

Early childhood caries prevalence and oral hygiene behavior of children under 2 y.o (9 months observation)

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ABSTRACT Various factors were believed to play an important role and were closely related to the risk of Early Childhood Caries (ECC), including daily oral hygiene behavior. Oral hygiene of children under 2 years is very dependent on their parents, especially mothers or caregivers. This study revealed the prevalence of ECC and its related to children's oral hygiene behavior after 9 months of observation. A total of 60 caries-free children (deft= 0) under two y.o were observed for 9 months. Without prior dental education regarding oral health care, all subjects were observed for their oral hygiene behavior. The questionnaires were given at the beginning and at the end of the observation and recording the final deft score. After 9 months later, from 60 caries-free children, 19 (31.6%) study subjects were exposed to ECC with a deft average score of 2 ± 2 . Oral hygiene behavior related to ECC prevalence in this study ($p < 0.05$). In conclusion, the prevalence of ECC was related to poor oral hygiene behavior.

KEYWORDS: ECC, deft score, oral hygiene behavior

INTRODUCTION

Early Childhood Caries (ECC) is a term to describe caries in primary teeth that occurs in children under six years of age in the presence of 1 or more caries, missing teeth due to caries, or having been restored. According to the American Academy on Pediatric Dentistry in 2014, the severity of ECC at 3-5 years of age can be classified according to the bad score as having one or more cavities, missing teeth due to caries, or deft score > 4 at three years of age, > 5 at age four years, or > 6 at five years of age.¹

The prevalence and incidence of ECC in each country vary and still high. The severity of caries in developed countries tends to decrease, while caries severity increases from low to moderate in developing countries. A literature review on the incidence of caries in the anterior maxillary teeth of children, including several studies in Europe, Africa, Asia, the Middle East, and North America, showed that the highest prevalence of caries still occurs in Africa and Southeast Asia.² According to the oral health status in America between 1988-1994 and 1999-2004, the prevalence of caries in adults tends to decrease, but the prevalence of caries at 2-5 years is increasing.³ The estimated prevalence of ECC ranges

from 1% to 12% in infants in developing countries.² Indonesia is a developing country with a national prevalence of dental and oral problems of 25.9%. As many as 14 provinces have a prevalence of dental and mouth problems above the average. The prevalence of ECC for children aged 1-4 years in Indonesia is 10.4%, with the majority of ECC in each region showing different numbers.⁴ In Riskesdas 2018, there was a national data change which states that early childhood (5 years) has experienced caries amounted to 67.3% with DMFT score above 6.⁵

Principally, ECC's etiology is the same as the etiology of caries. It has called multifactorial, and one of the risk factors is related to oral hygiene.^{2,6} Therefore, the American Academy on Pediatric Dentistry (AAPD) issued a policy to reduce the risk of developing ECC by advocating preventive through maintaining oral hygiene by brushing the teeth. This action aims to remove plaque or food/drink from tooth surfaces.¹ Plaque that adheres to teeth is a favorable environment for bacteria to adhere to and colonize, which can lead to caries, gingivitis, and periodontitis.⁷

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Erupted primary teeth are prone to caries, so it is recommended to immediately maintain early childhood oral hygiene after the primary teeth erupt. One effort is to brush the teeth regularly twice daily using a soft toothbrush. Because early childhood is still very dependent on parents, especially their mother, parents must assist this effort. For children under 3 years old, toothpaste's recommended size is about the size of rice or just a thin layer. All children aged 3-6 years are advised to use pea-sized fluoride toothpaste.¹

Considering the importance of maintaining oral hygiene against ECC, it is necessary to conduct research to determine behavioral factors as ECC's risk in caries-free children. The purpose of this study was to determine the oral hygiene behavior of caries-free children under 2 years of age and its relation to ECC. Oral hygiene behavior and increase in deft score were observed for nine months.

MATERIALS AND METHODS

This study was a longitudinal study for nine months in 60 caries-free children under 2 years. The inclusion criteria were an excellent general medical history without suffering from systemic disease and having at least two fully erupted primary maxillary teeth at initial examination. Caries was examined clinically, based on deft score, and performed at baseline (caries-free criteria) and nine months. Without prior dental education regarding oral

health maintenance, all subjects were observed for their oral hygiene behavior by giving questionnaires at the beginning and end of the study. The questionnaire consisted of 5 questions regarding the daily oral hygiene behavior of children. The analytical test used was the Chi-Square test; Mann Whitney test and Kruskal-Wallis test with a significance value of $p < 0.05$.

RESULTS

A total of 60 caries-free children under two years of age (28 boys and 32 girls) participated in the baseline study. **Figure 1.** reported that 42% of children did not clean their teeth after consuming

milk, 43.3% did not clean their teeth regularly, only 6.1% of children brushed their teeth more than twice daily, 70.6% brushed their teeth at the wrong time, and 73.3% did not use toothpaste.

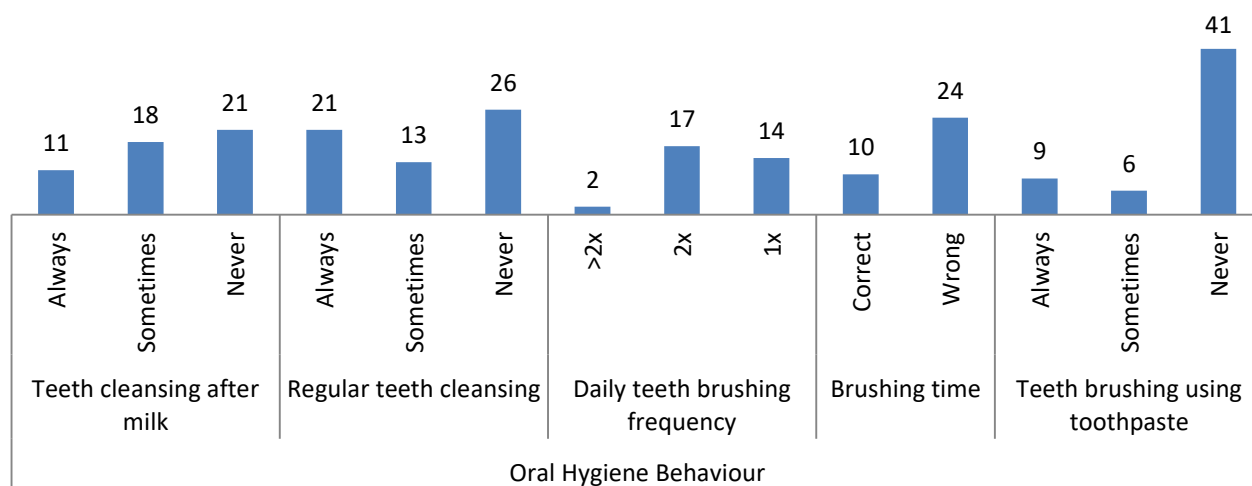


Figure 1. Oral hygiene behavior of children at the beginning examination

At the beginning of the study, subjects were caries-free children, but there were 31 (51.7%) children with ECC (def mean 4 ± 2). According to gender, 54.8% of caries were experienced in boys

and 45.2% in girls, but statistically, there was no significant difference between boys and girls (**Table 1**).

Table 1. Caries categories based on gender

Category	n (%)	Gender		p
		Boys n (%)	Girls n (%)	
Caries free	29 (48,3)	11 (37,9)	18 (62,1)	0,190 ¹
ECC	31 (51,7)	17 (54,8)	14 (45,2)	
Total	60 (100)	28	32	

¹Chi-Square Test, ² Mann Whitney Test

ECC children were mostly in group 20-24 months (57.1%) and at least 15-19 months (33.3%), but statistically, there was no significant difference between age groups. Likewise, the deft mean showed almost the same distribution in each age group (Table 2).

Table 2. Comparison of ages by caries category and deft mean

Age classification (Months)	n (%)	Caries free		ECC		p	deft		p
		n	%	n	%		Mean	SD	
15-19	3 (5)	2	66,7	1	33,3	0,848 ¹	1	2	0,975 ²
20-24	21 (35)	9	42,9	12	57,1		2	2	
25-29	19 (31,7)	9	47,4	10	52,6		2	2	
>30	17 (28,3)	9	52,9	8	47,1		2	3	
Total	60 (100)	29	48,3	31	51,7		2	2	

¹Chi-Square Test, ² Mann Whitney Test

Children who never brush their teeth after drinking milk showed ECC experience compared to children who always clean their teeth after drinking milk. Rarely brushing your teeth or brushing your teeth only once a day can be associated with ECC disease, conversely brushing your teeth with toothpaste did not show a significant difference against ECC. Overall, oral hygiene behavior was related to the deft score at the end of the observation. Children with poor oral hygiene behavior had a more excellent deft score than others (Table 3).

Table 3. Children's oral hygiene behavior based on caries category and deft score from the 9th-month

No	Oral hygiene behavior	Caries free	ECC	p	deft	p	Total
		n (%)	n (%)		$\bar{X} \pm SD$		
1	Teeth cleansing after drinking milk			0,016 ^{1*}		0,002 ^{3*}	
	Always	9(56,3)	7(43,8)		1(2)		16(26,7)
	Sometime	15(60)	10(40)		1(2)		25(41,7)
	Never	0(0)	7(100)		5(2)		7(11,7)
2	Regular teeth cleansing			0,001 ^{1*}		0,000 ^{3*}	
	Always	11(73,3)	4(26,7)		0(1)		15(25)
	Sometime	16(57,1)	12(42,9)		2(2)		28(46,7)
	Never	2(11,8)	15(88,2)		4(2)		17(28,3)
3	Daily teeth brushing frequency			0,001 ^{1*}		0,000 ^{3*}	
	More than twice daily	1(50)	1(50)		1(1)		2(3,3)
	Twice daily	14(87,5)	2(12,5)		0(1)		16(26,7)
	Once-daily	6(25)	18(75)		4(3)		24(40)
4	Brushing time			0,044 ^{1*}		0,046 ^{2*}	
	Correct time	15(62,5)	9(37,5)		2(3)		24(40)
	Wrong time	6(31,6)	13(68,4)		3(2)		19(31,7)
5	Teeth brushing using toothpaste			0,102 ¹		0,024 ^{3*}	
	Always	4(66,7)	2(33,3)		1(1)		6(10)
	Sometime	17(54,8)	14(45,2)		2(2)		31(51,7)
	Never	6(28,6)	15(71,4)		3(2)		21(35)

¹Chi Square Test; ²Mann Whitney Test, ³Kruskal-Wallis Test, * significant at $p < 0.05$

DISCUSSION

This research was conducted on 60 caries-free children under 2 years old (mean: 16.9±4.2 months). After 9 months, the prevalence of children with ECC was quite high at 51.7%. This data was higher than the national data in 2013, which about ECC prevalence of children 1-4 years. It was 10.4%, four but lower than the national data in 2018, which states that early childhood (5 years) has caries experience of 67.3% with deft score >6.⁵ This prevalence was still far from the FDI and WHO target, at least 50% of early childhood was free from caries.⁵

Research states that caries was more common in adult women than men due to differences in the composition and flow of saliva, hormonal changes, dietary habits, genetic variation, and social factors. However, children were more associated with the tendency for teeth to erupt faster in girls than boys, so they were more rapidly exposed to the oral cavity and bacteria.^{8,9} In contrast, the distribution of caries in boys and girls was almost balanced. Because the subjects in this study were still at an early age and their oral hygiene behavior was very dependent on their parents, their parents' oral hygiene treatment might have been the same.

Previous research also stated that more carious teeth would be observed with increasing age so that the incidence of caries would increase.^{10,11} Newly erupted teeth were more susceptible to caries, and the vulnerability would increase due to difficulty in cleaning teeth when they have not reached the occlusal plane. Therefore, the risk of caries was the increase in newly erupted teeth.⁹ Deft scores in this study increase with age but statistically showed no difference between age groups. ECC can occur in all age groups of children but tends to occur in higher age groups following more newly erupted teeth and prone to caries. This was why AAPD stated that efforts to maintain oral hygiene were carried out immediately after the primary teeth erupt.¹ Unfortunately, most parents start cleaning their child's primary teeth after the child's age was more than 1 year old in Indonesia.¹²

The prevalence of ECC in this study was closely related to children's oral hygiene behavior. Although there were changes in oral hygiene behavior between the initial and final questionnaires, the action was still associated with ECC occurrence. Children who never cleaned their teeth after consuming milk were at risk for ECC. After milk consumption, brushing teeth is necessary to remove milk residue that adheres to the primary teeth' surface. In the formula, milk contains sucrose, which is added to create a sweet taste, but sucrose is

the most cariogenic sugar among other sugars.¹³ Cleaning the teeth surfaces can prevent caries even in poor children's diet and high numbers of bacterial colonies in mouth cavities.¹⁴

Brushing teeth regularly will reduce gingivitis and caries risk because it can clean the tooth surface from plaque. The plaque will form continuously even after brushing and is a favorable environment for bacteria to adhere to and colonize. In this study, 28.3% of children did not brush their teeth regularly, so that 88.2% of children who did not brush their teeth had caries. Likewise, with the frequency of brushing their teeth, it was advisable to brush teeth at least 2 times a day. As many as 40% of children who brush their teeth only once a day, 75% of them would experience caries. The probability of caries lower in children who brush their teeth regularly with a frequency of twice daily. Although there were also children who suffer from ECC, even though they have brushed their teeth regularly with a frequency of twice or more daily, it was possible that ECC can occur due to incorrect tooth-cleaning techniques.

The correct and recommended time to brush teeth is after breakfast and at night before sleep. In this study's results, 40% of children brushed their teeth at the right time and found that 62.5% of children would be caries-free, in contrast to 31.7% of children who brushed their teeth at the wrong time it was found 68.4%, caries children. Although caries children were still found even though they have brushed their teeth at the right time, this was probably related to the inaccurate technique and duration of brushing.

The AAPD policy recommends brushing children's teeth as soon as possible after eruption using a soft toothbrush and using toothpaste containing fluoride according to the child's age. To reduce fluoride's impact, recommended to use fluoride toothpaste only for the size of rice or a thin layer for children under three years of age.¹ In this study, as many as 35% of children who did not use toothpaste were found 71.4% caries in the primary tooth. Although statistically, there was no significant difference between the use of toothpaste against caries between caries-free children and ECC, it was significant for the mean deft score.

The study concluded that oral hygiene behavior from an early age plays a significant role in preventing caries development. Prevention of caries at an early age through improving oral hygiene behavior is essential. The WHO and FDI targets state that children at 12 years of age should have a DMFT score <1 can be achieved.

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