Tooth Decay in the Perspective of Nutritional Status

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ARTICLE INFORMATION	ABSTRACT
  Keywords: Nutritional Status Dental Caries	Optimal nutritional intake impacts a child's physical growth and development, including their oral and dental health. Adequate protein and mineral intake influence the growth of primary teeth. This study aims to describe the relationship between tooth decay and nutritional status among first-grade students at SDN 3 Guntung Manggis, Banjarbaru City. The research employs a descriptive study design with a cross-sectional approach. Samples were selected using the Proportional Random Sampling technique, with a total of 92 students as respondents. The results indicate that the majority of respondents had good nutritional status (70.6%), while some were overnourished (14.1%) or obese (10.9%). Most respondents exhibited a high level of tooth decay (53.3%). Cross-tabulation analysis revealed that all nutritional status categories were predominantly associated with high tooth decay, with the highest proportion observed in the obese group, where 60% of obese students experienced severe tooth decay. In conclusion, obese students tend to be more vulnerable to tooth decay. Future research is suggested to use analytical methods and increase the sample size.

INTRODUCTION

Dental caries in children can interfere with chewing function, ultimately affecting their physical growth. Tooth decay is closely linked to children's tooth-brushing habits; the better the brushing habits, the lower the risk of caries (Darmayanti et al., 2022). According to the 2018 Basic Health Research (Riskesdas) data, the prevalence of dental caries in Indonesia reached 45.3%. In South Kalimantan Province, the prevalence was slightly higher at 46.90%, with the highest rates found in the 10–14 age group, at 47.67% (Kemenkes RI, 2018). There are two indices commonly used to measure dental caries: the def-t index and the DMF-T index. The World Health Organization (WHO) employs the def-t index (decayed, extracted, filled teeth) for primary teeth, while the DMF-T index (decayed, missing, filled teeth) is used for permanent teeth. Dental caries are assessed using a dental probe and a mirror (Napitupulu et al., 2019). Visually, caries are characterized by discoloration of the teeth, ranging from brown to black (Decay), missing teeth due to caries (Missing), and the number of teeth filled (Filling).

Nutritional status reflects an individual's overall condition based on nutrient intake, absorption, and utilization, indicating their health and nutritional well-being. Optimal nutritional status suggests sufficient and balanced nutrition to support growth, development, and body functions (Ministry of Health, 2020). Anthropometry is the most common method for assessing nutritional status. Anthropometric indices typically include weight-for-age (W/A), height-for-age (H/A), and weight-for-height (W/H). The Ministry of Health Regulation No. 2 of 2020 mandates the use of the Child Anthropometry Standards as a guide for healthcare workers, program managers, and stakeholders to assess children's nutritional status and growth. For children aged 5–18, nutritional status is evaluated using the Body Mass Index for Age (BMI/A) index, categorized as underweight, thin, normal, overweight, and obese. Research has shown a correlation between nutritional status and dental caries in elementary school students (Rosdiana, Riolina, & Sari, 2015). Another study also found a relationship between nutritional status and the likelihood of dental caries in school-aged children (Nur et al., 2023).

The 2018 Riskesdas report showed that the prevalence of stunted growth (H/A) among children aged 5–12 years in Indonesia was 16.9%. South Kalimantan ranked 11th, with 19.2%, while Banjarbaru City recorded the second-highest rate at 12.32%, following Tabalong Regency. Banjarbaru City also had one of the lowest rates of normal nutritional status at 72.16%, below the provincial average of 74.30% (Kemenkes RI, 2018).

Data from dental caries examinations among elementary school students in the Guntung Manggis Public Health Center's working area showed a caries rate of 64.16% in 2022. From January to August 2023, this figure rose significantly to 85.25%, reflecting a 21.09% increase within eight months. According to the school and adolescent health screening report by Guntung Manggis Public Health Center in 2022, the highest prevalence of caries was found at SDN 3 Guntung Manggis, with a rate of 92% (Puskesmas Guntung Manggis, 2023). This study aims to examine the relationship between dental caries and nutritional status among first-grade students at SDN 3 Guntung Manggis, Banjarbaru City.

METHOD

The research design used is cross-sectional, where data on nutritional status and dental caries among respondents were collected simultaneously. The study population included all first-grade students at SD Negeri 3 Guntung Manggis, totaling 120 students. The sample size was determined using the Slovin formula, resulting in 92 participants.

Since there are four first-grade classes, the proportional random sampling technique was employed to determine the proportion of subjects from each class, yielding 23 samples per class. The samples were randomly selected from each class using a lottery method. For nutritional status data, height (H) and weight (W) measurements were taken using a scale and microtoise. Body Mass Index (BMI) was then calculated, and nutritional status was categorized according to Ministry of Health Regulation No. 2 of 2020. Meanwhile, dental caries data were collected through a def-t index examination using diagnostic tools. The collected data were processed and analyzed descriptively using SPSS. This study received ethical approval from the Ethics Committee of Poltekkes Kemenkes Banjarmasin, with approval number: 814/KEPK-PKB/2024.

RESULTS AND DISCUSSION

Table 1. Nutritional Status of Grade 1 Students of SDN 3 Guntung Manggis Kota Banjarbaru

Nutritional Status	Amount	Percentage
Poor Nutrition	2	2,2
Underweight	2	2,2
Good Nutrition	65	70,6
Overweight	13	14,1
Obesity	10	10,9
Total	92	100

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Table 1 shows that most respondents had good nutritional status (70.6%). Only a few had poor nutritional status (2.2%) and undernourished status (2.2%). However, 14.1% were overnourished and 10.9% were obese.

Table 2. Dental Caries of Grade 1 Students at SDN 3 Guntung Manggis, Banjarbaru City

Dental Caries	Amount	Percentage
Rendah	10	10,9
Sedang	33	35,9
Tinggi	49	53,2
Total	92	100

Table 2 shows that most respondents had high caries (53.2%). Only a few (10.9%) had low caries.

Table 3. Cross tabulation of nutritional status with dental caries

Nutritional Status	Dental Caries Status			Total
	Low (%)	Medium (%)	High (%)	(%)
Bad	1 (50)	1 (50)	0	2 (100)
Poor	0	1 (50)	1 (50)	2 (100)
Good	6 (9,2)	24 (36,9)	35 (53,8)	65 (100)
Overweight	1 (7,7)	5 (38,5)	7 (53,8)	13 (100)
Obesity	2 (20)	2 (20)	6 (60)	10 (100)
Total	10 (10,9)	33 (35,9)	49 (53,3)	92 (100)

Table 3 shows that each category of nutritional status is dominated by high levels of dental caries. However, the highest proportion of severe dental caries is found in the group with obesity, where 60% of obese respondents experience high levels of dental caries.

DISCUSSION

The research results indicate that the majority of respondents have good nutritional status, although there are a few with poor or inadequate nutritional status, albeit in small numbers. On the other hand, a more significant number of respondents are classified as overweight or obese. Children's nutritional status plays a crucial role in their physical and intellectual development. The better the nutritional status, the more optimal their physical growth and cognitive abilities (Pardosi et al., 2022). Nutritional status is important for bone and muscle growth, organ development, immune system function, brain activity, focus and learning, daily energy and activity, chronic disease prevention, and overall quality of life.

To ensure optimal nutritional status, parents and caregivers need to provide a balanced and varied diet, including all major nutrient groups such as carbohydrates, proteins, healthy fats, vitamins, and minerals. Regular health monitoring by medical professionals is also essential for detecting and addressing nutritional problems early. By understanding the importance of nutritional status, greater attention can be given to children's nutrient intake, helping them grow and develop well.

The research also highlights that the majority of respondents suffer from severe dental caries, while only a small proportion exhibit low levels of caries. The primary causes of dental caries in children are oral bacteria and the consumption of sugar-rich foods. Bacteria such as *Streptococcus mutans* and *Lactobacillus* are the main culprits of dental caries. These bacteria convert sugars from food residues into acids that can erode tooth enamel. Sugar-rich foods are classified as cariogenic.

Research by Rahayu, & Asmara, (2021) indicates a correlation between the consumption of cariogenic foods and the incidence of dental caries. Similar findings are shown in studies by Andayasari & Anorital, (2019) and Safela et al. (2021). Dental caries is influenced not only by diet but also by inadequate brushing habits (Fahmah et al., 2023), brushing knowledge (Rahmawati & Nuryati, 2023), and dental caries awareness (Sholehoddin et al., 2023).

Another factor increasing the risk of dental caries in elementary school-aged children is their eating patterns. Children frequently consume snacks and sugary drinks at school,

increasing the exposure of their teeth to sugars and acids. Limited awareness and understanding among children about the importance of maintaining oral health further elevate the risk of caries. Children may not fully grasp the significance of oral hygiene or the negative impacts of consuming sugary foods. Additionally, limited access to dental health services can exacerbate the risk of dental damage in children.

Not all children have adequate access to routine dental care, such as check-ups and cleanings by dentists, which are crucial for the prevention and early detection of dental caries (Haryani et al., 2020). Dental caries in school-aged children is influenced by their oral hygiene habits and the frequency of consuming cariogenic foods. Better oral hygiene practices and reduced consumption of cariogenic foods are associated with a lower risk of dental caries (Farizah et al., 2021).

Children's nutritional status is closely linked to the risk of developing dental caries. Good nutrition is not only vital for overall growth and development but also plays a key role in maintaining oral health. Children who consume large amounts of sugary foods and beverages are at a higher risk of dental caries. Sugar serves as a primary source for bacteria like *Streptococcus mutans*, which convert sugar into acid that damages tooth enamel. Besides the amount of sugar consumed, the frequency of consumption also matters. Frequent intake of sugary foods or drinks increases the exposure of teeth to acid, thereby elevating the risk of caries (Lutfi et al., 2021).

Minerals are another critical component of a healthy diet. Calcium and vitamin D are essential nutrients for the health of bones and teeth. Deficiencies in these nutrients can weaken tooth structure, making them more susceptible to decay and caries. Fluoride also plays an essential role in strengthening tooth enamel and preventing tooth decay. Children who lack sufficient fluoride from drinking water or toothpaste are at a higher risk of dental caries (Utami et al., 2022). However, some studies have shown that even with adequate fluoride levels in drinking water, high rates of dental caries persist, suggesting that other factors may be at play (Sagemba et al., 2024).

A balanced diet is crucial for dental health. A diet rich in fruits, vegetables, protein, and dairy products supports the healthy development of teeth. These foods provide essential vitamins and minerals for oral health. High-fiber foods, such as fresh fruits and vegetables, are not only beneficial for digestion but also help clean teeth naturally by stimulating saliva production. Saliva helps neutralize acid in the mouth.

Good nutrition also supports a strong immune system, contributing to better oral health. Children with good nutritional status tend to have greater resilience to infections, including dental and gum infections (Lutfi et al., 2021). Malnourished children or those suffering from chronic malnutrition are at a higher risk of dental caries. Chronic malnutrition and stunting often lead to suboptimal dental growth, including weaker enamel formation, making teeth more vulnerable to decay. Children experiencing wasting (low weight-for-height) often have compromised immune systems, making them more susceptible to infections, including dental infections (Pardosi, 2022).

Family socioeconomic status significantly impacts children's nutritional and dental health. Children from low-income families may have limited access to nutritious food, increasing the risk of malnutrition and dental caries (Haryani et al., 2020). Nutrition assistance programs and health education initiatives in schools and communities can help address these issues.

Parents and caregivers, as well as government healthcare providers, play a vital role in ensuring children's nutritional and dental health. Parents should provide a balanced diet rich in the nutrients necessary for oral health and reduce the consumption of sugary foods. Education on the importance of balanced nutrition and oral hygiene should begin at an early age. Parents and healthcare providers should teach children how to maintain oral hygiene and make healthy dietary choices to promote both dental and overall well-being (Obi et al., 2022).

CONCLUSION

The conclusion of this study shows that most grade 1 students of SD Negeri 3 Guntung Manggis in Banjarbaru City have good nutritional status, but also have a high level of dental

caries. In all nutritional status categories, the largest proportion was high caries. However, the group with obese nutritional status showed the most significant proportion of high dental caries. For the continuation of this study on nutritional status and caries, it is hoped that future research can use analytical research methods and more detailed statistical tests, as well as increase the number of samples and expand the research area.

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