International Journal of Integrated Medical Research
Volume 11 Issue 01 January-February-March 2024
https://doi.org/10.57181/ijoimr/vol11i01/165
ISSN (Online): 2393-9869, ISSN (Print): 2350-0360

RESEARCH ARTICLE

DESCRIPTION OF SALIVARY VOLUME IN UNDERWEIGHT TODDLERS AGE 3-5 YEARS IN SILO II HEALTH CENTER WORKING AREA, JEMBER REGENCY

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ABSTRACT

Background: The high prevalence of underweight globally there are 45.4 million in underweight toddlers. Underweight is someone whose body weight in relation to their age is below standard. The underweight prevalence in toddlers under five years in Indonesia is 17.8% higher than in toddlers under two years. Based on resource, there are 593 underweight toddlers in Silo II Health Center working area, Jember Regency, until February 2023. Based on the high underweight incidence, if it's still continuing, it will give various impacts on the body and oral cavity's health. If it's analyzed in oral cavity from the saliva side, in underweight there's potential for changes in salivary gland (salivary gland atrophy). This causes salivary glands hypofunction so that saliva production is reduced and salivary volume decreases. The aim of this study is to describe the salivary volume in underweight toddlers aged 3-5 years in Silo II Health Center working area, Jember Regency.

Methods: Unstimulated saliva collection was be held at 9 to 11 a.m. (Western Indonesian Time), using the spitting method, which is collecting saliva in the mouth, with the lips closed, saliva was released every 1 minute, with duration of 5 minutes.

Results: The mean value of salivary volume based on the salivary volume category was found that the most respondents had low salivary volume with mean value of 0.885 ± 0.182 ml. The frequency distribution result of salivary volume based on weight categories showed that the most respondents were underweight with salivary volume in the low category with mean value of 0.921 ml.

Conclusions: Salivary volume of underweight toddlers in Silo II Health Center working area, Jember Regency is lower than the salivary volume of normal toddlers. This possibly occurs due to changes in the salivary glands and impacts salivary glands hypofunction which results in decreasing salivary volume production.

KEYWORDS: Adverse Toddlers, Underweight, Nutritional Status, Salivary Volume, Salivary Flow Rate.

INTRODUCTION

Indonesia is a country that has quite a lot of nutritional problems, especially among children under five.[1] When compared with other ASEAN countries, children under five in Indonesia experience malnutrition at a higher rate. The toddler years are vulnerable to nutritional problems. There are 3 criteria for malnourished children, namely stunting, wasting, and underweight. The prevalence of malnutrition among children under five globally is 149.2 million experiencing stunting, 45.4 million experiencing underweight, and 38.9 million experiencing overweight.[2] The prevalence of underweight in Indonesia is 19.9% and it occupies fourth position in Southeast Asia.[3] Based on the results of monitoring nutritional status in 2017, the

prevalence of underweight in children under five in Indonesia is 17.8% higher than in toddlers under two years old.[4] If this high incidence of underweight is left unchecked, it will have various impacts.

Nutritional problems in children can affect general and oral health. The negative impacts of being underweight on general health include impaired brain development, intelligence, stunted growth, disruption of the body's metabolism, weakening of the immune system, risk of contracting various diseases, such as heart and blood vessel disease, diabetes, stroke, cancer, disability at the old age, even stunting due to chronic malnutrition.[3] The impact of underweight on oral health, some of which lead to saliva. The impact of continuous malnutrition results in decreased salivary gland function and the risk of opportunistic diseases. Other impacts can result in the possibility of a decrease in the production of salivary secretions which results in decreasing salivary flow.[5] A decreased salivary flow rate results in a salivary volume reduction.[6] A decrease in salivary flow rate can cause xerostomia, inflammation of the mucosa, burning mouth, impaired taste, demineralization of teeth, candidiasis, and periodontal disease.[7] A decrease in salivary volume can have various impacts on the health of underweight children, such as pain, an uncomfortable mouth feeling, difficulty swallowing food, which impacts the digestive process, difficulty speaking, and can cause mouth infections which cause decreasing the quality of life.[8]

The toddler years are the golden age or golden period in the development and growth stages of a child.[9] Various studies state that the golden age is an urgent and very effective period for optimizing various intellectual potentials in children so that they become quality human resources.[10] There are several characteristics of toddlers aged 3-5 years. Toddlers aged 3-5 years tend to be more independent than those aged below because toddlers aged 1-3 years are very dependent on their parents in carrying out all their activities.[11] Toddlers aged 3-5 years are also able to communicate (respond) better than toddlers aged under 3 years.[12]

Jember Regency is the area that has the highest cases of underweight toddlers in East Java with a total of 18.664 cases in 2021, with a percentage of 10.7%.[13] One of the sub-districts in Jember which still has a high number of underweight toddlers is Silo District. Due to its geographical location, the majority of residents in Silo District earn their living as coffee plantation farm laborers and this area has not yet been studied much in Jember Regency. A number of residents in the area still have low incomes and this affects their food consumption. Consumption of food intake in this community is still low for energy, fat and carbohydrate intake, while protein intake is high.[14] An inadequate intake of balanced nutritious food has an impact on a person's body, especially on development and growth problems in the community's children, putting them at risk of becoming underweight.[15]

Based on the Silo II Health Center UPTD nutritional reporting records in February 2023, the total number of underweight toddlers was recorded at 593 cases, while underweight toddlers aged 3-5 years were recorded at 268 cases. Cases of underweight toddlers in February 2023 were higher than the previous month.[16] Until now, there is still not much research discussing salivary volume in underweight toddlers. Thus, this research discusses the description of salivary volume in underweight toddlers aged 3-5 years in Silo II Health Center working area, Jember Regency.

MATERIAL AND METHODS

The type of research carried out was descriptive observational research with a cross sectional approach. The research was carried out in Silo II Health Center working area which includes five villages, namely Silo, Karangharjo, Pace, Mulyorejo, and Harjomulyo villages located in Silo District, Jember Regency. The time for conducting the research is July to September 2023.

The population in this study were all underweight toddlers aged 3-5 years in Silo II Health Center working area with a total population of 268. The research subjects are underweight toddlers with the inclusion criteria being underweight toddlers aged 3-5 years in the underweight category (Z -score: -3 SD to <-2 SD) and severely underweight (Z-score: <-3 SD), generally good health, and accompanied by a parent or guardian and has signed informed consent. The exclusion criteria are uncooperative, sick, and stunting. Determining the minimum subjects in this study used the Slovin formula and the sampling technique used is purposive sampling. Based on this formula, a total of 161 subjects are obtained.

The tools and materials needed for this research are measuring cup, stopwatch, name tag, digital weight scale, stationery, recording sheet, handscoon, tissue, and mask.

The procedure in this research is to look for data related to underweight toddlers by conducting a preliminary survey at the Silo II Health Center working area, Jember Regency, then carrying out research permits and ethical clearance from the Faculty of Dentistry, Jember University. Posyandu cadres contacted the subject's guardian and advised them not to eat or drink for about 2 hours before saliva collection. Researchers and the community health center socialized the aims and procedures of the research and provided informed consent to the guardians of the research subjects. The initial examination is carried out by measuring the toddler's weight digital weight scale and measurement results are recorded on a sheet inspection. Height measurements were also taken to be sure the toddler is underweight, not stunted. Collection of unstimulated saliva is carried out at 9-11 a.m. (Western Indoesian Time), using the spitting method, which is collecting saliva in the mouth, with the lips closed, saliva is released every 1 minute, with a duration of 5 minutes. The saliva that has been collected in a measuring cup is labeled with the subject's name. Salivary volume measurements are carried out by observing the amount of saliva in a measuring cup and recorded on the examination sheet in ml units. Once finished, the subject and the subject's parents/guardians are allowed to go home and given gifts.

RESULT

The results of the research data obtained are then analyzed and data presentation using frequency distribution graphic images in the form of bar charts. Respondent data is grouped by age, gender, the category of underweight, salivary volume, and salivary volume based on underweight category.

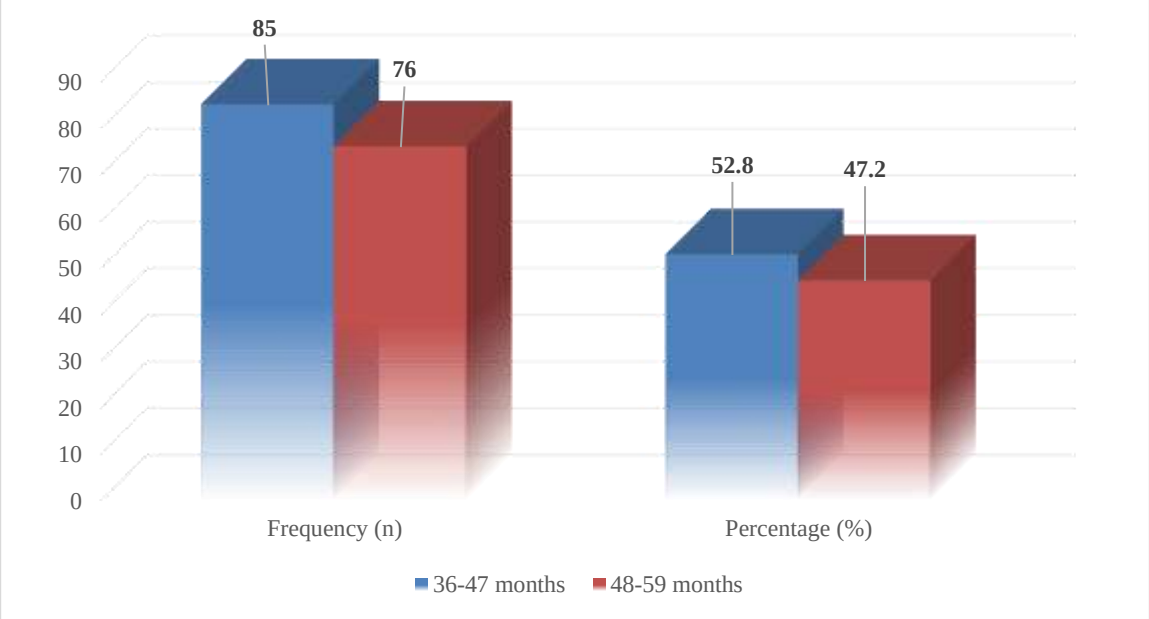

FIGURE 1- Frequency Distribution Based on Age Category of Underweight Toddlers in Silo II Health Centre Working Area, Jember Regency

The results of the frequency distribution based on age in figure 1, it is known that the most subjects found are in the age range of 36-47 months (3 years to 3 years and 11 months).

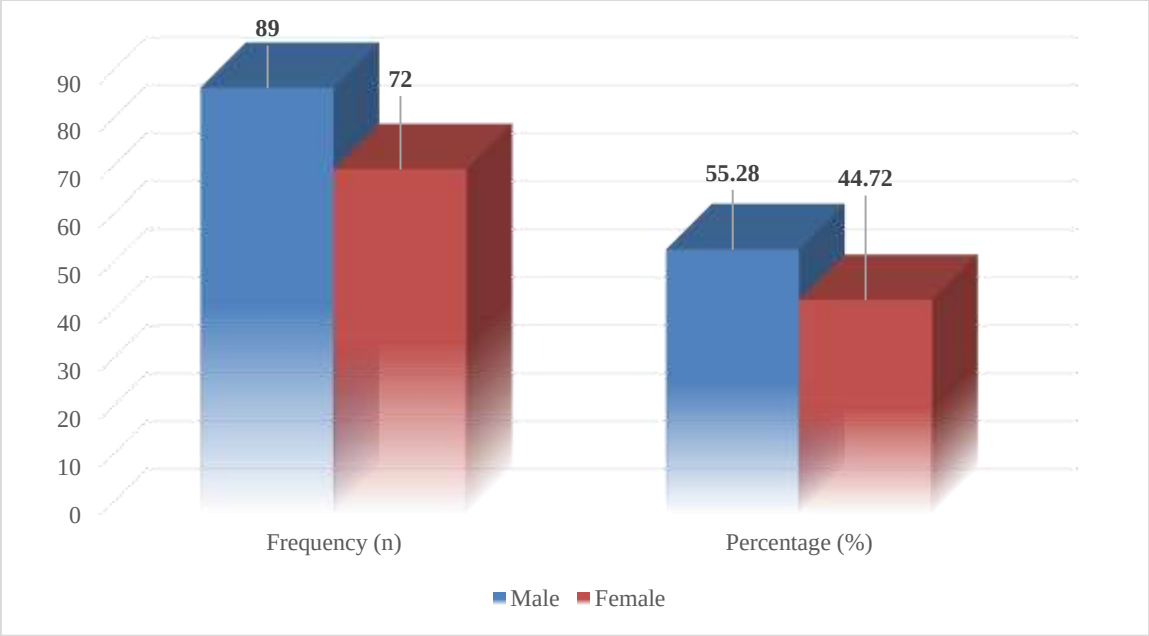

FIGURE 2- Frequency Distribution Based on Gender of Underweight Toddlers in Silo II Health Center Working Area, Jember Regency

Based on the result of the frequency distribution based on gender in the figure 2 above shows that the gender of the most underweight toddler respondents is male.

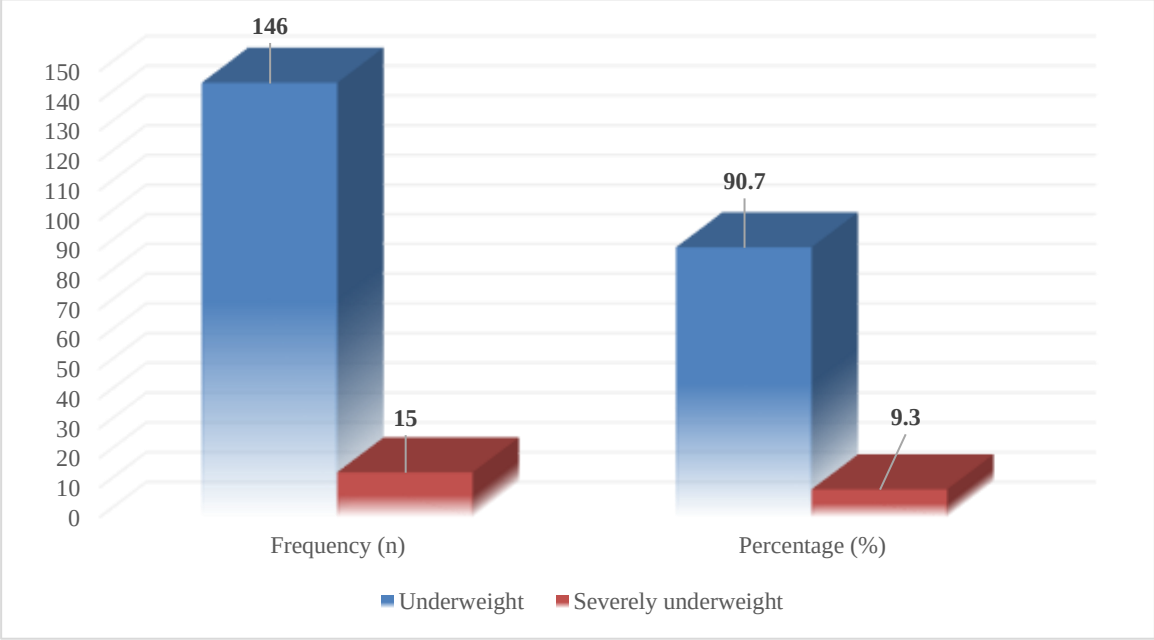

FIGURE 3- Frequency Distribution Based on Category of Underweight Toddlers in Silo II Health Centre Working Area, Jember Regency

Based on the results of the frequency distribution based on the underweight categories above shows that the most subject are included in underweight category.

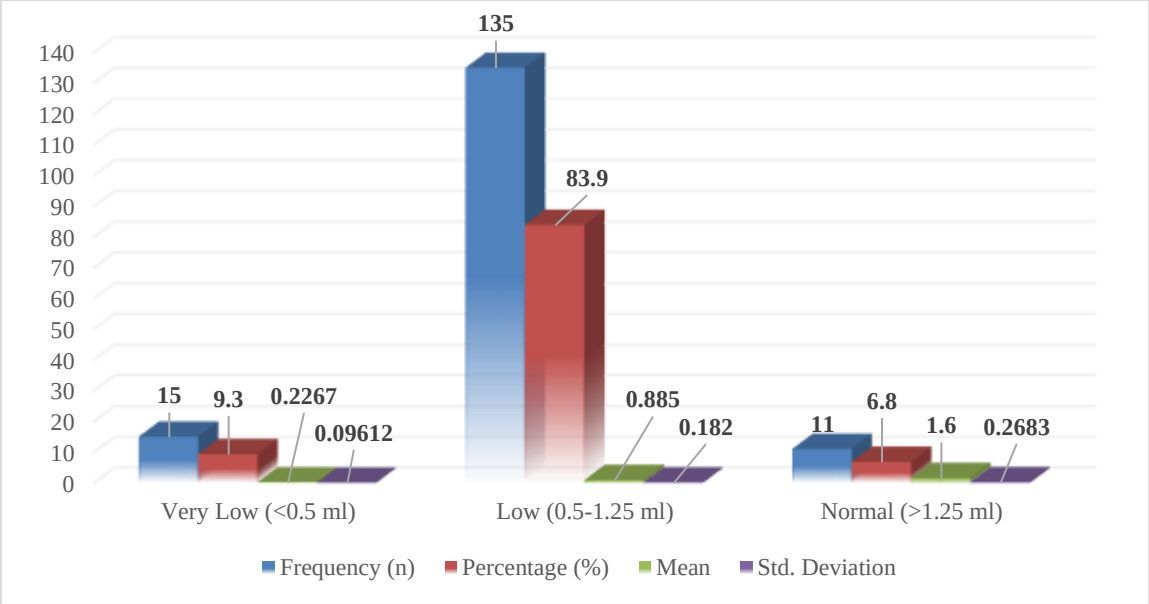

FIGURE 4- Average Value of Saliva Volume Based on Salivary Volume Category for Underweight Toddlers in Silo II Health Center Working Area, Jember Regency

The results obtained shows that the largest number of underweight toddlers in Silo II Health Center working area, Jember Regency have low salivary volume

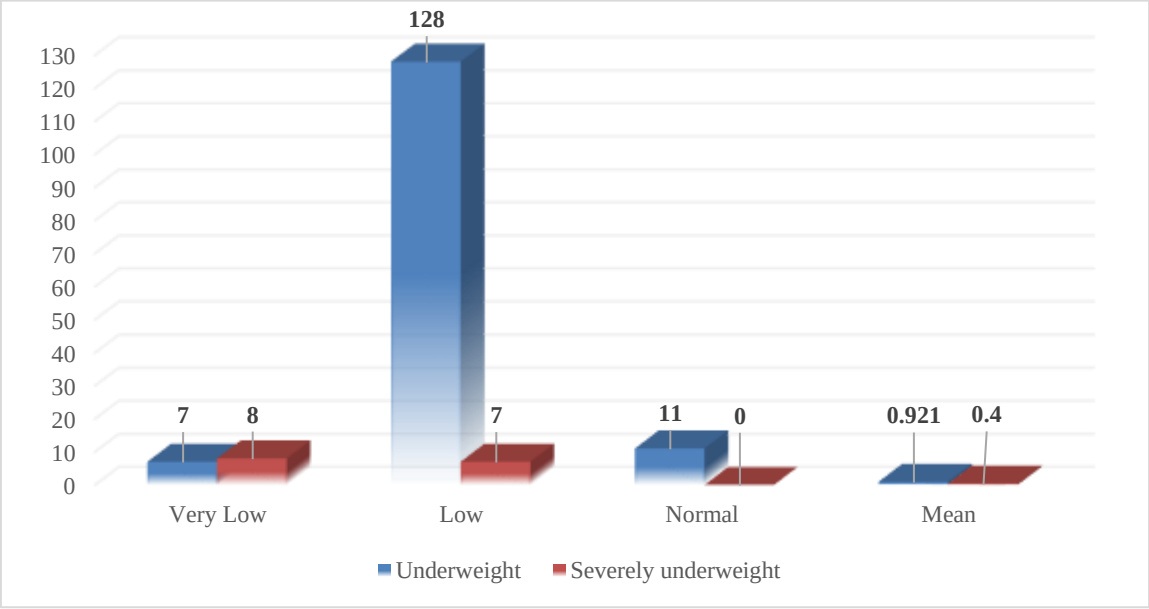

FIGURE 5- Frequency Distribution of Salivary Volume Based on Underweight Category for Underweight Toddlers in Silo II Health Center Working Area, Jember Regency

The figure 5 shows the frequency distribution of salivary volume measurement results based on the underweight category. Based on this figure, it shows that there are 146 underweight toddler subjects with the average salivary volume of 0.921 ml. There are 15 severely underweight subjects with the average saliva volume of 0.4 ml.

DISCUSSION

Based on figure 1, the most subjects are in the age range 36-47 months. This incident is possible at the end of 2019 to mid-2020, there will be an increase in the birth rate so that there tend to be more toddlers aged 36-47 months.

Meanwhile, there are fewer toddlers aged 48-59 months because some of these toddlers have moved to other areas and the majority of toddlers have already entered kindergarten school so they cannot come to the implementation location at 9-11 a.m. (Western Indonesian Time). Yunitasari's research in 2020 also showed that the frequency of underweight was highest at the age of 36-47 months compared to other ages.[17]

Based on figure 2, there are more male subjects. Jember Regency Health Profile Data for 2020 and 2021 recorded that the live birth rate for male toddlers was higher than female children.[18,19] Previous research also found that female toddlers had a lower chance of being underweight. This can be caused by the low calories' intake of female toddlers so that nutritional intake is more fulfilled.[20]

The data in figure 3 shows that the number of underweight toddlers is larger than the number of severely underweight toddlers. Based on conditions in the field, this could occur due to nutrition improvement program that has been carried out by the local health center so that underweight toddlers who were initially recorded as severely underweight experienced changes to underweight when re-examined. This change in body weight may occur because at the time of the examination, the toddler was in optimal condition and body weight also increased by the age. Toddlers with optimal conditions also influence food intake. Food intake that enters the body can affect a child's body weight, this is what can make it possible for the number of underweight toddlers to be greater than severely underweight toddlers.

Body weight is the most sensitive parameter and it is easy to see changes in a short time in a person's condition due to changes in food consumption and health conditions. Body weight describes the current nutritional status and if it is done regularly will provide a good growth.[21]

The salivary flow rate in normal toddlers tends to be lower than that of normal adults. The difference in salivary flow rate in normal adults and normal toddlers can occur due to changes in the development of salivary glands including changes in the growth and maturation of salivary glands which are related to age.[22] The categorization of salivary flow rate without stimulation in toddlers is in the very low category with flow rate less than 0.1 ml/minute, low category with a flow rate of 0.1-0.25 ml/minute, and normal category with a flow rate of more than 0.25 ml/minute.[23]

Figure 4 shows the average value of salivary volume measurements based on salivary volume categories in underweight toddlers in Silo II Health Centre working area, that the majority of underweight toddlers have low salivary volume, while only a few respondents with very low salivary volume. This condition can be caused by the prevalence of severely underweight toddlers, which is only small frequency, so it is directly proportional to the salivary volume in the very low category, which is also small. The severely underweight toddlers have poorer nutritional status, which allows salivary gland hypofunction to occur which tends to be more severe and causes less salivary production. The research results also shows that there are underweight toddlers with normal salivary volume, but the number of subjects is very small. This is possible because in these toddlers there is a change in nutritional status in terms of consuming food intake in a short time which causes weight loss so that it is possible that salivary gland hypofunction has not yet occurred and salivary production still tends to be normal.

The research results presented in figure 4 are in line with previous research which recorded that the salivary flow rate without stimulation in underweight children tends to be lower than that of normal children.[24] The decrease in flow rate is directly proportional to the decrease in salivary volume in underweight children. Research conducted by Siti et al, in 2021 recorded that underweight children had lower salivary volume than normal children. This research also shows that the average salivary pH of underweight children tends to be lower than the salivary pH of normal children.[25] Children who lack nutrition have the potential to experience salivary gland atrophy. This results in the possibility of a decrease in the production of salivary secretion which has an impact on decreasing salivary flow.[5] The decreased salivary flow rate has an effect on reducing the salivary volume.[6]

Previous research on children who were stunted recorded that 67.1% of stunted children had a flow rate below normal.[26] Based on research that has been conducted, it shows that in children who are stunted or underweight there is a decrease in flow rate and salivary buffer capacity. This can occur due to stunting, wasting, or underweight, including expressions of malnutrition.[27] Changes in the function of the salivary glands are influenced by malnutrition, resulting in decreased salivary flow rate and changes in salivary composition.[28]

Figure 5 shows that underweight toddlers in the severely underweight category have salivary volumes that tend to be lower than underweight toddlers. This may occur because the severely underweight toddlers tend to have difficulty eating than underweight toddlers, so chewing activities in the oral cavity rarely occur and can have an impact on the stimulation of the salivary glands which produce salivary volume. Research conducted by Vieira et al, in 2020 shows that there is a relationship between salivary flow rate and nutritional status. The worse the nutritional status, the lower the salivary flow rate tends to be.[5]

Based on theory, protein energy malnutrition is related to salivary gland hypofunction, which can cause salivary flow rate to decrease. Moderate malnutrition (lack of protein and certain micronutrients, such as vitamins, zinc) affects the amount and composition of saliva. Protein energy malnutrition and vitamin A deficiency are associated with atrophy of the salivary glands, which can result in a decrease in the oral cavity's defense capacity against infection and the ability to resist plaque acid.[28]

Children who experience malnutrition can affect the growth of their salivary glands, which can cause the salivary flow rate to decrease.[28] In the early stages, there is a decrease in salivary gland cell proliferation, then changes are followed, such as thinning of the epithelial layer, thinning of the rete-pegs, collagen tissue undergo degenerative changes. A continuous decrease in salivary gland cell proliferation can result in salivary gland atrophy.[29] Malnutrition affects the function of the salivary glands so that the salivary flow rate can decrease. A low salivary flow rate causes a decrease in the salivary buffer capacity so that the saliva becomes concentrated and the salivary pH changes to become acidic. This is because the salivary flow rate affects the bicarbonate component of saliva.[28]

The condition of decreased salivary volume can have various impacts on the health of underweight toddlers. A decrease in salivary volume causes pain, the mouth feels uncomfortable, it is difficult to swallow food which impacts the digestive process, it is difficult to talk, and can cause mouth infections which cause a decrease in quality of life.[8] Reduced salivary volume also causes teeth to become prone to caries because saliva plays a role in self-cleansing. [30] Another impact of decreasing salivary volume is that it can cause dry lips and mouth, dysgeusia, dysphagia, gingivitis, and also halitosis.[5]

CONCLUSION

The conclusion of the research results regarding the description of salivary volume in underweight toddlers aged 3-5 years in Silo II Health Center working area, Jember Regency is the mean value of salivary volume in underweight toddlers' category is 0.921 ml which is included in the low salivary volume category, while the mean value of salivary volume in severely underweight toddlers' category is 0.4 ml which is included in the very low salivary volume category. This possibly occurs due to changes in the salivary glands and impacts salivary glands hypofunction which results in decreasing salivary volume production.

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