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# THE IMPACT OF MORINGA LEAF CAPSULE SUPPLEMENTATION ON WEIGHT CHANGE IN ADOLESCENT GIRLS WHO DROP OUT OF SCHOOL AGED 12–18 YEARS

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**ABSTRACT**
Complex health issues require collaboration from various healthcare professions. One key aspect of preparing a healthy generation is nutritional status. Moringa leaves (Moringa oleifera), known as the "miracle tree," are rich in essential nutrients such as vitamins, proteins, iron, carbohydrates, fats, minerals, and amino acids. This study aimed to evaluate the impact of Moringa leaf extract capsules on weight gain among adolescent girls who dropped out of school in North Polongbangkeng District, Takalar Regency, South Sulawesi. This true experimental study used a Randomized Controlled Double Blind Pre-Posttest design. A total of 30 school dropouts aged 12–18 years were selected using simple random sampling, then randomly assigned into an intervention group (15 received Moringa capsules, 2×1 daily, 1000 mg/capsule) and a control group (15 received iron tablets with the same dose). Data were analyzed using the Paired T-Test and Mann-Whitney U test. The intervention group showed a significant weight increase from 41.82 kg to 42.42 kg ($p < 0.05$), while the control group showed no significant change. There was a significant difference between groups ($p = 0.001$). Moringa leaf extract significantly improved weight gain among adolescent girls who dropped out of school.

Keywords: moringa leaf extract; teenage girls dropping out of school; weight gain

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## INTRODUCTION

According to the World Health Organization (WHO), adolescents are defined as individuals who are in the age group of 10 to 19 years. On the other hand, the Regulation of the Minister of Health of the Republic of Indonesia Number 25 of 2014 stipulates that the age range of adolescents is 10–18 years. Meanwhile, the National Population and Family Planning Agency (BKKBN) defines adolescents as unmarried residents aged 10-24 years (Kusumaryani, 2017).Adolescence is often considered a critical period because at this stage individuals experience various challenges in terms of growth and development, both physical, psychological, and daily activities. This condition causes nutritional needs to increase significantly. Adequate nutritional intake is needed to support height and weight gain, as well as the growth of body tissues through increasing the number and size of cells (Siallagan, Swamilaksita, & Angkasa, 2016).

Weight itself is one of the anthropometric parameters expressed in kilograms (kg), and is used to assess a person's physical condition (World Health Organization Expert Committee, 1995). Through weight measurement, important information can be obtained such as Body Surface Area (BSA) and Body Mass Index (BMI) which helps in assessing the health status of individuals (Rahman, Fauzi, & Azhar, 2017). Therefore, regular weight monitoring is important because it is a simple but effective indicator in evaluating nutritional status. Changes in weight can reflect a change in a person's health status. Maintaining an ideal weight is essential to achieve optimal health conditions. Regular monitoring can also be a

preventive measure against problems such as obesity or chronic energy deficiency (SEZ) (Marmi, 2013). Efforts to improve nutritional status in adolescents, especially the age group of 15–19 years, contribute greatly to reducing the prevalence of malnutrition nationally. Adolescence is characterized by accelerated growth that requires high nutritional intake, especially proteins and vitamins which are important for physical development and support reproductive health in the future (Bwalya, 2015). When nutritional needs are not met, adolescents are at risk of malnutrition which can disrupt body proportions and reduce immunity, making them more susceptible to infectious diseases (Wanty, Widyastuti, & Purbosari, 2017).

One alternative that can be used to deal with nutritional problems in adolescents is the use of the moringa plant (Moringa oleifera), which is known as the "magic tree" because almost all of its parts have health benefits. Important nutrients are found in the leaves, bark of the stem, flowers, fruits, and roots of this plant. Moringa root is traditionally used to treat beri-beri diseases topically, while its leaves are beneficial for treating skin problems. Moringa has also long been used as an alternative treatment for various diseases, such as rheumatism, epilepsy, vitamin C deficiency, urinary tract infections, to sexually transmitted diseases such as gonorrhea. Moringa is scientifically recognized as one of the plants with the highest nutritional content in the world, because it is rich in vitamins, minerals, antioxidants, essential amino acids, as well as various other bioactive compounds (Jusnita & Syurya, 2019). Research also shows that all parts of Moringa oleifera can be used to maintain and improve human health, as well as as a source of nutrition for families (Krisnadi, 2015). The popularity of using moringa leaves as a nutritional supplement continues to increase, as evidenced by the numerous studies that report its benefits in both humans and animals. One of them is a study by Srikanth and his colleagues in 2014 that showed that the consumption of moringa leaf powder can have a positive effect on weight gain. The purpose of this study is to determine the effect of moringa leaf extract capsules on weight gain among teenage girls who dropped out of school in North Polongbangkeng District, Takalar Regency, South Sulawesi.

## METHOD

Questionnaire sheets, moringa leaf extract capsules, TTD (Blood Supplement Tablet) capsules, Weight scales, height measurements, weight and height measurement sheets, control sheets/capsule consumption checklist. This research was carried out in North Polongbangkeng District, Takalar Regency, South Sulawesi Province. The research took place from March to May 2020, after obtaining permission and ethical approval from the Research Ethics Committee of the Faculty of Public Health, Hasanuddin University. This study uses a quantitative approach with a true experimental design. The method applied is Randomized Controlled Double Blind, with a simple random sampling sample selection technique.The total number of respondents involved was 30 people, who were then divided into two groups, namely the intervention group and the control group. Before the treatment was given, all participants were first measured in their initial weight and height (O1). Next, participants received randomly coded intervention capsules labeled A and B (e.g.: A, B, B, A, and so on). After the intervention period ended, weight and height (O2) were re-measured as a posttest. Once all the posttest data is collected, a third party opens the capsule code and it is known that the capsule labeled A contains Blood Supplement Tablet (TTD), while the capsule labeled B contains moringa leaf extract. The intervention was carried out for 60 days (2 months), with a dose of moringa leaf extract of 1000 mg per day, taken two capsules at once at night. The same dose and timing of administration were also applied to the control group receiving TTD.

The population in this study includes all adolescent girls aged 12–18 years who have dropped out of school in the North Polongbangkeng District, Takalar Regency, South Sulawesi Province, with a total of 75 people. The research sample was part of the population, namely

adolescent girls aged 12–18 years who experienced mild anemia and met the set inclusion criteria. The initial number of participants was planned to be 40 people, but due to the COVID-19 pandemic during the post-intervention phase, the number of samples that could be involved shrunk to 30 people. Data was collected directly from respondents using questionnaires to obtain the required information, accompanied by weight and height measurements. The data collection process is carried out in two stages, namely before the intervention is given (pretest) and after the intervention is completed (posttest). Data analysis was conducted using the Paired T-Test test to determine the statistically significant mean difference in the same group, namely between the results before and after the intervention. Meanwhile, to compare the mean differences between two unpaired groups, namely the intervention group and the control group, the Mann-Whitney test was used.

## RESULT

Table 1.
Characteristic Distribution of Respondents

| Characteristics | Group | | | |
|---|---|---|---|---|
| | Control | | Intervention | |
| | f | % | f | % |
| Age (years) | | | | |
| 12-15 years | 5 | 33.3 | 7 | 46,6 |
| 16-18 years | 10 | 66,6 | 8 | 53,3 |
| Last Education Teenage Girls Dropped out of school (Child) | | | | |
| Elementary School | 5 | 33,3 | 5 | 33,3 |
| Did not graduate from junior high school | 5 | 33,3 | 4 | 26,6 |
| Junior high school | 5 | 33,3 | 5 | 33,3 |
| Did not graduate from high school | 0 | 0 | 1 | 6,6 |
| Parents' Education | | | | |
| Did not graduate from elementary school | 2 | 13,3 | 3 | 20 |
| Elementary School | 4 | 26,6 | 3 | 20 |
| Did not graduate from junior high school | 4 | 26,6 | 3 | 20 |
| Junior high school | 4 | 26,6 | 5 | 33,3 |
| Did not graduate from high school | 1 | 6,6 | 1 | 6,6 |
| Parents' Occupation | | | | |
| Daily laborer | 5 | 33,3 | 6 | 40 |
| Carpenter | 1 | 6,6 | 3 | 30 |
| Share farmer | 7 | 46,6 | 5 | 33,3 |
| Farmer | 2 | 13,3 | 1 | 6,6 |
| Village | | | | |
| Balangtanaya | 5 | 33,3 | 6 | 40 |
| Komara | 9 | 60 | 8 | 53,3 |
| Massamaturu | 1 | 6,6 | 1 | 6,6 |

Based on table 1, the majority of respondents in both groups were aged 16–18 years, namely 66.6% in the control group and 53.3% in the intervention group. Judging from the last level of education of adolescent girls who dropped out of school, most of the respondents in both groups were at the elementary and junior high school levels with a percentage of 33.3% each. For parental education, both the control and intervention groups showed a relatively even distribution, with the highest percentage at the junior high school education level, namely 26.6% in the control group and 33.3% in the intervention group. In terms of parental employment, most worked as farmer farmers (46.6%) in the control group and day laborers (40%) in the intervention group. The distribution of residences showed that the most respondents came from Komara Village, namely 60% in the control group and 53.3% in the intervention group, followed by Balangtanaya and Massamaturu Villages. Overall, the characteristics of respondents between the intervention and control groups appeared to be balanced, which supports the validity of the comparison between groups in this study.

Table 2.

Distribution of Weight Change Before and After in the Control Group and Intervention Group

| Characteristics | Group | | | |
|---|---|---|---|---|
| | Control | | Intervention | |
| | f | % | f | % |
| Weight Change (ounces) | | | | |
| <0-0 | 10 | 66,6 | 1 | 6.6 |
| 0.1-0.5 | 5 | 33,3 | 2 | 13.3 |
| 0.6-0.8 | 0 | 0 | 12 | 80 |
| Body Mass Index (BMI) | | | | |
| Thin (<18.5 cm) | 6 | 40 | 4 | 26,3 |
| Normal (18.5-25.0 cm) | 9 | 60 | 11 | 73,3 |
| Fat (>25.0) | 0 | 0 | 0 | 0 |

Based on table 2, there was a significant difference in weight change between the control group and the intervention group. In the control group, most respondents (66.6%) experienced a decrease or no change in weight (<0–0 ounces), and only 33.3% experienced a mild increase (0.1–0.5 ounces). None of the respondents in the control group experienced weight gain of more than 0.5 ounces. In contrast, in the intervention group, the majority of respondents (80%) experienced a weight gain of 0.6–0.8 ounces, indicating a positive effect of the moringa leaf extract intervention. Only a small percentage (13.3%) experienced a mild increase (0.1–0.5 ounces), and only 6.6% did not gain or lose weight. For the Body Mass Index (BMI) category, in the control group most of the respondents were in the normal category (60%) and 40% in the thin category. In the intervention group, the distribution was better, with 73.3% of respondents falling into the normal BMI category, and only 26.3% still in the lean category. None of the respondents from either group were included in the obese category. These results indicated that the administration of moringa leaf extract capsules for 2 months had a positive effect on weight gain and improvement of nutritional status of respondents, compared to the control group that received Blood Supplement Tablets (TTD).

Table 3.
Distribution of Weight Differences Before and After Treatment in the Control Group and Contrro Groupl

| Group | Weight | | Difference | *P Value* |
|---|---|---|---|---|
| | Pre Mean±SD | Post Mean±SD | Mean±SD | |
| Control | 42.00±4.10 | 42.05±4.05 | 0.05±0.05 | 0.068[a] |
| Intervention | 41.82±4.10 | 42.42±4.11 | 0.6±0.01 | 0.001[a] |
| P value | 0.001[b] | | | |

*Paired T Test[a], Mann Witney Test[b]*

Table 3 shows the results of the weight difference test before and after treatment in the control group and the intervention group. In the control group, the average weight before treatment was 42.00 ± 4.10 kg and after treatment was 42.05 ± 4.05 kg, with an average difference of only 0.05 ± 0.05 kg. The results of the Paired T-Test showed a value of p = 0.068, which means that there was no statistically significant difference between the weight before and after in the control group (p > 0.05). Meanwhile, in the intervention group that received moringa leaf extract capsules, the average body weight increased from 41.82 ± 4.10 kg to 42.42 ± 4.11 kg after treatment. The average difference in weight gain was 0.6 ± 0.01 kg. The results of the Paired T-Test showed a value of p = 0.001, which means that there was a statistically significant weight gain in the intervention group (p < 0.05). In addition, the results of the Mann-Whitney test on the comparison of the difference in weight gain between the two groups also showed p = 0.001, indicating that the difference between the control and intervention groups was statistically significant. Thus, it can be concluded that the administration of moringa leaf extract capsules for two months has a significant effect on weight gain in adolescent girls who drop out of school compared to the administration of Blood Supplement Tablets (TTD).

## DISCUSSION

Preliminary measurements of the weight of adolescent girls who dropped out of school showed that the average weight of the intervention group was 45.6 kg and the control group was 46.5 kg. After the intervention, the average body weight in the intervention group increased by 0.7 ounces, while the control group did not change (0 ounces). Based on the grouping of Body Mass Index (BMI), as many as 9 respondents (60%) in the control group had normal BMI and 6 respondents (40%) were classified as thin. Meanwhile, in the intervention group, 11 people (73.3%) had normal BMI and 4 people (26.6%) were still in the lean category. This shows that intervention with moringa leaf extract capsules not only increases weight but also has an impact on improving nutritional status in general.The frequency of eating only 1-2 meals a day is not enough for the body, especially for individuals with low BMI because it can exacerbate malnutrition. Even if a person is in the normal BMI category, it does not mean that they can reduce the frequency of eating. As revealed by Ratnasari (2018), a decrease in the frequency of meals can lead to an imbalance in nutrient intake in adolescents, which ultimately impacts their nutritional status. Therefore, meal times should be adjusted regularly. According to the Ministry of Health of the Republic of Indonesia (2014), adolescents need at least three main meals and two interlude meals per day to support their growth and metabolic activity. An irregular diet can lead to metabolic disorders as well as energy and protein deficits, especially in adolescent girls who have higher nutrient needs.

The results of the analysis with the Paired T-Test showed a significant difference in body weight before and after treatment in the intervention group receiving moringa leaf extract capsules, from 41.82 kg to 42.42 kg with an average difference of 0.6 kg ($p = 0.001$; $p < 0.05$), which showed a statistically significant improvement. Meanwhile, in the control group receiving Blood Supplemental Tablet (TTD) capsules, there was an increase from 42.00 kg to 42.05 kg with a difference of 0.05 kg, but it was not statistically significant ($p = 0.068$; $p > 0.05$), indicating no significant difference before and after treatment. This significant increase suggests that moringa leaf extract plays a greater role than TTD in weight improvement, likely due to its more complete nutritional composition and stimulant effects on appetite. The results of this study show that the consumption of moringa leaf extract in the form of capsules for two months has a significant impact on weight gain in adolescent girls who have dropped out of school. In Suhartini's (2020) study, the intake of nutrients obtained from daily food by adolescent girls who dropped out of school showed good quality of consumption, including carbohydrates, protein, energy, fat, vitamins A, B1, B2, C, and Zinc. The mechanism of weight gain occurs when the intake of carbohydrates, proteins, and fats that are not immediately used by the body is converted into fat reserves and stored in adipose tissue, resulting in weight gain. In addition, Vitamin B1 and zinc play a role in increasing appetite (Masthalina et al., 2012), which supports the benefits of giving moringa leaf extract in helping weight gain. In addition, compounds such as isothiocyanate found in moringa leaves are also known to improve the body's metabolism and accelerate the absorption of nutrients, which contributes to improved nutritional status.

This study is in line with a study conducted by Srikanth et al. (2014), which showed that intervention with moringa leaf powder (Moringa oleifera) significantly increased the body weight of children and adolescents with protein energy malnutrition ($p = 0.01 < 0.05$). The study suggests that the use of moringa leaf powder can be an effective approach in overcoming malnutrition through nutrition education to mothers, children and adolescents. Family support in processing and providing nutritious food is also an important factor in the success of the nutrition status improvement program.Similarly, research by Hadju and Bahar (2014) showed a significant relationship between the administration of moringa leaf extract and weight gain among pregnant women working in the informal sector. This reinforces the suspicion that moringa can be used as a nutritional supplement in a variety of vulnerable

groups, including adolescent girls.One of the main ingredients that stands out in the moringa plant is antioxidant compounds, especially in its leaves. Utami et al. (2013) stated that moringa leaves contain high antioxidants such as vitamins A, C, E, K, B complex vitamins (B1, B2, B3, B6), choline, as well as various other compounds such as alanine, beta-carotene, flavonoids, kaempferol, lutein, quercetin, rutin, selenium, xanthin, zeaxanthin, and zinc (Syahruni, 2015). This content provides great benefits for human health and nutrition. Antioxidants are also known to reduce oxidative stress that often occurs in individuals with malnutrition, thus helping to improve the body's overall metabolic function.

A study by Church World Service conducted in Southwestern Senegal showed that the use of moringa leaf powder in children, adolescents, pregnant and lactating women helps maintain or increase weight and improve overall health status. Women in villages are trained to prepare and use moringa leaf powder in their daily meals as an effort to combat malnutrition. This participatory approach model can be adapted to be applied in the local context in Indonesia to empower communities to improve family nutrition.In addition, research by Juhartini (2015) showed that giving biscuits made from moringa leaf flour can increase the weight of toddlers with significant results ($p = 0.003 < 0.05$). Another study by Fathnur (2018) also supports this finding, where the administration of moringa pudding showed a significant increase in weight. This shows that varied forms of processed moringa still have similar effectiveness, so that interventions can be tailored to people's preferences to make them more acceptable and sustainable.

## CONCLUSION

The results showed that the administration of moringa leaf extract capsules for two months significantly increased the weight of adolescent girls who dropped out of school aged 12–18 years in North Polongbangkeng District, Takalar Regency. The intervention group experienced an average weight gain of 0.6 kg with a value of $p = 0.001$ ($p < 0.05$), while the control group receiving Blood Supplement Tablets (TTD) only experienced an average increase of 0.05 kg and was not statistically significant ($p = 0.068$). In addition, the improvement in nutritional status was also seen from the increase in the number of adolescents in the normal Body Mass Index (BMI) category in the intervention group compared to the control group. This shows that moringa leaf extract capsules have the potential to be an alternative nutritional intervention in overcoming the problem of low weight and malnutrition in adolescent girls, especially those who drop out of school. Support from various previous studies, including the benefits of nutrient and antioxidant content in moringa leaves, reinforces these findings. Therefore, moringa leaf extract can be used as an additional supplement in an effort to improve the nutritional status of adolescents naturally and affordably

## REFERENCES

Bwalya, B. B. (2015) ‘Nutritional Status Among Female adolescents aged ( 15 – 19 years ) in Zambia : Why it Matters’, Horizon Journal of Medicine and Medical Sciences, 1(1), pp. 1–7.

Fathnur (2018) ‘Efektivitas Puding Kelor (Moringa oleifera) Terhadap Perubahan Berat Badan Balita Kurang Gizi’, Jurnal Agrisistem, 14(2), pp. 134–140.

Hadju, V. and Bahar, B. (2014) ‘Moringa Leaves Extract On Food Intake And Weight Gain Of Pregnant Women Working In Informal Sector Jurnal Ilmu Kesehatan Masyarakat P, 5(November), pp. 192–201.

Jusnita, N. and Syurya, W. (2019) 'Karakterisasi Nanoemulsi Ekstrak Daun Kelor (Moringa oleifera Lamk.) (Characterization of Nanoemulsion from Moringa oleifera' Extract)', Jurnal Sains Farmasi & Klinis, 6(1), pp. 16–24. doi: 10.25077/jsfk.6.1.16-24.2019.

Krisnadi, A. dudi (2015) 'kelor super nutrisi'. Available at: http://kelorina.com/blog/ebook-kelor-super-nutrisi.com.

Kusumaryani, M. (2017) 'Brief notes : Prioritaskan kesehatan reproduksi remaja untuk menikmati bonus demografi', Lembaga Demografi FEB UI, pp. 1–6. Available at: http://ldfebui.org/wp-content/uploads/2017/08/BN-06-2017.pdf.

Marmi (2013) gizi dalam kesehatan reproduksi. yogyakarta: pustaka pelajar.

Masthalina, H., Hakimi, M. and Helmyati, S. (2012) 'Suplementasi multi mikronutrien dibandingkan Fe-asam folat terhadap kadar hemoglobin dan berat badan ibu hamil anemia', Jurnal Gizi Klinik Indonesia, 9(1), p. 34. doi: 10.22146/ijcn.15375.

Rahman, F., Fauzi, H. and Azhar, T. N. (2017) 'Analisa Metode Pengukuran Berat Badan Manusia Dengan Pengolahan Citra', 38(1), pp. 35–39. doi: 10.14710/teknik.v38n1.12663.

Ratnasari, D. (2018) 'Gaya Hidup Sehat Remaja Putri di SMAN 2 Batu', Jurusan Ilmu Keolahragaan, Fakultas Ilmu Keolahragaan, Universitas Negeri Malang, (5), pp. 1–16.

Siallagan, D., Swamilaksita, P. D. and Angkasa, D. (2016) 'Pengaruh asupan Fe, vitamin A, vitamin B12, dan vitamin C terhadap kadar hemoglobin pada remaja vegan', Jurnal Gizi Klinik Indonesia, 13(2), p. 67. doi: 10.22146/ijcn.22921.

Srikanth, V. S., Mangala, S. and Subrahmanyam, G. (2014) 'Improvement of Protein Energy Malnutrition by Nutritional Intervention with Moringa Oleifera among Anganwadi Children in Rural Area in Bangalore , India', nternational Journal of Scientifi c Study, 2(1), pp. 32–35.

Syahruni, D. (2015) 'Aktivitas Antioksidan dan Sifat Orgaboleptik Daun Kelor Berdasarkan Variasi Lama Pengeringan', jurnal pangan dan gizi.

Wanty, W., Widyastuti, N. and Purbosari, E. (2017) 'Asupan Zat Gizi Makro, Status Gizi, dan Status Imun pada Vegetarian dan Non-Vegetarian', Journal of Nutrition College, 6(3), p. 234. doi: 10.14710/jnc.v6i3.16915.