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The Effect of Supplementary Food in the Form of Moringa Leaf Dry Brownies on the Increasing Weight of Under-Fives with Underweight Status in Wonokerto Village Turi Sleman

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A B S T R A C T

In 2020, the percentage of underweight children under-five in Indonesia is high, which is 6.7% or a total of 779,139 children under-five. This shows that the problem of under-five malnutrition is still high both in Indonesia and the regions. This study aims to determine the effect of providing additional food in the form of dry brownies of moringa leaves on the increase in body weight of toddlers with poor nutritional status. This study used Pre-Experimental designs, One Group Pretest and Posttest with a sample of 34 underweight toddlers were intervened for 21 days. The results showed that there was an increase under-five 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 under-fives with underweight status.

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INTRODUCTION

According to Primadi (2021) states that the percentage of toddlers with underweight status is 6.7%, namely 779,139 toddlers. Meanwhile, according to the Hastaryo (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, namely 41 toddlers. This problem shows the problem of malnutrition status which is still high, both in the regions and in Indonesia.

According to Pudiastuti (2011), the causes of malnutrition status include wrong diet, children often sick, lack of attention, disease infections, lack of nutritional intake, and poverty. Peraturan Menteri Kesehatan Republik Indonesia Tahun 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 (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 Suwandi (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).

Budiani et al. (2020) said that Moringa is also known as a functional food ingredient. The benefits of Moringa leaves for human health have been widely confirmed in scientific studies by health professionals and researchers from research centers and universities. According to the book Companion of Solid Nutrition for Breastfeeding, they also stated that Moringa leaves are called a superfood because the nutritional value contain is very high, both in terms of levels and variations in nutritional value, compared with. Among other food ingredients, Moringa leaves are also known as functional food ingredients. The various benefits of Moringa leaves for human health have been widely confirmed in scientific studies by health professionals and researchers from research centers and universities. Tekle et al. (2015) supports research by entitled Nutritional Profile of Moringa stenopetala Species Samples collected from various places in Ethiopia showed that the protein content of Moringa leaves alone is nine times higher than yogurt. Only 100 grams of Moringa leaves contain 307.30 kcal and contain 28.44% protein, 57.01% carbohydrates and 2.74% fat.

This is supported by Irwan et al. (2020) with the title Administration of Moringa Leaf Flour and Moringa Seeds on Weight and Nutritional Status of Toddlers showing changes in body weight before and after giving Moringa Seed Cakes and Moringa leaves Nutritional status also underweight changes before and after the biscuit intervention Moringa seeds and Moringa leaf biscuits.

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.

LITERATURE REVIEW

Toddlers are defined as children between the ages of 0-5 years. A vital period in the process of human growth and development is during infancy. Growth at that age is a determinant of the success of children's growth in the next period. During this period growth occurs so rapidly that it cannot be repeated, therefore it is often called the *golden age* or golden age and during this period it is very important to carry out stimulation in its entirety starting from health, nutrition, parenting to education. The effects of increased activity and selection or refusal of food, at this age toddler's weight tends to decrease (Heryani, 2019)

In infancy has a characteristic with very rapid growth. Followed by various kinds of transformations that require high-quality nutrition as well as an increased amount from before, so that the impact that can be caused if toddlers have a lack of the food they need is that toddlers easily suffer from nutritional disorders because they are included in the nutritionally vulnerable

group. One of the nutritional problems that Indonesia has to face today is undernutrition.

Growth is an increase in the physical size and structure of the body either partially or as a whole, which is caused by a multiplication process or an increase in the number of body cells also caused by an increase in cell size, such as an increase in body weight, height and head circumference. Growth is measured in units of weight (grams, kilograms), units of length (cm, m) or what is commonly called quantitative (Suparmi et al., 2018)

Growth is an increase in the size and number of intercellular tissue cells, which means an increase in the physical size and structure of the body in the sense of part or all. Growth has distinctive characteristics, namely changes in size, changes in proportion, loss of old characteristics, and emergence of new characteristics. The uniqueness of growth is that it has a varying speed in each age group and each organ also has a varied growth pattern. (Sunarsih, 2018) . Growth can be influenced by many interrelated factors. These factors include:

1) Hereditary factors such as sex and race, these are factors that cannot be changed.
2) Environmental factors that can affect toddler growth include:
   a) Culture in a place can affect behavior, patterns of habits and beliefs regarding child care.
   b) Nutrition, need to be considered in terms of quantity and quality. The quality of food is adjusted to the needs of the body such as protein, carbohydrates, fats, minerals and vitamins. Nutritional needs of children depend on sex, growth rate and age and activity patterns. The result of poor nutrition can be seen, namely the child's growth will be slow. Lack of nutrition can be due to the nutrients that enter the body of poor quality and quantity, a lot of physical activity, and physical illness that causes a decrease in appetite or impaired intestinal absorption and emotional conditions that can cause a decrease in appetite.
3) Deviations from a healthy state, this condition can be due to illness or an accident that can interfere with the child's growth rate.
4) Exercise will increase circulation, physiological activity and stimulate the development of muscles.
5) The order of children in the family can influence the attitude and treatment of parents towards each child. The first child in the family at birth tends to be the center of attention of all family members, so that all their physical and social needs are met. Then at the birth of subsequent children this situation began to decrease.
6) Internal Environment
   a) Intelligence

      Intelligence has to do with several stages of physical growth. In general, children who have a high level of intelligence will also be physically better and their growth tends to be better than children with less intelligence.

b) Hormone

There are 3 types of hormones that can affect growth including the hormone somatotropin (STH) which affects the growth of the number of bone cells, stimulates the skeleton, deficiency of this hormone can lead to "gigantism". Thyroid hormones that affect the growth and development of bones, as well as hormones that stimulate the gonads (sex hormones).

c) Emotion

In line with increasing age of the child, the nutritional needs will also increase. If the emotional and social needs of the child are not met, the child's needs will increase. This is often not realized by parents, so it can cause percotic symptoms.

By knowing the child's weight, we can get tissue mass, including the child's body fluids. The indicator of body weight for age (BB/U) is measured by paying attention to changes in body weight at the time the measurement is taken, which in use gives an overview of the current condition. Observation of body weight needs to be measured consistently and regularly, so that the health condition of toddlers can be seen as a whole. The weight variable is often used because it only requires one measurement. However, the weight variable can provide accurate results if we get the right data regarding the age of the toddler. (Paramashanti, 2019) .

The weight-for-age index gives an idea of relative weight compared to a child's age, and is used as an assessment for children who are underweight or severely underweight. Children with low body weight per age have the potential to experience growth problems (Peraturan Menteri Kesehatan Republik Indonesia, 2020)

According to (Ariani, 2017) the notion of nutrition is the processing of food consumed by individuals through the processes of breakdown, absorption, transfer, storage, metabolism and excretion of unused waste substances in order to sustain life, to grow and so that organs can function properly, and can produce energy.

Toddlers have fast body growth, so they need high nutrition per kilogram of body weight. But the reality that often occurs under five is precisely the period that often suffers from malnutrition. When a child is one year old and over, the child's food menu needs to be varied to prevent boredom in children. You also need to get milk, cereals (such as rice porridge, bread), meat, soup, vegetables and fruits. Solid food can also be given so that children who already have teeth can learn to chew (Heryani, 2019)

Children aged 1-3 years need 1,350 Kcal of energy, while the energy needed for children aged 4-6 years is 1,400 Kcal (Peraturan Menteri Kesehatan Republik Indonesia, 2019). According to Fikawati et al. (2017) protein in children functions to maintain body tissues, transform body components, and function for regeneration. At the age of one year the level of protein in the body increases from 14.6% to 18-19% at the age of 4 years. Children aged 1-3 years

need 20 grams of protein, then increase to 25 grams when children reach the age of 4-6 years (Peraturan Menteri Kesehatan Republik Indonesia, 2019)

According to (Fikawati et al., 2017) the primary benefit of carbohydrates is that they provide the main source of energy for the body in the form of energy. 4 kilo calories (Cal) are provided from 1 gram of carbohydrates Carbohydrates are stored in the form of glycogen which functions as an energy reserve in the body and is stored in the liver and muscles. The need for carbohydrates for children aged 1-3 years is 215 grams and their needs increase to 220 grams for children aged 4-6 years (Peraturan Menteri Kesehatan Republik Indonesia, 2019). According to Fikawati et al. (2017) fat provides 40-50% of the energy consumed by infants. Fat provides about 60% of the energy the body needs when the body is resting and when the body is doing moderately intense exercise . The total fat requirement for children aged 1-3 years is 45 grams, then the need increases to 50 grams for children aged 4-6 years (Peraturan Menteri Kesehatan Republik Indonesia, 2019).

Nutritional status is the condition of the body which is the result of food consumption as well as utilization of nutrients. Nutritional status is classified into poor nutritional status, less, good and more. Good nutritional status is a health status that is balanced between income and needs. One of the parameters of nutritional status can be done by using anthropometric measurements (Ariani, 2017) .

Based on (Peraturan Menteri Kesehatan Republik Indonesia, 2020) Regarding the Anthropometric Standards for Children, a child is categorized as underweight if his weight (BB/U) is below -2SD. Malnourishment or undernutrition (often referred to as malnutrition) results from inadequate intake of energy and macronutrients. In some people malnutrition is also associated with real or subclinical micronutrient deficiencies (Gandy et al., 2014)

According to Fikawati et al. (2017) underweight or malnutrition is caused by an unbalanced comparison of the quantity of energy fulfillment with the energy expended. Insufficient energy intake, consumption of essential nutrients, which the body needs, will often result in decreased activity. Those who are underweight are generally more susceptible to suffering from infectious diseases.

Table 1. Categories and Thresholds of Children's Nutritional Status

Index	**Category Nutritional Status**	**Threshold (Z-Scores)**
Weight for Age **(BB/U) for children aged 0-60 months**	Very underweight (*severe underweight*)	<-3 SD
	Underweight (*underweight*)	- 3 SD sd <- 2 SD
	Normal weight	-2 SD sd +1 SD
	The risk of being overweight	> +1SD

Source: RI Minister of Health No. 2 of 2020 Concerning Children's Anthropometry Standards

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

Providing supplementary food is an intervention strategy for toddlers with poor nutritional status, so that the nutritional needs of toddlers can be fulfilled, so that the nutritional status becomes good according to 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) .

In research conducted by Natassya Simbolon in 2019 with the title "The Effect of Giving Cookies with the Addition of Moringa Leaf Flour (Moringa Oleifera) on the Increase in Weight for Toddlers in Kubah Sentang Village" stated that giving additional cookies food with the addition of Moringa leaf flour for 21 days was proven to be effective. significant weight gain for toddlers.

One variation of additional food is dry brownies. Brownies are a type of solid chocolate cake which was originally a dough that failed and was hard. However, in its development there are many brownies with various creations and flavors that are much loved by cake lovers (Ismayani, 2013) . Dry brownies are a type of cake family that has a brown color and does not expand, this cake has a moist inner texture and a dry texture on the outside of the brownies, has a sweet taste and a distinctive chocolate aroma which is popular with children (Mulyati, 2015)

Figure 1Dried Moringa Leaf Brownies

So that dry brownies have 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 (*Moringa oleifera Lam*)

are the components that contain the most benefits. Moringa has received world attention because it can be a plant source of nutrients that can help humans from nutritional deficiencies because the content of Moringa is known to be many times more than other food sources of nutrients (Kurniasih, 2018) .

According to Ratna Budiani et al. (2020) Moringa leaves or what is often called a super food, 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.

Figure 2. Moringa Leaves

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

METHODOLOGY

This study used a pre - experimental design with a pretest and posttest research design without one group pretest and posttest control group. The research location was carried out in Wonokerto village, Turi sub-district, Sleman district from February to May 2022.

The reasons for choosing underweight toddler research subjects are the growth of children aged 0-5 years (golden age), a determinant of the success of the fast and irreversible period of child growth and development as well as the risk of underweight becoming a negative impact such as health problems health and growth disorders. Data from the Turi Health Center shows that there are

118 children under five who are underweight per age, with the village with the highest toddler malnutrition rate in Wonokerto Village, namely 41 toddlers.

Giving Cookies Leaf Flour and Moringa Seeds on Body Weight and Nutritional Status of Toddlers by Irwan et al. (2020) show there were significant changes in body weight and nutritional status of toddlers before and after the intervention of giving Moringa seed cookies and Moringa leaf cookies after 90 days. Research conducted by Natassya Simbolon in 2019 with the title "The Effect of Giving Cookies mixed with Moringa leaf extract (Moringa Oleifera) on the Increase in Weight for Toddlers in Kubah Sentang Village" states that providing additional Cookies mixed with Moringa leaf extract for 21 days is proven to be effective. significant weight gain for toddlers.

This type of supplementary food is a type of food that is specially formulated, modified so that nutritional intake can be fulfilled according to protein and micronutrient needs, safe, clean, not too spicy and salty and easy for children to consume (Wahyuningtyas & Wismanadi, 2017). This study used the Total Sampling technique from the study population of toddlers aged 12-59 months with underweight status in Wonokerto Village and the samples obtained were 34 toddlers in 2021.

The procedure for this research consisted of researcher preparation, implementation, and data management: (1) Researchers made dried moringa leaf brownie formulations and tested the nutrient content in the UGM Nutrition and Food Laboratory; (2) The researcher asked for permission from the Sleman District Health Office and the Turi Health Center to conduct research; (3) The research has received a proper ethical approval “layak etik” from the Ethics Commission of 'Aisyiyah University, Yogyakarta; (4) Asking for help from an enumerator to equate perceptions to select respondents who are included in the research inclusion criteria; (5) Informing the parents of the respondent about the purpose of the research and asking for permission to become a respondent by filling out informed consent; (6) Researchers discuss the time of conducting research with respondents and parents; (7) Researchers intervened in providing additional food in the form of dried brownies of Moringa leaves; (8) The researcher evaluates the results of the toddler's weight to find out whether or not there is an increase in body weight by weighing the toddler's weight and then entering it into the observation sheet and processing the data.

The instruments used consisted of weighing scales and respondent observation sheets (results of weighing monitoring). Data analysis uses theory from Notoatmodjo (2018) through a step-by-step procedure, namely, (1) univariate analysis, to describe the characteristics of each research variable, namely the average value and standard deviation in each treatment group; (2) a bivariate analysis, two variables that are thought to be related to determine differences before and after treatment using the T - test method paired with a significance level of 95% (p value < 0.05).

Data processing was carried out through several stages, including, (1) Editing, to correct the completeness of filling in the respondent's identity, ensure that the monitoring sheet for supplementary food consumption of dry brownies and moringa was completely filled in, and ensure that the observation

sheet for toddlers' weight was completely filled in; (2) Input Data, sample identity and body weight before and after the intervention of dry brownies and moringa supplementary feeding; (3) Processing, looking for the average value-the average of the toddler's weight, carrying out a data normality test, carrying out a statistical test of the toddler's weight before and after the intervention of providing additional food for dry brownies of Moringa leaves; (4) Cleaning, unused data will be cleaned.

This research has received an ethically proper statement from the Health Research Ethics Commission of 'Aisyiyah University Yogyakarta with number 2056/KEP-UNISA/V/2022 valid for the period 18 May 2022 to 19 May 2023 (Keterangan Layak Etik, 2022).

RESULT

In this chapter the researcher will present the results of research related to improvement weight in toddlers with undernourished status who have been given additional food interventions in the form of dried brownies of Moringa leaves in Wonokerto Village, Turi District, Sleman Regency. The number of respondents in this study were 34 respondents. The number of respondents in this study, namely there are 34 respondents.

Univariate analysis

Toddler weight before and after giving Moringa leaves dry brownies. The results of the research on increasing the body weight of toddlers with poor nutritional status in Wonokerto Village, Turi District, Sleman Regency before and after being given additional food in the form ofried moringa leaf brownies are explained in the following table.

Table 2. Results of Body Weight Before and After

		Prior Weight	**Weight After**
N	Valid	34	34
	missing	0	0
Means		10.5841	10.7950
std. Deviation		1.56303	1.56398

Source: Statistical Data Processing Output for 2022

Based on table 1 it shows that the increase in body weight before being given additional food in the form of dried moringa leaf brownies has an average of 10.5841 kg while after being given additional food in the form of dried moringa leaf brownies has an average increase of 10.7950 kg . Then the standard deviation before being given additional food in the form of brownies with dried moringa leaves is 1.56303 whereas after being given additional food

in the form of dried brownies of Moringa leaves, the standard deviation was 1.56398

Bivariate analysis

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

Table 3. Statistical Test Results with Paired T Test

Weight Gain	Means	*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

Source: Statistical Data Processing Output for 2022

Based on table 2, the results show that after being tested using the Coupled T'test statistical test, the increase in body weight of toddlers with poor nutritional status before and after being given additional food interventions in the form of dried moringa leaf brownies obtained an average result of -.21088 with *a p value* = 0.000. Because the value of p <0.05 this shows that Ha is accepted and Ho is rejected, which means that there is a difference in the effect of giving additional food in the form of dried moringa leaf brownies on weight gain in toddlers with undernourished status.

DISCUSSION

Toddler Weight Before and After Giving Moringa Leaves Dry Brownies

In a study conducted by researchers with 34 toddlers with undernourished respondents in Wonokerto Village, Turi District, Sleman Regency, it was found that the average body weight before being given additional food in the form of dried moringa leaf brownies was 10.58 kg and the average body weight after given additional food in the form of brownies dried moringa leaves for 21 days was 10.79 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 0.21 kg. In line with Widodo et al (2015) that toddlerhood is a period in which growth runs so rapidly that 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. Required recommendations for the amount of energy and nutrients Fikawati et al. (2017), amounting to 1,350 Kcal while the energy needed for children aged 4-6 years is 1,400 Kcal (Menteri Kesehatan Republik Indonesia, 2019)

One of the efforts to overcome the problem of undernutrition in Indonesia is to improve diverse consumption patterns and balanced nutritional quality, one

way is by direct intervention by providing supplementary food (PMT) to the target Ariani (2017), to cover deficiencies if someone does not get enough food (Gandy et al., 2014).

One variation of additional food is dry brownies. Brownies are a type of solid chocolate cake which was originally a dough that failed and was hard. However, in its development there were many brownies with various creations and flavors which turned out to be popular with cake lovers (Ismayani, 2013). In order for dry brownies to have a higher calorie and protein content , the main ingredient is added to 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).

Research conducted by Simbolon (2019) concerning the effect of giving Moringa leaf flour biscuits (Moringa oleifera) on baby weight gain in Kubah Sentang Village for 21 days showed an increase in results. on children's weight before and after crackers with the Cookies mixed with Moringa leaf extract flour, namely. the average baby's weight gain is 95 grams. The average weight before the procedure is 9,865-9,960 kg.

The Effect of Giving Additional Food in the Form of Dried Moringa Leaves Brownies on the Increase in Body Weight of Toddlers with Poor Nutritional Status

The results showed that the average baby weight before being given Moringa leaf supplements was 10.58 kg, while the average baby weight after being given dry Moringa leaf supplements. 21 days old brownie weighs 10.79 kg. So it can be analyzed that the change in toddler's weight increased by 0.21 kg.
Respondents in this study were toddlers aged 1 until 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.

Providing supplementary food is a strategy in interventions for undernourished toddlers 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 (Wahyuningtyas & Wismanadi, 2017). 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 (Izwardy, 2017).

Moringa leaves or what is often called a super food because it has a very high nutritional content both in terms of levels, as well as the variety of types of nutritional content beneficial to health (Budiani et al., 2020).
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 contain 13.4 grams of carbohydrates. Moringa also contains about 73% oleic acid (omega 9). In fact, the word " Oleifera " itself in the Latin name Moringa (Moringa oleifera), is the meaning of a Latin term which means it

contains oil. Moringa also contains 44.57% a-Linolenic acid (omega-3), dried Moringa leaves contain 10 times more omega-3 found in salmon.

According to the Table of Nutritional Content of Moringa Leaves in Krisnadi, 2015 shows that 100 grams of Moringa leaf powder contains 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 macronutrient content contained in Moringa leaves is high in line with research conducted by Pardosi (2019) that there was an increase in body weight in undernourished toddlers between before and after the intervention of giving Cookies mixed with Moringa leaf extract, that is, from the average - the average weight of toddlers before and after the intervention increased by 0.31 kg that there was an effect of giving cookies mixed with Moringa leaf extracton the weight of undernourished toddlers.

Research conducted by Martha et al. (2021) explains the average - The average weight of toddlers before being given extra food, Moringa leaf sticks, was 11.25 kg. While average _ _ - average toddler weight after being given Moringa leaf stick food is 11.39 kg with a difference of 0.14 kg and the results of the p value statistical test is 0.000 which means that there is an effect of giving Moringa leaf sticks on toddler's weight.

In line with Juhartini (2016) the results showed that there was no effect of energy and protein intake on body 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 undernourished toddlers while giving PMT BMC Moringa had an effect on weight and TB in toddlers with undernourished status.

Irwan et al. (2020) added his research entitled Giving Cookies Leaf Flour and Moringa Seeds to Weight and Nutritional Status of Toddlers which was carried out for 90 days showed the result that there was a change in body weight before and after giving cookies Moringa seeds and Moringa leaf cookies. Likewise, the nutritional status before and after giving Moringa seed cookies and Moringa leaf cookies underwent changes. Giving cookies from Moringa leaves and seeds can significantly increase body weight and nutritional status of toddlers.

CONCLUSION AND RECOMMENDATION

Based on the results obtained from research conducted in Wonokerto Village, Turi District, Sleman Regency for 21 days, it can be concluded that there is an effect of providing additional food in the form of dried moringa leaf brownies on an increase in undernourished toddler weight, with an increase in

average body weight is 0.21 Kg. Statistical test results using the Paired T Test obtained value (p = 0.000 <0.005).

Midwives and other health workers can apply the provision of dried moringa leaf brownies as an alternative food supplement for toddlers. The community can apply additional food for dry brownies so that it can help increase body weight in an effort to improve the nutritional status of toddlers. This research can be used as material for consideration and as a basis for future researchers who will conduct similar research

Based on the research that has been done, there are several suggestions for parents to be more careful in terms of providing food to toddlers, especially in providing additional food which is very important to increase the intake of nutrients for toddlers. Dry brownies with the Cookies mixed with Moringa leaf extract can be used as an alternative food supplement for toddlers. In addition, the puskesmas can apply the results of this study as 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.

ADVANCED RESEARCH

1. No control was carried out on intake and other factors that could affect toddlers' weight besides giving brownies with dried moringa leaves. Even so, researchers have advised parents of toddlers to provide daily food according to the nutritional needs of toddlers.
2. The variables used only focus on nutrition, while there are many factors that affect toddler weight. However, researchers have established firearms of inclusion and exclusion so that the research process is in accordance with the fulfillment of toddler nutrition associated with increased body weight.

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