



The Effect Of Supplementary Food In The Form Of Moringa Leaf Dry Brownies On The Increasing Weight Of Under-Fives With Underweight Status

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ABSTRACT

Background: In 2020, the percentage of underweight children under five in Indonesia is relatively high, which is 6.7% or a total of 779,139 children under five. Wonokerto Village is the village with the highest number of underweight children under five in Turi District. This shows that the problem of under-five malnutrition is still high both in Indonesia and in the regions, even though toddlers are a golden age where the growth process occurs very rapidly and cannot be repeated. Therefore, malnutrition in toddlers needs to be addressed immediately so that growth disorders do not occur. One alternative treatment is with dry brownies of Moringa leaves.

Methods: This study used Pre Experimental designs, One Group Pretest and Posttest with a sample of 34 underweight toddlers who were intervened for 21 days and analyzed their weight gain using the Paired T-Test.

Results: The results showed that there was an increase in underfive weight between before and after being given moringa leaf brownies with a p value of $0.000 < 0.05$. The standard deviation before being given additional food in the form of dried moringa leaf brownies was 1.56303 while after being given additional food in the form of dried moringa leaf brownies the standard deviation was 1.56398.

Conclusion: The conclusion is there is an effect of providing additional food in the form of dry brownies of Moringa leaves on increasing body weight in underfives with underweight status.

Keyword : *additional food; dry brownies; Moringa leaves; underweight toddlers*

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Background. Toddlers are children between the ages of 0-5 years and this period is vital in the growth process of an individual because growth at this age is a determinant of the success of children's growth in the following period (Heryani, 2019).. At this age, it is a period of growth and development that takes place quickly and cannot be repeated, therefore it is often called the golden age (Heryani, 2019).

Underweight children need serious attention. The reason is, underweight that is not treated is at risk of experiencing various health problems and growth disorders, such as decreased immunity, susceptibility to disease, delayed physical and cognitive development, loss of a toddler's healthy life span, and the consequences that can occur can be more serious, namely disability. to

rising morbidity rates as well as accelerated death (Kurnia Rahim, 2014).

According to the Indonesian Ministry of Health (2020) the 2020 Indonesia Health Profile, states that the percentage of toddlers with underweight status is 6.7%, namely 779,139 toddlers. Meanwhile, according to the Sleman Health Office (2020), Toddlers with underweight status based on body weight per age in Sleman Regency experienced an increase of 0.34% compared to the previous year, from 7.32% to 7.66%. Coupled with the results of a preliminary study at the Turi Health Center which showed that there were 118 children under five who were underweight per age, with the village with the highest malnutrition rate in Wonokerto Village. This problem shows the problem of malnutrition

status which is still high, both in the regions and in Indonesia.

According to Pudiastuti & Dewi (2011), the causes of malnutrition status include wrong diet, children often sick, lack of attention, disease infections, lack of nutritional intake, and poverty. The Regulation of the Minister of Health of the Republic of Indonesia of 2014 also states that the quality and amount of food and drink consumed can determine a person's health status. Children's growth is greatly influenced by optimal nutrition. Optimal nutrition will be able to realize a normal and healthy toddler weight so that they are not easily infected with the disease and avoid chronic diseases and premature death.

Therefore, in the context of alleviating the problem of malnutrition in toddlers, one way that can be done is by holding Supplementary Feeding (PMT) which is intended as an addition, not to replace staple foods. This is supported by research conducted by Iskandar in 2017 entitled Effects of Modified Supplementary Feeding on the Nutritional Status of Toddlers in the Aceh Besar District with $p = 0.007$ found a significant effect of supplementary feeding on changes in body weight and changes in nutritional status, there change in average nutritional status of toddlers from $-2,712$ SD to $-2,493$ SD (Iskandar, 2017)

One of the variations of additional food is dry brownies. Dry brownies are one of the types of family cakes that have a brown color and don't expand, this cake has a moist inner texture, and the outside of the brownies has a dry texture, because of the sweet taste and distinctive chocolate aroma, this cake is a favorite for children (Mulyati, 2015). In line with the report from the Secretariat General of Agriculture (2015) which shows that in Indonesia the average consumption of pastries (including dry brownies) in 2011-2015 was quite high, so the development of average consumption of around 24.22% tended to be high compared to the average consumption of wet cakes which has a consumption growth of only around 17.78%.

So that dry brownies have a higher calorie and protein content, dry brownies are added as the main ingredient, namely Moringa leaf extract because as is well known to the public, Moringa leaves are one of the hedge plants in Indonesia which is known as a food ingredient that contains high nutrition, making Moringa has various functional properties in the health sector and overcoming nutritional deficiencies. Because Moringa is often referred to as the Miracle Tree and Mother's Best Friend (Kumar & Pandey, 2013).

That Moringa leaves are called a superfood, because the nutritional value contained in them is very high, both in terms of levels, and types of variations in nutritional content, when compared to other food ingredients, Moringa leaves also known as functional food ingredients (Ratna Budiani et al, 2020). The various benefits of Moringa leave for human health have been widely proven in scientific studies by health experts and researchers at research centers and universities. Supported research conducted by Tekle et al. (2015) entitled Nutritional Profile of Moringa stenopetala Species Samples Collected from Different Places in Ethiopia showed that the protein content in Moringa leaves alone is 9 times more than yogurt. 100 grams of Moringa leaves itself contains 307.30 kcal, contains 28.44% protein, 57.01% carbohydrates, and 2.74% fat

This is supported by research conducted by Irwan (2020) with the title Giving Cookies Leaf Flour and Moringa Seeds to the Weight and Nutritional Status of Toddlers in the Working Area of the Tampa Padang Health Center which shows that there is a change in body weight between before and after giving Moringa seed cookies and Moringa leaf cookies. Nutritional status before and after the intervention of Moringa seed cookies and Moringa leaf cookies also changed.

Based on these problems and also considering the excellent potential of Moringa leaves and the high nutritional value of Moringa leaves, the authors are interested in making brownies made from Moringa leaves

and given to underweight toddlers and pre-test and post-test in the form of measuring body weight before and after giving additional food to determine the effect of giving additional food in the form of brownies dried moringa leaves on weight gain in toddlers with underweight status.

Methods. This study used a pre-experimental design with a pretest and posttest research design without a one Group Pretest and Posttest control group. The population in this study were toddlers aged 12-59 months with underweight status in Wonokerto Village. Inclusion Criteria are toddlers who want to regularly consume brownies dried moringa, Toddlers are in good health. Whereas exclusive criteria is do not want to be a respondent. The intervention was carried out by giving brownies dried moringa leaves as much 100 gram are consumed 3 times a day or once every 8 hours for 1 month.

Result and Discussion. The results of the study are related to the increase in body weight in toddlers with underweight status who have been given additional food interventions in the form of dried moringa leaf brownies in Wonokerto Village, Turi District, Sleman Regency. The respondents in this study was 34 respondents.

Toddler weight before and after giving Moringa dry brownies

Table 1. Weight gain before and after the intervention

		Previous Weight	Weight After
N	Valid	34	34
	Missing	0	0
Mean		10.5841	10.7950
Std. Deviation		1.56303	1.56398

Table 1 shows that the average body weight before being given additional food in the form of dried moringa leaf brownies was 10.5841 kg and the average body weight after being given additional food in the form of dried moringa leaf brownies for 21 days was 10.7950 kg. So it can be seen that the

average weight gain of toddlers who are given additional food in the form of dried moringa leaf brownies is 0.2109 kg. Then the standard deviation before being given additional food in the form of dried moringa leaf brownies was 1.56303 while after being given additional food in the form of dried moringa leaf brownies the standard deviation was 1.56398.

The toddler period is a period of rapid growth so the intake of the necessary nutrients must be high. Starting from the time toddlers are weaned passive immunity and rapid growth in toddlers will start to fade until the age of 5, which is a vulnerable period in the life cycle. If special attention is not given, the child has the potential to experience nutritional problems. Therefore, children need to get the right parenting style, especially in terms of their nutritional needs. (Blondo et al., 2016)

The way to overcome this lack of nutrient intake is to provide nutrient-dense foods for children under five. Importance Based on the nutritional consumption standards of children who are growing rapidly, recommendations for the amount of energy and nutrients are needed. (Fikawati et al., 2017). Children aged 1-3 years need the energy of 1,350 Kcal while the energy needed for children aged 4-6 years is 1,400 Kcal (Regulation of the Minister of Health of the Republic of Indonesia, 2019)

According to Ariani (2017), one of the efforts that can be made to alleviate the problem of undernutrition in Indonesia is by improving diverse consumption patterns and balanced nutritional quality, one of the ways is through direct intervention in providing supplementary food (PMT) to the target.

According to Gandy et al. (2014), there is strong evidence showing that nutrition assistance can increase protein and energy intake, improve body weight and reduce weight loss, in addition to helping access food to get appropriate food, providing additional food (PMT) to cover deficiencies if someone does not get enough food.

One variation of additional food is dry brownies. Brownies are a type of dense

chocolate cake which was originally a failed and hard dough. However, in its development, there were many brownies with various creations and flavors which turned out to be popular with cake lovers (Ismayani, 2013). For the dry brownies to have a higher calorie and protein content, the main ingredient is added to the dry brownies, namely moringa leaf extract because as is well known to the public, Moringa leaves are the part that has ingredients with many benefits. (Kurniasih, 2018).

In line the research conducted by (Simbolon, 2019) concerning the Effect of Giving Cookies With the Addition of Moringa Leaf Flour (*Moringa oleifera*) on the Increase in Weight for Toddlers which was carried out in Kubah Sentang Village for 21 days showed the result that there was an increase in body weight in toddlers between before and after the intervention of giving cookies with the addition of moringa leaf flour, that is, the average toddler's weight increased by 95 grams. The average body weight before the intervention was 9.865 kg to 9.960 kg.

The effect of giving additional food in the form of dried moringa leaves brownies on the increase in body weight of toddlers with underweight nutritional status

Table 2. Statistical Test with Paired T Test

Weight Gain	Mean	P value
Weight Before - Body Weight After the intervention was carried out by giving additional food in the form of dried moringa leaf brownies	-.21088	.000

Based on table 4.2, the results show that giving additional food in the form of brownies and dried moringa leaves for 21 days could provide a significant increase in the weight of underweight toddlers. Supported by the results of statistical tests using the Paired T-Test of ($p = 0.000$) then H_a is accepted, which means that there is an effect of giving additional food in the form of dried moringa

leaf brownies on the increase in body weight of toddlers with underweight status.

Respondents in this study were toddlers aged 1-5 years with underweight status in Wonokerto Village, Turi District. Each respondent was given 6 pieces of dried moringa leaf brownies per day with a total weight of 100 grams which contained 476.07 Kcal of calories.

Supplementary feeding is a strategy in intervention for underweight children whose goal is to improve nutritional status so that the child's nutritional needs are met and nutritional status and good nutritional conditions are achieved according to the child's age. The type of supplementary food is a specially formulated food that is modified so that nutritional intake can be fulfilled according to needs, modified so that nutritional intake can be fulfilled according to protein and micronutrient needs, safe, clean, not too spicy and salty, and easily consumed by children (Wahyuningsih & Devi, 2017)

Giving PMT is made to address the direct cause of malnutrition. Provision of additional food which has the aim of overcoming the nutritional state of children in nutritionally vulnerable groups who suffer from malnutrition and is given with the criteria of children under five who are not sick when given PMT. The PMT program is carried out as an intervention aimed at maintaining and improving nutritional status (Kemenkes RI, 2017).

According to Ratna Budiani et al. (2020), Moringa leaves or what is often called a superfood, because the nutritional content is very high both in terms of levels, as well as from the variety of types of nutritional content. When compared to other food ingredients, Moringa leaves are often considered a functional food ingredient. Many studies from health experts and researchers at research centers and universities state that Moringa leaves contain various health benefits.

According to Kurniasih (2018) when the nutritional content of Moringa leaves is compared with several other nutritional sources, the amount is many times that of

other sources used for nutritional sources, such as Every 100 grams of fresh Moringa leaves containing 13.4 grams of carbohydrates. Moringa also contains about 73% oleic acid (omega 9). Bankan, the word "Oleifera" itself in the Latin name Moringa (*Moringa oleifera*), is the meaning of the Latin term which means containing oil. Moringa also contains 44.57% α -Linolenic acid (omega-3), and dried Moringa leaves contain 10 times more omega-3 found in salmon.

According to the Table of Nutritional Content of Moringa Leaves in Hakim Bey, all things Moringa, 2010 in Krisnadi, 2015 shows that 100 grams of Moringa leaf powder contain 205.0 calories of calories, 27.1 grams of protein, 2.3 grams of fat, and 38.2 grams of carbohydrates. So it can be seen that the content of macronutrients contained in Moringa leaves is high.

The results of this study are in line with research conducted by (Monawinda Pardosi, 2018) regarding the Effect of Giving Cookies with the Addition of Moringa Leaf Flour on Weight Gain in Malnourished Children 12-59 Months in the Working Area of the Petumbukan Health Center for 21 days showing the result that there was an increase in body weight in underweight toddlers between before and after the intervention giving cookies with the addition of moringa leaf flour, that is, the average toddler weight before and after the intervention increased by 0.31 kg. The average body weight before the intervention was 10.40 kg to 10.56 kg after the intervention of giving cookies with the addition of Moringa leaf flour. From the results of the Dependent T-Test analysis, it shows that the p-value is $0.001 < 0.05$ so it can be concluded that there is an effect of giving cookies with the addition of Moringa leaf flour on the weight of underweight toddlers.

This research is also in line with research conducted by (Widya Martha, 2021) entitled The Effect of Giving Moringa Leaf Sticks on Increasing Toddler Weight which was carried out in Bejiharjo Village, Karangmojo, Gunungkidul for 14 days which shows the

average toddler weight before being given food additional moringa leaf sticks is 11.25 kg. While the average weight of toddlers after being given Moringa leaf sticks is 11.39 kg. So it can be seen that the average difference in weight gain before and after giving Moringa leaf sticks is 0.14 kg. Supported by the results of statistical tests which show that the p-value is 0.000, it can be concluded that there is an effect of giving Moringa leaf sticks on toddlers' weight.

This research is also supported by research (Juhartini, 2015) entitled The Effect of Supplementary Feeding of Biscuits and Moringa Mixed Food Ingredients on Body Weight and Height in Malnourished Toddlers which was carried out in the Working Area of the Kalumpang Health Center, Ternate City for 30 days showing no effect energy and protein intake on weight and height after giving PMT biscuits. Energy intake in the group that received PMT biscuits did not affect weight ($p=0.139$) and TB ($p=0.368$). Protein intake in the group that received PMT biscuits also did not affect weight ($p=0.126$) and TB ($p=0.286$), whereas in the group that received PMT moringa BMC there was an effect of energy and protein intake on weight and height after administration of PMT moringa BMC. Energy intake in the group that received PMT BMC Moringa affected body weight ($p=0.003$) and TB ($p=0.007$). Protein intake in the group receiving PMT BMC moringa also affected weight ($p=0.028$) and TB ($p=0.049$). And it can be concluded that giving PMT biscuits for 30 days had no effect on weight and TB in underweight toddlers while giving PMT BMC Moringa affected weight and TB in toddlers with underweight status.

Another study by (Irwan et al., 2020) with title Giving Cookies Leaf Flour and Moringa Seeds to Weight and Nutritional Status of Toddlers which was carried out in the Working Area of the Tampa Padang Health Center for 90 days showed the result that there was a change in body weight before and after administration Moringa seed cookies and Moringa leaf cookies. Likewise, the nutritional

status before and after giving Moringa seed cookies and Moringa leaf cookies changed. Giving cookies from Moringa leaves and seeds can significantly increase the body weight and nutritional status of toddlers. The limitation of this research is the simple research design.

Conclusion and Suggestions. Based on the results that have been obtained from research conducted regarding the effect of giving additional food in the form of dry brownies of Moringa leaves on weight gain in toddlers with underweight status in Wonokerto Village, Turi District, Sleman Regency, it can be concluded that the average weight of underweight toddlers before giving additional food in the form of dried moringa leaf brownies was 10.5841 kg, while the average weight of underweight toddlers after giving additional food in the form of dried moringa leaf brownies for 21 days was 10.7950 kg. The average difference in body weight before and after the intervention of giving additional food in the form of dried moringa leaf brownies for 21 days was 0.2109 kg. The results showed that there was an increase in underfive weight between before and after being given moringa leaf brownies with a p value of $0.000 < 0.05$. The conclusion is there is an effect of providing additional food in the form of dry brownies of Moringa leaves on increasing body weight in underfives with poor nutritional status. Dried brownies of Moringa leaves can be used as an alternative to additional food for toddlers. Community health centers can apply the results of this study as a consideration in programs for handling malnutrition in toddlers either by providing additional food in the form of dried moringa leaf brownies directly or through counseling about the benefits of dried moringa leaf brownies and how to make them. only pre experimental design, Furthermore It need further research with control to give evidence effect of moringa to increase body weight in children under five with under weight status

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