

## THIS STUDY EXAMINES THE RELATIONSHIP BETWEEN THE FREQUENCY AND TIME OF TOOTH BRUSHING WITH DENTAL CARIES IN CLASS V AND VI STUDENTS OF PUBLIC ELEMENTARY SCHOOLS IN THE NAGARI MUARO PAITI DISTRICT COMPRISING 50 TOWNS

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### Abstract

*The most prevalent dental and oral health issue among school-aged children is dental caries. This can be attributed primarily to inadequate toothbrushing techniques and behaviours. The objective of this research is to ascertain the relationship between the frequency and duration of toothbrushing and the prevalence of dental caries among students in grades V and VI of state-run elementary schools (SDN) in Nagari Muaro Paiti. This study employs a cross-sectional analytical research design. The research population comprised all students in grades V and VI of SDN in Nagari Muaro Paiti. The sampling technique employed was saturation sampling, which yielded a sample size of 186 students. The data were collected utilising a checklist to ascertain the frequency and timing of toothbrushing, as well as an examination format to determine the presence of dental caries. The data were subjected to analysis using the chi-square test. The findings indicated that students who brushed their teeth once a day exhibited a favourable caries status of 4.3% and an unfavourable caries status of 35.5%. Conversely, students who brushed their teeth at least twice a day exhibited a favourable caries status of 9.7% and an unfavourable caries status of 50.5%. The p-value for this comparison was 0.331. It was observed that no students were brushing their teeth at the optimal time. A total of 10.2% of the observed subjects exhibited a favourable caries status, while 24.7% displayed an unfavourable one. Among the subjects who reported brushing their teeth twice daily, 3.8% exhibited a favourable caries status, while 61.3% exhibited an unfavourable one. The p-value for this group was 0.000, indicating a statistically significant difference. In the presence of dental caries, it is recommended that students engage in twice-daily tooth brushing at designated times: in the morning following breakfast and in the evening before bedtime. Furthermore, it is recommended that students limit their consumption of sweet and sticky foods.*

**Keywords:** Tooth brushing frequency, tooth brushing time, dental caries

### 1. INTRODUCTION

Optimal dental and oral health is defined as a condition that does not impede an individual's ability to perform essential functions, including but not limited to biting, chewing, smiling, speaking, and socializing(1). One method of maintaining dental and oral health is through the practice of toothbrushing, which is a fundamental aspect of oral hygiene. The objective of this process is to remove plaque, food residue, and harmful microorganisms from

the oral cavity, which can lead to dental caries(2). Dental caries represents a significant dental and oral health concern among school-aged children. This can be attributed to inadequate oral hygiene practices, particularly with regard to tooth brushing(3).

The prevalence of proper and correct tooth brushing habits among Indonesian children and adolescents aged 10-14 is 1.7%. This figure is slightly higher in West Sumatra (2.1%) and the 50 Cities District 0.82%(4,5,6).This toothbrushing behavior will have an impact on the incidence of dental caries. In light of the aforementioned background, researchers are interested in conducting further research on students in Muaro Paiti, a city in the Regency of 50 Cities.

## 2. METHODOLOGY

The research employs an analytical approach with a cross-sectional design, whereby data collection is conducted concurrently on risk factors and their effects. This approach allows for the examination of the interrelationships between risk factors and their effects, providing insights into the complex nature of these phenomena. This is a time-point approach, whereby data are collected at a single point in time(7). The study population comprises all students in grades V and VI of state-run elementary schools (SDN) in Nagari Muaro Paiti. The research was conducted at the following state-run elementary schools (SDN) in Nagari Muaro Paiti Regency, Kota: The study population comprised students from the following state-run elementary schools (SDN) in Nagari Muaro Paiti Regency 50 Kota: SDN 01 Jorong Kampuang Dalam, SDN 02 Jorong Aur Duri, SDN 03 Sungai Panjang Indah, SDN 04 Jorong Talawi, and SDN 05 Jorong Sungai Panjang Indah. A total of 186 students were selected using the saturated sampling technique, and the data were analysed using the chi-square test.

## 3. RESULTS And Discussion

The results of the study, which was conducted on students in grades V and VI at Nagari Muaro Paiti, are presented in the table below.

**Table 1: Toothbrushing Frequency Distribution**

<b>Brush your teeth often to keep your mouth clean</b>	<b>f</b>	<b>%</b>
<b>The intervention was done once a day</b>	74	39,8
<b>Two times a day</b>	112	60,2
<b>Total</b>	186	100

Table 1 demonstrates that 60.2% of students engage in at least two daily toothbrushing routines, while 39.8% adhere to a single daily brushing regimen.

**Table 2: The Distribution of Instances of Tooth Brushing**

<b>Time for Teeth Brushing</b>	<b>f</b>	<b>%</b>
<b>The morning following breakfast and the evening preceding bedtime</b>	0	0
<b>It is recommended that one take a shower in the morning and evening before bed.</b>	65	34,9
<b>While showering</b>	121	65,1
<b>Total</b>	186	100

Table 2 illustrates that 65.1% of students engage in tooth brushing activities at times that are suboptimal for dental health. Specifically, 65.1% of students indicated that they engaged

in tooth brushing activities during the morning shower, while an identical proportion reported that they performed this activity during the afternoon shower. It is noteworthy that none of the students performed the recommended oral hygiene practices at the appropriate times, namely after eating in the morning and before going to bed at night.

**Table 3:** The Frequency Distribution of Dental Caries

Dental Caries Status	f	%
Good ( $\leq 1$ )	26	14,0
Bad ( $> 1$ )	160	86,0
Total	186	100

Table 3 illustrates the prevalence of dental caries among the student population. It can be observed that 86.0% of students exhibited the most severe dental caries with unfavourable criteria, while 14.0% demonstrated less severe caries with favourable criteria.

**Table 4:** The Relationship Between the Frequency of Toothbrushing and the Incidence of Dental Caries

The Frequency of Toothbrushing	Dental Caries		Total
	Good	Bad	
Once a day.	8	66	74
Twice a day.	18	94	112
Total	26	160	186

Table 4 illustrates that students who brush their teeth on a daily basis exhibit a favourable caries status of 4.3%, whereas students who brush their teeth a minimum of two times per day demonstrate a superior caries status of 9.7%.

**Table 5:** Illustrates the Relationship Between Toothbrushing Time and the Incidence of Dental Caries

Time for Teeth Brushing	Dental Caries			
	Good	%	Bad	%
The morning following breakfast and the evening preceding bedtime	0	0	0	0
It is recommended that one engage in a daily cleansing ritual, comprising a shower in the morning and evening before bed.	19	10,2	46	24,7
While showering	7	3,8	114	61,3
Total	26	14,0	160	186

As demonstrated in Table 5, the majority of students do not adhere to the recommended oral hygiene practices, specifically brushing their teeth in the morning after breakfast and at night before bed. Amongst this cohort, those who adhere to the recommended oral hygiene practices of brushing their teeth in the morning and at night before bed have a relatively low prevalence of dental caries, at 19%. In contrast, students who brush their teeth in conjunction with their showering routine display a slightly elevated prevalence of dental caries, at 3.8%. Table 5 illustrates that none of the students adhere to the recommended optimal times for tooth brushing, namely in the morning after breakfast and at night before bedtime. Amongst those who do brush their teeth, the majority (19%) have a favourable dental caries status, while

a smaller proportion (3.8%) have a favourable dental caries status when brushing their teeth in conjunction with their showering routine.

Brushing is a fundamental aspect of oral health care. It is of great importance for each individual to engage in regular tooth brushing as a preventative measure against oral health issues. Nevertheless, research findings indicate that the brushing habits of primary school students are frequently inappropriate, particularly with regard to the frequency and appropriate time for brushing. The majority of primary school students perform oral hygiene routines twice a day, typically in the morning and evening. Nevertheless, this practice is deemed to deviate from the recommended guidelines. Brushing the teeth at least twice a day, specifically in the morning after breakfast and in the evening before bed, is the most effective method for maintaining oral hygiene. One of the principal causes of this phenomenon is a lack of knowledge and education about dental health. The majority of students are unaware of the optimal time to brush their teeth, which has resulted in the formation of poor habits. It is similarly crucial to consider the role of familial and environmental support in the formation of effective brushing habits. Inappropriate brushing techniques have the potential to have a detrimental impact on oral health(8). The accumulation of plaque, if not regularly removed, can increase the likelihood of further tooth decay. This disease is the result of a complex interaction between bacteria and carbohydrates in food, which leads to the formation of acid that subsequently damages tooth tissue (9,10)

The high prevalence of caries in students in grades V and VI can be attributed to a number of factors, including a lack of knowledge regarding proper tooth brushing techniques, unhealthy eating habits, and a lack of support from the surrounding environment(10). A significant proportion of elementary school students exhibit a deficiency in comprehension regarding the recommended brushing techniques.

Furthermore, a significant proportion of children are unable to accurately identify the teeth that require brushing. A review of the literature reveals that a significant proportion of children do not adhere to the recommended brushing routines, namely in the morning after breakfast and at night before bed. Children do not adhere to effective toothbrushing procedures, thereby reducing their capacity to remove plaque in an optimal manner and increasing the likelihood of developing toothbrushing caries. It is not uncommon for children of elementary school age to consume sweet foods and beverages that contain elevated levels of sugar. The research indicates that children in this age group are particularly susceptible to dental caries as a consequence of consuming foods and beverages that are high in sugar. The excessive consumption of sugar has been linked to an increased production of acid, which in turn accelerates the process of tooth decay.

It is of the utmost importance to recognise the pivotal role that parents and family members play in fostering positive oral hygiene habits in children. A lack of encouragement from this source can impede children's motivation to maintain optimal oral health. The results of the statistical test indicated that there was no statistically significant correlation between the frequency of tooth brushing and the incidence of dental caries. This was evidenced by the p-value of 0.311, which indicated that the observed difference was not statistically significant. Conversely, the statistical test results indicated that there was a statistically significant relationship between the frequency of tooth brushing and the occurrence of dental caries, as evidenced by a p-value of 0.000.

The findings of the research conducted at SD 01, 02, 03, 04, and 05 Muaro Paiti District 50 Kota indicate that 39.8% of students in grades V and VI brushed their teeth once a day,

while 60.2% of students brushed their teeth  $\geq 2x$  a day. It may be posited that students who brush their teeth at least twice a day are already aware of the recommended frequency of tooth brushing. These students engage in twice-daily tooth brushing as a result of their recognition of the significance of this practice in maintaining optimal oral health. Furthermore, parents have an important role to play in teaching their children to brush their teeth twice a day.

This assumption is supported by the theory that the frequency of toothbrushing is a form of behavior that can influence poor dental and oral hygiene. It is widely acknowledged that school-aged children are cognizant of the recommended frequency for toothbrushing. The optimal frequency of toothbrushing is two times per day, with the first brushing occurring after breakfast and the second before bedtime. To ensure optimal oral health, it is essential to perform the act of toothbrushing in a manner that is both effective and correct. Manson (2016) posits that brushing one's teeth twice a day represents the optimal frequency(11).

The role of parents is of considerable significance in the transmission of behaviours that facilitate children's oral and dental hygiene. Parents play a pivotal role in a child's developmental process. Children who engage in regular tooth brushing at least twice a day demonstrate an understanding of the significance of maintaining oral hygiene, which is likely influenced by their parents' actions and guidance. It is therefore imperative that parents are aware of and convey to their children the importance of maintaining good oral hygiene, as well as instilling in them the habit of caring for their teeth from an early age(15).

It is recommended that children become accustomed to regular tooth brushing under the guidance of a parent or guardian. A lack of oral hygiene can result in a range of dental and oral health issues, including gingival bleeding and dental caries, which may emerge at any time. It is recommended that children be encouraged to develop the habit of brushing their teeth twice a day(1).

A child is considered to have a regular oral hygiene routine if they brush their teeth at least twice a day, in accordance with the recommendations set forth by dental health professionals. An irregular oral hygiene routine is defined as one that occurs less than twice a day or is absent altogether. This is inextricably linked to the role of parents, who must be aware of the importance of maintaining their children's dental hygiene. The presence of clean teeth has been associated with increased confidence and activity levels in children. Moreover, the maintenance of optimal dental hygiene can prevent a spectrum of dental complications, including dental caries, gingivitis, and halitosis. The dearth of regular toothbrushing in children is frequently ascribed to parental neglect in maintaining their children's oral and dental health. This negligence may be attributed to several factors, including a lack of awareness about the significance of dental health or a lack of motivation to engage in regular toothbrushing(10).

The findings of the study revealed that 65.1% of the children surveyed indicated that they brushed their teeth most frequently during their morning shower and evening bath. It was observed that a significant proportion of the children surveyed (34.9%) did not adhere to the recommended time for tooth brushing, which is in the morning after eating and at night before bedtime. The researcher hypothesises that students brush their teeth when taking a shower in the morning and in the afternoon due to a lack of awareness about the recommended time for tooth brushing in the morning after breakfast and at night before bed. Additionally, brushing the respondents' teeth has become a daily habit.

The optimal time for toothbrushing is immediately following a meal and before bedtime. The objective of toothbrushing after a meal is to remove food debris that has accumulated on the surface of the teeth or between the teeth and gums. Conversely, toothbrushing before

bedtime is beneficial for preventing the proliferation of bacteria in the oral cavity. This is due to the fact that during the period of sleep, the production of saliva is halted, which would otherwise serve to clean the teeth and mouth in a natural manner. It is therefore of the utmost importance to ensure that the teeth are thoroughly cleaned before retiring for the night. Upon waking in the morning, the oral cavity is still relatively clean, allowing for the performance of dental hygiene activities after the completion of breakfast.

The paucity of knowledge among students regarding the optimal time for toothbrushing may be attributed to a number of internal factors, including innate traits and self-perceived knowledge(12). The practice of brushing one's teeth in the shower has become a routine for a significant proportion of the population. This is largely attributed to the fact that respondents tend to brush their teeth only during the morning shower, as they lack sufficient knowledge about dental and oral health. This is supported by the observation that they have never received appropriate and effective instructions on how to brush their teeth correctly(11).

This research is in accordance with previous studies examining the relationship between tooth brushing behaviour and the incidence of dental caries in fifth-grade children. The findings suggest that fifth-grade students require additional guidance on optimal toothbrushing practices(13). The findings of the dental caries research indicated that 86.0% of the students exhibited dental caries in the severe category, while 14.0% demonstrated dental caries in the moderate category. The hypothesis put forth by the researcher suggests that students exhibiting dental caries in the severe category are susceptible to developing this condition as a consequence of their consumption of sweet and sticky foods. The ingestion of sweet and sticky foods and beverages containing sucrose represents a primary etiological factor in the development of dental caries. The failure to rinse the mouth after consuming these foods allows the residual matter to adhere to the teeth, which subsequently leads to the formation of dental caries.

The behavior of children has been demonstrated to exert a considerable influence on the prevalence of dental caries. This can be observed in the consumption of foods that are known to cause dental caries, as well as in the lack of oral hygiene practices, such as rinsing the mouth or brushing the teeth after eating sweet and sticky foods. Such behaviors may contribute to the development of dental caries in children. Sucrose-containing foods have two particularly detrimental effects. Firstly, the regular consumption of foods containing sucrose has the potential to facilitate the colonization of *Streptococcus mutans*, thereby increasing the likelihood of caries in plaque. Secondly, old plaque that has been exposed to sucrose undergoes rapid metabolism into organic acids, resulting in a significant reduction in plaque pH(8).

The most common cause of dental caries is the consumption of sweet and viscous foods. This is due to the production of acid ions by plaque, which is a form of carbohydrate. The ions in question impede the efficacy of the salivary buffering system, thereby facilitating demineralisation of hard tooth tissue(18). One of the causes of dental caries in an individual is the consumption of sweet and sticky foods, a lack of motivation, incorrect toothbrushing techniques, and a lack of attention to dental health. In addition, the infrequent utilisation of health services, with appointments occurring only once every six months, can also contribute to the development of dental caries.

A significant proportion of the population fails to adhere to government recommendations for healthy living, particularly those pertaining to dental and oral health. In rural areas, for instance, dental and oral health are frequently overlooked. Nevertheless, it is of the utmost

importance to maintain optimal dental and oral health in order to ensure overall well-being. Dental and oral disorders, including dental caries, gingivitis and dental calculus, are particularly prevalent(14).

The findings of the study indicated that 66 students who engaged in daily toothbrushing demonstrated the highest prevalence of severe caries. Similarly, among the 94 participants who engaged in twice-daily toothbrushing, the majority also exhibited the highest prevalence of severe caries. The results of the chi-square statistical test indicate that there is no statistically significant relationship between the frequency of tooth brushing and the incidence of dental caries. It can be postulated that the majority of students brush their teeth twice a day and are therefore in the category of severe dental caries. This indicates that while children have adopted an appropriate toothbrushing routine, they lack the capacity to regulate their intake of sweet and sticky foods. Moreover, children often display a reluctance to consume fruit and vegetables. It is therefore incumbent upon parents to remind their children to reduce their intake of these foods and to seek regular dental health services.

Dental caries is a multifactorial disease, with a number of factors contributing to its development, including the host, microorganisms, substrate, and time. Dental caries can be prevented through various means, including reducing the consumption of sugary and sticky foods, increasing the consumption of fibrous fruits and vegetables, brushing teeth at least twice a day, and regular dental check-ups at least once every six months. Brushing the teeth is an important method of removing food debris, bacteria and plaque(16).

The prevalence of dental caries in school-aged children is strongly correlated with their behavioural patterns. Behavioural factors represent one of the contributing elements to oral hygiene. A failure to maintain optimal oral hygiene can result in the development of dental caries, calculus, dental plaque, gingival inflammation and dental anomalies. The understanding of the importance of oral hygiene practices among children is shaped by the role of parents. Parents play a pivotal role in influencing their children's oral health behaviours. This necessitates the instillation of the habit of brushing twice a day and moderation in the consumption of sweet and sticky foods to prevent tooth decay. It is of the utmost importance for parents to recognise that oral health is inextricably linked to that of their children(8). This research is in accordance with previous research conducted in 2019 regarding the relationship between the frequency of tooth brushing and the incidence of dental caries in students at TKIT B Mutiara Hati Klaten. The results demonstrated a statistically significant correlation between the frequency of tooth brushing and the incidence of dental caries, with a p-value of 0.000(19).

The results of the chi-square statistical test indicated a statistically significant correlation between the frequency of tooth brushing and the prevalence of dental caries in grade V and VI primary school students in Nagari Muaro Paiti, 50 Kota District. The p-value was less than 0.05, indicating a statistically significant result.

An individual's inclination to engage in suboptimal dental hygiene practices, such as improper brushing techniques and untimely routines, is frequently influenced by a deficiency in awareness regarding the most efficacious methods for maintaining oral health. This lack of knowledge consequently results in a lack of awareness regarding the importance of brushing teeth in the morning after breakfast and in the evening before bedtime. Furthermore, habitual factors also exert an influence. It seems reasonable to posit that an individual who has been lacking in regular toothbrushing habits from an early age is likely to continue this behaviour into adulthood. Furthermore, the absence of familial support has a considerable impact on children's toothbrushing behaviour(17).

The practice of brushing one's teeth during the course of a bath has become a routine for a significant proportion of the population. This is attributed to the fact that respondents only brush their teeth during morning baths, due to a lack of sufficient knowledge about dental and oral health. This is corroborated by the evidence that they have never received appropriate and effective instructions on how to brush their teeth properly(11). This study is in accordance with the findings of previous research, which demonstrated a statistically significant correlation between the frequency of tooth brushing and the incidence of dental caries, with a p-value of 0.013(9).

#### 4. CONCLUSIONS

The findings of the study, conducted on a sample of elementary school students in Nagari Muaro Paiti, 50 City Regency, indicate that there is a statistically significant correlation between the frequency and duration of tooth brushing and the prevalence of dental caries in the sample group of 186 respondents. The relationship can be described as follows: The highest frequency of tooth brushing was observed to be  $\geq 2x$  per day, representing 60.2% of the total sample. The highest frequency of tooth brushing is performed during morning and afternoon showers, at a rate of 65.1%. The prevalence of dental caries is 86.0% among those in the low-income category. The results of the statistical test indicate that there is no statistically significant relationship between the frequency of tooth brushing and the occurrence of dental caries (p-value = 0.311). The results of the statistical test (p-value = 0.000) indicate a statistically significant relationship between the frequency of tooth brushing and the occurrence of dental caries.

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