

Relationship Between Knowledge of Dental Health Care and The Incidence of Dental Caries as A Basis for Nursing Intervention in School-Aged Children

Djahra Warda Sopaliu^{1✉}, Dewi Syitra Rumadaul¹, Riska M. Attamimi¹

¹ STIKes Maluku Husada, Indonesia

✉ Corresponding author: Djahra Warda Sopaliu; email: djahra28@gmail.com

Abstract

Background: Dental caries is a dental and oral health problem that is still commonly found in school-age children. If left untreated, this problem can lead to complications such as inflammation and pus in the gums, gum tissue abscesses, and inflammation of the jawbone. This has the potential to not only reduce the child's health status but also affect their concentration at school, attendance, and quality of life. The high prevalence of caries indicates that preventive efforts through dental health maintenance are not yet optimal. A factor that plays a role in the prevention of dental caries is children's knowledge of dental health maintenance. **Objective:** This study was conducted to identify the relationship between knowledge of dental health maintenance and the incidence of dental caries as a basis for nursing intervention in school-age children. **Method:** This study used a quantitative design with a cross-sectional approach. This study was conducted at SD Inpres 22 Ambon for 2 days with 60 students as respondents using total sampling technique. Data on dental health knowledge was collected using a questionnaire, while the incidence of dental caries was assessed by conducting dental examinations. Data analysis was performed using the chi-square test. **Results:** The results of the study obtained a p-value (0.000), indicating that there is a relationship between the level of dental health knowledge and the incidence of dental caries in school-age children. Children with less knowledge tended to have higher dental caries compared to children with good knowledge. **Discussion:** This study concluded that knowledge of dental health maintenance is a factor related to the incidence of dental caries in school-age children. **Conclusion:** These findings can be used as a basis for developing promotive and preventive nursing interventions, such as structured and continuous dental health education in the school environment.

Keywords: children, dental caries, health maintenance, knowledge, school age

INTRODUCTION

Dental health is an integral part of overall health that is no less important. One of the common issues in dental and oral health, especially among elementary school students, is a lack of attention to dental and oral hygiene. One of the health problems commonly experienced is dental caries, which is a process of tooth decay that starts from the tooth enamel to the pulp [1]. The prevalence of dental caries among Indonesian children is still very high [2]. This problem is a major issue that needs to be addressed in order to improve dental and oral health, especially among children [3].

Global data on the prevalence of dental caries varies greatly. The World Health Organization (WHO) estimates that the frequency of dental caries in children from low- and middle-income countries is 60%-90%, while in high-income countries the prevalence reaches 20%-40% (Raviglione et al., 2023). According to information from the WHO in 2021, the incidence of dental caries in children reached 53% in Asia and 65% in Africa. In 2019, it was also found that the rate of dental caries reached 43.77% in the Southeast Asia region [4]. Indonesia also experiences a relatively high incidence of dental caries, with a prevalence of dental caries [5] based on data from the Regional Health Research [6] Oral health problems in Indonesia are as high as 57.6%, supported by data from the Indonesian Dental Association (PDGI), which shows that at least 89% of patients with cavities or dental caries are children under the age of 12 [7].

Problems caused by dental caries in children range from impaired chewing ability, which then affects their nutritional intake and health status. In addition, dental and oral problems can lead to other diseases in the body, such as arthritis, rheumatic fever, heart valve disorders, and kidney problems [8]. If left untreated, dental caries can lead to complications such as inflammation and pus in the gums, abscesses in the gum and muscle tissue, inflammation of the jawbone, and even death [9]. This has the potential to not only reduce children's health status but also affect their concentration at school, attendance, and quality of life.

In order to reduce the prevalence of caries and achieve the Ministry of Health's goal of a Caries-Free Indonesia by 2030, basic and ongoing research is needed. According to research [10], there are many factors that cause dental caries, including children's understanding of proper tooth brushing techniques, the condition of the teeth themselves, the role of parents, and the lack of utilization of dental health services that should be performed every six months as recommended. Unhealthy behaviors and neglecting oral health are among the factors that trigger dental caries.

Knowledge is the basis for the formation of healthy behavior. According to [11], lack of education and low awareness and knowledge about dental and oral care are factors that trigger health problems. Elementary school children still lack knowledge about dental and oral health, rarely brush and clean their teeth, which can lead to tooth decay due to food debris buildup [12]. Diet is also a cause of tooth decay. School children tend to prefer cariogenic foods. Cariogenic foods are foods that are high in sugar and can cause damage to teeth, leading to the formation of caries [13].

In line with the research by [14], which states that many children still like to consume cariogenic foods and drinks that are not good for dental and oral health. This is supported by research indicating that dental and oral health issues among elementary school-aged children remain a major concern due to incorrect behavioral habits in maintaining dental and oral hygiene, as well as improper brushing techniques [15]. It was found that many children at this stage are still learning how to care for their teeth and mouth. Some children understand the importance of maintaining proper oral hygiene, but there are also children who lack knowledge and awareness in maintaining oral and dental health [16].

In other report, the children aged 9-14 years, who are classified as school-aged children, still have dental and oral problems. Dental and oral hygiene must be paid attention to by children aged 9-12 years because they are not yet accustomed to brushing their teeth properly. In addition, most school-age children, especially those aged 10-12 years, do not understand how to properly care for their teeth and mouth, including how to clean their teeth, when to brush their teeth, and how to apply toothpaste. This age is a period when children like to snack on whatever they like, such as candy or cotton candy, and their motivation to take care of their teeth is still lacking [17].

Based on the results of the 2023 Indonesian Health Survey (SKI), children aged 6-14 years are a critical age group with specific characteristics, as they are undergoing a transition or replacement from baby teeth to permanent teeth. Children aged 10-12 years are prone to caries because this age group is in a phase of childhood where they are more active and have more food choices. Children of this age are in grades 4-6 of elementary school. In Indonesia, the proportion of dental caries is still high at 57.6%, where when viewed based on age distribution, the proportion is 55.6% for ages 10-14 and 67.3% for ages 5-9. This data shows that dental caries in school-aged children has a fairly high proportion [18].

There are three provinces with the lowest rates of dental and oral problems: Bali (46.5%), Bangka Belitung (46.9%), and Papua (49.4%). The five provinces with the highest prevalence of dental and oral problems include Maluku with a prevalence of 64.9%. According to data from the Maluku Provincial Health Office in 2020, approximately 87% of children aged 7 to 9 years old have experienced dental problems in the form of caries [19].

Based on preliminary information obtained on April 30, 2025, at SD Inpres 22 Ambon, it was revealed that the school has established cooperation with the Karang Panjang Community Health Center. The health center usually conducts health checks, including dental examinations. According to data provided by the health center, the number of students with dental caries at SD Inpres 22 Ambon was recorded at 135 students in 2023, consisting of 70 boys and 65 girls. while in 2024, the number decreased to 125 students, consisting of 64 boys and 61 girls, and in 2025 until April, it increased to 158 students, consisting of 98 boys and 60 girls.

The limited information available on oral and dental hygiene causes children to neglect their dental and oral hygiene, which affects the health of their mouths and teeth [20]. Other report in Dukuh Kupang, Surabaya supports the idea that there is a link between understanding dental health and the frequency of dental caries among elementary school students.

There is a relationship between understanding of dental and oral health and concern for dental and oral health care. In improving knowledge, strategic efforts are needed as a prompt and preventive measure. Nurses can apply their role as educators who provide systematic and continuous dental health education in accordance with the child's developmental stage. The incidence of dental caries in school-age children shows that

educational efforts have not been fully effective, so a strong scientific basis is needed to design targeted nursing interventions. Research on the relationship between the level of knowledge of dental health maintenance and the incidence of dental caries in school children is important to conduct. The results of the study can be the basis for developing evidence-based nursing interventions, especially in the aspects of education and prevention of dental caries in improving the dental and oral health of school-age children [21].

METHOD

Study design

This study used a correlational analytical research design [22], which aims to determine the relationship between variables. It used a cross-sectional approach. Study was conducted at SD Inpres 22 Ambon, Batu Merah Village, Sirimau District, Ambon City, from June 16 to June 17, 2025.

Population and Sample

The population in this study consisted of 60 students in grades 4-5 at SD Inpres 22 Ambon. The sampling technique used in this study was total sampling. The independent variable in this study was the level of knowledge about dental health care. The dependent variable in this study was the incidence of dental caries.

Instrument

The measurement tool used in this study was a knowledge questionnaire consisting of 19 statements about dental health. Positive statements are numbered (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 18, 19). Correct answers are given a score of 1, and incorrect answers are given a score of 0. Negative statements are numbered (12, 14, 17), where incorrect answers are given a score of 1 and correct answers are given a score of 0. An observation sheet for dental caries was used with a scoring system where the presence of dental caries was scored as 1 and the absence of dental caries was scored as 0.

RESULTS AND DISCUSSION

The largest number of respondents were 10 years old, numbering 25 (41.7%), while the smallest number were 9 and 12 years old, numbering 8 (13.1%). The majority of respondents were female, numbering 33 (55.0%). The most common grade level among respondents was grade 4, with 31 respondents (51.7%). The highest level of knowledge was found in 34 respondents (56.7%), while the lowest level was found in 12 respondents (20.0%). The highest number of respondents with caries was 46 (76.7%) and the lowest number without caries was 14 (23.3%) (Table 1).

Table 1. Characteristics of respondents

Respondent Characteristics	Frequency (n)	Percentage (%)
Age		
9 years old	8	13.1
10 years old	25	41.7
11 years old	19	31.7
12 years old	8	13.1
Gender		
Male	27	45.0
Female	33	55.0
Class		
4 th Grade	31	51.7
5 th Grade	29	48.3
Level of Knowledge		
Good	12	20.0
Fair	14	23.3
Poor	34	56.7
Occurrence of Dental Caries		
No Cavities	14	23.3
Cavities	46	76.7

Table 2. The Relationship Between Dental Health Maintenance Knowledge and the Incidence of Dental Caries in School-Age Children at SD Inpres 22 Ambon

Knowledge Variable	Dental Caries				Total		p-value
	No Dental Caries		Dental Caries		N	%	
	n	%	n	%			
Good	10	16.7	2	3.3	12	20.0	0.000
Fair	3	5.0	11	18.3	14	23.3	
Poor	1	1.7	33	55.0	34	56.7	

The 12 respondents with good knowledge, 2 (3.3%) respondents had dental caries and 10 (16.7%) respondents did not have caries. Of the 14 respondents with adequate knowledge, 11 (18.3%) respondents had dental caries and 3 (5.0%) respondents did not have caries. Of the 34 respondents with insufficient knowledge, 33 (55.0%) respondents had dental caries and 1 (1.7%) respondent did not have caries.

The statistical test results using the Chi Square test with a significance level of $\alpha=0.05$ yielded a p value = 0.00, indicating that $p < \alpha$, so the alternative hypothesis (H_a) was accepted and the null hypothesis (H_0) was rejected, meaning that there was a significant relationship between the level of knowledge of dental health care and the incidence of dental caries in school-age children at SD Inpres 22 Ambon (Table 2).

The results of the research and statistical tests show that the highest level of knowledge about dental health care is lacking in 34 people. This is shown in the results of the

questionnaire that was distributed. Dental health care, where the majority of respondents have less knowledge than respondents who have sufficient and good knowledge.

Research conducted by [14] showed that of the 100% of students with insufficient health knowledge, 80% had a high rate of dental caries, similar to the research by Friandi [15] which found that more than half of the respondents (61.7%) of school-age children had a low level of knowledge about dental caries. This can be seen from the low level of knowledge among students about dental health maintenance and the high incidence of dental caries among student respondents.

The level of knowledge varies among children. Lack of knowledge can be caused by several factors, namely the media and information obtained from both formal and non-formal education, such as leaflets, which provide short-term knowledge, thereby bringing about change and increasing knowledge [16]. The low level of knowledge about dental health maintenance is caused by attitudes, parental support, and school monitoring of dental health, which are still low [17]. Research by [18] found that efforts to maintain oral health and dental hygiene, especially among school children, need special attention because at this age children are undergoing a process of growth and development.

Students level of knowledge can increase if they are given access to information related to proper dental health maintenance so that they can change their insights and knowledge for the better, which will have an impact on the application of positive habits in maintaining daily dental and oral health, thereby improving dental and oral health.

The incidence of dental caries occurs most frequently at the age of 10, showing that the majority of respondents who have dental caries are more numerous than respondents who do not have dental caries. Research by [19]. found that out of 32 students, the most dominant incidence of dental caries was 22 people (68.8%). In line with [20] research, more than half of the respondents (55.3%) of school-aged children aged 9-12 years are prone to dental caries.

The high prevalence of dental caries is caused by children not applying their knowledge of dental and oral health in their daily dental health behaviors or perhaps not brushing their teeth after eating chocolate or similar foods. Sweet foods are available at school, and very few of them are aware of the importance of brushing their teeth after eating and before going to bed at night [21].

Children aged 10-12 years are prone to dental caries because this age group is in a more active phase of childhood and has many food choices. Children of this age are in grades 4-6 of elementary school [22]. At this stage, the school environment can be used as a place to obtain information about dental health. This age is an ideal time to implement oral health efforts, as elementary school age marks the beginning of permanent tooth growth and is a high-risk group for dental caries [11].

The lack of knowledge among students can increase the incidence of dental caries due to insufficient information about caries and poor oral hygiene. Dental care that can be done includes brushing teeth (the correct way to brush teeth, choosing the right toothbrush,

and the correct frequency of brushing), regulating food (choosing foods that are good for strengthening teeth and brushing teeth after eating), using fluoride, and having regular check-ups with the dentist. This awareness will encourage children to think more about what they receive. In this case, school-age children learn about dental hygiene, including dental problems and how to care for their teeth.

The results of the study indicate that there is a relationship between knowledge and the incidence of dental caries at SD Inpres 22 Ambon in 2025, as proven by the results of statistical tests that have been conducted. This is in line with the research [12] which shows that of the 100% of students with poor health knowledge, 80% had a high status of dental caries, while of the 100% of students with good dental knowledge, 83.3% had a low status of dental caries. This indicates that there is a relationship between students' level of knowledge about dental health and the incidence of dental caries.

Similarly, a study conducted by [13] found a cross-tabulation between knowledge and dental caries in students at Al-Fakhri Private Elementary School, with 56 respondents (100%) showing a dominant lack of knowledge and a high incidence of caries. This study found a relationship between knowledge and the incidence of dental caries.

The results of the study found that low levels of knowledge were associated with a high incidence of dental caries due to poor dental hygiene among children and a low level of awareness among children about maintaining dental and oral health. This is where the role of parents and schools is greatly needed in providing educational guidance to children about dental and oral health.

The relationship between the two variables in this study reinforces the importance of appropriate education-based interventions as part of proactive and preventive efforts in preventing dental caries in school-age children.

CONCLUSION

This study shows a relationship between knowledge of dental health care and the incidence of caries in school-age children. Low levels of knowledge about dental caries care tend to be associated with higher rates of dental caries. This indicates that knowledge is an important factor related to the dental and oral health of school-age children. The results of this study provide a scientific basis for considering knowledge of dental health care as a key factor in caries prevention efforts. Improving children's knowledge of dental health care plays a strategic role as a basis for developing promotive and preventive nursing interventions in the school environment.

Collaboration between the school environment, health workers, and parents is expected to create an environment that supports optimal dental health maintenance for children. It is recommended that future researchers conduct studies with stronger designs, such as longitudinal studies or interventions, to test the effectiveness of dental health education programs in reducing the incidence of dental caries in school-age children. Further research may also consider other factors that may influence the incidence of caries, such

as toothbrushing behavior, dietary patterns, and family support in promoting dental health.

ACKNOWLEDGMENTS

This research was funded by the researchers themselves. The researchers would like to express their gratitude for the cooperation between the research team and SD Inpress 22 Ambon school for their valuable contribution in granting permission to the research team to conduct this research. This research was supported by STIKes Maluku Husada.

DISCLOSURE OF INTERESTS

The authors declare that they have no conflicts of interest.

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