Budapest International Research and Critics Institute-Journal (BIRCI-Journal)
Humanities and Social Sciences
ISSN 2615-3076 Online)
ISSN 2615-1715 (Print)
www.bircu-journal.com/index.php/birci
Budapest Institute

The Effect of Saliva Zink Levels with Nutrition Status of Elementary School Children in Air Beliti Puskesmas Year 2021

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Abstract

The impaired nutrition in children is a very important problem because it has a direct impact on the growth and development of children. Malnutrition in children can lead to micronutrient deficiencies including zinc. Zinc is an important mineral found in every cell and is needed to support the body's immune system, heal wounds, help the ability to taste and smell and is needed in the DNA synthesis process. The purpose of this study was to examine the relationship between salivary zinc with the nutritional status of elementary school children in the Air Beliti Public Health Center work area. ***Methods:*** *This study is an observational study with a cross-sectional design. The study was conducted on 76 respondents who met the inclusion criteria. Measurement of Height for Age to determine the nutritional status of children and examination of salivary zinc levels with the ELISA method to determine salivary zinc levels. The data was analyzed using the Spearman correlation test.* ***Results:*** *The results of the measurement of nutritional status showed that 46.1% of children were stunted and 53.9% of children had normal nutritional status. The results of the measurement of salivary zinc levels showed that the average salivary zinc level in stunted children was 1.96 mmol/L, while in children who were not stunted, it was 2.43 mmol/L. Salivary zinc levels in stunted children were lower than in children who were not stunted.* ***Conclusions and Suggestions:*** *There is an effect of saliva zinc examination on the nutritional status of schoolchildren. It is necessary to increase the intake of nutrients, especially zinc, in children so that their nutritional status is not disturbed. Also, check the nutritional status of children by adding variables that can describe the nutritional status of children in accordance with their development and growth.*

Keywords
Nutritional Status, Salivary Zinc, Schoolchildren and Stunting

I. Introduction

School children often experience various health problems and nutritional problems such as malnutrition. Nutritional problems or malnutrition are closely related to children's diet. One of the nutritional problems experienced by school children is stunting (Purnasari, 2018). According to data from the United Nations Children's Fund (UNICEF, 2019) in 2018, almost 3 of 10 children under the age of five are stunted or are short and very short for their age,

while 1 of 10 children are underweight or too thin. One-fifth of primary school-age children are overweight or obese, and millions of Indonesian children still suffer from high stunting, experiencing a "double burden" due to malnutrition. The double burden of malnutrition is a serious problem in Indonesia. This is a big challenge, because as many as 12% of children in Indonesia under the age of 5 years are stunted (UNICEF, 2017). The World Health Organization (WHO) stated the rate of stunting in Indonesia is above the stunting threshold set by WHO, which is 20%. Meanwhile, the prevalence of stunting in children under five in Indonesia reached 43.8%. Indonesia is the second country with the highest stunting cases. Based on nutritional status records (PSG) in 2017, stunting was recorded for 26.6% of children under-five, 9.8% of very short children under-five, and 19.8% in the short category (WHO, 2019). Basic Health Research 2018 data showed that the prevalence of stunting in children under five in Indonesia is 30.8%. However, when compared to the results of the 2013 Basic Health Research, the number of cases had decreased from 37.2%. Meanwhile, in South Sumatra Province, the prevalence of stunting in children under-five in 2018 was 36.7% (Basic Health Research 2018). This number, when it is compared to the results of Basic Health Research in 2013, has decreased as well. In 2013, stunting in South Sumatra was recorded at 32.0%. Despite the decline, the prevalence of stunting is still high when compared to the WHO standard, which is <20%. (South Sumatra Health Office, 2020).

Children who are stunted have a lower zinc intake compared to normal children, with a p value of 0.001. Thus, zinc deficiency will have implications for growth disorders. Impaired growth is a nutritional problem that is influenced by a lack of zinc consumption in the long term (Sulistianingtias, 2017).

Zinc is an important mineral for humans. This mineral is the second most abundant mineral after iron in the human body. Zinc deficiency can also lead to weight faltering, decreased appetite, and slow wound healing. Providing zinc supplements can improve growth in children. Zinc supplementation has a positive response to weight and height gain, and is able to increase linear growth in stunted children. Research conducted by Bening et al. (2017) states that a low level of zinc adequacy has a 6.39-fold significantly higher risk of stunting than an adequate level of zinc adequacy (OR = 6.39; 95% CI = 1.34–30.33). Research conducted by Mamiro et al. (2005) also stated that children with stunting had an average zinc concentration of 10.0 ± 6.2 g/g.

Research conducted by (Widita et al., 2017) stated that salivary zinc levels were correlated with the nutritional status of children (r = 0.410, p = 0.000). According to (Maharani & Kusumastuti, 2017), zinc in saliva is not only a regulator of appetite, but also of body weight, primarily on the nutritional status of children and toddlers.

In Musi Rawas Regency in 2019, there were 1.09% malnourished children, 9.33% of children affected by undernutrition, and 10.42% of children with malnutrition and undernutrition. Data from community-based nutrition records and reports (e-PPBGM) in 2019, regarding the nutritional status of toddlers in 19 Public Health Centers in Musi Rawas Districts, from a total of 2003 toddlers, 321 toddlers (0.16%) and 819 toddlers (0.40%) were found to be very short and short respectively. At the Air Beliti Public Health Center, there are 115 toddlers (0.05%) who are stunted (Musi Rawas Health Office, 2020). Musi Rawas Regency was once one of the areas experiencing food insecurity in 2015-2019 which had an impact on the incidence of stunting. The purpose of this study is to analyze the relationship between salivary zinc level with the nutritional status of elementary school children in Musi Rawas Regency.

II. Research Methods

This research was quantitative with an analytical survey method with a cross-sectional design. The location of the research was in Musi Rawas Regency. The population in this study was elementary school children in Musi Rawas Regency. The sample in this study was schoolchildren who met the inclusion criteria and were picked randomly. The inclusion criteria are elementary school children aged 9–14 years, who have received approval from their parents and do not have infectious diseases in their oral cavity. Characteristic data obtained from questionnaires Salivary zinc level data was obtained by measuring salivary zinc levels using the ELISA while height nutritional status was measured by height for age measurement (Anthropometry). The data was analyzed using SPSS 17 Spearman correlation test was used to analyze the correlation between salivary zinc levels and nutritional status in school children.

III. Results and Discussion

3.1 Univariate Analysis

Table 1. Frequency Distribution of School Children's Characteristics

No	Variable	N	%
1.	**Age (years old)**		
	a. 9-11	53	69,8
	b. 12-14	23	30,2
2.	**Sex**		
	a. Male	36	47,4
	b. Female	40	52,6
3.	**Father's education**		
	a. Low	51	67,1
	b. High	25	32,9
4.	**Mother's education**		
	a. Low	51	63,2
	b. High	28	36,8
5.	**Father's occupation**		
	a. Farmer	40	52,6
	b. Not farmer	36	47,2
6.	**Mother's occupation**		
	a. Unemployed	8	10,5
	b. Employed	68	89,4
7.	**Parent's income**		
	a. Low	25	32,9
	b. High	51	67,1
8.	**Nutrition status**		
	a. Stunting	35	46,1
	b. Not Stunting	41	53,9

Based on Table 1, it was found that most of the children were aged 9–11 years (69.8%), with the most common gender being female (52.6%). The results of the measurement of nutritional status showed that 46.1% of children were stunted. Parental data shows that fathers' education is low at 67.1%, and mothers' education is low at 63.2%. Most of the fathers work as farmers, 52.6%, and 89.5% of the mothers work. Based on income criteria, 67.1% of parents have a high income.

3.2 Bivariate Analysis

Table 2. The effect of zinc saliva examinations on elementary schoolchildren

		Variabel	n	Mean	SD	p-value
Nutritional status	Stunting	Zink Saliva	76	1,96	0,787	0,016
	Not Stunting			2,43	0,791	

Based on Table 2, the average value of salivary zinc levels in stunted children is 1.96, which is lower than in children who are not stunted, with an average salivary zinc level of 2.43. The results of statistical tests showed the effect of salivary zinc levels on the nutritional status of elementary school children, with a p-value of 0.016.

Based on the results of the study, it was found that most of the children were aged 9–11 years (69.8%), with the most common gender being female (52.6%). The results of the measurement of nutritional status showed that 46.1% of children were stunted. Parental data shows that fathers' education is low at 67.1%, and mothers' education is low at 63.2%. Most of the fathers work as farmers, 52.6%, and 89.5% of the mothers work. Based on income criteria, 67.1% of parents have a high income.

The results of the analysis showed that there was a relationship between salivary zinc levels and the nutritional status of elementary school children. Ferritin is one of the main biomarkers present in saliva that acts as an iron-binding protein and also as a monitoring tool in children suffering from iron deficiency.

Malnutrition is a common risk factor that causes infectious diseases. The dental and oral problems in preschool children will affect the results of the salivary examination, hence the result obtained that the incidence of stunting is 13.5% (Vieira et al., 2020). This study is not in line with research conducted by (Yani et al., 2020) that found that there is no significant difference between malnutrition and the age of children after the salivary flow examination was carried out. Malnutrition that occurs has a negative effect, hence worsening the malnourished children's condition.

According to the research by Hashemi et al. (2018), saliva is one bio-fluid component that contains various important components that have been successfully used for health research. It was found that there was a positive correlation between the levels of ferritin and saliva (p=0.004). Research explains that early cavities in children affect salivation, thereby increasing the risk of anemia in children.

Research conducted (Gibson et al., 2007) states that the percentage of low socioeconomic status households at risk of having stunted children was 80%, so it affects children's nutrition. Based on Sibarani (2019), the results showed that there was a relationship between zinc with the incidence of stunting in elementary school children with p value 0.016. According to research (Damayanti, R.A, Muniroh, L, 2016), a lack of appetite and low intake of nutrients, especially zinc, can cause energy deficiency in children, thus affecting the nutritional status of children.

According to Adriani (2014), the incidence of zinc deficiency in adults results in normal tasting food. Because the taste buds do not have blood circulation, saliva is the most important source of nutrients. Saliva contains *gustin*, a rich 27 kilodalton molecular weight polypeptide and 85% istidine, containing two zinc atoms. Low zinc levels can indicate impaired taste function. So, experiencing impaired taste buds can affect appetite because the condition of the taste buds is not good. Children who have a poor appetite can reduce the level of lower nutrient consumption, causing differences in nutritional status.

IV. Conclusion

Salivary zinc levels alone cannot be used to predict the nutritional status of children. Therefore, it is necessary to add other variables such as salivary iron, which when used together with salivary zinc, can predict the nutritional status of children.

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