Correlation Between Level of Knowledge And Tooth Brushing Practices With Oral Hygiene Among Elementary School Students

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ABSTRACT

Background: *Poor oral health has a significant impact on a person's quality of life, as seen in Ministry of Health data, especially in Semarang City which recorded an increase in cases from year to year. Children aged 10-12 years are at high risk due to lack of knowledge and poor oral hygiene behavior, such as brushing teeth properly and correctly has been proven to be effective in preventing plaque, calculus, and other periodontal diseases. One way to assess the level of oral and dental hygiene is to use the Simplified Oral Hygiene Index (OHI-S). This study aims to analyze the correlation between the level of knowledge of oral health and tooth brushing practices on the oral hygiene of grade V students of Tunas Harapan Islamic Elementary School.*

Method: *This study uses an observational study, namely a cross-sectional study approach. The population consisted of 111 fifth-grade students at Tunas Harapan Islamic Elementary School, Semarang. However, based on the inclusion and exclusion criteria (students' willingness to participate and parental consent), a total of 82 students were recruited as the final sample. Data were obtained from questionnaires filled out by students, observation sheets, and oral hygiene assessment sheets.*

Result: *The data were analyzed using the Spearman test. The significance value was ρ=0.000 (ρ<0.05) for the knowledge level and oral hygiene in children and the significance value was ρ=0.000 (ρ<0.05) for the tooth brushing practice and oral hygiene in children.*

Conclusion: *There is a significant relationship between the knowledge level with oral hygiene in children and there is a significant relationship between the tooth brushing practice with oral hygiene in children.*

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INTRODUCTION

Dental and oral health is important because poor dental and oral health negatively impacts growth and development, daily activities, and work and reduces quality of life and well-being.[1] According to the Indonesian Health Survey data in 2023 obtained in the age group 12 (WHO), damaged or decayed tooth are the most serious problem with a percentage of 35.3%. This is following the 2018 Riskesdas data, in the age group 12 (WHO) the highest dental and oral problems are damaged or decayed tooth at 39.9% which indicates that the problem of damaged and decayed tooth is still a major problem in this age group.[2]

The number of dental cases in Semarang City and Regency has increased from year to year, in 2022 there were 109,911 dental cases then increased to 147,787 in 2023, likewise in the Kedungmundu sub-district which experienced an increase from 5,285 cases in 2022 to 8,248 cases in 2023 and became the second highest case in Semarang City and Regency.[3] Children aged 10–12 years are the age recommended by WHO for research because they tend to be more cooperative and are considered independent in maintaining dental hygiene.[4] From a psychosocial aspect, at this stage children begin to learn skills, are more confident, independent, and full of initiative. The influence of parents begins to decrease, while the influence of peers increases.[5]

Knowledge about dental health is made up of all the information, intellect, and skills that are stored in a person's head. Knowledge is crucial to actions that are intended to preserve oral health. Understanding the elements that can impact dental health, such as food, is crucial.[6] Practice is the end result of behavior that can be seen in the form of actions. Good dental and oral health practices can be implemented if a person's knowledge and attitude are good. Children who routinely brush their tooth twice a day tend to have better dental hygiene levels than children who are not disciplined in maintaining oral hygiene.[1]

Lack of awareness about maintaining dental and oral hygiene results in plaque and calculus. Both of these things, if left unchecked, can cause periodontal disease. Regular check-ups and never forgetting to maintain oral hygiene are ways to care for and maintain the oral cavity so that it can be protected from bad breath and caries.[7]

The Oral Hygiene indicator Simplified (OHI S) is one indicator that can be used to evaluate dental and oral hygiene. Developed by Green and Vermillion in 1964, OHI-S evaluates a person's oral hygiene by looking for tartar and food residue on the tooth's outermost layer. Next, the calculated calculus index (CI) and debris index (DI) are added.[8] This study aims to analyze the influence between the level of knowledge of oral health and tooth brushing practices on the oral hygiene of grade V students of SD Islam Tunas Harapan Semarang.

RESEARCH METHOD

The Ethical Committee of the Nursing and Health Science of Muhammadiyah Semarang University granted ethical permission for this study (No. 829/11/2024). This study took a cross-sectional strategy and employed observational methodologies. Stationery, a dental study model, a timer, a toothbrush, a mask, a disposable diagnostic set, and disposable gloves were the instruments utilized. Additionally, 70% alcohol, sterile cotton, questionnaires, observation sheets, informed permission sheets, and oral hygiene inspection sheets were utilized. Students from the Islamic Elementary School of Tunas Harapan Semarang, ages 10 to 12, made up the population. Total sampling was used in the sampling process. Eighty-two children from SD Islam Tunas

Harapan Semarang's class V who met the inclusion criteria and were willing to participate in the survey were included in the sample, and their parents had completed the informed permission form.

The children's oral hygiene, tooth brushing habits, and knowledge level were the variables utilized. Students who fit the inclusion criteria at Islamic Elementary School of Tunas Harapan Semarang were the direct subjects of the data collection. The data collection used primary data, which was based on the results. The knowledge level data were obtained from questionnaires, the tooth brushing practice data were obtained by observation sheet and the children's oral hygiene data were obtained by examining the children's oral cavity. The results were written in the OHI-S index assessment sheet. The data analysis used the spearman correlation test using the SPSS application (Statistical Package for the Social Science).

The preparation and implementation phases of this study were carried out. In the preparation stage, the researcher took care of the research permit, ethical clearance, and prepared the necessary tools and materials. Next, in the implementation stage, researchers visited the research location, distributed informed consent sheets to respondents to be agreed with their parents, and selected respondents according to inclusion and exclusion criteria. The researcher then gave questionnaires, observed tooth brushing practices, and conducted intraoral examinations to measure the simplified oral hygiene index. The data obtained were recorded and processed for analysis.

RESULTS

This study was carried out on December 14, 2024, at the Islamic Elementary School of Tunas Harapan Semarang. There were eighty-two samples. According to the Islamic Elementary School of Tunas Harapan Semarang's questionnaire results, 69 students (84,2%) had good knowledge, 45 students (54,9%) had good brushing habits, and 52 students (63,4%) had good oral hygiene based on a direct examination of the oral hygiene index simplified in children at the Islamic Elementary School of Tunas Harapan Semarang.

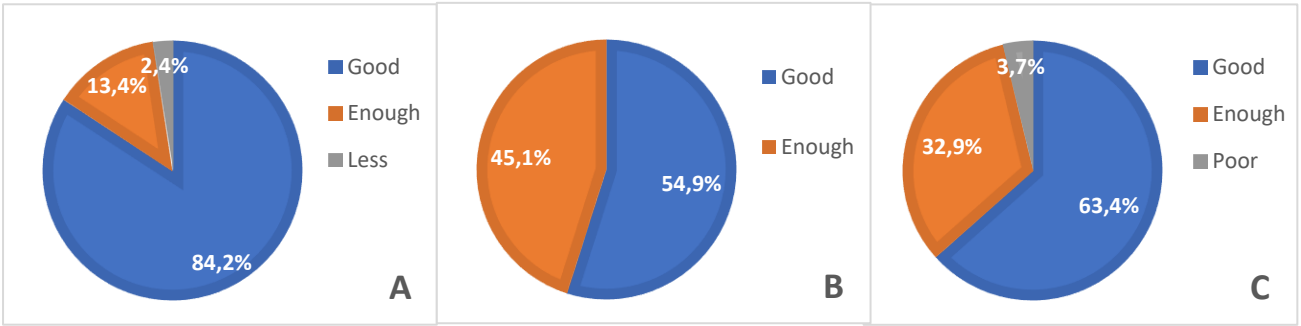

Figure 1. Pie Chart of Frequency Distribution Based on Level of Knowledge (A) Tooth Brushing Practice (B) Oral Hygiene (C).

According to the statistical test results, the Sig. value was 0.000 <α (0.05). This indicates that oral hygiene and knowledge level are significantly correlated. For oral hygiene knowledge, the correlation coefficient is +0.389. Higher levels of education are linked to better dental hygiene in youngsters, as indicated by the sign (+) and the weak correlation of 0.389. (Table 1).

Table 1. The correlation test results between level of knowledge and oral hygiene in children

		Oral Hygiene
Level of Knowledge	Coefficient	0.000
	Value Sig.	0.389
	Total	82

The results of the statistical test showed a Sig. value of 0.000 <α (0.05). This indicates that oral hygiene and tooth brushing are significantly correlated. The correlation coefficient figure for knowledge of oral hygiene is 0.442. The sign (+) indicates that a higher level of tooth brushing practices is associated with better oral hygiene in children and 0.389 indicated that relationship has a sufficient relationship.

Table 2. The correlation test results between tooth brushing practice and oral hygiene in children

		Oral Hygiene
Tooth Brushing Practice	Coefficient	0.000
	Value Sig.	0.442
	Total	82

DISCUSSION

Knowledge of Oral Health

Knowledge of dental and oral health refers to an individual's capacity to learn about these topics as self-education in order to attain optimal health.[9] The correlation between improved oral health and higher knowledge has demonstrated the importance of oral health information in fostering healthy behavior. Education provides information about dental and oral health, which eventually transforms bad conduct into good behavior.[10]

The results of the level of knowledge at the Islamic Elementary School of Tunas Harapan Semarang are shown in Figure 1. Most students had good knowledge of 69 students (84,2%). The high level of children's knowledge about oral dental health can be influenced by the many health facilities available in the area around the school and also the school is located in an urban area which has very adequate communication facilities, so that information about oral dental health is very easy to obtain.[11]

Tooth Brushing Practice

Brushing tooth is one way to maintain dental health by brushing them. The purpose of brushing tooth is to remove plaque or dirt on the surface of the tooth, clean food residue in the mouth, maintain oral hygiene and prevent tooth decay.[12] The findings of the tooth brushing practice at the Islamic Elementary School of Tunas Harapan Semarang are shown in Figure 1. Most students had good practice of 45 students (54,9%). Based on the observation results, although most students were aware of the appropriate timing for toothbrushing, many still failed to correctly apply the roll technique on the posterior teeth, brush the lingual surfaces of the teeth, and tended to neglect brushing the tongue surface. Through everyday activities, the family especially mothers plays a crucial role in teaching children healthy behaviors to maintain their oral and dental health. Teachers act as educators who guide students to implement good habits, including maintaining dental and oral health.[13]

Although students demonstrated a high level of oral health knowledge (84.2%), the proportion of those with good tooth-brushing practice was lower (54.9%), indicating a gap between knowledge and behavior. According to the Health Belief Model, students may understand the importance of tooth brushing but may not yet perceive sufficient susceptibility to or severity of oral diseases, and may face barriers such as limited motor skills and lack of parental supervision at home. Based on Green's behavioral theory, knowledge as a predisposing factor is not adequately supported by enabling factors (proper tooth-brushing skills) and reinforcing factors (support and supervision from parents and teachers). Therefore, oral health education programs should not focus solely on increasing knowledge but should also include supervised hands-on tooth-brushing training and stronger involvement of parents and teachers to reinforce positive behavior.[14]

Oral Hygiene

Oral health includes healthy hard and soft tissue conditions, allowing a person to eat, speak, and interact without functional or aesthetic impairment. Ignoring dental hygiene can lead to plaque formation, as the moist and dark conditions of the mouth support bacterial growth. If left untreated, plaque can spread across the tooth surface, increasing the risk of oral health problems.[15] Figure 1 displays a direct analysis of the simplified oral hygiene index in students at the Islamic Elementary School of Tunas Harapan Semarang. Most students had good oral hygiene of 52 students (63,4%). This is a good step because school age is an age that has a big influence on a child's physical growth and development and this period is the period when a child will carry the habits they do into adulthood.[1]

The Correlation Between Level of Knowledge and Oral Hygiene

A study by Selvaraj (2021) in a South Indian population reported that although individuals may have good oral health knowledge, their attitudes and behaviors toward oral health often remain inadequate due to low perceived importance. This is following the results of the study a significant value (Sig.) of 0.000, which is less than α (0.05). This suggests that oral hygiene and knowledge level are significantly correlated. The correlation coefficient of +0.389 indicates that children's dental hygiene and knowledge level are positively correlated. In other words, Higher levels of knowledge correlate to improved dental hygiene. However, the correlation value of 0.389 indicates that the relationship is weak. [16] The weak correlation between knowledge and oral hygiene status indicates that knowledge alone is insufficient to determine oral hygiene outcomes. This may be influenced by various confounding factors, including toothbrushing skills and habits, parental supervision, dietary patterns particularly the intake of cariogenic foods and biological factors such as salivary flow and tooth anatomy. Therefore, oral hygiene is a multifactorial condition influenced by the interaction of knowledge, behavior, environmental, and biological factors, rather than knowledge alone.[17]

Oral and dental health status tends to increase along with a person's level of knowledge. Higher knowledge allows individuals to make better decisions about dental care, such as healthy eating patterns, the importance of oral hygiene, and stress management. They can also better access the right dental health information and services, which can prevent dental and gum disease. On the other hand, ignorance can raise the chance of dental health issues like gum disease and cavities.[18]

The Correlation Between Tooth Brushing Practice and Oral Hygiene

A study by Anuar (2025) in school adolescents in Malaysia reported that toothbrushing practice is an essential habit for achieving good oral health status. The study's statistical analysis showed a significant value (Sig.) of 0.000, which is less than α (0.05), indicating a significant relationship between tooth brushing practices and oral hygiene. This suggests that effective removal of dental biofilm through toothbrushing and the use of fluoridated toothpaste plays an important role in preventing dental caries. The correlation coefficient of +0.442 demonstrates a positive relationship, meaning that better tooth brushing practices are associated with improved oral hygiene in children. A correlation value of 0.442 suggests that the relationship is sufficient.[19]

Proper brushing technique is essential for maintaining overall oral health. With proper technique, plaque, food debris, and stains can be effectively removed, avoiding the accumulation of plaque, which can cause gum disease, tooth damage, and other oral health issues. In addition, proper technique also gently stimulates the gum tissue, which helps strengthen and maintain gum health, reducing the risk of gingivitis and more serious gum disease, ultimately improving overall quality of life and well-being.[20]

Considering that students' level of knowledge is relatively high (84%) while toothbrushing practice remains low (54%), the Unit kesehatan Gigi Sekolah (UKGS) should not be limited to theoretical education alone but should also incorporate supervised hands-on toothbrushing training to improve students' motor skills.

There are several of limitations to this study that should be noted. It is impossible to determine whether regular toothbrushing or other contributing factors lead to good oral hygiene since the cross-sectional design makes it impossible to determine cause-and-effect correlations. Furthermore, self-reported questionnaires were used to collect knowledge data, which may be prone to social desirability bias since students may give responses they believe to be ideal rather than ones that really reflect their knowledge.

CONCLUSION

The study's findings indicate that children's oral hygiene and teeth brushing habits are significantly correlated.

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