

The Effect of Giving Tempeh Nugget and Cork Fish Substance on Weight Gain and Height of School Children in The Sarudik Health Center Area, Central Tapanuli Regency in 2021

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ABSTRACT

Elementary school age children are an age group that has a fairly high activity both in a state of learning and at rest. Optimal growth and development of primary school-age children depends on the provision of nutrients of good quality and quantity, such as providing intake of tempeh and snakehead fish protein to increase children's growth. Without good nutrition, children will definitely experience nutritional problems, one of which is stunting. Stunting (short) is a nutritional status based on height for age with a z-score of less than -2 elementary school. Categorized as very short if the z-score is less than -3 SD. This study aims to determine the effect of nutrition education and supplementary feeding made from tamban fish on increasing weight and TB in school children in the working area of the Sarudik Health Center, this study was carried out in May–November 2021. This study was a quasi-experimental study with a pre-test research design. and posttest. The research sample amounted to 31 people with male sex 19 people and 12 women.

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1. Introduction

Nutritional status is the state of the body as a result of food consumption and use of nutrients, distinguished between poor, less, good and more nutritional status (Akbar et al., 2022). Classically the word nutrition is only associated with body health, such as providing energy, maintaining body tissues, but now the word nutrition has a broader meaning, in addition to health, nutrition is associated with economic potential because nutrition is related to brain development, learning ability, and work productivity. Therefore, in Indonesia, which is a developing and developing country, nutrition is one of the factors that are considered important to spur development, especially those related to the development of quality human resources.\

Child health is the main capital for optimal growth. A child's growth and development that goes well from infancy to school age will make him a human full of potential for life in the future (Anemia et al., 2021). A child's health which includes physical, spiritual and social health, is not only related to illness and weakness, but also relates to physical, intellectual and emotional development (Br et al., 2021).

Optimal growth and development of school-age children depends on the provision of nutrition with good and correct quality and quantity. Without adequate and quality nutrition, children will suffer from malnutrition (malnutrition) which usually experiences various problems, including impaired growth and development, reduced work productivity, reduced concentration and attention to the surrounding environment so that it can reduce learning achievement, as well as endurance. against various diseases is reduced, especially in the oral cavity (Anggraini & Andriani, 2021).

Based on the results of the Basic Health Research, the nutritional condition of children has shown improvement. In the problem of stunting, there was a decrease in prevalence in children under five from 37.21% in 2013 to 30.79% in 2018. Likewise, when compared to the data on the prevalence of stunting in children under five in 2016 (Sirkesnas), which was 33.60 percent. In addition, improvement in nutrition was also reflected in the decrease in underweight in children under five from 19.6% in 2013 to 17.68% in

2018. A decrease in wasting or underweight children from 12.12% in 2013 to 10.19% in 2013. 2018 (Misnawati¹, Muzakar^{2*}, Eddy Susanto³, A. Sadiq⁴, 2021).

The Central Tapanuli Regency Government fully supports the stunting nutritional status prevention action, this is with the issuance of Regent Regulation Number 36 of 2020 concerning Integrated Stunting Management in Central Tapanuli Regency, followed by Regent's Decree Number 1158/BPTT/2020 concerning Determination of 22 Locus Villages for Integrated Stunting Prevention. In 9 sub-districts, and other technical matters that have been carried out by the Tapteng OPD. With the National target for accelerating the decline in Stunting Prevalence in the 2020-2024 National RPJM, it is 14% in 2024.

Based on a preliminary survey conducted at the Sarudik Health Center, it was found that the number of school children who experienced malnutrition and stunting was 23 people out of 271 school children. One of the local food ingredients that is often consumed by the community is tempeh, but people do not know about the abundant nutritional content of tempeh, therefore researchers have taken the initiative to make a variety of food with the basic ingredient of tempeh, namely tempeh nuggets (Akbar et al., 2022). Tempeh nuggets are nuggets made from the basic ingredients of tempeh, tempeh is a food made from fermenting soybean seeds or several other ingredients that use several types of food (Anemia et al., 2021). Tempeh is known as a high source of protein, in the fermentation process, tempeh can retain most of the nutrients contained in soybeans so that tempeh can increase protein digestibility. Various studies have shown that tempeh and consumption of various types of fish can be used as a cheap source of protein for children's food (Chasanah et al., 2018).

Tempeh is a food source of protein, dietary fiber, calcium, B vitamins and iron. Tempeh is made by fermentation or fermentation using *Rhizopus* sp mold on a soybean substrate, so as to form a dense and compact mass. The nutritional content in 100g of soybean tempeh is 55.3g of water; energy 201 kcal; 20.8g protein; fat 8.8g; carbohydrates 13.5g; and 1.4g (Anggraini & Andriani, 2021). Tempeh also has a high protein content and dietary fiber and good digestibility when consumed because the nutritional components are converted into simple compounds that are more easily absorbed by the body by microorganisms during the fermentation process. However, tempeh has limiting amino acids, namely methionine 173mg/100g and cystine 153mg/100g. The substitution of snakehead fish was carried out to increase the limiting amino acid content in the processing of tempeh into nuggets. Central Tapanuli Regency is one of the most suitable places for snakehead fish breeding. This is because most of the land in this area is a swamp area so it is very suitable for the growth of snakehead fish. Snakehead fish is known to contain 553mg/100g of methionine and 187mg/100g of cystine as well as white flesh color so it can improve the color of tempeh nuggets (Phala et al., 2019). The nutritional content of 100g of snakehead fish is 79.7g of water; energy 89 kcal; 18.7g protein; fat 1g; and 0g karbohidrat carbohydrates (Phala et al., 2019).

In Denmark (Aaslyng & Højer, 2021) people who have a great interest in consuming tempeh are young people and female, which is 58% compared to men and only 4.5% are the elderly group, namely 60 years old. Based on the facts above, it can be interpreted that the majority of people in Denmark have basically tried to change their diet from the habit of consuming meat to the behavior of consuming plants derived from plants. In several other countries according to (Vital et al., 2018) also said the food industry is currently being challenged to develop new healthy food products. The new healthy food, Tempe, which comes from Indonesia and is produced by fermenting mushrooms, will be an alternative to healthy food for Brazilians.

2. Research Methods

2.1 Research Design

This type of research is an experimental research design. The research design used is an assessment in the food laboratory of the Matauli Fisheries and Marine College (STPK) by looking at the physical and organoleptic properties and pre-experimenting with a one group pre test - post test design.

2.2 Population and Sample

The total population in this study was 31 people. The sample used in this study is the total available population of 31 respondents.

2.3 Data Collection Techniques and Instrument Development

The tools used in making tempe nuggets are stainless steel knife, baking sheet, miyako blender, telenan, steamer, stove, frying pan, basin, spoon, freezer and plastic. The tools used for analysis are Minolta color reader, mortar and pounder, glassware, desiccator, analytical balance, spatula, tongs, Memmert oven at 100° C, Naberthem ashing furnace, back cooler. Basically, the whole process of making nuggets is done almost the same as the technique that has been done by previous researchers. Snakehead fish meat and

green bean sprouts are purchased at traditional markets, while other ingredients such as wheat flour, salt, pepper, flavoring, chicken eggs, sugar, and garlic (Yuliani et al., 2021).

The ingredients used to make tempe nuggets and analysis include tempeh, snakehead fish, tapioca flour, blue triangle flour, sugar, salt, nutmeg, pepper powder, garlic, eggs, palm oil, bread flour, celery leaves and prey onions, filter paper. The implementation of the research consisted of three stages, namely the first stage of determining the formulation and making of tempeh nuggets. The second stage is organoleptic testing, and the determination of the two best products based on organoleptic tests. The third stage is the analysis of the physical and chemical properties of tempe nuggets from each of the selected formulations.

2.4 Analysis Techniques

Analysis of this research data using:

a. Univariate

Univariate analysis is the analysis used on each variable from the research results. This analysis was used to describe the distribution of nugget tempe with cork fish substance with the nutritional status of school children. The nature of the data is generally divided into two types, namely, categorical data in the form of a nominal scale and numerical data in the form of a ratio and interval scale.

b. Bivariate

Bivariate analysis is an analysis carried out on two variables that are suspected to be related or correlated. The bivariate analysis in this study was to analyze the effect of giving nugget tempeh with the substance of snakehead fish on the nutritional status of school children. To determine the bivariate analysis from the research conducted data analysis first. The researcher conducted a dependent T-test because it did not meet the requirements of the researcher using the alternative test, namely Wilcoxon with a significance of $\alpha = 0.05$.

3. Results and Discussion

Table 1.

Distribution of Children's Average Body Weight Before and After Giving Cork Fish Tempeh Nugget

Weight	N	Minimum	Maksimum	Average value	Standar Deviasi
Before	31	14,30	21,90	17,08	1,81
After	31	14,40	22,40	17,56	1,96

Based on the table above, it is known that the average value of body weight before the intervention was 17.08 kg, with a minimum value of 14.30 kg and a maximum of 22.40 kg. Meanwhile, after the intervention, the average weight value was 17.56 kg with a minimum value of 14.40 kg and a maximum of 21.90 kg. After processing snakehead fish and tempeh into nuggets, it is known that there is an increase in appetite in children and physical growth in children. Physical growth is often used as an indicator to measure the nutritional status of both individuals and groups to determine their nutritional status. Physical growth can be in the form of a child's weight, which is an anthropometric measure used. Body weight can be used to see the rate of physical growth. The results of this study indicate that all children experience weight gain that varies and almost all of them experience an increase in child development according to age.

The results of this study indicate that before receiving the cork fish tempe nugget, the average body weight of students was 17.08 kg, with the lowest weight being 14.30 kg and the highest being 22.40 kg. After receiving the cork fish tempe nugget, the average body weight of the students became 17.56 kg with the lowest weight being 14.40 kg and the highest being 21.90 kg.

Table 2.

Distribution of Children's Average Height Before and After Giving Cork Fish Tempeh Nugget

Wight	N	Minimum	Maksimum	Average value	Standar Deviasi
Before	31	102,70	115,00	107,59	3,26
After	31	104,10	116,20	108,71	3,26

Based on the table above, it is known that the average height before the intervention was 107.59 cm, the minimum value was 102.70 cm and the maximum was 115.00 cm. Meanwhile, after the intervention, the average value of TB became 108.71 cm, the minimum value was 104.10 cm and the maximum was 116.20 cm. At the school growth rate, the average increase in children's height of approximately 7.6 cm a

year is experienced by children aged 1-9 years, and increases by approximately 5.1 cm a year until the beginning of rapid growth in adolescence. The causes of slowed growth are due to malnutrition, among others, due to poverty, congenital diseases, crowded environment, pollution, instant food, and parenting patterns. Several other research results also state that there are differences in growth rates between genders in children aged six years and early growth in adolescents. Boys aged six years are taller than girls. However, at the age of nine, girls are on average the same height as boys, while their weight is slightly higher.

In this study, it showed that there was an effect of supplementary feeding on the increase in height where between the height before and after administration showed a significant difference $p = 0.009$, with the average being 82.8. In another study, it showed that there was an effect of giving additional food (PMT) on the height of children under five by 1.5 cm, the administration was carried out for 3 days.

Table 3.
The Effect of Giving Cork Fish Tempeh Nugget on Weight Gain

Variabel	N	Increase difference (kg)	p-value
Weight before	31	0,48	0,001
Weight after	31		

The results of the study based on statistical tests showed that there was an effect on body weight before and after giving the Cork Fish Tempe nugget with a value of $p=0.001$ ($p<\alpha$). Provision of additional food for cork fish tempe nugget is a side dish made from certain ingredients, as the main ingredient for tempe and cork fish. Based on the results of the analysis of the influence of nutrition education and the provision of additional food made from snakehead fish tempeh as the research sample, a value of ($p = 0.001$) was obtained, which means that the data was stated to be H_0 accepted, which means that there was an effect of giving additional food made from snakehead fish tempe to increase body weight in students who had undernutrition and stunting in the working area of the Sarudik Health Center which was the research.

This research is in line with previous research which states that optimal growth and development of school-age children depends on the provision of good and correct nutrition with good quality and quantity. Without adequate and quality nutrition, the child will suffer from malnutrition (malnutrition) that there is an effect of giving additional food to the giving of cork fish tempe nuggets before and after with an average value of 0.88 kg. The results of this study also say that energy intake is also the main need of every human being, because if energy needs are not met according to the body's needs, then the needs of other nutrients are also not met such as protein, vitamins and minerals including iron, so the results of this study also showed that there was a relationship between supplementary feeding and an increase in infant weight, the value of $\text{sig} = 0.004$ ($p\text{-value} 0.005$). Based on the results of research on changes in body weight of toddlers, it shows that there is a change in body weight before and after giving PMT with an average increase of 1.2 kg.

Based on the reality in the field, it is known that there is a change in the weight of toddlers for one month in the experimental group, there appears to be an average weight increase of 0.1207 body weight. This shows that the dick group also gained weight but not as significantly as the experimental group, where the experimental group achieved a weight gain of 0.1207. Another appropriate study also revealed that there was an effect of giving tofu-tempe on the weight gain of toddlers because tofu and tempeh are traditional Indonesian foods that contain lots of vegetable protein.

Table 4.
The Effect of Giving Cork Fish Tempeh Nugget on Height Before and After

Variabel	Increase difference (cm)	p-value
Height before	0,48	
Height after	1,2	0,0001

The results of the study based on statistical tests showed that there was a significant difference in height before and after nutrition education and giving snakehead fish nuggets with a value of $p=0.0001$ ($p<\alpha$). The results of another study showed that snakehead fish has a high iron content in the formation of hemoglobin in addition to very high iron albumin, which is an essential protein needed. The results of this research can be interpreted that there is an effect of giving additional food to increase in height where between height

before and after administration shows a significant difference $p = 0.009$, with the average being 82.8. The increase in children's height is closely related to similar research which says that the more proportion of snakehead fish added to children, the higher the protein content, this is because snakehead fish meat has a fairly high protein content of 25.2 grams/100 grams. .

Increasing the height growth of healthy, intelligent children is the dream of all parents and is highly dependent on the fulfillment of balanced nutrition. Nutritional disorders in toddlers can cause developmental disorders in children, such as stunting, wasting and mental development disorders. Soy tempe nuggets are processed products in frozen form that are ready to be cooked, based on the results of Novelina's research on Increasing the Added Value of Tempe Products with Product Verification into Nuggets. The nutritional content in tempeh nuggets after going through the processing process does not reduce its nutritional value, it is even more nutritious because it contains high protein and low fat. Protein quality is determined by the type and proportion of amino acids it contains. Complete protein or protein with high biological value or high quality is a protein that contains all types of essential amino acids in appropriate proportions for growth purposes.

The function of protein for the human body is the most important for the formation of cells in the body, and protein will be food for muscles so that they can grow and develop so that if the muscles are fulfilled by protein, the muscles will be well maintained. Protein also helps glucose metabolism in the body, so it can help increase the formation of cells in the body. Other factors that influence the incidence of stunting include maternal knowledge about nutrition, family income, exclusive breastfeeding, genetics, and nutrient intake including lack of macronutrient intake such as energy and protein and micronutrients such as Fe and Zinc.

4. Conclusion

The average weight value of school children before administration was 17.08 kg, and the average weight value after administration was 17.56 kg. The average value of height of school children before administration was 107.59 cm, and the average value of height after administration was 108.71 cm. There is a significant difference in body weight to changes in body weight before and after nutrition education and giving snakehead fish tempe nuggets. There is a significant difference in height to changes in height before and after giving the cork fish tempeh nugget.

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