

Original Article

Tempeh Soybean And Banana Cookies Increasing Weight To Wasting Toddler

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ABSTRACT

Background: Wasting is caused by insufficient nutritional intake or disease in children. This situation results in reduced weight in children so that the child's weight is disproportionate to his height. The impact of wasting on children is a decrease in export power to their environment, increased frequency of crying, less sociability with fellow children, fewer feelings of joy, and a tendency to become apathetic. To overcome the problem of wasting, Indonesia has done various ways, including supplementary feeding. The research aimed to know the effect of giving soybean tempeh cookies and kepok bananas at the Sukarami Health Center in Palembang City on increasing the weight of wasting toddlers.


Methods: This type of research is quasi-experimental, using a one-group pretest-posttest research design. Research sampling using the Lameshow formula as many as 60 samples. Data analysis using t-dependent test and t-independent test


Results: The results showed that the average body weight of the treatment group respondents before the intervention was 9.38 kg, and after the intervention, it was 9.65 kg. The average body weight of the control group before the intervention was 9.95 kg, and after the intervention, it was 10.01 kg. The difference in the average change in body weight of respondents before and after treatment in the treatment group was 0.27kg, and in the control, 0.06 kg. There is an effect of giving soybean tempeh cookies and kepok bananas on increasing the weight of wasting toddlers with a p-value of 0.014.

Conclusion: Providing Supplementary Food can be added seller because children like sales from organic ingredients (fruits and vegetables) for a longer time, so the effect can be more visible in increasing the weight of toddler wasting

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Introduction

In Indonesia, malnutrition in children under five is still a serious problem, including wasting. The results of World Health

Organization research on the prevalence of wasting in Indonesia was 14.8% in 2007. Based on Basic Health Research in 2010, the prevalence of wasting reached 13.3%.



Palembang City Health Office in 2017 stated that of the 39 Puskesmas spread across Palembang City, malnutrition status with the third highest prevalence, one of which was Sukarame Health Center at 5.4 per cent (Palembang, 2017). The results of research by Rotua & Terati (2021) showed that there is a significant relationship between eating parenting ($p\text{-value} = 0.025 < 0.05$), intake of energy ($p\text{-value} = 0.000 < 0.05$), intake of protein ($p\text{-value} = 0.026 < 0.05$), intake lemak ($p\text{-value} = 0.007 < 0.05$), intake carbohydrate ($p\text{-value} = 0.000 < 0.05$) with wasting in the working area of Sukarame Health Center Palembang City (Rotua & Terati, 2021).

Overcoming the problem of wasting in Indonesia has been done by means of supplementary feeding (Providing Supplementary Food). The research entitled "Giving Providing Supplementary Food Bolu Tempeh Flour in the treatment group for 30 days affects increasing body weight and height of malnourished toddlers with values $p\text{-value} 0,003$ (Adriani, dkk 2015)" (Adriani et al., 2015). Famitalia's research (2012) showed that the provision of Providing Supplementary Food Tempe Kurma biscuits was efficient in improving the nutritional status of toddlers in Depok City (Famitalia, 2011). From the data mentioned above, researchers are interested in the Effect of Giving Soybean Tempeh Cookies and Kepok Bananas on Wasting Toddler Weight Increase at the Sukarame Health Center in Palembang City.

Methods

This study was a pseudo-experiment with a pretest and posttest design with the control group. The research was conducted at the Sukarame Health Center in Palembang City, South Sumatra Province, from March to June 2022. The number of samples was 60 people, each 30 people for each group. The inclusion criteria of this study were toddlers aged 06-59 months, had a body weight according to body length or height $< -2SD$ to $< -3SD$ below the median or categorised as underweight, not in a state of ill complications, and mothers of toddlers willing to be respondents during the study.

The data type consists of primary and secondary data. The independent variable in this study was the provision of soybean tempeh cookies and kepok bananas, and the dependent variable was the parenting style (breastfeeding and MP-ASI practices, macronutrient intake, and body weight. The treatment group received soybean tempeh and kapok banana cookies twice a day (10.00 WIB and 16.00 WIB) for 15 consecutive days, while the control group was only given placebo cookies. This study used univariate and bivariate analysis using statistically Paired t-tests and continued with statistically Independent Sample t-tests.

Results

Table 1. Organoleptic Test Results of Soybean Tempeh Cookies and Kepok Bananas

Formula	Colour	Taste	Aroma	Texture
F0	3,6	3,47	3,5	3,47
F1	3,47	3,27	3,5	3,27
F2	3,43	3,7	3,63	3,83
F3	3,63	3,9	3,87	3,73

Based on Table 1, the average value of the highest assessment results on organoleptic tests was soybean tempeh cookies and banana kepok formula 3, with values of 3.63 in the

colour category, 3.9 in the taste category, 3.87 in the aroma category and 3.73 in the texture category, so that F3 became the selected formula and continued with the proximate test.

Table 2. Proximate Test Results of Soybean Tempeh Cookies and Kepok Bananas

Gizi Content	Soy Tempeh Cookies and Pisang Kepok	SNI 01-2973-1992
Energy (Kkal)	482,23	Max 400
Protein (%)	14,4	Max 9
Fat (%)	23,29	Max 9.5
Carbohydrate (%)	53,755	Max 70
Up to air (%)	6,065	Max 5
Up to abu (%)	2,49	Max 1.6

Sumber: PT. Saraswanti Indo Genetech Bogor, 2022

Based on Table 2 of the proximate test, it is known that the carbohydrate content in soybean tempeh cookies and kepok bananas has met the standards determined by SNI 01-2973-1992. Still, the energy content, protein, fat, water content, and ash content of soybean tempeh cookies and kepok bananas do not meet the predetermined standards.

Table 3. Frequency Distribution of Respondents Based on Age Characteristics

Age	n	Minimum Value	Maximum Value	Average	Median	Standard Deviation
Treatment	30	7	60	28,83	28	14,902
Control	30	7	58	26,07	19	15,431

Table 4. Frequency distribution of respondents based on sex characteristics

Gender	Treatment		Control	
	n	%	n	%
Man	19	63,3	17	56,7
Woman	11	36,7	13	43,3
Total	30	100	30	100

Intake of macronutrients (energy, protein, fat and carbohydrates) was obtained from the results of direct interviews of respondents (parents of toddlers) using the 2 x 24-hour recall method conducted before and during administration to the treatment and control groups. The results of the analysis of the frequency distribution of energy, protein, fat and carbohydrate intake in the treatment and control group respondents are seen in Table 5.

Table 5. Frequency Distribution of Intake Before and After Intervention in Treatment and Control Groups

Intake	Treatment		Control	
	Mean Before±SD	Mean Sesudah±SD	Mean Before±SD	Mean Sesudah±SD
Energy	818,56±204,72	967,80±162,71	829,35±195,15	869,33±188,99
Protein	28.07±10.47	36.5±9.99	29.75±9.87	30.98±11.41
Lemak	32.58±14.49	37.64±10.94	35.61±13.35	37.05±12.59



Karbohidrat	103.66±27.15	122.14±23.62	97.23±24.93	104.15±25.72
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Table 6. Differences in Average Body Weight in the Treatment and Control Groups

Examination Results Toddler Weight	Mean Awal ±SD	Final Mean ±SD	Difference	t	p-value
Treatment groups	9.38±2.47	9.65±2.52	0,27	-2,601	0,014
Control group	9.95±2.86	10.01±2.90	0,06	-0,448	0,657

Discussion

Based on Table 3, it can be seen that of the 60 samples that experienced wasting, the average age of toddlers in the treatment group was 28.83 months, and in the control group, it was 26.07 months. This is in line with research conducted by Sujianti and Pranowo (2021), which states that children aged 24-59 months experience more malnutrition than toddlers aged 12-23 months (Sujianti & Pranowo, 2021). According to Diniyyah & Nindya (2017), most toddlers who are at risk of being vulnerable to malnutrition are toddlers who have entered the age of 2 years because, at that age, toddlers have entered the weaning period and apply the same diet as their parents so that food intake is needed to support the growth process of toddlers (Diniyyah & Nindya, 2017). Based on Table 4, it can be seen that the frequency distribution of respondents by sex in the treatment and comparison groups is mostly men, namely the treatment group 63.3% and the comparison group 56.7%.

According to Pramudya & Bardosono (2012), boys are at greater risk of undernutrition because boys tend to be more lazy to eat than girls. In addition, it can be exacerbated by high physical activity in boys compared to girls (Pramudya & Bardosono, 2012). Meanwhile, according to Muslimah et al. (2019), it is reported that there is no influence of sex on changes in nutritional status and weight in toddlers (Muslimah, 2017).

Average Intake Before and After Administration in the Treatment Group and Control Group

Based on Table 5, the average energy intake in the treatment and control groups before the intervention was 818.56 kcal and increased after the intervention to 967.80 kcal. In the control group, the average energy intake before the intervention was 860.84 kcal and experienced a slight increase after the intervention to 879.33 kcal. The increase in energy intake in the treatment group was higher than in the control group. This is because the treatment group was given 100 grams of cookies of soybean tempeh and kepok banana with an energy content of 482.23 kcal. In contrast, the control group was only given a cookie placebo. According to Diniyyah & Nindya (2017), insufficient energy intake can cause energy imbalances, which, if they occur prolonged, can cause nutritional problems such as chronic energy deficiency (SEZ) and have an impact on changes in one's weight (Diniyyah & Nindya, 2017). Low energy intake in toddlers can also have an influence on the process of growth and cognitive development in toddlers to be inhibited (Rahim, 2014).

The average protein intake in the treatment group before the intervention was 28.07 grams and increased after the intervention to 36.5 grams. While in the control group, the average protein intake before the intervention was 31.07 grams and experienced a slight increase after the intervention to 31.32 grams. The increase in protein intake in the treatment group was higher than in the control group. This is

because the treatment group was given 100 grams of *Cookies* soybean tempeh and kepok banana with a protein content of 14.4 grams. In contrast, the control group was only given a *Cookie placebo*. Protein functions for growth and maintenance, the formation of essential bonds of the body, regulating water balance, the formation of antibodies, transporting nutrients and as an energy source where protein contributes energy as much as 4 kcal/gram (Rahim, 2014). One of the factors that cause not increasing protein adequacy is due to inadequate daily intake. Inadequate protein intake can occur due to a lack of the amount of protein source food consumed or due to the low quality of protein sources consumed (Muslimah, 2017).

The average fat intake in the treatment group before the intervention was 32.58 grams, which increased after the intervention to 37.64 grams. While in the control group, the average fat intake before the intervention was 37.37 grams and experienced a slight increase after the intervention to 37.82 grams. The increase in fat intake in the treatment group was higher than in the control group. This is because the treatment group was given 100 grams of *cookies of soybean tempeh and kepok banana with a fat content of 23.29 grams*. In contrast, the control group was only given a *cookie placebo*. Fat is a macronutrient that serves as the largest energy-support substance in the body. Low-fat intake, followed by reduced energy in the body, can cause changes in body mass and tissues and cause impaired absorption of fat-soluble vitamins (Muslimah, 2017).

The average carbohydrate intake in the treatment group before the intervention was 103.66 grams and increased after the intervention to 122.14 grams. While in the control group, the average carbohydrate intake before the intervention was 100.41 grams and experienced a slight increase after the intervention to 104.36 grams. The increase in carbohydrate intake in the

treatment group was higher than in the control group. This is because the treatment group was given 100 grams of *cookies of soybean tempeh and kepok banana with a carbohydrate content of 53.755 grams*. In contrast, the control group was only given a *cookie placebo*. Adequate carbohydrate intake affects overall energy intake because it is based on the recommendation that 60% of energy needs come from carbohydrate sources. If the toddler lacks carbohydrates, it can cause a lack of energy, which results in the toddler's weight decreasing, thus affecting the nutritional status of the toddler (BB / U) and experiencing stunted growth (Puspasari & Andriani, 2017).

The Effect of Soybean Tempeh Cookies and Kepok Bananas on Weight Gain Toddler

Based on Table 6, it is known that in the treatment group, the difference in the average increase in toddler weight was 0.3 kg, while the control group had a difference of 0.14 kg. The results of *t*-dependent statistical tests in the treatment group obtained a *p*-value of 0.014 ($p < 0.05$), so it can be concluded that there is a significant effect on weight gain before and after giving soybean tempeh cookies and kepok bananas in the treatment group. While in the control group of *t*-dependent statistical test results obtained a *p*-value of 0.657 ($p > 0.05$), it can be concluded that there is no significant effect on weight gain before and after giving *placebo cookies*. After the *t*-dependent analysis was carried out in the control group, there was no significant effect; therefore, the *t*-independent test (non-paired *t*-test) was no longer needed.

This study is in line with Gultom's (2013) research, which obtained statistical test results that there was a significant difference between the average body weight before the intervention and after the intervention in the treatment group ($p <$

0.05) given *cookies* substitution of tempeh flour by 100 grams or 42 pieces for 42 days. There was a significant difference in the average increase in body weight in the treatment group and the control group that was not given *cookies* with *p-value* <0,05 (Gultom, 2013). This study is also in line with the research of Sarmana et al. (2021), with the results of the bivariate analysis found that there is an effect of giving tempeh biscuits on weight changes in toddlers with *p-value* 0,0001 ($p < 0,05$) (Sarmana et al., 2021).

Consumption of tempeh flour is one alternative to increase weight in malnourished toddlers. Besides, tempeh has several advantages over soybeans. The advantages of tempeh include a high protein complement, eight essential amino acids, saturated fat and low cholesterol levels, high vitamin B12, easily digested because of its unique cell texture and it contains antibiotics and has an effect on stimulating growth (Sarmana et al., 2021). Tempeh protein is also relatively easy to digest, so it can be used to gain weight, especially in toddlers (Mariyam et al., 2017). Tempeh on *cookies* contains micro and macronutrients that are needed by the body. One of the micronutrients that play an important role in the growth process is zinc, where its role is as a mediator of growth hormone activity. Zinc also acts as a potential mediator of the body's defence against infection and has physiological functions in taste and appetite (Almatsier, 2001). Zinc deficiency in toddlers can result in decreased appetite in a short time, while the long-term impact is that there can be impaired growth and development.

In addition, according to the results of research by Nelista & Fembi (2021), it is stated that there is an effect of providing locally-based recovery supplementary foods, namely sweet potatoes, bananas, and moringa alternating for 30 days on changes in the weight of malnourished toddlers in the

Nanga health centre work area with *p-value* 0,000 ($p < 0,05$) (Nelista & Fembi, 2021).

Bananas contain energy, protein, dietary fibre, carbohydrates, calcium, magnesium, vitamin A, vitamin B6, vitamin C, sodium, potassium, phosphorus, iron, and zinc (Pardosi, 2018). Kepok banana flour acts as a source of energy and carbohydrates (Siagian, 2006). Based on previous research, the addition of 20 g of kepok banana flour to the supplementary food formula for green bean-based KEP children given five times a day for two weeks was proven to increase body weight by 500 g (Fitriyanti & Nurdini, 2017). Based on research that has been done, it was concluded that giving soybean tempeh cookies and kepok bananas to wasting toddlers for 15 days can increase body weight in the treatment group with an increase difference of 0.27 kg.

Conclusion

There is an effect of giving soybean tempeh cookies and kepok bananas as much as 100 grams/day with a nutritional value of 482.23 calories as additional food for 15 days has an impact on increasing the weight of wasting toddlers at the Sukarami Palembang Health Center. Further research is needed to see the increase in weight of wasting toddlers with various menu variations of the same ingredients so as not to be boring for toddlers. Providing Supplementary Food can be added seller because children like sales from organic ingredients (fruits and vegetables) for a longer time, so the effect can be more visible in increasing the weight of toddler *wasting*.

Authors Contributions

The author carries out tasks from data collection, data analysis, and discussions to making manuscripts.

Conflicts of Interest

There is no conflict of interest.

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