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Effectiveness of Developing Dietary Culture by Utilizing Local Food Products from Moringa Leaves Through Fortification in Handling Stunting

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ABSTRACT

Stunting is a condition of growth failure in toddlers caused by long-term malnutrition, repeated exposure to infections, and lack of stimulation. The number of stunting in Indonesia in 2022 was 15,798,153 toddlers with a prevalence rate of 21.6%. This figure is high, stunting can be a threat to future generations. This study aims to determine the effectiveness of developing a diet culture by utilizing local food products from Moringa leaves through fortification in handling stunted toddlers. This study used a quasi-experimental design, the number of samples was 30 stunted toddlers divided into 2 groups, namely 30 treatment groups and 30 non-treatment groups. The results of this study show that the use of local food using fortified Moringa leaf products can affect the weight gain of toddlers as seen from the intervention group before and after treatment. Fortification with Moringa is one way to prevent underweight in toddlers

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INTRODUCTION

Stunting is a condition of growth failure in toddlers caused by malnutrition for a long time, exposure to repeated infections, and lack of stimulation. This condition indicates malnutrition in babies during the first 1000 days of their life, which can result in stunted brain development and growth As a result of this chronic malnutrition, stunted toddlers tend to have a shorter height than the standard toddler of their age (1).

In 2021, the prevalence of stunting in Indonesia is still high, reaching 24.4%, this figure exceeds the standard set by the WHO of 20%, so that Indonesia is included in the category of high stunting problems. In 2022, according to the Monitoring of the Implementation of the Integrated Stunting Reduction Intervention Convergence Action carried out by the Ministry of Home Affairs, the number of children included in the short stunting category reached 977,185 children, while those included in the very short stunting category were 344,122 children out of a total of 15,798,153 children under five (2).

Central Sulawesi is one of the provinces with a fairly high prevalence of stunting, while for Sigi Regency which holds the 3T status according to the Presidential Regulation

https://www.kemendesa.go.id/berita/view/detil/3261/ini-daerah. lagging behind makes SIGI Regency with the highest Stunting Incidence Prevalence Rate of 36.8%, followed by Boul Regency at 32.7% and Banggai

Islands Regency at 32.6% (SSGI 2022). In addition, based on data from the Sigi Regency Health Office in 2022, there are twenty-five villages designated as stunting handling loci distributed in nine sub-districts including Sigi Biromaru, Nokilalaki, Palolo, South Dolo, West Marawola, Kulawi, Gumbasa, West Dolo and Dolo Districts.

One of the steps in stunting prevention is through the Supplementary Food Provision (PMT) program aimed at toddlers. This program aims to provide nutritional interventions to children who are malnourished. One type of additional food given to toddlers are products that contain moringa leaves. In Indonesia, the moringa plant is widely found, and this plant is believed to have many health benefits. In fact, the WHO describes moringa as a miracle tree, which shows how incredible the benefits of this plant are (3).

According to research conducted by Keloris Indonesia, moringa leaves are known to be useful in overcoming stunting conditions in babies. The vitamin and mineral content in moringa leaves is higher compared to other vegetables. For example, the Vitamin A content in moringa leaves is four times higher than that of carrots, and the Vitamin C content in moringa leaves is seven times higher than that of oranges (4). Currently, moringa leaves are widely used in products that can be consumed by toddlers, especially through the fortification process. Fortification is one of the methods of adding certain vitamins and minerals to foodstuffs, which is an opportunity in providing nutritious food for all levels of society, especially for those who need additional nutritional intake (5)

RESEARCH METHODS

The method used in this study used a pseudo-experimental design (quasi-experiment) with a pre-posttest design, namely 2 pairs of groups. The sample was selected by complete randomization (RAL) based on inclusion and exclusion criteria.

The formula used in the calculation of the number of samples in this study is as follows: Using the slowin formula;

n= N 1+N (e)2
n= 101 1+101 (0,1)2
n= 101 1+1.01
n= 101 2.01
= 50, 2 ≈ 5
n = sample size
N = total population
(e) = percentage of sampling accuracy that is still tolerated; e=0,1

Based on the calculation of the formula above, the number of samples for each group is 25 samples. To anticipate the number of respondents dropping out, corrections were made to the sample size by adding as much as 16% of the number of samples calculated, so that the number of samples for each group became 30 people. Where as many as 30 people for the treatment group (giving Moringa leaf products), and 30 people for the treatment group (giving biscuit to the government). So the total sample in the study is 60 people.

RESULTS AND DISCUSSION

Weight gain in toddlers

Table 1. Average Food Recall Score of Energy and Protein Intake Before and After the Intervention

Energy	n	Post Test ± SD	Post Test ± SD	Paired V	Difference ± SD	Independent T-test
Moringa	30	554.0 ±147.2	1076.6 ±132.3	0.226	522.3 ±62.2	
Biscuit	30	479.1 ±79.2	834.0 ±67.0	0.000	355 ±77.4	0,001
Protein	**n**	**Post Test ± SD**	**Post Test ± SD**	**Paired V**	**Difference ± SD**	**Independent T-test**
Moringa	30	19.4 ±6.7	29.3 ± 4.18	0,371	10 ±5.8	
Biscuit	30	16.5 ±3.9	16.6 ± 3.6	0,001	0.02 ±4.4	0,001

Source: Anova Test. SPSS ver.26

Based on Table 1, it shows that the value of energy and protein consumption levels increases after being given the moringa intervention. The average highest difference in energy intake compared to the

biscuit group was 522.3 (kcal). The results of the analysis of the anova test showed that the post hoc value between the moringa group had a significant difference with the biscuit group, but between the moringa group and the biscuit group had a significant difference value (0.371 >0.005), this showed that there was no difference in the level of energy consumption in the group given moringa and the government biscuit group. The average difference in protein intake compared to other groups was 10g and followed by the government biscuit group which was 5.6g. The results of the analysis of the anova test of the post hoc value between the moringa group had a significant difference with the Biscuit group (p-0.001).

Table 2 Analysis of the Average and Difference in Weight Gain of Toddlers Before and After Treatment in Each Group

Heavy Body	n	Pre Test ± SD	Post Test ± SD	Paired V	Difference ± SD	Independent T-test
Moringa	13	10.10 ±1.6	12.8 ± 2.08	0.000	2.8 ± 668	0,001
Biscuit	13	10.4 ± 1.4	12.0 ± 1.6	0.000	1.6 ± 353	

Source: ANOVA Test Processing Data, SPSS ver.26

Based on Table 3, the analysis of the average weight gain of toddlers in both groups before and after treatment increased. The average weight of toddlers in the moringa group of 10.10kg increased to 12.8kg after treatment. Meanwhile, in the group that was given government biscuits, the average weight of toddlers was 10.4kg and increased to 12.0kg after treatment. Based on the results of the anova test, the significant value of body weight before and after the intervention showed significant differences in the two groups.

The provision of interventions from both groups can increase the weight of toddlers. However, the weight gain in the treatment group that received moringa was more significant than in the group that was given government biscuits. The average difference in weight gain of toddlers before and after treatment in the enriched moringa group was 2.8kg, while the government biscuit group was 0.9kg. The results of the post-hoc test of the difference in the value of weight gain of toddlers showed that there was a difference between groups.

Based on the results of the anova test value (p- 0.001) showed that in the two treatment groups there was a significant difference with the difference in the weight gain of toddlers after being treated.

Table 3. Analysis of the Average and Difference in Height Increase of Toddlers Before and After Treatment in Each Group

Height	n	Pre Test ± SD	Post Test ± SD	Paired V	Difference ± SD	Independent T-test
Moringa	13	89.0 ±8.4	91.6 ±8.6	0.000	2.6 ±0.8	0,001
Biscuit	13	90.5 ±7.4	92.7 ±7.8	0.000	2.1 ±0.6	

Source: ANOVA Test Processing Data, SPSS ver.26

Based on Table 4, the analysis of the average height increase of toddlers in both groups before and after treatment has changed. The average height of toddlers in the moringa group was 89.0cm before increasing to 91.6cm after treatment. In the biscuit group, the average height of toddlers was 90.5cm before and after the intervention was 92.7cm. Based on the results of the anova test, the significant value of height before (p-0.614) and after (p-0.754) the intervention did not show any significant difference in the two groups. The provision of interventions from both groups can increase the height of toddlers.

However, the increase in height in the intervention group that received moringa was more significant than in the group that received government biscuits. The average difference in height gain of toddlers before and after treatment in the moringa group was 2.6cm while the government biscuit group was 1.8cm. The results of the post-hoc test of the difference in the value of weight gain of toddlers showed that there was a difference between groups. Based on the results of the anova test (p-0.001), it was shown that in the two treatment groups there was a significant difference with the difference in weight gain of toddlers after being given the intervention.

CONCLUSION

The results of this study showed that the use of local food using moringa leaf products with fortification was able to affect the weight gain of toddlers as seen from the intervention group before and after the treatment. Fortification with moringa is one way of efforts to prevent underweight in toddlers. When consuming moringa that has been fortified with high nutritional and protein content, it is able to maintain a balance in the level of macro substance consumption in the body.

SUGGESTION

Researchers realize that this research still needs improvement. The researcher provides suggestions that can be considered for parties interested in the health center and related parties to be able to prepare additional food in the form of moringa fortification. For this reason, based on the results of the research, the author gives the following suggestions:

For the Institute of Health Technology and Business Graha Ananda, this research can provide additional insights for readers, especially students of the Institute of Health Technology and Business Graha Ananda, especially students of the Faculty of Health. In addition, the author hopes that the library's scientific books are always updated with the latest published yearbooks.

The results of this study are expected to be developed in the next research, especially regarding the provision of additional food in the form of moringa leaf flour cookies enriched with sea urchin gonads to other targets such as pregnant women, lactating mothers, infants and adolescents.

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