

ARTICLE INFORMATION

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The relationship between tooth brushing habits and dental caries in third and fourth grade elementary school children

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Abstract

Background: Dental caries is one of the most common oral health problems among elementary school children and can affect their comfort, chewing ability, and learning activities. One behavioral factor suspected to play a role in the development of dental caries is tooth brushing habits.

Purpose: This study aims to determine the relationship between tooth brushing habits and dental caries in elementary school children in grades 3-4

Method: This quantitative study used a descriptive correlational design and a cross-sectional approach. The sampling technique used purposive sampling, with a sample size of 58 respondents. Data on tooth brushing habits were collected using a questionnaire, while data on dental caries were obtained through direct observation. Data analysis was performed using univariate and bivariate analysis with the Chi-square test at a significance level of $p < 0.05$.

Results: The results showed that most respondents had good tooth brushing habits (63.8%), adequate habits (34.5%), and poor habits (1.7%), and the majority of children had dental caries with a frequency of 82.8%. The Chi-square test results showed a value of ($p=0.839$), meaning that P Value > 0.05 , which means that H_a is rejected and H_o is accepted, indicating that there is no significant relationship between tooth brushing habits and dental caries in children in grades 3-4 at SDN Nogotirto.

Conclusion: There is no significant relationship between toothbrushing habits and dental caries in third and fourth grade elementary school children.

Keywords: Elementary School Children; Dental Caries; Toothbrushing Habits.

INTRODUCTION

Dental and oral health are an integral part of overall health and play an important role in supporting the quality of life of elementary school children. Between the ages of 6 and 12, children are in a phase of rapid growth and development, including the process of replacing primary teeth with permanent teeth, thus requiring special attention to dental and oral care (Zakiyah, Hasibuan, Yasifa, Siregar, & Ningsih, 2024). Children aged 6-12 years require serious dental care because this is the age when teeth change and new teeth grow. At this age, all primary teeth have fallen out and most permanent teeth will grow (Simbolon, 2020).

Community behavior in maintaining dental health is reflected, among other things, in the routine of brushing teeth. Children are more vulnerable to dental and oral health problems and require special attention. The state of children's dental and oral health includes poor oral hygiene and the accumulation of plaque and other deposits on the surface of the teeth. The role of parents at home, teachers, and health workers is very important in guiding children to maintain oral hygiene through the use of toothbrushes, rules, and proper brushing times from an early age (Larasati, Wahyuni, Prasetyowati, & Hadi, 2022). Brushing teeth is an

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activity of cleaning teeth from food residues, the commonly used technique is the roll technique by directing the part facing the cheeks up and down or in a circular motion, the part facing the lips up and down, the part facing the tongue by hooking, and the chewing part back and forth (Tonglo & Maramis, 2021).

Oral health problems, particularly dental caries, are still commonly found in elementary school children. Dental caries not only cause pain and discomfort but can also interfere with chewing, sleeping, and children's concentration at school (Putri & Damayanti, 2022). Tooth decay is a problem commonly found in school-aged children aged 6-12 years because during this period, their baby teeth are replaced with permanent teeth. Therefore, this problem is a major issue in dental and oral health. The habit of brushing teeth daily is not yet optimal because children are not accustomed to it from an early age by their parents; hence, children lack awareness and motivation to maintain dental and oral health. This condition makes it easier for children to be at risk of tooth decay (Rahina, Digaa, Elang, & Walianto, 2021). One behavioral factor that plays an important role in the development of dental caries is the habit of brushing teeth. Improper tooth brushing habits, in terms of frequency, timing, and technique, can cause plaque and food debris to accumulate on the tooth surface, which in turn triggers the demineralization of tooth enamel by acids produced by bacterial metabolism (Marlindayanti, Hanum, Ismalayani, & Heriyanto, 2022).

Dental caries is one of the problems in dental health, with around 80% of Indonesians experiencing dental caries. In general, dental caries is an accumulation of food residues left on the teeth, which causes the teeth to become calcified. Dental caries problems that occur in children aged 6-12 years have quite serious impacts, as they lead to cavities and calcification which can cause teeth to break, thereby interfering with chewing (Nurjanah, Farizki, Hidayat, & Saebah, 2021).

The WHO (2022) reports that more than two billion children worldwide have permanent tooth decay and around 514 million children have primary tooth decay, with a fairly high prevalence in Southeast Asia. In Indonesia, the 2023 Indonesian

Health Survey shows that 43.6% of the population has damaged or decayed teeth. Meanwhile, in the Special Region of Yogyakarta, around 41.7% of residents experience tooth damage. Then, in the 5-9 age group, around 49.95 children experience dental problems, and 37.2% of children aged 10-14 experience dental caries (Kediri City Central Statistics Agency, 2023).

The government has paid attention to dental and oral health as stipulated in Law of the Republic of Indonesia Number 17 of 2023 concerning health in Article 70 paragraph (1) regarding public health services. Furthermore, paragraph (2) explains that oral health services are carried out in the form of improving oral health, preventing dental diseases, treating dental diseases, and restoring dental health.

RESEARCH METHOD

This study used a quantitative approach with a correlative descriptive design and a cross-sectional design, in which the independent and dependent variables were measured simultaneously at one time to determine the relationship between the variables. The study was conducted at SDN Nogotirto from November 2025 to January 2026, with data collection on January 28–29, 2026. The research population consisted of all 114 students in grades 3 and 4, while the sample of 58 respondents was determined using purposive sampling based on inclusion and exclusion criteria, with the sample size calculated using the Slovin formula. The independent variable in this study was toothbrushing habits, while the dependent variable was dental caries. Data were obtained from primary data sources through the completion of a toothbrushing habits questionnaire and direct observation of dental caries. The tooth brushing habit questionnaire was adopted from Nabila Fitriani (2024), consisting of 10 questions covering the frequency, time, and technique of tooth brushing, with the reliability test results showing a Cronbach's Alpha value of 0.805, indicating a reliable

instrument. Dental caries were measured using an observation sheet, while the measurement method was physical examination, including the presence of cavities divided into classes I-VI. Data collection was carried out directly by the researcher with the assistance of research assistants who had

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received prior guidance. Data analysis was performed using SPSS software through univariate analysis to describe the data distribution and bivariate analysis using the Chi-square test with a significance level of 0.05 to determine the relationship between tooth brushing habits and

dental caries. This study complied with research ethics principles, including informed consent, anonymity, and data confidentiality, and obtained approval from the research ethics committee prior to implementation with No. 5160/KEP-UNISA/I/2026.

RESEARCH RESULTS

Table 1. Characteristics of Respondents (N=58)

Variable	Results
Age (Mean±SD) (Years)	(9.60 ± 0.53) (9-11)
9	24/41.4
10	33/57.0
11	1/1.6
Gender (n/%)	
Male	27/46.6
Female	31/53.4
Tooth Brushing Habits (n/%)	
Good	10/17.2
Fair	48/83.0
Poor	1/1.6
Dental Caries (n/%)	
Yes	48/83.0
No	10/17.2
Dental Caries Class (n/%)	
None	10/17.2
1	41/70.7
6	5/8.6
1 and 6	2/3.4

Based on Table 1, it can be seen that the majority of respondents were aged 10 years (56.9%) and the majority of respondents were female (31 children or 53%). It was found that third and fourth grade students at SDN Nogotirto had good tooth brushing habits, with 37 respondents (63.8%). A total of 20 respondents (34.5%) were categorized as adequate, and 1 respondent (1.7%) was categorized as poor. Data shows that 48 children (82.8%) in grades 3-4 at SDN Nogotirto had dental caries, while 10 respondents (17.2%) did not have dental caries. Data shows that third and fourth graders have the highest number of caries in first grade with 41 respondents (70.7%), sixth grade with 5 respondents (8.6%), and first and sixth grades with 2 respondents (3.4%) and it was found that third and fourth graders at SDN Nogotirto had good toothbrushing habits, with 7 respondents having no dental caries and 30 respondents having dental caries. The sufficient category had 3 respondents with no dental caries and 17 respondents with dental caries, while the poor category had 1 child with dental caries.

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Table 2. Results of the Chi-Square Test on the Relationship between Tooth Brushing Habits and Dental Caries

Statistical Test	Value	df	P-Value
Pearson Chi-Square	1.352	2	0.839

Based on Table 2. the data on the relationship between tooth brushing habits and dental caries shows a p-value of 0.839, which is greater than 0.05, meaning that there is no significant relationship between tooth brushing habits and dental caries in third and fourth grade elementary school children.

DISCUSSION

Based on the results of the study conducted by the researcher on 58 respondents, 37 respondents (63.8%) had good tooth brushing habits, 20 children (34.5%) had adequate tooth brushing habits, and only 1 child (1.7%) had poor tooth brushing habits. These findings indicate that, in general, third and fourth graders have relatively good tooth brushing habits.

The results showed that the majority of respondents (63.8%) had good toothbrushing habits but still had dental caries. Tooth brushing behavior cannot be assessed solely based on routine, as the effectiveness of caries prevention is largely determined by the quality of toothbrushing practices (Prasetya, 2024). Explain that in elementary school-aged children, there is often a gap between knowledge and practice, so that good toothbrushing habits do not necessarily reduce the risk of dental caries (Meidina, Hidayati, & Mahirawatie, 2023).

The factors that influence tooth brushing habits are very diverse. Tooth brushing behavior in elementary school children is greatly influenced by early habituation and reinforcement from the immediate environment, particularly the family and school (Larasati, Wahyuni, Prasetyowati, & Hadi, 2022). Children who regularly receive guidance and examples of proper tooth brushing tend to exhibit better tooth brushing habits. Tooth brushing habits in children are influenced by several interrelated factors, namely knowledge, the role of parents, the role of teachers, the role of health workers, and attitudes and behaviors related to clean and healthy living (Prasetya, 2024).

The high proportion of the "good" category does not necessarily reflect optimal practice quality. Elementary school-aged children tend to evaluate habits based solely on frequency, often neglecting duration, proper technique, and crucial timing such as

after breakfast and before bedtime (Meidina et al., 2023). Therefore, ongoing parenting and supervision from parents and schools remain necessary to transform routines into effective health skills.

The prevalence of dental caries among respondents was found to be very high, with 82.8% (48 children) experiencing dental caries. In addition to the physical impact, this condition risks reducing children's quality of life through pain that can interfere with concentration and academic achievement (Apro, Susi, & Sari, 2020).

The factors that influence dental caries are microorganisms, which play an important role in the caries process through their ability to ferment carbohydrates into acids. The acids produced lower the pH of the oral cavity and cause demineralization of tooth enamel. Teeth and saliva are also factors that influence the occurrence of dental caries. The anatomical structure of teeth, which has pits and fissures, facilitates the accumulation of food debris and plaque. Saliva acts as a natural protector of teeth because it has a cleansing and acid-buffering function. If the amount or quality of saliva decreases, the ability to neutralize acid decreases, thereby increasing the risk of caries. Time and age are factors that influence the risk of dental caries. The longer and more frequently teeth are exposed to acids from cariogenic foods, the higher the risk of caries. In addition, age affects tooth susceptibility, the ability to maintain oral hygiene, and eating patterns, which also determine the occurrence of caries (Nabila, 2024).

Bivariate analysis using the Chi-Square test showed no significant relationship between toothbrushing habits and dental caries ($p = 0.839 > 0.05$). This insignificance indicates that the assessment of habits, which has been quantitative (frequency), does not fully reflect the qualitative

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effectiveness of plaque removal (Prasetya, 2024). Other factors such as improper brushing techniques (predominantly horizontal technique), brushing times that do not follow recommendations, and high consumption of sugary foods are confounding variables that increase the risk of caries even if children brush their teeth regularly (Napitupulu, 2023). These findings emphasize that caries prevention is not sufficient by merely increasing brushing frequency but must be accompanied by education on proper techniques and strict monitoring of biological risk factors and other behaviors (Yogie & Ernawati, 2020).

The results of research that are not consistent are found which found a significant relationship between oral hygiene behavior and the incidence of dental caries with a Kendall's Tau test value of 0.047, meaning that there is a significant relationship. The study showed that the contribution of oral hygiene behavior to the incidence of dental caries is very low, only 7.8%, so most of the occurrence of caries is influenced by factors other than the behaviors measured (Pratiwi, Rohmawati, & Isnaeni, 2025).

The results of this study are also in line with previous research conducted which shows that the habit of brushing teeth has no statistically significant relationship with the experience of dental caries. The study found that even though most respondents had the habit of brushing their teeth regularly, the prevalence of caries remained high (Suryandi, 2023).

Similar findings were also reported who stated that there was no significant relationship between tooth brushing habits and the incidence of dental caries in elementary school students ($p > 0.05$). The similarity of these results shows that tooth brushing habits, as assessed in general, do not necessarily reflect the effectiveness of dental care in preventing caries (Yogie & Ernawati, 2020). According with other research in the International Dental Journal, who reported that the high prevalence of tooth brushing habits in children is not automatically followed by low DMFT (Decayed, Missing, Filled Teeth) scores. The study shows that the statistical relationship between tooth brushing habits and the incidence of caries is weak and insignificant after considering other factors (Elidrissi & Naidoo, 2016).

CONCLUSION

Based on the results of the research and discussion conducted by the researcher, it can be concluded that the majority of children in grades 3-4 experience dental caries even though most of them have good tooth brushing habits. The results of the analysis show that there is no significant relationship between tooth brushing habits and dental caries in third and fourth grade elementary school children with a Chi-Square test result of 0.839, indicating that there are other factors that affect dental caries besides tooth brushing habits. The high prevalence of dental caries in children with good tooth brushing habits indicates that dental caries is not solely influenced by tooth brushing habits, but also by other factors such as brushing technique and timing, consumption of cariogenic foods, dental and saliva conditions, as well as biological and environmental factors. Therefore, efforts to prevent dental caries in elementary school children need to be carried out comprehensively through improving the quality of oral hygiene behavior, continuous education, and the active involvement of parents, schools, and health workers in forming clean and healthy living habits from an early age.

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