

THE EFFECT OF ZINC SALIVA ON THE TODDLERS' NUTRITIONAL STATUS

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Abstract

This study aimed to know the correlation between zinc saliva and the toddlers' nutritional status (W/A). The writer utilized observational analytic and utilized 102 toddlers (3-5 years old) in Ambulu subdistrict, Jember, for the sample as the method of this study. The toddlers' nutritional status was measured by W/A index, furthermore, the unstimulated saliva was collected and analyzed by utilizing AAS method in order to estimate the concentration of zinc saliva. The result of this study showed that there was the correlation between zinc saliva and toddlers' weight by utilizing Spearman correlation ($P=0.000$, $\alpha=0.05$). In conclusion, zinc saliva related with the toddlers' weight. This correlation is associated with the fact that zinc saliva is not only as the regulator of appetite but also it can stimulate the production of leptin that is considered as the protein of weight regulator. Zinc of saliva influenced the sense of taste on the tongue that could increase more the function of taste. Hence, it could increase the toddlers' appetite and cause the increasing of toddlers' weight.

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Introduction

Nutrition is one of important aspects of human's growth and development. The nutrition has a role of the metabolic activity of various organ¹. Besides, the nutrition also has an important role in determining the individual's growth. The human's growth and development are considered appropriate if it is indicated by the adequacy of nutritional intake. In contrast, if the nutritional intake is inadequacy, it can make the human's growth slower².

Saliva is used to diagnose disease and to control the health status and disease. Moreover, saliva has the hundreds of components that help to detect systemic disease and to give biomarker

of health and disease status. The saliva test provides more advantages than blood test. The advantages are the blood sampling can be taken easily and it can be done by all of the people (non-medical people), some samples can be collected, hence, it can give more information than single blood sample. Most of the studies show the advantages of the use of saliva to detect the physiologic or pathologic condition because the parameter of saliva relates with the parameter of serum¹.

Kadoum et al., reported that there was a systematically correlation between zinc saliva and BMI in their study. Zinc saliva had a role in the metabolism process and if it occurred inadequacy, it could cause the loss of appetite, hence, the human's growth was slower³.

The deficiency of zinc influences almost two billions of human in developed country⁴. Hence, almost two billions of human in the world undergo the deficiency of zinc. The deficiency of zinc can cause the loss of weight, the loss of appetite, the long process of wound curing, the abnormality of sense of taste, and the cognitive disorder, anorexia, retardation of growth^{5,6}.

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The role of zinc of saliva in affecting the nutritional status is still unclear, hence, the researchers want to analyze the correlation between zinc saliva and the toddlers' nutritional status (by using W/A index).

Method of the Study

This study was done in Ambulu subdistrict, Jember, East Java-Indonesia, by involving 102 toddlers (3-5 years old) as the sample. The toddlers and their parents were invited to participate this study after obtaining the explanation of the purpose of this study.

The assessment of nutritional status was measured by utilizing W/A index in utilizing weight scales that had been calibrated and the information of birth date that was taken from the school. Afterwards, the result was noted in assessment sheet. Furthermore, the procedure of the analysis of zinc of saliva as follows:

1. The respondents were not allowed to eat or drink anything for 1 hour before taking over the saliva.
2. The respondents were asked to gargle before taking over the saliva in order to abolish the leftover in the mouth.
3. The collecting of toddlers' saliva was done by allowing the toddlers to sit comfortably in upright position with the opened eyes, and their head were slanted front a bit.
4. Five ml of saliva were taken unstimulatedly, start at 08.30 until 10.00, and collected in a bottle, which had been wiped with alcoholic disinfection tissue and had been closed soon. Afterwards, it was sealed by parafilm and labeled by each code.
5. Saliva that have been coded were sent to the RSPTI Unair laboratory, Surabaya-Indonesia by utilizing ice box^{7,8,9}.
6. The measurement of zinc concentration by using AAS (Atomic Absorption Spectrophotometer) methods (AA 6200 model).
7. The result was noted by assessment sheet.

The Pearson correlation test was used to know that there was the correlation between the concentration of zinc saliva and the toddlers' nutritional status (W/A) with $\alpha=0.05$.

Results

The number of samples of this study was 102. Besides, the variable of zinc saliva had minimum value in 0.005, maximum value in 1.985, the average value in 0.410, Std. deviation in 0.386, and the variance in 0.149. Whereas, the variable of the nutritional status (W/A) had minimum value in -1.98, maximum value in 1.19, the average value in -1.029, Std. deviation in 0.847 and the variance in 0.717 (Table 1).

Variable	N	Minimum	Maximum	Average	Std. Deviation	Variance
The Zinc of Saliva	102	0.005	1.985	0.410	0.386	0.149
W/A	102	-1.98	1.19	-1.029	0.847	0.717

Table 1. The Descriptive Result of Zinc Saliva and the Nutritional Status (W/A)

Data were tested statistically by utilizing Spearman correlation test in order to know the correlation between zinc saliva and the toddlers' nutritional status. The result of the analysis showed that $P=0.000$ ($\alpha=0.05$). It meant that there was correlation between zinc saliva and the toddlers' weight (Table 2).

	Nutritional Status (W/A)	
The Zinc of Saliva	$P=0.000$	$r=0.345$

Table 2. The Spearman Correlation Test between Zinc Saliva and the Nutritional Status (W/A)

Discussion

The substance of element in blood had been detected in saliva¹⁰. The analysis of Pearson correlation in Rahmana et al. study showed that there was the strong correlation between the concentration of zinc in serum and in saliva. The significant positive correlation between the concentration of zinc in serum and in saliva showed that saliva could be used with the similar success in order to determine the change of the concentration of zinc element¹¹.

The other research was found that saliva had hundreds of components that could help to detect the systemic disease and to provide the biomarker of health and disease status¹. The saliva itself had become one of the most important and the most effective thing to analyze

zinc status in human. Therefore, it could help to facilitate the identification from the abnormality, including toxic or deficiency of the element¹². Moreover, zinc was one of the trace element, including micronutrient that influenced the human's nutrition⁵.

This study showed that there was a correlation between zinc saliva and the toddlers' weight. Furthermore, it can be related with the fact that zinc saliva is not only as the regulator of appetite but also it can stimulate the production of leptin that is considered as the protein of weight regulator¹³. The level of zinc saliva related with the function of taste buds because zinc in saliva was needed to synthesize the gustin that was needed in forming and maintenance the taste bud. Zinc saliva could influence the sense of taste on the tongue that influenced gustin in mucosa of the tongue, which could increase more the function of taste. Hence, it could increase the toddlers' appetite and weight¹⁴. The zinc was needed for enzymatic gustin function (carbonic anhydrase VI) that was in the gland of parotid saliva. The reducing of the numbers of gustin in saliva related with the decrease or sense of taste and smells disorder, hence, it occurred the reducing of taste perception. This taste perception disorder affected the pattern of food consumption that caused the lower weight^{15,16}. The change of appetite would be affected food intake, including zinc intake in the body that would also decrease. Therefore, it affected toward secretion from the leptin. Leptin was the primary hormone in weight regulation. Besides, leptin brought the information from the body to the brain about the energy that was needed by the body. Hence, it would control the food intake¹⁷.

Furthermore, saliva was used more as the biological medium that was chosen for study that involved the toddlers¹⁸. The examining of saliva provided more advantages than the examining of blood. Besides, the sample was done extremely easy by non-medical person and some samples can be collected to give more information than the sample of single blood. Saliva offered the rise of flexibility, the cost effectiveness, pleasantness, and not to be invasive if it was compared with the blood sample^{1,18}.

This study was appropriate with the study that was done by Alsaadi et al who stated that zinc saliva increased more the overweight toddlers than the normal weight toddlers.

Conclusion

1. Zinc saliva related with the toddlers' weight
2. The correlation between zinc saliva and the weight can be associated with the fact that zinc saliva is not only as the regulator of appetite but also it can stimulate the production of leptin that is considered as the protein of weight regulator.
3. For the next research is needed to evaluate the level of zinc saliva at the larger community and the correlation with the different index from the nutritional status.

Declaration of Interest

The authors report no conflict of interest and the article is not funded or supported by any research grant.

List of Abbreviations

- W/A : Weight/Age
AAS : Atomic Absorption Spectrophotometer
BMI : Body Mass Index
RSPTI : Rumah Sakit Penyakit Tropik dan Infeksi (Hospital of Tropic Diseases and Infection)

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