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## The Effectiveness of Moringa Oleifera Pudding to Change Nutritional Status in Stunted Toddlers

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### ABSTRACT

The high prevalence of stunting is a priority that must be resolved with abundant local food sources and high nutritional content, one of which is Moringa leaves (*Moringa oleifera*). Moringa leaves are one of the interventions that can be used to prevent stunting. Moringa oleifera (moringa plant) is a widespread and easy cultivated plant in Indonesia with the potential for ergonomic, cheap and nutritious food additives. Many communities have widely used moringa plants. Stunting is a global health problem that affects 165 million children around the world. The global prevalence rate of toddlers/children with stunting incidence in 2020 is 22% or around 149.2 million children who are stunted. This study aims to determine the efficacy of Moringa Oleifera pudding in preventing child stunting. This study used a quasi-experimental approach, where one group of pre-test and post-test was used as a research design. A total of 33 children were selected as survey respondents. The results showed that Moringa Oleifera pudding consumption was effective in significantly increasing children's height and weight, with a p-value of 0.000 (< 0.05).

Keywords: Stunting, Moringa Leaf Pudding, Nutrition

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## INTRODUCTION

Natural resources are everything that as long as they can (or are recognized as things that can) meet the needs of society, raw resources come from nature that can be processed into a support for human well-being<sup>1</sup>. It can even be concluded that humans depend their lives on plants. One plant that has many benefits for humans is Moringa (*Moringa oleifera* Lam). The high prevalence of stunting is a priority that must be resolved with abundant local food sources and high nutritional content, one of which is Moringa leaves (*Moringa oleifera*)<sup>2</sup>. Moringa has many benefits, especially in the leaves, in general, Moringa plants are only processed ordinary vegetables and also only used as animal feed. In fact, *Moringa oleifera* (known as Moringa) has incredible nutritional and therapeutic properties<sup>3</sup>. Globally, it is considered one of the foods that have the potential to eradicate malnutrition and contribute significantly to preventive health care<sup>4</sup>. Moringa is one of the most beneficial tropical and sub-tropical trees, high economic value and widely bred, especially in countries with high rates of poverty, ill health, and malnutrition<sup>5</sup>. Moringa Oliefera is one part of the Moringa plant that has been widely studied for its nutritional content and usefulness. Moringa Oliefera is ovoid with flat leaf edges and small size stacked compound in one stalk, Moringa Oliefera is very rich in nutrients, including calcium, iron, protein, vitamin A, vitamin B and vitamin C, when compared to other vegetables Moringa Oliefera has more iron which is 17.2 mg / 100 g<sup>6</sup>.

Indonesia is one of the countries that has nutritional problems called triple burden. This is because there are still three nutritional problems, namely undernutrition, overnutrition and micronutrient deficiency. One of the nutritional issues that is being discussed is stunting<sup>7</sup>. Stunting is one of the global nutrition problems that is being addressed by various countries and world organizations<sup>8</sup>. The incidence of stunting is caused by various factors, one of which is malnutrition that occurs in the First 1000 Days of Life (HPK)<sup>9</sup>. A very important period in a person's development is during the first thousand days of life or window of opportunity, this period begins in gestation until the age of 2 years<sup>10</sup>. When nerve cells in the brain and bones experience very rapid growth and development, when the energy and nutrients provided are not right it can lead to stunting and long-term deficits in brain function<sup>8</sup>. Stunting is a child under the age of five years (toddler) whose growth is disrupted due to chronic malnutrition, and results in children having a short body. According to the World Health Organization (WHO) in 2017 around 22.2% of children worldwide are stunted or around 150.8 million children, the average age is under 5 years<sup>11</sup>.

The global prevalence rate of toddlers/children with stunting incidence in 2020 is 22% or around 149.2 million children who are stunted. Indonesia is the 3rd country in the South-East Asia Regional (SEAR) with stunting cases. Malnutrition is a challenge faced by many people. Because this results in impaired growth in children, stunting is therefore a threat to the quality of human life, and it will also

be a threat to the competitiveness of the Indonesian nation<sup>12</sup>. To overcome this problem, Moringa Oleifera-based food fortification is needed to attract interest from stunting toddlers themselves. One alternative that can be used to reduce the incidence of stunting is the use of Moringa leaves (Moringa oleifera) which has not been widely known by the wider community. Moringa leaves are rich in carbohydrates, protein, vitamin A, vitamin C, iron, calcium and potassium<sup>13</sup>. By relying on Indonesian local wisdom, namely utilizing Moringa Oleifera, the nutrients contained in Moringa Oleifera can be optimally accepted by toddlers.

### METHOD

The research design used was quasi-experimental with one pretest and posttest design. The pretest is done by observing the first variable and the posttest is done afterwards. The pretest is performed by observing the variables first, and the posttest is performed after the respondent receives the intervention. The Independent Variable of this study was the administration of Moringa Oleifera pudding to children. Pudding with a content of 2 grams of Moringa Oleifera is given every day for 30 days. The dependent variable of this study is stunting in children under five, which is measured based on height (TB) and age (TB / U). The number of samples in this study was 33 respondents, namely toddlers in Mojoranu Village, Sooko District, Mojokerto Regency and routinely communicated and monitored the condition of research respondents. Furthermore, the data that has been obtained is carried out analysis tests. The data analysis test was carried out using the Wilcoxon rank test. If the results of the mann-witney test obtained a sigification (p value) of  $< \alpha (0.05)$ , then the research hypothesis is accepted, which means that giving Moringa Oleifera pudding is effective in increasing the weight of toddlers with stunting in Mojoranu Village, Sooko District, Mojokerto Regency.

### RESULTS

The results of the study on the average distribution of height, weight and body mass index before and after consuming moringa oliefera pudding on the table 1.

Table 1. Average Distribution of Height, Weight and Body Mass Index Before and After Consuming Moringa Oleifera Pudding

Variable	Before	After
Height	107.79	108.58
Weight	17.85	18.06
BMI	15.3	15.28

Table 1 shows that the average anthropometric measurements before the intervention increased after Moringa Oleifera pudding intake, especially the height from the previous average of 107.79 to 108.58 and the weight from the previous average of 17.85 to 18.06. But it can be seen from the table

above that there is no increase in Body Mass Index.

According to the results of anthropometric data collection before and after statistical tests, Here are the results obtained:

Table 2. Wilcoxon Signed Rank Test Results.

	Mean Positive	Mean Negative	Sig. (2-tailed)
Pre and Post Height	12.5	0	0.000
Pre and Post Weight Loss	13.23	4.5	0.000
BMI Pre dan Post	11.45	13.25	0.310

Table 2 shows that administration of Moringa Oliefera Pudding affects the increase height and weight with a Sig. (2-tailed) of 0.000 (<0.05). And the positive mean is greater than the negative mean, which means more children have increased height and weight.

## DISCUSSION

### **Average height, weight and body mass index before and after consuming moringa oliefera pudding**

Table 1 shows that the average anthropometric measurements before the intervention increased after Moringa Oliefera pudding intake, especially the height from the previous average of 107.79 to 108.58 and the weight from the previous average of 17.85 to 18.06. But it can be seen from the table above that there is no increase in Body Mass Index.

Although the weight and height of children under five improved following the intervention, their nutritional status did not change much. However, it should be noted that there is potential to improve the nutritional status of children under five years if the intervention is carried out longer, that is, more than 2 or 3 months. Thus, the results of this study that in this study show the potential of improving the nutritional status of children under five. However, with more extended interventions time is another factor that can affect their required intake of nutrients.

### **The effectiveness of Moringa oliefera pudding on changes in nutritional status in stunted toddlers**

Table 2 shows that Moringa Oliefera Pudding affects height and weight increase with Sig. (2-tailed) by 0.000 (<0.05). And the positive mean is greater than the negative mean, which means more children have increased height and weight.

From the results of the study, there was a significant difference between the two research groups or in other words, it can be said that giving Moringa Oliefera pudding proved to be more effective for improving nutritional status in stunted toddlers / improving nutritional status in stunted toddlers. The rich nutritional content of Moringa leaf extract is very beneficial for the growth and development of

infants and toddlers. The high calcium content in Moringa Oleifera Extract makes it one way to increase baby height as a supplement or as a companion to breast milk<sup>14</sup>. Moringa Oleifera extracted contains higher levels of calcium than fresh ones, ranging from 1600-2200 mg. Research also shows that Moringa Oleifera has vitamin C equivalent to 7 oranges, vitamin A equivalent to carrots, calcium equivalent to 4 glasses of milk, and potassium equivalent to 2 yogurts. The results of this study are supported by research conducted by Muliawati & Sulistyawati (2019) on the provision of moringa aleifera extract as an effort to prevent stunting events in toddlers. From the results of the research conducted it was found that the results of Moringa oleifera extract can increase height by 0.342 cm with a prediction of 16.2% while 83.8% may be caused by other factors<sup>14</sup>. The results of multivariate analysis show the best model, namely if the Moringa leaf extract variable (Moringa Oleifera) is controlled by the maternal education variable can increase the height of toddlers by 0.476 cm with a prediction of 34.1%. Research conducted by Oyeyinka & Oyeyinka (2018) on Moringa oleifera as a food fortificant: recent trends and prospect,s found results that Moringa plants (moringa oleifera) are plants that have great potential to be explored in food. The use of Moringa leaf powder (moringa oleifera), moringa seed powder (moringa oleifera), moringa flower powder (Moringa oleifera) in various food applications such as in the fortification of amala (stiff dough), ogi (corn grits), bread, biscuits, yogurt, cheese and in making soup and others is proven to help stunting toddlers in meeting the nutritional needs needed by the body during growth and development<sup>15</sup>.

The provision of Moringa Oleifera Pudding as an intervention to overcome the problem of stunting is not without obstacles. In practice, often toddlers with stunting refuse to consume Moringa Oleifera pudding products because they do not like the taste of Moringa Oleifera itself if processed simply. For this reason, Moringa Oleifera which contains many nutrients should be processed and utilized optimally. Consuming Moringa Oleifera should be routinely given to children in the form of additional foods that vary of course so as to avoid boredom of children so that they experience body malnutrition. Conditions like this must be watched out for by both stunting toddler mothers and health workers considering that when toddlers feel bored with certain types of food, stunting toddler mothers or health workers must innovate again to increase the appetite possessed by stunting toddlers. When stunted toddlers have an appetite, toddlers will consume various types of food prepared by toddler parents. When this appetite has arisen, the possibility of overcoming the problem of stunting experienced by toddlers and nutritional deficiencies needed by toddlers during growth and development can be corrected and resolved more quickly. This research has directly proven that giving pudding done with Moringa leaves in the form of moringa oleifera pudding has proven effective in improving nutritional status and nutritional adequacy needed by toddlers with stunting.

## CONCLUSION

The study found that daily consumption of Moringa Oleifera pudding of 2 grams for one month significantly reduced the incidence of stunting in children, as indicated by a p value of 0.000. This shows a positive impact on children's height and weight.

In any case, there was no significant change in body mass index (BMI) following the intervention, with a p value of 0.310. Overall, the findings suggest that Moringa Oleifera Pudding may help prevent stunting in children under five by positively affecting their height and weight. The study had limitations, such as a short duration that limited direct observation and monitoring of children's progress. In addition, the influence of other desserts consumed during the study is also another factor.

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