier to understand and more engaging [10].

Media is a tool for communicating ideas to an audience in a way that can be understood by the intended audience or party. Media, including radio, television, movies, newspapers, magazines, posters, and banners, are tools (or means) of communication (Adventus et al., 2019). Tooth puppet media is used to help children, especially elementary school children, learn to wash their teeth. This toothed puppet is shaped like a donkey and has full body features, including hands, hooves, ears, and a jaw model with real teeth and tongue. To create a child-safe tooth puppet, Hardiyanti (2016) details how the Velboa material is used. The teeth are made of fiber and resin, while the inside of the puppet is filled with dacron.

SDN Bendul Merisi has never been given counseling on the maintenance of kesgilut so that the understanding of the maintenance of kesgilut of grade II students of SDN Bendul Merisi Surabaya is low.

This study aims to explore the effectiveness of using dental puppets as an educational media in improving the knowledge of second-grade students at SDN Bendul Merisi Surabaya regarding oral hygiene practices. This school has not received any prior education on maintaining oral health, resulting in a low understanding among students about dental care. Survey results reveal that 60% of 52 students have a poor debris index, with an average debris index score of 1.9, indicating inadequate oral hygiene practices. Through the intervention utilizing dental puppets, it is hoped that students can enhance their knowledge of oral health and improve their tooth brushing habits

Based on the description above, the problem in this study is the high *debris index* of grade II students at SDN Bendul Merisi Surabaya.

II. METHODS

This study employs an experimental design using a pretest-posttest design for a single group, utilizing a pre-experimental approach. The research aims to evaluate the effectiveness of dental puppet media in enhancing knowledge about oral health maintenance among second-grade students at SDN Bendul Merisi Surabaya. A total of 52 respondents participated in this study.

The intervention process involved using dental puppets as a central educational tool during counseling sessions. Each session lasted approximately 30 minutes and was conducted in a friendly and interactive manner. During the sessions, the dental puppet was used to demonstrate proper tooth brushing techniques and explain the importance of maintaining oral hygiene. The puppet engaged the students by allowing them to participate in a role-playing activity, where they could practice brushing the puppet's teeth while discussing the significance of oral health. This hands-on approach aimed to make the learning experience enjoyable and memorable for the students.

To assess the impact of the intervention, a pretest was administered before the counseling sessions, followed by a posttest immediately after the intervention. The pretest and posttest utilized a structured questionnaire designed to measure students' knowledge regarding oral hygiene practices. The questionnaire underwent a validation process to ensure its reliability and accuracy. This involved a pilot test with a small group of students, followed by adjustments based on feedback and item analysis to improve clarity and relevance.

For the statistical analysis, the Wilcoxon signed-rank test was chosen due to the non-parametric nature of the data. This decision was based on the results of the normality test conducted using the Kolmogorov-Smirnov method, which indicated that the data distribution was not normal ($p < 0.05$). The Wilcoxon test is suitable for paired data where the assumptions of normality are not met, making it an appropriate choice for analyzing the differences between pretest and posttest scores. By employing these methods, the study seeks to provide valuable insights into the effectiveness of using dental puppets as an innovative educational medium for improving children's oral health knowledge

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engaging and easily understandable way [25]. Kesgilut problems afflict the majority of elementary school students. This is caused by a lack of knowledge about tooth brushing [4].

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SDN Bendul Merisi Surabaya is located at Jl. Bendul Merisi No.35 Surabaya in the working area of Puskesmas Sidosermo which is visited by health workers twice a year including dental examinations, as well as referrals for students who need dental care. SDN Bendul Merisi has never been given counseling on the maintenance of kesgilut so that the understanding of the maintenance of kesgilut of grade II students of SDN Bendul Merisi Surabaya is low.

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with an average debris index score of 1.9, indicating inadequate oral hygiene practices. Through the intervention utilizing dental puppets, it is hoped that students can enhance their knowledge of oral health and improve their tooth brushing habits. Based on the description above, the problem in this study is the high *debris index* of grade II students at SDN Bendul Merisi Surabaya.

III. RESULT AND DISCUSSION

The findings of this study provide an overview of how good dental puppet counseling media is in improving the understanding of grade II students in maintaining dental hygiene. This study was attended by 52 students of grade II SDN Bendul Merisi as respondents.

TABLE 1
Frequency Distribution of Oral Health Maintenance Knowledge About The Meaning Of Oral Health Maintenance Before And After Counseling Using Dental Puppet Media In 2024

Question	Before				After			
	Correct		Wrong		Correct		Wrong	
	Σ	%	Σ	%	Σ	%	Σ	%
Oral health maintenance is?	47	90.38	5	9.62	48	92.31	4	7.69
What is the purpose of brushing your teeth?	30	57.69	22	42.31	49	94.23	3	5.77
How to clean food residue on teeth?	35	67.31	17	32.69	50	96.15	2	3.85
Total	112	215.38	44	84.62	147	282.699		17.31
Average	37.33	71.79	14.67	28.21	49.00	94.23	3.00	5.77

TABLE 1 shows that the value of knowledge about the meaning and purpose of maintaining kesgilut before being given counseling using dental puppet media gets an average correct answer of 71.79% and the wrong answer of 28.21%, so that knowledge is in sufficient criteria. Whereas after counseling using dental puppet media, the average correct answer is 94.23% and the wrong answer is 5.7% knowledge in good criteria.

TABLE 2 shows that the value of knowledge about the meaning and purpose of maintaining kesgilut before being given counseling using dental puppet media gets an average of 38.46% correct answers and 61.54% wrong answers, so that knowledge is in poor criteria. Whereas after counseling using dental puppet media, the average correct answer is 88.46% and the wrong answer is 11.54%, so knowledge is in good criteria.

TABLE 2
Frequency Distribution of Knowledge Of Dental Health About Tooth Brushing Time Before And After Education

Question	Before				After			
	Correct		Wrong		Correct		Wrong	
	Σ	%	Σ	%	Σ	%	Σ	%
1.How many times should you brush your teeth?	23	44.23	29	55.77	45	86.54	7	13.46
2.How long to brush your teeth?	6	11.54	46	88.46	46	88.46	6	11.54

3. When is it time to brush your teeth?	31	59.62	21	40.38	47	90.38	5	9.62
Total	60	115.38	96	184.62	138	265.38	18	34.62
Average	20.00	38.46	32.00	61.54	46.00	88.46	6.00	11.54

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TABLE 3

Frequency Distribution of Knowledge of Kesgilut Maintenance on How to Brush Teeth Properly Before And After Education								
Question	Before				After			
	Correct Σ	Wrong %	Correct Σ	Wrong %	Correct Σ	Wrong %	Correct Σ	Wrong %
1. How do I brush my teeth on the side facing the roof of my mouth?	15	28.85	37	71.15	40	76.92	12	23.08
2. How do I brush my front teeth?	11	21.15	41	78.85	46	88.46	6	11.54
3. How to brush the side of your teeth?	13	25.00	39	75.00	44	84.62	8	15.38
4. How to brush the back teeth?	26	50.00	26	50.00	45	86.54	7	13.46
Total	65	125.00	143	275.00	175	336.54	33	63.46
Average	16.25	31.25	35.75	68.75	43.75	84.13	8.25	15.87

TABLE 3 shows that the value of understanding of how to brush teeth properly before being given counseling using dental puppet media gets an average correct answer of 31.25% and the wrong answer of 68.75%, so that knowledge is in poor criteria. While after counseling using dental puppet media gets an average correct answer of 84.13% and wrong answer 15.87% knowledge in good criteria.

TABLE 4 shows that the value of knowledge about tools and materials for brushing teeth, good and bad food for kesgilut before counseling using dental puppet media gets an average correct answer of 60.77% and wrong answers of 196.15%, so that knowledge is in sufficient criteria. Whereas after counseling using dental puppet media, the average correct answer is 92.69% and the wrong answer is 7.31% knowledge in good criteria. Whereas after counseling using dental puppet media, the average correct answer is 92.69% and the wrong answer is 7.31% knowledge in good criteria.

TABLE 5 explains if the understanding of the maintenance of kesgilut about tooth brushing materials before being given counseling using dental puppet media gets an average correct answer of 27.88% and the wrong answer of 72.12%, so that knowledge is in the criteria less. Whereas after counseling using dental puppet media, the average correct answer is 88.46% and the wrong answer is 11.54% knowledge in good criteria. Whereas after counseling using dental puppet media,

the average correct answer is 88.46% and the wrong answer is 11.54% knowledge in good criteria.

TABLE 5

Frequency Distribution of Knowledge of Dental Health About Tooth Brushing Materials Before And After Education								
Question	Before				After			
	Correct Σ	Wrong %	Correct Σ	Wrong %	Correct Σ	Wrong %	Correct Σ	Wrong %
What toothpaste ingredients are good for teeth?	11	21.15	41	78.85	46	88.46	6	11.54
How many months should a toothbrush be replaced?	18	34.62	34	55.38	46	88.46	6	11.54
Total	29	55.77	75	44.23	92	176.92	12	23.08
Average	14.50	27.88	37.50	72.12	46.00	88.46	6.00	11.54

TABLE 6 explains if the value of understanding the maintenance of Kesgilut regarding the timing of dental examinations before being given counseling using dental puppet media gets an average correct answer of 41.03% and the wrong answer of 58.97%, so that knowledge is in poor criteria. While after counseling using dental puppet media gets an average correct answer of 94.87% and a wrong answer of 5.13% knowledge in good criteria.

TABLE 6

Frequency Distribution of Knowledge Of Kesgilut Maintenance About The Timing Of Dental Examinations Before And After Education								
Question	Before				After			
	Correct Σ	Wrong %	Correct Σ	Wrong %	Correct Σ	Wrong %	Correct Σ	Wrong %
1. When is the recommended time to visit a dental clinic?	25	48.08	27	51.92	51	98.08	1	1.92
2. What do you do when you have a toothache?	25	48.08	27	51.92	50	96.15	2	3.85
3. What is the purpose of having your teeth and mouth checked at a dental clinic?	14	26.92	38	73.08	47	90.38	5	9.62
Total	64	123.08	92	176.92	148	284.62	8	15.38
Average	21.33	41.03	30.67	58.97	49.33	94.87	1.67	3.13

TABLE 7 shows that the knowledge of respondents before counseling on the maintenance of kesgilut with dental puppet media, most of them were in the poor category (46.92%). After being given counseling on maintaining kesgilut with dental puppet media, respondents experienced an increase so that the knowledge category became good (90.48%).

Statistical Test Results of dental puppet as an Educational in pre and post counseling increased the awareness of second grade students of SDN Bendul Merisi Surabaya in maintaining their health.

TABLE 7

Recapitulation of Knowledge of Health Maintenance Before And After Education

No.	Question	Respondent's Answer Correct	
		Before	After
1	Definition of dental hygiene maintenance and definition, purpose of tooth brushing	71,79	94,23
2	Frequency and timing of tooth brushing	38,46	88,46
3	The right way to brush your teeth	31,25	84,13
4	Toothbrushing tools and food what is good and not good for kesgilut	60,77	92,69
5	Tooth brushing materials	27,88	88,46
6	Dental checkup time	41,03	94,87
Total amount		938,46	1809,62
Average		46,92	90,48
Knowledge Criteria		Less	Good

TABLE 8

Statistical Results of The Wilcoxon Test for The Effectiveness Of Oral Health Maintenance Education with Dental Puppet Media

Variables	Z	P
Before - After	-	0,00
	6.295	0

The statistical test results of the Wilcoxon Signed Rank Test that have been calculated previously, resulted in a sig value of 0.000, presented in TABLE 8 Considering that $0.000 < 0.05$, it can be concluded that H_0 is rejected and H_1 is accepted, this shows that there is a considerable difference in the participants' knowledge before and after counseling on maintaining kesgilut when using dental puppet media. The use of dental puppet media in counseling has been proven to be successful in increasing awareness of maintaining teeth and lips in children in grade II SDN Bendul Merisi Surabaya.

As demonstrated in the table above, there is a clear improvement in the students' knowledge regarding oral hygiene after the intervention using dental puppets. Definition and Purpose of Oral Hygiene: The average score for correct answers improved from 71.79% in the pretest to 94.23% in the posttest, indicating a significant enhancement in understanding. Understanding and Goals of Oral Hygiene: Scores rose from 38.46% to 88.46%, showing a notable increase in awareness regarding the objectives of maintaining oral health. Proper Brushing Technique: Knowledge regarding brushing techniques increased from 31.25% to 84.13%, reflecting a significant improvement in practical skills. Tools and Materials for Brushing: The average score increased from 60.77% to 92.69%, indicating better knowledge of what is needed for proper oral hygiene. Understanding of Brushing Materials: There was a substantial rise in knowledge from 27.88% to 88.46%, demonstrating the effectiveness of the puppet intervention. Knowledge of Dental Check-up Timing:

Students improved from 41.03% to 94.87%, showing a significant understanding of when to have dental check-ups.

Overall Knowledge Level: Before the intervention, 46.92% of students fell into the 'poor' knowledge category. After the intervention, this figure decreased dramatically to 90.48% in the 'good' knowledge category.

IV. DISCUSSION

Based on research on the knowledge of grade II students of SDN Bendul Merisi, the poor group of students are students who have not received dental puppet education in terms of awareness of maintaining oral and dental hygiene. Lack of understanding about foods that harm teeth, the ingredients in toothpaste that benefit teeth, and why brushing teeth is important, all contribute to students' lack of awareness in maintaining oral health, how to remove food debris on teeth, how often to brush, and how long to brush. Tooth replacement should be done at routine dental check-ups. Students' habits such as brushing their teeth when taking a morning shower and an evening shower, brushing their front teeth in a right to left motion, their side teeth facing their cheeks in a back-and-forth motion, and their inner teeth rarely facing their tongue and palate and dental check-ups only when they have a toothache, influenced students in answering the questionnaire.

This is in line with [21] Lack of knowledge can be influenced by several things, one of which is the media. Information from the media, both formal and informal, can have an instant impact on knowledge and provide short-term knowledge that can bring about change. In addition, the principal stated that UKGS has not been running optimally so that grade II students at SDN Bendul Merisi Surabaya lack understanding about maintaining health. This further supports the theory that low knowledge can be caused by a lack of health education at school.

Knowledge is the result of an individual's effort in learning something by using his senses of sight, smell, hearing, taste, touch, and so on. The senses of sight (eyes) and hearing (ears) are how most knowledge is obtained. A person's actions are strongly influenced by his knowledge (Notoatmodjo, 2018). Adam [1] found that most primary school students knew little about kesgilut. To improve primary school children's understanding of the issue, educational and promotional campaigns on the practice of kesgilut are needed, both at home and at school.

To improve skills, awareness, and attitudes, health education is needed. Dental health education is a purposeful and focused effort to instill in a person or group of people the desire to change from behaviors that were previously less beneficial to dental health to behaviors that are more beneficial to dental health, with the ultimate goal of improving their standard of living. The educational methods used have an influence on the success of education; in particular, the use of educational tools that involve the senses as much as possible will have an impact on the successful understanding of educational objectives. The use of learning media puppets to

present health education content can increase its impact, ease tension, and foster a stronger bond between the presenter and the audience.

After using the dental puppet media to provide counseling, it is known from the analysis of student knowledge data that the average student knowledge about maintaining kesgilut includes understanding about brushing teeth, understanding about eating foods that are good for teeth, and understanding about dental examinations all have increased and are classified in the good category. Choosing the right media and implementing health promotion strategies such as teaching elementary school students about dental care using dental puppets can have a positive impact on increasing good knowledge. Because dental puppet media can attract children's attention to learning activities and provide opportunities for students to practice or observe directly how to clean teeth so as to increase understanding of the material given to them.

This is in line with Nurhuda's research. (2021) on the impact of hand puppet therapy on MIN children aged 6-8 years Retention of tooth brushing knowledge Banjar Martapura showed an increase in tooth brushing knowledge after receiving hand puppet-based counseling. Information based on the need to maintain kesgilut and improve living standards is what is meant by kesgilut promotion. In the field of kesgilut promotion, people can gain knowledge or experience through several media. Many media, including print and electronic media, are still developing ways to promote health [6].

Keeping teeth healthy should start from a young age, The best time to establish moral principles and superior behavior is when the child is in school. Teaching children motor skills, including how to brush their teeth, should be done while they are still in elementary school. In addition, children who are old enough to attend school have a learning sensibility that matches their inherent curiosity. [8]. Because children still like to play at the age of 6-9 years, the counseling process needs to be accompanied by interesting media.

The method used in providing counseling on the maintenance of kesgilut in class II students is the storytelling method. It is possible to help children follow the storyline and understand the message by using stories or events to convey information. Counseling lasted for 21 days, as reported by Fatmasari et al. [6] who said that because knowledge is influenced by material input or providing more information to someone, providing support for 21 days can increase knowledge. Based on these results, counseling with dental puppet media with storytelling methods can improve the knowledge of grade II students as indicated by an increase in scores after counseling and almost all students are in the good category.

Based on the findings of the data analysis, the second grade students of SDN Bendul Merisi Surabaya showed a statistically significant difference in their understanding of the maintenance of oral health before and after counseling using dental puppets. The reason is, after receiving counseling on the

use of dental puppets to maintain oral hygiene, students now know more. More understanding of the importance of maintaining oral hygiene, the reasons for brushing teeth, how to remove food debris on teeth, how often to brush teeth, when to brush teeth, how to clean the front, back, and side teeth, the area facing the palate, brushing tools, as well as foods that are good and bad for oral hygiene content in toothpaste, the recommended time to check teeth to the dental clinic. Before counseling, students' knowledge was in the poor category, but after counseling using dental puppet media, students' knowledge was in the good category.

The Stimulus Organism Response Hypothesis, often known as the S-O-R theory, states that behavior is the reaction of living things to something outside themselves. Since behavior depends on your knowledge, it is important to pay attention to dental hygiene. Lack of understanding of hygiene issues leads to tooth decay. Knowledge-based behavior is more likely to persist than ignorance-based behavior, as shown by several studies. According to Musyarofah (2017) in Purnama et al. [28] Providing stimulus is tailored to the child's developmental stage, and appropriate techniques are needed to attract children's interest and ensure information is well absorbed. Tooth puppets are used as a counseling medium that functions as a research stimulus.

Based on the results of data analysis, there are variations in the category of understanding level before and after counseling on the maintenance of dentition using dental puppets, this shows how teaching students about the maintenance of dentition through dental puppets can effectively improve their knowledge of the topic in class II students of Bendul Merisi Elementary School Surabaya.

Tooth puppet media has been proven in various studies to increase knowledge. Julianti et al. [13] found that dental puppet media was useful in increasing elementary school students' awareness of dental care. Dental puppet media is an effective way to increase elementary school students' understanding of dental care because it is a visual tool with an attractive model. It also makes students more interested in practicing and listening, so that the material is easier for them to understand and remember.

V. CONCLUSIONS

This study shows that the use of dental puppets as a media tool in dental and oral health education at SDN Bendul Merisi Surabaya is effective in increasing the knowledge of second-grade students. Before the intervention, the majority of students demonstrated a lack of understanding of dental hygiene, with many not knowing the correct way to brush their teeth or what foods are good for their teeth. However, after the educational session using dental puppets, the percentage of students with good knowledge significantly increased, reaching 90.48% compared to 46.92% before the intervention. Statistical analysis using the Wilcoxon test indicated a significant difference ($p < 0.05$), suggesting that dental

puppets can be an effective tool for educating children about dental health.

For future research, conducting longitudinal studies to assess the long-term effects of dental puppets on students' dental hygiene behaviors. Additionally, exploring the effectiveness of dental puppets among different age groups, such as preschoolers and teenagers, will help determine the method's broader applicability. Investigating various educational media—like videos and interactive apps—and comparing their effectiveness with dental puppets can provide insights into the best practices for enhancing oral health knowledge.

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