Original Article

The Relationship between Frequency of Consumption of Cariogenic Foods and DMF-T Index in 12-Year-Old Children

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ABSTRACT

The most common oral disease in Indonesia is dental cavities, especially common in school-age children due to their tendency to favor sweet and sticky foods that can cause dental caries. This study aims to identify the relationship between the frequency of cariogenic food consumption and the DMF-T index in 12-year-old children at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency in 2023. This type of research is an analytic study with a cross-sectional design. The study population included 47 respondents aged 12 years from SDN 05 Batu Taba. The research methods involved interviews regarding the frequency of cariogenic food consumption and DMF-T index examination. Data analysis involved univariate and bivariate analysis, with the chi-square test used for bivariate analysis. The results showed that the frequency distribution of cariogenic food consumption was categorized as low 63.8%, medium 19.1%, high 17.0%, and very high 0%. The frequency distribution of dental caries in the good category reached 42.6%, while the bad category reached 57.4%. The statistical test results showed a ρ value of 0.016 <0.005. The conclusion of this study is that there is a significant relationship between the frequency of cariogenic food consumption and the DMF-T index in 12-year-old children at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency. It is recommended to intensify the longitudinal study to better understand the behavioral changes of cariogenic food consumption frequency and its impact on DMF-T index over time.

Keywords: Cariogenic Food, Dental caries, DMF-T Index, Primary School Students

INTRODUCTION

Oral health plays an integral role in maintaining overall well-being, serving as a reflection of the body's general condition and indicative of nutritional deficiencies and other illnesses. Disturbances in oral health not only impact physical well-being but also have psychosocial ramifications, including diminished self-confidence and effects on daily activities, both in educational and workplace settings[1].

Dental and oral diseases, such as dental caries and periodontal diseases, are significant concerns in Indonesia, particularly among children and adults[2]. Dental caries, being a multifactorial and infectious disease, involves genetic and environmental factors in its etiology[3]. In this context, it is crucial to emphasize the importance of dental and oral health care in children, given the significant prevalence of dental caries in this age group.

The World Health Organization

(WHO) 2013 research results indicate that the prevalence of dental caries in 12-year-old children is 22.5% [4]. WHO considers 12-year-olds a global indicator for comparing dental caries, as they are in the final years of elementary school, easily accessible through the school system, and have complete permanent teeth growth (except for third molars)[4]. In 2018, the 12-year-old age group in the Sumatera Barat region faced the highest proportion of dental problems, with 43.4% having cavities[5].

Data from Riskesdas 2018 reveals that dental and oral problems affected 57.6% of the Indonesian population, a notable increase from 25.9% in 2013 [5]. The DMF-T index also rose from 4.6 to 7.1, suggesting an average of 7 dental issues per individual[5]. Sumatera Barat experienced an increase in the proportion of dental problems, especially cavities, from 22.1% in 2013 to 43.9% in 2018 [5].

School-aged children are vulnerable to dental caries due to their inclination towards consuming cariogenic foods like chocolates and candies. The frequency of consuming cariogenic foods, particularly those containing sucrose, can lead to a low pH in the mouth, triggering demineralization and reducing remineralization. The oral hygiene of children is often worse due to a higher intake of cariogenic foods and beverages compared to adults[6].

A recent study at SDN 3 Fajar Mataram in 2020 revealed a prevalence of 55 (64%) dental caries among respondents who frequently consumed cariogenic foods (≥3 times a week) [7]. Similar research conducted at SDN Bung Makassar in 2018 and Puskesmas III Denpasar Selatan in 2017 also found a significant relationship between the consumption of cariogenic foods and dental caries [8,9].

SDN 05 Batu Taba in Sumatera Barat is the focus of this study. Despite receiving regular dental health education, mass tooth brushing activities have not been fully implemented, influenced in part by the distance from Puskesmas Biaro to SDN 05 Batu Taba, which is approximately ±5.1 km. The aim of this research is to investigate the relationship between the frequency of cariogenic food consumption and the DMF-T index in 12-year-old children at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency.

METHOD

This study employs an analytical research design aimed at gaining an understanding of how and why health phenomena occur. It involves the dynamic analysis of correlations between various risk factors and related effects. The research design used is cross-sectional because the focus is on analyzing the correlation between risk factors and effects at a specific point in time.

The research was conducted on February 8, 2023, at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency. The research population includes all 12-year-old children at SDN 05 Batu Taba, totaling 47 individuals. The sample was taken using a total population technique, making the entire population the research sample. Inclusion criteria involve research subjects willing to be respondents and present at school during the research.

Data analysis was carried out using univariate and bivariate analyses. Univariate analysis is utilized to describe the general characteristics of the research subjects, while bivariate analysis, particularly the chi-square test, is employed to evaluate the relationship between two main variables: the influencing (independent) variable and the influenced (dependent) variable.

RESULTS

Table 1. Data on the number of students aged 12 years SDN 05 Batu Taba Ampek Angkek District Agam Regency in 2023

Class	Number of students aged 12 years		Total	Percentage (%)
	Male	Female		
VI A	9	12	21	44,7
VI B	11	15	26	55,3
Total			47	100

Table 1 shows that the number of respondents was 47 people consisting of female respondents as many as 55.3% (26 people), male respondents as many as 44.7% (21 people) and this study was conducted on 12-year-old children in class VI A and VI.

Table 2. Frequency Distribution of Cariogenic Food Consumption in 12-Year-Old Children at SDN 05 Batu Taba, Ampek Angkek Canduang District, Agam Regency in 2023.

Criteria	F	%
Low	30	63,8
Medium	9	19,1
High	8	17,0
Very High	0	0
Total	47	100%

Table 2 shows that the frequency distribution of respondents with the highest frequency of consumption of cariogenic foods is low criteria, namely 63.8% (30 people) and the least is high criteria, namely 17.0% (8 people).

Table 3. Frequency Distribution of Dental Caries Based on DMF-T Criteria in 12 Years Old Children at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency in 2023.

DMF-T criteria	f	%
Good	20	42,6
Bad	27	57,4
Total	47	100%

Table 3 shows that the frequency distribution of respondents with dental caries based on the DMF-T criteria was mostly poor criteria, namely 57.4% (27 people) and the least DMF-T criteria was good criteria, namely 42.6% (20 people).

Table 4. Statistical Test Results of the Relationship between Frequency of Consumption of Cariogenic Foods and DMF-T Index in 12-Year-Old Children at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency in 2023.

	Value	Df	Asymp. sig (2-sided)
Pearson's chi-square	8.274[a]	2	0.016
Likelihood ratio	11.197	2	0.004
Linear-by-Linear Association	3.109	1	0.078
N of Valid Cases	47		

Table 4 shows that the results of chi square statistical analysis using the SPSS program obtained the result ρ value 0.016<0.05,

meaning that there is a significant relationship between frequency of cariogenic food consumption with DMF-T index in children aged 12 years old at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency.

DISCUSSION

Based on the research on the frequency of consumption of cariogenic foods among 12-year-old children at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency, the data shows that the frequency of consumption of cariogenic foods has low criteria for 63.8% (30 people), moderate criteria for 19.1% (9 people), and high criteria for 17.0% (8 people). Thus, it can be concluded that the majority of students have a low criteria for the frequency of consumption of cariogenic foods.

According to Tarigan (2013), food significantly influences oral health[10]. Fiber-rich foods with natural teeth-cleaning properties, such as apples, guavas, and jicamas, can be considered alternatives to maintain dental hygiene. Conversely, soft and tooth-damaging foods, such as candies, chocolates, and biscuits, can increase the risk of dental damage.

However, these research findings differ from Novita's study in 2022 at SDN 224 Palembang, which showed that the frequency of cariogenic food consumption was mostly in the moderate criteria at 63% [11].

The distribution of dental caries frequency based on the DMF-T index among 12-year-old children at SDN 05 Batu Taba indicates that 42.6% (20 people) have good criteria, and 57.4% (27 people) have poor criteria. Data analysis shows that the distribution of dental caries frequency with poor DMF-T criteria is dominant. This may be caused by a lack of attention to oral hygiene, insufficient regular dental check-ups, and the habit of consuming sweet foods at school.

Dental caries is caused by host factors, microorganisms, substrates (diet), and time factors[12]. Carbohydrates left in the mouth, microorganisms, and saliva can directly cause dental caries. Another factor that can influence is inadequate tooth brushing frequency.

The importance of tooth brushing habits is evident from the recommendation to brush teeth twice a day, after breakfast and

before bedtime. Brushing teeth before bedtime is crucial to stop bacterial reproduction in the mouth because reduced saliva production during sleep cannot neutralize the acidic pH in the oral cavity [13].

Substrate or diet factors, as stated by Effendy (2016), can affect plaque formation and bacterial metabolism[14]. Research shows that carbohydrate consumption, especially sucrose, can increase the risk of dental damage[15-19]. Therefore, it is important to reduce the frequency of consuming cariogenic foods and pay attention to daily eating patterns.

Sweet and adhesive foods, such as chocolate and biscuits, have properties that can adhere to teeth. If not cleaned properly, it can undergo a chemical process with bacteria and saliva that can damage tooth enamel. Sugar in food and drinks can lower plaque pH, leading to demineralization of tooth enamel with the help of bacteria, especially Streptococcus mutans[20-23].

Oral health maintenance, such as regular dental check-ups every 6 months, can help prevent and treat cavities[23-26]. Talibo's research (2016) also supports the relationship between the frequency of consuming cariogenic foods and the incidence of dental caries in sixth-grade students at SDN 1 & 2 Sonuo.

This study also found a significant relationship between the frequency of consuming cariogenic foods and the DMF-T index in 12-year-old children at SDN 05 Batu Taba. High frequency of consuming cariogenic foods, especially with low criteria, is associated with a poor DMF-T index. Thus, the findings of this research make a significant contribution to understanding the factors influencing the oral health of 12-year-old children.

CONCLUSION

Based on the results of the study on the Relationship between Frequency of Consumption of Cariogenic Foods and DMF-T Index in 12-Year-Old Children at SDN 05 Batu Taba, Ampek Angkek District, Agam Regency, it can be concluded that the majority of 12-year-old children experience frequency of cariogenic food with low criteria as much as 63.8%, and the most DMF-T index with very low criteria at 42.6%. Furthermore, this study showed a significant relationship between the frequency of cariogenic food consumption and DMF-T index in 12-year-old children in the area, along with a p-value of 0.016 (p<0.05) obtained from the chi-square test.

For future research, it is recommended to intensify the longitudinal study to better understand the behavioral changes of cariogenic food consumption frequency and its impact on DMF-T index over time.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

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