



River Water Consumption as A Source of Drinking Water with Caries in Stunting Children

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ABSTRACT

Stunting is a chronic nutritional problem, which is currently still an important problem in Indonesia. Chronic malnutrition also has an impact on dental and oral health, such as causing disturbances in the development of salivary glands and can affect the eruption time of milk teeth, which can increase the risk of dental caries. The purpose of this study is to examine the impact of consuming river water as drinking water on caries in stunted children in Sungai Tuan Ilir Village, Banjar Regency. This research is an analytical survey with a cross-sectional design. The study population consisted of elementary school children from the Sungai Tuan Ilir Village area in Banjar Regency. The sampling method used was total sampling, involving 95 children. The results of the research using the Chi-Square Tests obtained a Sig value. (2-tailed) = 0.000, so there is a relationship between drinking water consumption and dental caries in stunted children. The conclusion drawn from this study is that there is a significant relationship between water consumption and caries in stunted children in Sungai Tuan Ilir Village, Banjar Regency. It is recommended that promotive and preventive efforts need to be increased from pregnant women to toddlers regarding stunting and the importance of maintaining healthy teeth as early as possible.

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INTRODUCTION

Stunting is a long-term nutritional issue that remains a significant concern in Indonesia. According to the 2021 Indonesian Nutritional Status Study (SSGI), the national prevalence of stunting among toddlers is 24.4%. Stunting can cause new problems such as short growth that continues between generations, delays in cognitive development in children, and increased susceptibility to infections and non-communicable diseases. Indonesia is the nation with the third-highest stunting prevalence in Southeast Asia, according to statistics gathered by the World Health Organization (WHO). According to the 2018 Basic Health Research statistics, 30.8% of Indonesians suffer from stunting, which is still far from the WHO recommended level,

namely 20% (Kemenkes RI, 2018).

Chronic malnutrition also has an impact on oral and dental health, such as causing disturbances in the development of salivary glands and can affect the time of eruption of milk teeth which can increase the risk of dental caries. Caries is a disease of the oral cavity that can cause pathological loss of teeth and can result in various diseases, both local and systemic (Susilawati et al., 2023). WHO data states that 70-95% of school children in the Southeast Asia region experience dental caries, this means that seven to nine out of ten children experience dental caries (Aviva, Pangemanan and Anindita, 2020). Dental caries can affect children's appetite and nutritional intake, which in turn can cause growth disorders and impact children's nutritional status, ultimately harming their quality of life (Boy and Khairullah, 2019).

Environmental factors play a role in the development of dental caries. The physical environment that contributes to dental caries includes the water used as a daily drinking source. Differences in geographic location cause variations in fluorine content in water. If the fluorine content in water is less than 1 ppm, this can affect the resistance of tooth enamel to caries. Drinking water is an essential need in daily life and plays an important role in maintaining overall body health, including dental and oral health. As stated by the World Health Organization (WHO), safe pH standards for drinking water range from 6.5 to 8.5. If the water's pH is below 6.5, it can become more corrosive, which not only affects water quality but also negatively impacts dental health. Water with a pH that is too low (acidic) can cause erosion of tooth enamel, increasing susceptibility to demineralization and the formation of dental caries. River water in South Kalimantan has a fluorine content below 1 ppm and a pH of less than 6.5. Based on research (Napitupulu, Adhani and Erlita, 2019), South Kalimantan is a wetland area with quite high levels of acidity (Salamah, Hidayati and Sari, 2020; Utami, Amperawati and Salamah, 2022; Mazidah, Hadi and Ulfah, 2023). This low pH water condition is not very good for dental health (Napitupulu, Adhani and Erlita, 2019). Salamah's research, Banjar Regency, including Sungai Tuan Ilir village, is geographically a riverside area where in general the activity of using the river for daily needs is quite large, including the use of the river as drinking water, which is 30% (Salamah, 2017). The aim of this study is to assess the impact of consuming river water as drinking water on caries in stunted children in Sungai Tuan Ilir Village, Banjar Regency. The difference with previous research was looking at dental caries and drinking water consumption, whereas this research looked at drinking water consumption and its relationship with dental caries in stunted children.

METHOD

This study is quantitative in nature, utilizing an analytical survey research design with a cross-sectional approach. The population in this study were elementary school children in the Sungai Tuan Ilir Village area, Banjar Regency. The sampling method used in this study is total sampling, involving a total of 95 children. The stages of the research method are first to examine nutritional status which is measured using anthropometric measurements based on height divided by age (TB/U). Body height was measured with a microtoise to an accuracy of 0.1 cm. The height values were then converted into standardized scores (Z-scores) using the 2006 anthropometric standards and obtained stunted (short) and normal nutritional status. Examination of dental caries with the help of diagnostic tools such as sondes and mouth mirrors is then calculated using the caries index for primary teeth, namely the def-t index, and the caries levels are very low, low, medium, high and very high. The collected data is then processed through stages of editing (re-examining the gathered data) and coding (coding the data which consists of several categories), tabulation (creating data tables), and calculations, the obtained data is then analyzed statistically. The processed data was analyzed using the Chi-square analyze which is useful for testing the association between short nutritional status (stunting) who consume river water and the level of dental caries. This research has received ethical approval with number 610/KEPK-PB/2024.

RESULTS AND DISCUSSION

Table 1. Respondent Characteristics by Age and Gender

Characteristics of the Respondents	Amount	Percentage
Age		
7 years	16	17%
8 years old	14	15%
9 years old	19	20%
10 years	11	12%
11 years old	19	20%
12 years old	16	17%
Amount	95	100%
Gender		
Woman	46	48%
Man	49	52%
Amount	95	100%

Table 1, it is shown that the number of respondents was 95 with an age range of 7-12 years. Of the 95 respondents, 46 respondents (48%) were female, 49 respondents (52%) were male.

Table 2. Analysis of drinking water consumption with dental caries in normal children's nutritional status

Drinking Water Consumption	Dental Caries in Normal Children				Amount	
	Low		High		N	%
	N	%	N	%		
River water	3	4	6	7	9	100
Other Water Sources	52	66	18	23	70	100
Total	55	70	24	30	79	100

Table 2 shows that among the 79 respondents with normal nutritional status who consumed river water, 3 respondents (4%) had low dental caries, while 6 respondents (7%) had high dental caries. For those consuming drinking water from other sources, 52 respondents (66%) had low dental caries, and 18 respondents (23%) had high dental caries.

Table 3. Analysis of Drinking Water Consumption with Dental Caries on the Nutritional Status of Stunting Children

Drinking Water Consumption	Dental Caries in Stunted Children				Amount	
	Low		High		N	%
	N	%	N	%		
River water	2	12	7	44	9	100
Other Water Sources	4	25	3	19	7	100
Total	6	37	10	63	16	100

Table 3 indicates that of the 16 respondents with stunted nutritional status who consumed river water, 2 respondents (12%) had low dental caries, while 7 respondents (44%) had high dental caries. Among those consuming water from other sources, 4 respondents (25%) had low dental caries, and 3 respondents (19%) had high dental caries.

Table 4. Chi-Square Tests Result River water consumption variables on dental caries in Stunting Children

Variable	Sig. (2-tailed)
River Water Consumption	.000
Dental Caries	.000

Table 4 shows the Sig value. (2-tailed)=0.000, so the p-value< α (0.000<0.05), this shows

that there is a relationship between water consumption and caries in stunted children in Sungai Tuan Ilir village, Banjar Regency.

DISCUSSION

Dental caries has become a serious health problem among school children in various parts of the world, including in Indonesia. Dental caries not only cause pain and discomfort, but can also impact the quality of life (Ulfah et al., 2024). Children aged 7 to 12 years is the time when teeth change and new teeth grow. At this age, tooth enamel is still maturing after eruption, so the possibility of caries is high. Characteristics of this age will consume all types of food so that the required energy intake matches the energy expended. This will have an impact on children's dental health by consuming these various foods. Dental caries can occur due to four internal factors that influence each other, namely teeth and saliva as the host, bacteria, substrate, and time. Caries can occur if these four factors are present and interact with each other (Rekawati and Frisca, 2020). The more often a child consumes sweet foods, the more it will affect the child's dental health. The increase in the prevalence of dental caries is a result of increased sugar consumption and insufficient use of flour (Andriyani, Arianto and Chandra, 2023). Children's lack of knowledge about how to maintain oral hygiene compared to adults, influences them in maintaining dental hygiene, accompanied by a high sweet eating pattern which increases the risk of dental caries (Handayani et al., 2023).

Research in various regions in Indonesia, including South Kalimantan, shows that the fluorine level in drinking water is 0.018 ppm. This condition is one of the factors causing the high prevalence of caries in South Kalimantan (Kevin, Adhani and Hamdani, 2023). Fluorine in optimal concentration in tooth tissue can stimulate anti-caries effects. The fluorine content that is integrated into the enamel during the process of tooth development is influenced by the presence of fluorine in drinking water or other foods that contain fluorine. Enamel with a high fluorine content is not automatically resistant to acid attack. However, the presence of fluorine around the teeth during the enamel dissolution process will affect the remineralization process and impact plaque bacteria in forming. Laboratory examination of the fluorine content in river water in Banjar Regency, obtained results where the fluorine content was very low, namely 0.07 ppm. Fluorine levels of less than 1 ppm are associated with high levels of caries in children (Handayani et al., 2023). Lack of fluoride can cause tooth decay to become brittle and susceptible to dental caries (Shabrina and Hartomo, 2020).

Short nutritional status (stunting) is a condition where a person's height is lower than the standard height that should be for a certain age, which indicates a disturbance in physical growth due to chronic malnutrition (Hadi, Alfridsyah and Affan, 2019). A factor that is closely related to the occurrence of stunting is child nutrition (Hutagaol et al., 2023). Stunting can hinder a child's development, including the development of the oral cavity. Stunted children are more prone to dental caries due to alterations in the characteristics of saliva, including a reduced flow rate and lower pH (Lutfi et al., 2021). This is also confirmed by research (Vieira et al., 2020) Research on chronic malnutrition and oral health in children aged 1-5 years indicates that malnutrition negatively affects the oral cavity and leads to a reduction in saliva flow rate. Stunting or malnutrition in children can cause a decrease in saliva secretion. Salivary flow has a direct relationship with the incidence of caries through the oral cleaning process which helps remove pathogens (such as viruses, bacteria and fungi) from the surface of teeth and mucosa. The buffer function of saliva is to neutralize the pH after eating and reduce the time required for demineralization of Di Below the critical pH, dental inorganic materials will dissolve (Vieira et al., 2020).

The research findings indicate a correlation between water consumption and the occurrence of caries in stunted children in Sungai Tuan Ilir village, Banjar Regency. This result is in line with research by (Jumriani, 2020) on the level of children's dental caries where there were 30 children (65%) experiencing short and very short stunting (Jumriani, 2020). Malnutrition is considered a host factor that contributes to the development of caries lesions, particularly through its impact on tooth structure and salivary gland function. Disturbances in tooth structure that occur when tooth enamel does not develop properly are known as

hypoplasia, can create an oral cavity environment that is more susceptible to caries due to increased demineralization of the thin protective enamel. Therefore, stunted children have a higher risk of developing dental caries compared to children who are not stunted (Aviva, Pangemanan and Anindita, 2020). Limitations of this study focus on river water consumption as a risk factor, while other factors that can also influence dental caries, such as diet, frequency of brushing teeth, and family economic status, were not analyzed in depth.

CONCLUSION

It can be concluded that there is a relationship between the consumption of river water as drinking water and the occurrence of caries in stunted children in Sungai Tuan Ilir Village, Banjar Regency. Promotional and preventive efforts are needed from pregnant women to toddlers regarding stunting and the importance of maintaining dental health.

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