

The Role of Parents in ECC Prevention: A Cross-sectional study

Ulliana^{1*}, Yuli Puspitawati¹, Silvia Sulistiani¹, Nia Afdilla²

1. Department of Dental Therapist, Akademi Kesehatan Gigi Ditkesad Jakarta, Indonesia.
2. Department of Dental Therapist, Politeknik Bina Husada Kendari, Indonesia

Abstract

The aim of the study is to analyze parents' practice and to access the prevalence of ECC in the prevention of dental caries with Early Childhood Caries (ECC).

The population in this study was parents of children and toddlers aged 3-5 years who were selected using the purposive sampling method. Data were obtained prospectively through questionnaires filled out by parents themselves in writing, and data on the practice of brushing toddler teeth by parents were obtained by observation and clinical examination of toddlers. Dental caries are diagnosed using WHO's index dmft criteria consisting of d (decayed tooth), m (missing tooth due to caries), and f (filled tooth) in the primary dentition was recorded.

The experience of dental caries in children is included in the medium criteria; parents' practice of brushing toddlers' teeth is not good at 86% and good at 14%. There was no significant correlation between parental behavior with ECC status ($p = >0.05$). There was no significant correlation between the practice of brushing teeth with ECC severity and dental caries status ($p = >0.05$). The role of parents in preventing ECC not only emphasizes parental behavioral factors. In subsequent studies, there were observations of biological factors in the development of ECC; Dental health service implementers educate and train parents and caregivers on preventive practices and oral care measures in toddlers.

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Introduction

Dental caries is a global oral cavity disease problem in developed and developing countries that can affect people worldwide.¹ Early childhood caries (ECC) is defined as the presence of one or more cavities in children under 72 months of age.² ECC is a multifactorial chronic disease caused by several factors such as diet, oral microbiome, socioeconomic status, parental education, maternal nutrition, and psychosocial problems.³

This dental health problem is a health burden globally, medically, socially, and economically for every country.¹ The Global Burden of Disease study in 2017 reports that around 530 million children experience untreated

caries in their primary teeth.⁴ Children who experience ECC require general anesthesia for caries treatment of their primary teeth with indications for extraction, which has social implications and big costs.¹

In Germany, the main caries experience at the defect level in the form of decayed, missing, and filled teeth (dmft/DMFT) is concentrated in 14% of 3-year-olds, with 74% of untreated lesions.⁵ In many countries, ECC is often untreated, painful, and has a negative impact on general health, growth, and development, and the quality of life of children and families.^{1,6}

Indonesia's national health insurance scheme, the National Health Insurance (JKN), facilitates Indonesians' access to health.⁷ However, Indonesia has a prevalence of ECC of 90% in the population of children aged five years, which is the highest among several other countries.⁸ The capital city of Indonesia is Jakarta, which has the highest population density

*Corresponding author:

Ulliana
Department of Dental Therapist,
Akademi Kesehatan Gigi Ditkesad Jakarta, Indonesia.
E-mail: ulliana1212@gmail.com

and relatively adequate access to health services compared to other provinces in Indonesia.⁹ However, dentists are not evenly distributed in the work area of the health center together with centralized private health service facilities in this city.^{10,11} Thus, the prevalence of dental health problems is still high in this city.² Jakarta has the lowest level of health inequality in Indonesia compared to Papua province (3.1% compared to 92.3%).^{9,12}

Primary teeth in children aged five years are the final stage of teeth and can be used as a benchmark to evaluate previous dental healthcare behavior. Identifying problems with primary teeth at this stage can help prevent future oral health problems.¹³

Prevention and treatment of ECC require the mother's role in providing effective guidance and a positive attitude toward dental and oral health.^{14,15} Parents play a central role in the early caries prevention process since most preschool children cannot brush their teeth correctly and cannot understand the importance of maintaining good oral health.⁵ Children's dietary practices and dental and oral hygiene habits depend heavily on parents' or caregivers' knowledge, beliefs, and practices regarding dental health, which must be conveyed from the primary level. With basic knowledge about risk factors and how to maintain children's dental health, achieving effective dental and oral disease prevention strategies will be easier.^{16,17}

The reason for conducting this research was to explore the habits of mothers in preventing ECC. Therefore, this study aims to assess the customary practices of mothers with their children and the dental caries experience on ECC using the decay, missing, filling index to prevent ECC.

Materials and Methods

This study is an analytic observational study with a cross-sectional design. The population in this study were parents of children and toddlers aged 3-5 years. The location of this research was Posyandu PM 2 Metland Tambun, with 100 research subjects, of which 50 were the parent group samples, and 50 were the toddler

group samples. The sampling technique used a purposive sampling method, with inclusion criteria such as toddlers aged 3-5 years getting parental approval and being willing to be examined. In contrast, the exclusion criteria were uncooperative toddlers.

Before the clinical examination, parents were asked to fill out informed consent for themselves and their children to participate in this study. Data were obtained prospectively through questionnaires filled out by the parents themselves in writing, data on the practice of brushing their teeth under toddlers was obtained through observation, and clinical examinations on toddlers were carried out by two trained and calibrated examiners using sterilized dental mirrors, dental explorers, tweezers along with disposable masks, gloves, and intraoral light-emitting diode light. Before commencing the research, ethical approval was obtained from the deanship of Scientific Research, Akademi Kesehatan Gigi Ditkesad, KSA.

Dental caries was diagnosed using WHO's index dmft criteria consisting of d (decayed tooth), m (missing tooth due to caries), and f (filled tooth) in the primary dentition was recorded.¹³ then the dmft score of each 5-year-old child is classified into five criteria, namely very low (0.0-1.1), low (1.2 - 2.6), moderate (2.7-4.4), high (4.5 -6.6), and very high (>6.6). The dmft index is an index for measuring dental caries burden used in oral epidemiology. A higher dmft index indicates a worse caries burden and further damage to oral health.¹⁸ The severity of early childhood caries (ECC) is classified into three based on the type of ECC, namely type I (mild), type II (moderate), and type III (severe).¹⁹

The IBM Statistical Package for social sciences version 25 for Windows was used for data entry and analysis. Descriptive and inferential statistics were performed to analyze the data. The data obtained were analyzed using descriptive statistical methods. In contrast, Spearman was used to analyze the correlation between parental behavior, brushing practices with dental caries status, and the severity of ECC.

Results

Table 1 presents the distribution of characteristics of study participants. The majority of the toddlers were female (n=28, 56%), the majority of the toddlers were three years old (n=26, 52%), most parents' education were high school educated, and the majority of the parents' occupations were housewives (n=32 64%).

Based on Table 2, the prevalence of dental caries with ECC in this population was 54%. The severity of ECC that affects most children aged 3-5 years is type I (mild) = 19 (38%).

Based on Table 3, the study population included 50 special children in the range of 3-5 years found with Early Childhood Caries (ECC) using the dmft index criteria consisting of d = 168 (decayed tooth), m = 1 (missing tooth due to caries), and f = 1 (filled tooth), overall of index dmft = 170 and the average of index dmft = 3.4 with moderate criteria.

The relationship between the variables age of toddlers, gender of toddlers, parental education, and work's parents with decay > 0 has no significant relationship as evidenced by p > 0.05.

Variable	Percentage(n)	Decay>0	P value
Age of toddlers			0.348
3 years	52%(26)	73.1%(19)	
4 years	38%(19)	68.4%(13)	
5 years	10%(5)	40%(2)	
Gender of toodler			0.779
Male	44%(22)	63.6%(14)	
Female	56%(28)	71.4%(20)	
Parental Education			0.432
Elementary School	4%(2)	100(2)	
Middle school	40%(20)	60%(12)	
High school	56%(28)	71.4%(20)	
Work's parents			0.321
Housewives	64%(32)	65.6%(21)	
Self employed	24%(12)	83.3%(10)	
others	12%(6)	50%(3)	

*chi-square test

Table 1. Characteristic of Study Participant.

Parental behavior in preventing ECC in children had good practice; as much as 64% of parents get used to their children not holding food in their mouths; as many as 42% of children

have a habit of drinking with a bottle until they sleep; as many as 64% of children rinse their mouth after eating candy, chocolate, or sweet and sticky foods; 74% of children were accompanied by their parents when brushing their teeth, 52% brushed their teeth when going to bed at night, 86% of children brushed their teeth twice a day, 74% brushed their teeth for 2 minutes, 84% of children used toothpaste the size of a pea seed and 86% % use their toothbrush;

ECC prevention efforts by parents still need to be more optimal because children still have bad practices. As many as 36% of children brushing their teeth every bath, as many as 64% of children consume sweet foods > 4 times a day, and 68% of children are correct in practicing brushing their teeth correctly. Statistical results showed no significant correlation (p>0.05) between parents' behavior and dental caries status in toddlers in preventing dental caries and had a weak statistical correlation with a positive relationship.

Dental Caries Status		ECC Severity Level		
ECC	Caries free	Mild	Moderate	Severe
%(n)	%(n)	%(n)	%(n)	%(n)
54%(27)	46%(23)	38%(19)	34%(17)	28%(14)

Participant Dental Health Status.

dmft components			Index	dmft index
d	m	f	dmft	criteria (WHO)
168	1	1	170	Moderate
Average	3.36	0.02	0.02	

Table 2. Dental Caries Experience.

Question	n(percentage)	r	p
Does your child usually hold food in his mouth?			
a. Yes	18(36)	0.110	0.434
b. No	32(64)		
Does your child habitually drink with a bottle (pacifier) until they go to bed?			
a. Yes	21(42)	0.024	0.863
b. No	29(28)		
Does your child gargle after eating candy, chocolate, or other sticky foods?			
a. Yes	32(64)	0.155	0.266
b. No	18(36)		
Do parents accompany their children when brushing their teeth?			

a. Yes	37(74)	0.016	0.912
b. No	13(26)		
When is it common for your child to brush your teeth?			
a. After meals	4(8)	0.154	0.749
b. Every bath	18(36)		
c. When going to sleep	26(52)		
d. Volatile	2(4)		
How many times a day does your child brush their teeth?			
a. 1 time	1(2)	0.064	0.658
b. 2 times	43(86)		
c. 3 times	6(12)		
How long does it take for your child to brush your teeth?			
a. <1 minute	5(10)	0.081	0.575
b. 1 minute	7(14)		
c. 2 minutes	37(74)		
d. 3 minutes	1(2)		
Does your child use his toothbrush?			
a. Yes	43(86)	0.065	0.643
b. No	7(14)		
How much toothpaste is given?			
a. The entire surface of the toothbrush	8(16)	0.051	0.716
b. The size of a pea grain	42(84)		
When does your child usually do a dental examination by the doctor/primary health?			
a. When a child's teeth hurt only	2(4)	0.130	0.835
b. If you remove baby teeth	10(20)		
c. once every 6 months	29(58)		
d. Never at all	9(18)		
Mention sweet foods and drinks that your child consumes in a day?			
a. <4	18(32)	0.111	0.444
b. >4	32(64)		

* Correlation Coefficients Contingency test

Table 3. Correlation of Parental Behavior in the Prevention of ECC with dental caries status.

Based on observations, parents' practice of brushing children's teeth in preventing dental caries was categorized as a score of <8 steps

not being done by brushing teeth = not good and a score of > 8 steps being practiced by brushing teeth = good. The results of observations of brushing teeth in children show that most children have practices in the good category, namely 14% of the number of children. While 86% of children have internal practice bad category. (tables 4 and 5).

Practice	n(%)	
	Yes	No
Put toothpaste the size of corn kernels on the toothbrush.	33(66)	17(34)
Gargle in advance	50(100)	0(0)
To clean the upper front teeth (moved from top to bottom, brush movement in an upward to downward or rotating direction)	24(48)	26(52)
To clean the side teeth of the upper and lower jaws, move the brush upward to downward or rotate.	18(36)	32(64)
A forward-to-backward movement can be performed to clean the masticatory part of the upper and lower jaw teeth.	47(94)	3(6)
The inside and back of the teeth can be cleaned by moving the brush up and down.	16(32)	34(64)
The position of the toothbrush forms a 45° angle	20(40)	30(60)
Eight times the bond per partition	2(4)	48(96)
Gargle again when you're done.	50(100)	0(0)
Duration of brushing teeth 2-3 minutes	19(38)	31(62)
Clean the toothbrush with water.	49(90)	1(2)

Table 4. Observations of Children's Toothbrushing Practices by Parents.

Tooth Brushing Practice	n(%)
Not good	43(86)
Good	7(14)

Table 5. The practice of brushing children's teeth by parents.

Per Table 6, there is no significant correlation between the variables of tooth

brushing practice, ECC severity, and dental caries status ($p > 0.05$), and had a weak relationship with a negative relationship.

Variable	r	p-value
Brushing Practices and ECC Severity	-0.089	0.538
Brushing Practices and Dental Caries Status	-0.094	0.517
*Spearman Correlation test		

Table 6. Correlation between tooth brushing practice, ECC severity, and dental caries status.

Discussion

ECC strongly predicts dental caries in mixed and permanent teeth and often continues into adulthood.²⁰ This study shows that decay in children is higher in children aged three years and females. However, this study's incidence of decay > 0 showed no significant association with age and sex. This corresponds to the absenteeism of children aged three years, and the female sex is more than the ages of 4 and 5 years and the male gender. This corresponds to the absenteeism of children aged three years, and the female sex is more than the ages of 4 and 5 years and the male gender. This causes the results of the examination of teeth with decay status > 0 to have a greater percentage. In addition, the participation of children in this study who had previous ECC experience was not limited by a dmft index score of at least 5, as evidenced by the results of ECC experience having moderate criteria. The results of this study are consistent with previous studies, which reported that caries incidence had no significant correlation between ECC and gender. Parental Education and parental occupation.^{21,22,2}

ECC is caused by multifactorial, environmental, and cultural factors that play a key role in shaping individuals' dietary habits and prevention practices that affect ECC.^{23,24} In addition to biological and behavioral factors, ECC is also influenced by socio-psychological, economic, and social determinants of health. Mother's knowledge, beliefs, and practices related to dental care are the main influences on children's dental practices and the development of ECC.²⁵

Analysis of parental behavior variables in preventing dental caries from proving the correlation using the Correlation Coefficients Contingency test. The results of this study indicate no correlation between any question indicators related to parents' behavior towards their children in preventing ECC. This is related to the findings from subjective examinations considering that the results of the patient's perceptual response to the questionnaire are very subjective and are influenced by many factors such as educational level, culture, and socioeconomic aspects. In addition to parental behavioral factors, dental caries in children aged two years due to the formation of primary teeth, the acquisition of bacterial factors such as *Streptococcus mutans*, and host factors such as saliva have a major role in the etiology of ECC.^{26,27} Caufield et al. showed a "window of infectivity" for the initial acquisition of *Streptococcus mutans* at an average age of 26 months with age between 9-44 months.²⁸ The literature review reported that predicting dental caries risk and activity tests in at-risk children were associated with bacteriological criteria. Thus, several studies that have been conducted state bacterial testing as a predictor in assessing the risk of dental caries in children.²⁹

Saliva is also a complex fluid with a function and an essential role in maintaining the microbiota balance.³⁰ Maintaining a neutral pH through the buffering capacity of saliva prevents tooth demineralization and dental caries.³¹ Salivary pH and buffering capacity in children with and without ECC have been studied extensively with varying results.^{32,33}

Prevention of ECC can also be done by paying attention to dental and oral hygiene, which can be done by brushing your teeth correctly. Children aged 2-5 years can brush their teeth, but they still need to be guided and supervised by their parents at least twice daily to brush their teeth properly. The practice of brushing your teeth must reach 16 tooth surfaces by reaching all stages, starting from giving toothpaste to finishing rinsing your mouth.³⁴

Previous research findings have proven that tooth brushing habits contribute significantly to reducing the prevalence of dental caries.^{35,36,37}

Research in Saudi Arabia has reported that most parents show positive results. However, many mothers do not use any method of cleaning teeth for their young children. Attention, awareness, and knowledge of parents' dental health are needed to prevent children from the causes of ECC.³⁸

The analysis results in this study indicate that tooth brushing has no significant relationship with the severity of ECC and the status of dental caries. The authors concluded that observing the relationship between tooth brushing habits and ECC is difficult. However, brushing your teeth can remove plaque if done the right way. This result occurred because the practice of brushing teeth carried out by parents in this study was unfavorable. Previous research also supported these results, which reported that the visible plaque index (VPI) is more reliable for measuring tooth-cleaning behavior.²⁷ Brushing teeth in children once or more a day with the help of parents is important for controlling dental plaque.³⁹

This study has several limitations, namely sampling bias, where the sample is in one area by purposive sampling. Future studies need randomized sampling with a larger sample size, collecting data over a longer period to monitor children to observe the effect of dental visits and preventive dental treatment.

The author thinks dental health education should be given, starting with pregnant women. Parents should know how streptococcus mutans is transmitted to their babies during breastfeeding and how to care for their toddler's teeth before practicing good oral hygiene under parental supervision. This study does not prove that parental behavioral factors are not fully a potential risk factor for ECC. Therefore, it is necessary to understand the composition of biofilm bacteria from oral hygiene status to design ECC prevention strategies to improve oral health in parents of children effectively.^{40,41}

Conclusions

This study emphasizes the importance of the role of parents in preventing ECC, not only the pressure on parental behavioral factors.

Subsequent studies are observing biological factors in the development of ECC.

We recommend further educating and training parents and caregivers on preventive practices and oral care measures in young children. In addition, dental and oral health service providers must be enacted to intensify awareness of dental health in children among mothers, especially about the importance of early first dental visits, healthy diet, and proper use of milk bottles during children's bedtime. Oral prevention program aimed at improving oral health care and reducing the prevalence of dental caries in toddlers and providing a manual for health cadres as a guide for implementing oral health promotion for early prevention of ECC in toddlers.

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Declaration of Interest

The authors report no conflict of interest.

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