Moringa Oleifera In the Form of Ready Useable Food Therapy as Stunting Preventer

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ABSTRACT

The prevalence of malnutrition which can result in stunting is still a serious problem in Indonesia. Until now, research is still continuing on the most effective prevention of this problem. The large number of supplements circulating with a mixture of chemicals can often cause health problems in the future. Moringa oleifera (moringa leaves) can be an alternative to prevent stunting problems. People still use this plant as an accompaniment to everyday cooking, and it is not uncommon for this plant to only be used as decoration in their yard. From the results of a preliminary study at Pandanmulyo Community Health Center, Pandanmulyo Village, it was found that there were 21 cases of malnutrition and 23 cases of children experiencing malnutrition. Researching whether or not Moringa leaves may help malnourished youngsters gain weight is the driving force for this project. Using a non-randomized pretest-posttest control group design, this study applies quantitative research approaches. The sample was 20 toddlers aged 1-3 years old. Paired t-test analysis was used to determine the comparison of weight between groups. From the research results, data was obtained that there was a significant difference in the control group and the treatment group with a p value of 0.037 (p <0.05) which shows that giving Moringa aloifera in the form of Ready Useable Therapy Food for 4 weeks can increase the weight of toddlers.

INTRODUCTION

The Global Health Nutrition Report estimates that 150.8 million children were stunted in 2018. Southeast Asia has the highest rate of child wasting, affecting almost 50.8 million children. Nutritional data in Indonesia revealed that malnutrition rates remain high, including stunting at 30.8%, wasting at 10.2%, and malnutrition at 18%. Based on the results of the 2018 Basic Health Research (Riskesdas), the figures for East Java Province are as follows: underweight prevalence in toddlers at 15%, wasting prevalence in toddlers at 8%, and red (BGM) at 0.77% (WHO 2019). Nutrition case data in Malang Regency shows that malnutrition rates are still high, with 30,323 toddlers spread across 33 sub-districts in Malang Regency (Dinas Kesehatan Kota

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Malang 2021).

Eating is a basic human need because it provides the body with the nutrients and energy it needs to sustain life. Because toddlers (under three years old) are highly dependent on adults for food, they are not yet able to feed themselves (Amalia, Arum, and Satiti 2021). Parents often face eating problems in toddlers, including picky eaters, selective eaters, and small eaters. When children exhibit these conditions, parents often seek solutions by giving them multivitamins or supplements. Some parents even assume that eating can be replaced by drinking milk. This misconception, unbeknownst to parents or caregivers, can lead to malnutrition in children (Liza, 2023).

Moringa oleifera, or moringa leaves, is a plant native to India that contains protein, vitamins, and minerals that can help combat malnutrition. This plant can also thrive in tropical countries like Indonesia. Furthermore, the moringa tree is also very easy to grow in soil that is not very fertile (Purba 2020). Although moringa leaves are often used as a garnish in ordinary cooking, many people just cultivate them for their aesthetic value on terraces. It is a miracle tree according to the World Health Organization. The nutrients included in moringa leaves, which include calories, protein, carbs, iron, magnesium, potassium, and folic acid, further substantiate its health advantages. They also contain vitamins A, B, and C (Alamsyah et al. 2022). Moringa leaves are equivalent to three times the potassium of bananas. In powder form, the potassium content of moringa is equivalent to 15 times that of bananas. One bowl of moringa leaves is equivalent to four times the calcium of 200 milliliters of milk. In powder form, moringa calcium is equivalent to 17 times the calcium of milk. Moringa leaves are very rich in vitamins and minerals, their potassium content is three times that of bananas, their vitamin C content is seven times higher than oranges, their calcium content is four times higher than the calcium found in milk, their vitamin A content is four times higher than carrots, and their iron content is even higher than spinach. Therefore, this can be used to prevent toddlers who are at risk of entering a condition of stunting (*Muliawati and Sulistyawati 2019*).

Toddlers who are experiencing nutritional issues may ingest Ready Usable Therapeutic diet (RUTF), which

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is a high-energy and protein diet. RUTF is generally fat-based or in the form of a thick paste (*Selvaraj et al. 2022*). This therapeutic food has been widely used in several African and Asian countries for treatment in hospitals and community health centers. Milk, sugar, veg fat, veg oil, RUTF, vitamins, and minerals are some of the readily digested components of RUTF. With RUTF, children's weight may be increased by as much as 3.5 g/kg/day, although the conventional formula recommended by the WHO only raises it by 2 g/kg/day (Amalia 2021). The mortality rate and relapse rate in children given RUTF are lower at 8.7%, compared to 16.7% in children given the WHO standard formula. Research conducted in Malawi shows that RUTF has a 95% higher recovery rate than corn and soybeans (Amalia, 2020)

Preliminary research at the Pandanmulyo Community Health Center has shown that many health issues persist, particularly when it comes to dealing with children's dietary issues. There are 27 children in stunting conditions and 23 undernutrition and 21 malnutrition. The Pandanmulyo village government is very concerned about the current health problems of toddlers, namely by programming the Moringa plant as a superior plant in Pandanmulyo village. This was triggered by the many problems regarding nutrition and the myriad benefits of Moringa leaves in their influence on children's nutrition. Based on the presentation of research facts, and the results of the preliminary study, researchers are interested in analyzing the utilization of the superior plant product Moringa Oleifera in the form of RUTF (ready to use therapy food) to prevent malnutrition in toddlers in Pandanmulyo Village, Malang.

RESEARCH METHODS

A non-randomized pretest-posttest control group design characterizes this quasi-experimental research. This approach was selected since it is challenging for pure field research to satisfy the requirements for random sample selection. This study involved 20 toddlers aged 1–3 years who were classified as underweight who lived in the Pandanmulyo Health Center's service area in Pandanmulto Village, Malang Regency, and were considered part of the study's sample were enrolled between July and December 2023. Preceded by the

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issuance of an ethical test with number 298 / KEPK-POLKESMA / 2023, a preliminary study was conducted to obtain samples with a treatment group of 20 toddlers and a control group of 20 toddlers. In the treatment group, Moringa aloifera will be administered in the form of RUTF while the control group will be given additional food in the form of green beans. The research instruments included a GEA foot scale for measuring body weight. Data collection was carried out through direct measurements conducted by trained health workers at the posyandu (integrated health post). The toddlers were divided into a control group and a treatment group. Before the treatment, the sample was first measured body weight. Then, each sample group was given treatment after which it was measured again. Moringa is taken from the superior plants of the Pandanmulyo village community which are then extracted into moringa powder in the form of RUTF (Ready Useable Therapy Food). The composition of Moringa leaves RUTF (Ready-to-Use Therapeutic Food) is not just pure Moringa leaves**.** Instead, it is a nutrient-dense food product formulated to treat severe acute malnutrition, and Moringa leaves are added as a functional or nutritional ingredient**,** not the sole component. Moringa leaf powder can be incorporated as a supplementary ingredient in various food products, including steamed sponge cakes, jelly, egg noodles, and other processed foods. 1.27 kg of moringa leaves are washed with running water and then wet sorted to separate the fresh moringa leaves. The moringa leaves are then drained and stored in a closed container. Moringa leaves are dried in an oven at 500C until dry and then their water content is measured with a moisture balance tool. The dried moringa leaf simplicia is blended and sieved using a 40 Mesh sieve into moringa powder and then processed into RUTF (Ready Useable Therapy Food) form. For young children, it is recommended to consume 60mg of moringa extract per day. The collected data will be analyzed using a paired t-test to determine the comparison of body weight between groups.

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RESULTS AND DISCUSSION

This analysis was conducted to determine the relationship between the independent variables, namely the treatment with and without moringa, and the dependent variable, namely toddler weight. The statistical test used was a paired t-test to observe changes in toddler weight after four weeks in each group. The level of significance used was a p-value <0.05 at a 95% confidence interval. An independent t-test was used to determine differences in changes between groups.

Table 1. Paired T Test Analysis Control Group

Control Group	Mean Difference (SD)	Difference in Mean Difference (CI)	t	*p*
Weight Before	10.785 (1,612)	-0,085	-1.308	0,207
Weight after without moringa	10.870 (1,523)	(-0,221) - (-0,051)		

Table 1 shows no significant changes in the control group with the provision of additional green beans for 4 weeks. The results of the paired t-test obtained a p-value of 0.207 (p>0.05) and the mean difference value of CI and the calculated t-value were negative indicating that there was no change in body weight in the control group.

Table 2. Paired T Test Analysis Treatment Group

Treatment Group	Mean Difference (SD)	Difference in Mean Difference (CI)	t	*p*
Weight before	11.080 (1,858)	-0,905	-15.910	<0,000
Weight after with Moringa	11.985 (1,731)	(-1,024) - (-0,785)		

Table 2 shows a significant change in the control group after receiving Moringa aloifera in the form of Ready to Use Therapy Food (RUTF) for 4 weeks. The paired t-test results obtained a p-value of 0.000 (p < 0.05), and the difference in the mean CI value was normal and the t-value was positive, indicating that there was no change in Moringa powder that had an impact on weight changes in toddlers.

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Table 3 Independent T Test Analysis in Each Group

Variable	N	Mean	SD	t	*P*	Difference Mean	CI
Weight without moringa	20	10.870	1.523	-2.162	*0,037*	-1.115	(- 2,159) – (-0,070)
Weight with moringa	20	11.985	1.731				

Table 3 shows a significant difference between the control and treatment groups with a p-value of 0.037 ($p < 0.05$) with a mean difference of 1.115 between the two groups. This indicates that administering Moringa aloifera in the form of Ready to Use Therapy Food (RUTF) for 4 weeks can increase toddlers' weight.

The Moringa oleifera plant is a plant with many benefits, one of which is its roots can fertilize the soil. Moringa leaves are oval with flat edges and small in size, arranged in compound on a single stalk. Among the many nutrients found in moringa leaves are protein, calcium, iron, vitamins A, B, and C. The moringa leaf color changes from pale green to dark green as the plant becomes older. You may make powder or extract from mature moringa leaves. Dried moringa leaves or those made into extracts have a higher calcium content than wet leaves, at 1600-2200 mg. According to studies, moringa leaves provide potassium, calcium (the same amount found in four glasses of milk), vitamin A (the same amount found in carrots), and vitamin C (the same amount found in seven oranges). Babies and toddlers benefit greatly from the growth and development promoting elements included in moringa leaf extract (Asmawati et al. 2022). Because of its high calcium content, it may be used as a supplement to breast milk or on its own to help children grow taller. You may get the protein content of two yogurts' worth of moringa leaf extract by just adding a little to your diet or mixing it with water or orange juice (Larasati and Eviana 2022).

RUTF is a high-energy and protein food made from a mixture of ingredients such as peanuts, skim or nonfat milk, granulated sugar, soybean oil or vegetable oil, and a mineral mix, a mixture of various minerals, and can be made on an industrial or household scale. RUTF is specifically designed to treat various types of toddler nutritional problems and can be made in

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commercial forms, namely solid (flour, biscuits, candy) and semi-solid (paste and cream) (Amalia, 2020). In this study, researchers attempted to combine superior plants from Pandanmulyo village in the form of RUTF in the form of moringa flour, which can be made into various foods for toddlers to address stunting. Children with mild to moderate malnutrition are still like other children, active, playing, and so on, but upon closer inspection, their bodies begin to lose weight and their stamina begins to decline. In the advanced phase (malnutrition), children are susceptible to infection, muscle wasting, liver swelling, and various other disorders such as skin inflammation, infections, and organ and function abnormalities (due to atrophy/shrinking of the organ). One way to prevent nutritional problems is through nutritional improvement (Luluk Sutji Marhaeni 2021). To support growth and development during infancy, foods with high nutritional value are crucial, such as sources of energy and protein, vitamins (B complex, C, and A), and minerals (Ca, Fe, Iodine, Phosphorus, and Zn). Inadequate nutrition results in a decline in nutritional status, resulting in malnutrition in children. This affects physical growth, intelligence, and future development. The role of nutrition in developing human resource quality has been proven through various studies. During infancy, nutrients from food sources need to be provided appropriately and with the best quality because nutritional disorders during this period can affect the quality of life later in life (Purba 2020).

CONCLUSIONS

The results of the study showed that giving Moringa in the form of RUTF was significantly effective in increasing the body weight of toddlers aged 1-3 years because the p value showed 0.000 ($p < 0.05$) and the difference in body weight changes between the treatment group and the control group was also significantly different with a p value of 0.039 ($p < 0.05$) which indicates that the toddler's body weight changed more quickly with the administration of Moringa. Therefore, this method may serve as an adjunctive approach to support weight gain in children through the utilization of locally available food sources.

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