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Incidents of dental caries in SAD toddlers at risk of stunting in Muaro Jambi

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Abstract

Background: According to the WHO, the prevalence of dental caries is 81.5% in children aged 3-4 years, 92.6% in those aged 5-9 years, and 90.2% in the 5-year age group. Diet and nutrition can influence oral health, including dental caries, which in turn affects overall health, depending on the types of food consumed. Damage to teeth causes loss of chewing ability in children (masticatory dysfunction), impacting appetite, food intake, and digestion, and causes stunted growth, thus affecting children's eating patterns. This study aims to analyze the relationship between dental caries and stunting in SAD toddlers.
Method: This cross-sectional study included 40 children under five years old, selected through stratified random sampling. Data were collected using questionnaires, dental exams, and anthropometry, and analyzed with the Chi-square test.
Results: Research found 20.0% incidence of stunting, 32.5% dental caries, and 40% high cariogenic diet. Among SAD toddlers in Muaro Jambi, a significant relationship was found between high cariogenic food consumption patterns and dental caries, as well as stunting.
Conclusion: A high cariogenic diet is a contributing factor to dental caries, which is linked to the incidence of stunting in SAD toddlers.

Keywords: dental caries; incidence of stunting; SAD.

INTRODUCTION

One of the nutritional problems that is quite complex in various countries in the world is stunting, especially in poor and developing countries, including Indonesia. Stunting refers to chronic malnutrition that leads to long-term effects such as impaired growth, reduced cognitive and mental capacities, increased susceptibility to illness, lower economic outcomes, and decreased production quality. If a child does not receive sufficient nutrition throughout their life, they are at risk of stunting (1).

Stunting affects 150.8 million children under the age of five worldwide, with 31.9% of cases occurring in Asia, following Africa at 33.1% (2). In 2018, Indonesia held the highest stunting rate in the Southeast Asia region, at 30.8% (3). National stunting prevalence reached 30.8%, Jambi Province 30.1% and Muaro Jambi Regency 20.68% (4,5). Muaro Jambi Regency in 2021 was recorded as the area with the largest prevalence of stunted toddlers in Jambi Province, namely 27.2%, meaning that approximately 1 in 3 toddlers experienced stunting. (6).

Muaro Jambi is among the regions in Indonesia which is the focus location (locus) in reducing stunting to 14% in 2024, out of 514 districts/cities that are the locus for integrated stunting reduction interventions in 2022 (7). Poverty causes many stunting incidents in Jambi, one of which is in SAD community (7).

SAD is a remote traditional community and is scattered in small groups in secondary forests, oil palm plantations and industrial plantation forests in Jambi Province (8). One of the health problems that often occurs in the SAD community is low nutritional status, making them susceptible to disease (9). Haris, A found that 42.2% of SAD toddlers in Nyogan Muaro Jambi Village experienced stunting (10). On average, SAD children in Pelempang Village brush their teeth once a day. Although most of them use toothbrushes, they are often not in usable condition, with frayed bristles and infrequent replacement. A small number of respondents do not brush

their teeth at all and instead use their fingers to clean their teeth (11). The incidence of stunting and dental caries in Muaro Jambi Regency remains high, especially among SAD toddlers living in Nyogan Village, Muaro Jambi.

Dental caries is one of the common oral health issues faced by children, in addition to stunting. Tooth loss due to caries is a significant issue in Indonesia, and the incidence has been increasing, reaching 57.6% in 2018 compared to 25.9% in 2013 and 23.4% in 2007. In Jambi Province, the rate is 45%, with only 9.53% receiving treatment from dental health professionals. According to WHO, the prevalence of caries is 81.5% in children aged 3-4 years, 92.6% in those aged 5-9 years, and 90.2% in the 5-year age group (4,5).

Oral health and diet have a reciprocal relationship. Diet and nutrition influence the health of oral tissues, while oral health impacts the nutrition consumed. Dental caries can lead to a loss of chewing ability in children, affecting their appetite, nutritional intake, and digestion, which in turn hinders optimal growth and ultimately affects the child's nutritional status (12).

Dental caries status in SAD was 88.3% in the category not according to target and 93.3% had poor dental and oral hygiene status. On average, SAD in Pelempang Village brush their teeth once a day, although most use toothbrushes, but they are not suitable for use because the bristles have grown and have not been replaced for a long time. There are still a small number of respondents who do not brush their teeth at all and only use their fingers to brush their teeth (11).

The prevalence of stunting and dental caries in Muaro Jambi Regency remains high, particularly among SAD toddlers residing in Nyogan Village, Muaro Jambi. Based on the description above, researchers are interested in conducting research on the incidence of dental caries in toddlers at risk of stunting among the SAD community in Muaro Jambi.

METHOD

This research is a cross-sectional study. The stunting incidence among SAD toddlers serves as the dependent variable, while dental caries and consumption patterns in toddlers are the independent variables.

The research population was all 129 children under five in Nyogan Village, Muaro Jambi. The survey sample formula was used to calculate the sample size and a total of 40 toddlers were obtained. The formula for calculating a large sample is as follows (13):

$$n = \frac{Z^2_{1-\alpha/2} \cdot P(1-P).N}{d^2(N-1)+Z^2_{1-\alpha/2}P(1-P)}$$

Information:
n = minimum sample size required
Z= degree of freedom = 1,96
p = proportion of children with caries = 81,5%
q = 1-p (proportion of children with no caries)
d = error of limit

The sampling technique is based on proportional allocation using stratified random sampling, with inclusion criteria consisting of toddlers aged 16-60 months, cooperative and having good general health conditions, and the sample's parents or guardians were willing to sign informed consent. The exclusion criteria consisted of toddlers with anodontia (no growth of some or all of their teeth since birth), and the sample was not at the research location at the time the research took place.

RESULTS

1. General Characteristics of the Sample

This research sample consisted of 48.0% male toddlers and 52% female toddlers. The education of the fathers and mothers of the sample is still low education, that is, 45% of fathers have not completed elementary school and 42% of mothers have not completed elementary school. Most of the respondents' occupations are housewives (56%) and most fathers work as fishermen (45%). These fishermen use the Nyogan River as a source of livelihood. Almost all SAD make their living as fishermen, because the majority do not have a definite job.

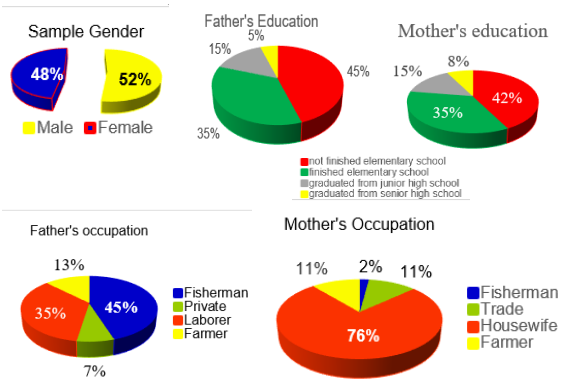

Figure 1. Characteristics of the Sample in the SAD of Muaro Jambi in 2024

2. Incidence of Dental Caries

The results of dental and oral examinations revealed that dental caries was experienced by 32.5% of the sample. In Figure 2 you can see the proportion of dental caries status among SAD toddlers.

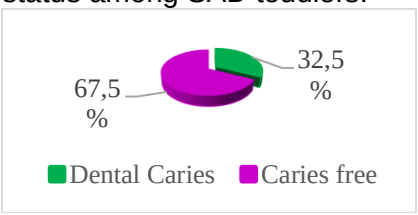

Figure 2 Status of Dental Caries in SAD Toddlers in Muaro Jambi in 2024

3. Incidence of Stunting in SAD Toddlers

Stunted growth, or short stature, also known as stunting, results from growth failure in earlier stages. Stunting occurs when height (TB) or length (PB) for age (U) is less than -2 standard deviations (SD) from the average child growth standard (14). The sample included toddlers aged 16 to 58 months. The average HAZ score (TB/U) for these toddlers was -1.48 ± 1.03. Subsequently, the toddlers were categorized, and their proportions were detailed. The stunting incidence among SAD toddlers was found to be 20.0%, as shown in Figure 3.

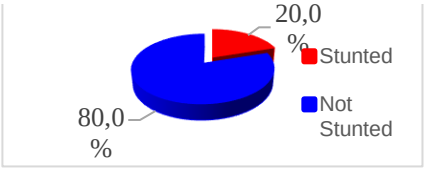

Figure 3 The Incidence of stunting among SAD toddlers in Muaro Jambi in 2024

4. Consumption Patterns of Cariogenic Foods and Foods High in arbohydrate Sources

Table 1
Distribution of Cariogenic Food and High Carbohydrate Food Consumption Patterns among SAD Toddlers in Muaro Jambi in 2024

Variable	f	%
Cariogenic Food		
High	16	40,0
Low	24	60,0
High Carbohydrate Food Consumption Patterns		
High	19	47,5
Low	21	52,5
Amount	40	100,0

This research found that 40% of the sample had a pattern of consuming foods high in cariogenic foods and 47.5% high in carbohydrate sources.

Bivariate Analysis

The bivariate analysis of the relationship between the consumption patterns of high cariogenic and high carbohydrate foods and the incidence of dental caries in SAD toddlers in Nyogan Village, Muaro Jambi, is shown in Table 2. The detailed analysis of the relationship between dental caries and stunting in SAD toddlers can be found in Table 3.

Table 2
The Association between Cariogenic and High Carbohydrate Food Consumption Patterns and the Incidence of Dental Caries in SAD Toddlers in Muaro Jambi in 2024.

Variable	Incidence of Dental Caries				Total		OR (95% CI)	Sig.
	Dental Caries		Caries Free					
	f	%	f	%	f	%		
Cariogenic food								
High	9	56,3	7	43,8	16	100,0	6,4 (1,5 – 27,6)	0,023
Low	4	16,7	20	83,3	24	100,0		
High Carbohydrate Food Consumption Patterns								
High	8	42,1	11	57,9	19	100,0	2,3 (0,6 – 9,0)	0,370
Low	5	23,8	16	76,2	21	100,0		
Amount	13	32,5	27	67,5	40	100,0		

The results of statistical tests found that there was a relationship between cariogenic food consumption patterns and the incidence of dental caries. The OR value = 6.4 means that high-cariogenic food consumption patterns have a 6.4 times chance of toddlers experiencing high caries compared to low-cariogenic toddlers. The pattern of consumption of high carbohydrate foods with the incidence of dental caries was not significant. Furthermore, in table 3 there is an analysis of dental caries and the incidence of stunting in SAD toddlers.

Table 3
The relationship between dental caries and stunting in SAD toddlers in Muaro Jambi

Incidence of Dental Caries	*Stunting*				Total		OR (95% CI)	Sig.
	Stunted		Not *Stunted*					
	f	%	f	%	f	%		
Dental Caries	7	53,8	6	46,2	13	100,0	30,3	0,001
Caries free	1	3,7	26	96,3	27	100,0	(3,1 – 295,2)	
Amount	8	20,0	32	80,0	40	100,0		

The results of statistical tests show that there is a relationship between dental caries and the incidence of stunting, with an OR = 30.3, meaning that a child with caries status has a 30.3 times greater chance of experiencing stunting than a child without dental caries.

DISCUSSION

The condition of the level of dental and oral health in Indonesia still needs attention even though it has decreased slightly, namely in 2023 43.6% of Indonesians will experience dental caries (cavities) and 24.6% will have the motivation to have fillings, whereas in 2018 as many as 45.3% and only around 4.3% have the motivation to fill cavities. This figure shows that Indonesian people still have low awareness of maintaining oral health (4,14).

The findings of this study are consistent with those of Abdat et al., who found that stunted children have a 2.5 times higher risk of developing dental caries compared to non-stunted children. This relationship is statistically significant, indicating a link between chronic malnutrition, which leads to stunting, and an increased risk of dental caries. Stunted children tend to have poor dietary patterns, such as consuming sugary foods without proper tooth-brushing habits. Chronic malnutrition also disrupts tooth development, making the enamel more susceptible to damage (15).

The existence of a relationship between dental caries and the incidence of stunting in toddlers was found in this study. Diet and nutrition affect the health of oral tissue and oral and dental health depends on diet. Dental caries causes impaired chewing function in children, affects appetite, nutritional intake and digestive disorders, and reduces ideal growth, affecting children's nutritional status (16,17).

Cariogenic foods are foods that contain fermentable carbohydrates, such as sugars and starches, which can be converted by bacteria in the mouth into acid. This acid then lowers the pH of dental plaque, causing enamel demineralization and eventually triggering the development of dental caries. A study by Asmara found that high consumption of cariogenic foods is significantly associated with an increased incidence of dental caries in children (18).

The relationship between dental caries and growth retardation has two mechanisms, the first is that dental caries and related pain in primary teeth affect children's difficulty chewing, which ultimately causes malnutrition and growth disorders. The second mechanism is the influence of dental caries on the body's systemic response, such as systemic inflammation, immune and hormonal changes, which can cause growth failure (19).

Untreated deep dental caries causes chronic inflammation and mouth pain. Then, chronic inflammation and mouth pain can

cause eating and sleeping disorders, as well as exacerbate the negative impact of other risk factors on a child's nutritional status (20).

Suffering from certain diseases for a long period of time is a factor that causes stunting. One disease that lasts a long time is dental caries. Dental caries is a variable that causes disruption of masticatory function, affects appetite and nutritional intake, impacts growth disorders and affects children's nutritional status. Dental caries that occurs in children will cause pain so that the child will become reluctant to eat and will also cause the bones around the teeth to become infected. If the damage occurs at a severe stage or an abscess occurs, the tooth will fall out. Children who have lost several teeth cannot eat well except soft foods. A person with a poor chewing apparatus will choose food according to their chewing strength, which will ultimately cause malnutrition (21).

CONCLUSIONS

A high cariogenic diet is a factor related to dental caries and dental caries is related to the incidence of stunting in SAD toddlers.

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