



## Relationship between Tooth Brushing Behavior and Dental Caries in Children at 27 Sungai Sapih Public Elementary School Kuranji, Padang City

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**Abstract:** Caries is often experienced in mid-childhood (10-12 years) which is referred to as a vulnerable period, because at that time milk teeth begin to fall out and first permanent teeth begin to erupt. Tooth brushing is the most recommended primary prevention in maintaining dental and oral health. This study aimed to evaluate the relationship between tooth brushing behavior and dental caries in children at 27 Sungai Sapih Kuranji Public Elementary School, Padang City. This was a quantitative study with an analytical and observational approach. Population were all students in grades 4 and 5, totaling 114 students obtained with total sampling technique. Data were analyzed using the Spearman test, and were processed using computerized program SPSS IBM version 25.0. The results showed that most subjects had moderate tooth brushing behavior (82.5%), and the highest percentage of dental caries level was very low (49.1%). The Spearman test showed a significant relationship between tooth brushing behavior and dental caries level among the subjects ( $p=0.001$ ). In conclusion, there was a significant relationship between tooth brushing behavior and dental caries in children at SD Negeri 27 Sungai Sapih Kuranji, Padang City. It is recommended for dental health workers to educate the students about the importance of dental and oral care and how to do tooth brushing properly and correctly.

**Keywords:** tooth brushing behavior; dental caries; elementary school children; dental and oral health

## INTRODUCTION

Caries is a dental tissue disease characterized by tissue damage, starting from the tooth surface starting from the enamel, dentin and extending towards the pulp. Caries can be caused by several factors, namely poor dental and oral hygiene, inappropriate tooth brushing techniques, and the use toothpaste that is not appropriate and brushing habits that are not as recommended.<sup>1</sup> Data from *the World Health Organization* (WHO), dental caries is a major public health problem globally, this disease is not contagious and is the most common condition included in the 2015 *Global Burden of Disease study and* ranks first for permanent tooth damage as many as 2.3 billion people and ranks 12th for primary tooth decay as many as 560 million children.<sup>2</sup>

Caries is often experienced in childhood in the middle of 10-12 years which is referred to as a vulnerable period, because at that time the milk teeth begin to fall out and the first permanent teeth begin to grow. There are variations in baby teeth and permanent teeth in the mouth, marking the mixed dentition period in children. The teeth that have just grown are immature, so they are vulnerable to damage due to eating sweet foods and not being accompanied by good brushing so that leftover food remains between the cavities.<sup>3</sup>

The results of West Sumatra *Riset Kesehatan Dasar* (Rikesdas ) in 2018 stated that 41.74% of children aged 10-14 years experienced dental caries , while the prevalence of dental caries problems in Padang City was around 6,154 children, namely 36.71%. This data shows that the data on caring for children in maintaining oral health is still very low. Dental caries is also a disease of the teeth and mouth that affects many school-age children which occurs due to a lack of attention from children and parental knowledge.<sup>4</sup>

The behavior of maintaining community dental and oral health is tooth brushing, the most important primary prevention action recommended.<sup>5</sup> The Riskesdas 2018 showed that the percentage of the population aged 10-14 years who brushed their teeth every day in West Sumatra Province was 96.25%, albeit, only 0.92% had the proper tooth brushing behavior. Meanwhile, the percentage of those who brushed their teeth every day in Padang City was 97.85%, however, only 2.51% behaved correctly in brushing their teeth.

Lendrawati's research<sup>6</sup> regarding the relationship between dental health maintenance and dental caries status in class 1 students of Muhammadiyah Middle School, Padang Timur District, Padang City, reported that students with good category maintenance were 54.2%, medium category were 35%, and poor category were 10.8%. Most of the children with good dental health maintenance patterns had low caries status, whereas those with poor dental health maintenance patterns had high caries status. This shows that maintenance of dental health has an effect on caries status where the poorer the maintenance of one's dental health, the higher the caries status and vice versa.

Based on the background described, the purpose of this study was to determine whether there was a relationship between tooth brushing behavior and dental caries in children at 27 Sungai Sapih Kuranji Public Elementary School, Padang City.

## METHODS

This was an analytical and observational quantitative study with a cross sectional design aiming to assess the relationship between tooth brushing behavior and dental caries in children. The population in this study were all students in grades 4 and 5 at 27 Sungai Sapih Kuranji Public Elementary School Padang City, totaling 114 students. Samples were obtained by using total sampling. Examination of dental caries was performed to check the level of caries, and questionnaires were distributed to obtain the child's brushing behavior. Statistical analysis was conducted to determine the characteristics of each variable using SPSS and to evaluate the relationship between tooth brushing behavior and dental caries using the Spearman rho test.

## RESULTS

Subjects in this study were 114 students in grades 4 and 5 at 27 Sungai Sapih Kuranji Public Elementary School Padang City, consisted of 67 males (58.8%) and 47 females (41.2%).

Table 1 showed that out of 114 subjects, most were 10 years old (50%). Table 2 showed that out of 114 subjects, most had moderate tooth brushing behavior (82.5%). Table 3 showed that out of 114 respondents, the most dental caries level was very low (49.1%).

Table 4 showed that of 18 students with good tooth brushing behavior, the most had very low caries (77.8%); of 94 students with moderate tooth brushing behavior, the most had very low caries (44.7%); and of two students with poor tooth brushing behavior, both had moderate dental caries (100%). The Spearman rho test obtained a p-value of 0.001 ( $p < 0.05$ ), indicating that there was a relationship between tooth brushing behavior and dental caries among the subjects.

**Table 1.** Distribution of characteristic of subjects by age

Characteristics of subjects	<i>f</i>	%
Age (years)		
9 years	10	8.8
10 years	57	50
11 years	43	37.7
12 years	2	1.8
13 years	2	1.8
Total	114	100.0

**Table 2.** Distribution of toothbrushing behavior of subjects

Tooth brushing behavior	<i>f</i>	%
Good	18	15.8
Moderate	94	82.5
Poor	2	1.8
Total	114	100.0

**Table 3.** Distribution of dental caries level of subjects

Dental caries level	<i>f</i>	%
Very low	56	49.1
Low	26	22.8
Medium	25	21.9
High	6	5.3
Very high	1	0.9
Total	114	100.0

**Table 4.** Relationship between tooth brushing behavior and dental caries of subjects

Tooth-brushing behavior	Dental caries level										Total	p-value	
	Very low		Low		Medium		High		Very high				
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%			
Good	14	77.8	4	22.2	0	0	0	0	0	0	18	100	*0.001
Moderate	42	44.7	22	23.4	23	24.5	6	6.4	1	1.1	94	100	
Poor	0	0	0	0	2	100	0	0	0	0	2	100	
Total	56	49.1	26	22.8	25	21.9	6	5.3	1	0.9	114	100	

## DISCUSSION

Based on the results on student characteristics consisting of age and sex, the most frequent age was 10 years (50%) and the predominant sex was male (58.8%). This findings are in line with the previous research of Ayuningtyas<sup>7</sup> that obtained more than half of the respondents ( 68.5%) were aged >12 years, with the majority of being male (56.2%). In accordance with the age of the respondents ranging from 9-13 years, efforts to maintain dental and oral health should be carried out from an early age. Elementary school age is the ideal time to practice a child's motor skills, including tooth brushing. Behavior cannot be learned in a short time, but gradually over the years as the child grows and develops. Children at school age are very active in learning what is in their environment, so the urge to know and act on their environment is very high. Therefore, children are easily guided, directed, and instilled good habits. Based on Piaget's cognitive development theory, the intellectual abilities of children aged 6-12 are sufficient to become the basis for various skills that can develop their mindset or reasoning power. It is expected that knowledge will raise their awareness, and eventually make them behave in accordance with the knowledge they have.<sup>8</sup> The result also showed that caries was more frequently in males than in males. Sex variations can affect children's behavior patterns in maintaining oral hygiene and aesthetic needs.<sup>7</sup>

The results showed that out of 114 subjects, the most tooth brushing behavior was moderate, (82.5%) In line with research conducted by Yogie<sup>2</sup> concerning the relationship between tooth brushing and caries in students of SD X in West Jakarta in 2019, the results showed that 35.4% of students had bad habit of tooth brushing. This was also in line with the research conducted by Ruslan and Jayanti<sup>9</sup> concerning the relationship between tooth brushing behavior and the level of dental plaque maturity in elementary school students. It was found that most students had tooth brushing behavior in the unfavorable category, namely 11.86%. The results of this study was also in line with research conducted by Maryani<sup>10</sup> concerning relationship between tooth brushing behavior and caries incidence in grades 1 and 2 of Tanggulangrejo Elementary School Tempuran District, Magelang Regency. The results showed that as many as 34.0% of students had tooth brushing behavior in the moderate category. Research of Saragih<sup>11</sup> regarding the description of tooth brushing patterns and the incidence of caries in elementary school children in 2021 showed that 50% of students had poor pattern of tooth brushing. Likewise with the research conducted by Prasada<sup>12</sup> regarding the tooth brushing behavior among first grade Elementary School students with dental caries in the work area of Rendang Karangasem Health Center Bali, the results showed that 81.5% of students had poor tooth brushing behavior.

The findings showed that many students behaved in the moderate category of tooth brushing. This can be seen in terms of unfavorable times, where most students only brushed their teeth while bathing and very rarely brushed their teeth at night before going to bed or after eating. These timing is very important to do tooth brushing in children to clean food residue on the teeth which can cause tooth decay. Maryani<sup>10</sup> stated that concerning tooth brushing, it was important to timing the right way to clean the teeth and to use the right tools routinely. Tooth brushing have to be performed on the right way i.e. after eating and before going to bed. Tooth brushing after eating can clean up leftover food attached to the tooth surface, so that, it can prevent the formation of dental plaque.<sup>11</sup>

The results showed that out of 114 subjects, the most had very low level of dental caries (49.1%). In line with the research conducted by Yogie<sup>2</sup> concerning the relationship between tooth brushing and caries in SD X students in West Jakarta in 2019, the results showed that 40.4% of students had dental caries. Regarding the description of tooth brushing patterns and caries incidence in elementary school children in 2021, Saragih<sup>11</sup> reported that all children (100%) had dental caries.

Dental caries is a disease of the hard tissues of the teeth, namely the enamel, dentin and cementum. Demineralization of hard tooth tissue is followed by damage of the organic matter, resulting in bacterial invasion and pulpal necrosis as well as the spread of infection to the periapical tissue that eventually causes pain.<sup>13</sup> Caries or cavities are characterized by damage to the enamel and dentin caused by the metabolic activity of bacteria in plaque, causing demineralization.<sup>10</sup>

Caries can also be caused by inappropriate tooth brushing behavior such as tooth brushing during the morning shower and afternoon bath instead of after breakfast and before sleeping at night. Tooth brushing before going to bed is very effective to reduce dental caries. Moreover, high caries numbers can be related to poor eating habits such as sweet food, less fiber and easily sticky.<sup>11</sup> Severe caries can affect the quality of life of children - the experience of pain, feeling of discomfort while eating, sleep distraction, and also a higher risk of being hospitalized resulting in higher cost of treatment and loss days at school. Experienced children of toothache will not answer the test as well as children unaffected by toothache. Dental caries too affects nutrition, growth, and weight gain.<sup>1</sup> According to the analysis of this study, it was found that most students experienced caries in the very low category. This can be caused by several factors, namely frequent eating of sweet foods which has an impact on the occurrence of porous teeth and caries poor tooth brushing. It is necessary to educate the students about caries prevention efforts such as reducing consumption of sweet foods and brushing their teeth properly, correctly, and at the right times.

The results showed that of the 18 students with good brushing behavior the most experienced very low caries (77.8%). Of the 94 students with moderate brushing behavior the most experienced very low caries (44.7%), and of the two students with poor tooth brushing behavior all had medium level of caries (100%). The Spearman rho test obtained a p-value of 0.001 ( $p < 0.05$ ), which means that there was a relationship between tooth brushing behavior and dental caries in children at SD Negeri 27 Sungai Sapih Kuranji, Padang City.

In line with the research conducted by Yogie<sup>2</sup> in students SD X in West Jakarta in 2019, the results showed that there was a relationship between tooth brushing behavior and dental caries. In line with research conducted by Maryani<sup>10</sup> concerning relationship between tooth brushing behavior and caries incidence teeth in grades 1 and 2 of Tanggulrejo Elementary School Tempuran District, Magelang Regency, shows that there is a relationship between tooth brushing behavior and dental caries in students. Research conducted by Saragih<sup>11</sup> regarding the description of tooth brushing patterns and the incidence of caries elementary school children's teeth in 2021, showed that there was a relationship between tooth brushing pattern and the incidence of caries.

It is proven in this study that there is a relationship between tooth brushing behavior and the incidence of caries. This can be caused by improper tooth brushing behavior which will leave food residue on the tooth surface. This food residue can be a source for growth of microorganisms that can further interfere with dental and oral health such as dental caries. Prasada<sup>12</sup> stated that the improper behavior of tooth brushing in children caused caries since they did not know how to do tooth brushing properly and at the right times. Moreover, Saragih<sup>11</sup> reported that caries could also be caused by poor tooth brushing behavior such as doing tooth brushing during the morning shower and afternoon bath instead of doing it after breakfast and before going to bed at night which was very effective to reduce dental caries. In this study, it was found that many students had moderate tooth brushing behavior. Therefore, it is necessary to educate students about correct tooth brushing behavior so that the incidence of dental caries can be minimized.

## CONCLUSION

There is a relationship between tooth brushing behavior and dental caries in children at SD Negeri 27 Sungai Sapih Kuranji, Padang City.

## Conflict of Interest

The authors affirm no conflict of interest in this study.

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