Effect of *Moringa oleifera* Leaf Capsul on Hemoglobin Levels in Anemia: A Pilot Study

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Abstract

Backgrounds. With a prevalence of 36.5%, anemia in pregnancy is public health concern in developing nations. This study aims to analyze the effect of *Moringa oleifera* leaf capsules for enhanced hemoglobin levels in pregnant women.

Methods. This study used a pretest–posttest design with a control group design. The study was conducted in Cibeureum Cimahi City, Province West Java, Indonesia. A total of 60 participants were recruited in the study. Thirty participants were divided into each groups. The treatment group received additional blood-related pills and capsules of powdered moringa leaf, and the control group received additional related tablets only. Statistical test using the Wilcoxon test.

Results. Based on analysis Wilcoxon test statistics obtained the result (p = 0.000). Hemoglobin levels in the moringa group were enhanced at 1.743 mg /dL while they increased by 0.81 mg/dL in the control group. Enhancement more moringa group tall compared to the control group.

Conclusions. Giving mothers capsules made from moringa oleifera leaves capsules for a month raises their hemoglobin levels, making their babies taller than those who do not take the supplements.

Keywords: Anemia, Capsules Leaf Moringa, Tablets, Blood

Introduction

Anemia during pregnancy is a public health concern, specifically in developing countries. [1] Anemia during pregnancy is defined by the World Health Organization (WHO) as a hemoglobin (Hb) concentration below 11 g/dL. [2] Causes of anemia include poor nutrition, infections and chronic diseases like malaria, TB, and HIV, as well as domestic violence, which are all factors that might arise during pregnancy in developing nations. [3,4]

Prevalence of anemia in women of child-brearing ag was 29.9% (15–49 years old) and in pregnant women was 36.5%, respectively, according to WHO in 2019. [5] Prevalence of anemia during pregnancy ranges from 41.8% to 43.8% worldwide, with Africa (61.3%) and Southeast Asia (52.5%) having the highest prevalence. [6,7] According to Riskesdas data 2018, the prevalence of anemia deficiency iron on mother pregnant experience enhancement from 37.1% in 2013 to 48.9% in 2017. [8] Prevalence anemia is present in pregnant women in West Java in 2020 at 7%, and in Cimahi in 2021at 6%. [9]

Anemia is one most frequent complications that occur during pregnancy. This is typically regarded as a risk factor for an unfavorable pregnancy and can lead to life-threatening issues for both the mother and the fetus, including early birth, low birth weight, miscarrage, and death. [10] When anemia no overcome so could cause a dead mother, fetus, and baby. Globally 1 in 5 deaths mother very related to anemia. [11]

The WHO advises pregnant women to consume iron and folic acid supplements (IFA) for at least 180 weeks of their pregnancy, at a dose of 30–60 mg of iron and 0.4 mg of folate. [12] The Indonesian government has to improve the nutrition intake via administration of iron and acid folate tablets during pregnancy. Intervention, however, is not yet able to reduce the prevalence of anemia in Indonesian pregnant mothers.

Hemoglobin levels are affected by several factors factor including types of food source substance iron, the composition of food, disease infection, and menstrual periods. [13] Increasing hemoglobin levels require the proper dosage of extra tablets of blood alone character supplementation as well as their combination with other micronutrients. [14] because it is necessary existence intervention nutrition and possible alternative to lower the prevalence of anemia in mother pregnant.

Moringa oleifera is native to Indonesia and has a high nutritional value. It can be used as a dietary supplement for expectant mothers to help reduce the prevalence of anemia. [15] *Moringa oleifera* extract has phytochemicals in the form of flavonoids, phytosterols, and steroids that are anti-inflammatory, anti-carcinogenic, anti-proliferative, and anti-viral. [16] *Moringa oleifera* extract has more micronutrients than

IFA because mothers who take *Moringa oleifera* can meet their demands for the micronutrient. Micronutrients like Fe in extract moringa oleifera delivers enhancement hemoglobin in mother pregnant and also prevents DNA damage due to oxidative stress. [17]

Moringa oleifera capsule was used to analyze the nutrient content in the Saraswati Bogor laboratory. Test results obtained content nutrition capsule leaf Mor & More brand moringa per 100 grams is energy 358.08 Kcal, protein 24.52%, substances iron 13.09 mg, vitamin A 261.49 mg, calcium 2940.29 mg, zinc 2.57 mg, vitamin E 66.68 mg, vitamin C 8.90 mg, and vitamin D 3.73 mg. The results of the microbiological and contamination tests on the metal indicate that it is free of lead, mold, and yeast. The purpose of the study is to determine how taking IFA and moringa oleifera capsule affects a pregnant mother's ability to increase hemoglobin levels.

Materials and Methods

Research Design

Type Research used is a quasi-experiment design with pre and posttest. This study was conducted in the West Java, Indonesia, region at the Cibeureum public health center in Cimahi City. Studies were conducted for 3 months starting from May to July 2022.

Participants

Mothers only make up the study's population, and there is anemia in the workplace. Cibeureum Cimahi City, a public health facility that later became a patient health center. Based on Puskesmas data the average number of mothers pregnant with anemia in one year final totaled 112 people. [18] All expectant mothers with anemia in the second and third trimesters are the study's subjects. Research this consist of two groups group treatment is given IFA tablets and Moringa oleifera capsules, while group control is only given IFA tablets. According to the calculation, a large sample of up to 60 respondents was acquired to assess the average difference between the two groups with 90% power. To prevent respondents drop out so added 10% to obtain a total of 66 respondents were divided into two group mother pregnant women with anemia.

Moringa oleifera capsule supplementary

The *Moringa oleifera* capsules contain 500 mg of powdered *Moringa oleifera* leaves and contain 13.09 mg of iron per100 gram. Mother pregnant given capsule leaf moringa as much as 2 × 2 capsules in a day. Giving

a pregnant mother a capsule of Moringa oleifera was done for 30 days. Capsule *Moringa oleifera* consumed together with added tablet blood taken 2 × 1 tablet. Each IFA tablet distributed contains 400 mcg of folic acid and180 mg of Ferrous Fumarate.

Data Collection and Measurement

The whole respondent conducted measurement anthropometry including body weight (BW), body height, and MUAC mid-upper arm circumference. BW was measured using the Camry brand digital scale, and MUAC was measured using the proper measuring tape following Indonesian Ministry of Health guidelines. 24 h food recall done as much as 1 time at a time beginning research. A food recall is carried out by nutritionists for knowing the intake eaten in 1 day Additionally, a meal journal is kept every week for a month, every time. This thing meant see intake eat every day to mom pregnant with anemia intake of energy, protein, carbohydrates, vitamin A, vitamin C, and substances iron. The program survey will directly record and process the daily food record data. Taking 1 ml of blood from the vein is carried out by personnel analyst at the laboratory public health center Cibeureum. Blood samples collected using the *ferrocyanide method.*

Monitoring obedience with the use sheet checklist to see compliance and effect side conducted every day very in a month by a nutritionist and assisted midwife. However, every day respondents send reports via WA (*WhatsApp*) to the Cibeureum public health nutritionist on the effects on the side. During the study no there is complaint affect side from the mother's pregnancy like diarrhea or allergy etc.

Data Analysis

Study This data is linked to compare the average hemoglobin count before and after receiving Moringa oleifera capsules. Statistical test using Wilcoxon, because the data is distributed not normal.

Ethical Considerations

This study is based on the Declaration of Helsinki and has *received ethical approval* from the UNPAD Health Committee Ethics Study under the designation 525/UN6.KEP/EC/2022. Informed consent was obtained from all subjects before participating in this study.

Results

Age Mother moment pregnancy relate to risk consequence of pregnancy and childbirth. If the mother is between 20 and 35, she is considered to be at risk. Respondents studied this part big have age pregnancy no risk. According to amount parity, 46.67% of group controls are primiparous and 40% have multipara parity. On both groups part big complete education school middle and status no work. None of the respondents have ever had a chronic illness (table 1).

Based on nutritional status respondents (table 2) are known in both group part big no malnutrition and no anemia. More anemic respondents were in the control group compared to the treatment group (40% versus 10%) however a sizable portion (36.67%)of the anemic respondents were mildly anemic.

On analysis intake food respondents (table 3), it is known that both groups have less intake of energy, carbohydrates, protein, consumption of Fe, and consumption of vitamin C. Only vitamin A is considered sufficient, although only 60% of respondents in the group treatment and 53.3% in the group control reported getting enough of it.

There are different means (p = 0.000) on the average value of HB levels before and after intervention in both groups. When compared to the group receiving treatment, which has HB levels of 1,743 mg/dL, there are significant increases in HB alterations(table 4).

Discussion

According to research, taking IFA along with a capsule of Moringa oleifera leaves for a month could raise hemoglobin levels above those of the group receiving only IFA without a capsule of Moringa oleifera leaves (1.743 mg/dL vs. 0.81 md/dL), producing results that are statistically significant (p = 0.000). Study this in line with the results study Manggul who uses a combination of biscuits flour leaf Moringa and Fe tablets (p = 0.001) and an increase in an average value of 1 g/dL. [19] Similar study findings indicate that supplementing with powdered leaf Moringa for 8 weeks in pregnant women who fall into the anemia category and are now in the third trimester can dramatically raise hemoglobin levels while also lowering perceived stress and cortisol. [20]

Giving supplementation extract leaf moringa during pregnancy is known could prevent stunting in children 36-42 months old, so recommended for consumption while pregnant. [21] According to research, moringa leaves contain a variety of micronutrients, such substance iron (7 mg) per 100 g. Leaf Moringa is rich in

vitamin A, vitamin B, vitamin C, and calcium. [22] While capsule leaf moringa has been shown to have component iron 13.09 mg/100 grams, flour leaf Moringa is reported to have a higher Fe content tall, which is 28.2 mg/100 grams.

Giving extract of Moringa oleifera to a woman pregnant could supply Abundant micronutrients including Fe, vitamin A, vitamin C, and selenium during pregnancy. Plant Moringa oleifera is known as the miracle tree because it contains numerous nutrients, both macronutrients, and micronutrients. [23] Giving intervention leaf moringa this could. Becomes supporting Fe tablets taken by a mother pregnant so the increase in maternal hemoglobin pregnant more significant. Iron absorption and metabolism are impacted by the combination of minerals, vitamins, and bioactive substances in moringa leaf. Animal studies rat show that the bioavailability substance iron leaf Moringa oleifera is more good than the bioavailability supplement substance iron, so that leaf Moringa oleifera could. serves as the foundation for efficient treatment of anemia in pregnant women. [24]

Moringa leaves are a good source of amino acids, vitamins, minerals, and various phytochemical agents. Compared to other plants, Moringa oleifera also contains a lot of iron. The high content of vitamins A and C could increase the bioavailability substance iron. [25] It has been demonstrated that vitamin C can boost iron absorption from non-heme sources by up to 4 times. Vitamin C and substances iron join to shape an easy ferro-ascorbate complex soluble and easily absorbed, vegetables and fruit very fresh and high in vitamin C are effective in increasing hemoglobin levels. Numerous studies have shown that Moringa oleifera absorption of non-heme iron from the diet that is consumed. [26]

Analysis of the food intake data reveals that both groups consume less in the way of calories, carbohydrates, protein, iron, and vitamin C and that there is no difference in the pace at which hemoglobin changes between the two groups. Besides that, upgrading sufficient Hb levels high in the group that received add tablet combination of blood and capsule leaf moringa could be considered as the effect produced by the capsule leaf moringa. Giving capsules of Moringa leaf to respondents may even help them meet their needs for a shortage of macro and micronutrients.

Supplementing with Moringa oleifera offers positive health effects, particularly for pregnant women and those with anemia-related conditions. The scientific name moringa is *Moringa oleifera* or *Moringa pterygosperma* Gaertn. In Indonesia, the consumption of leaf moringa is one alternative for fighting

deficiency nutrition. *B*ecause nearly every part of the plant is plant-based, moringa is a versatile vegetable that may be utilized as a source of food and an ingredient in locally sourced, nutritious cuisine. [17]

In additional research, Herawati et al. used IFA and eel biscuits and they found that the rate of hemoglobin improvement in mothers with pregnancy anemia who receive eel biscuit supplementation is also higher than in those who only receive IFA. [27] Enhancement rate hemoglobin more tall using IFA and eel biscuit compared with IFA and Moringa oleifera capsules. The reason for this is that whereas Moringa oleifera is a herb, eels are animals. The advantages of Moringa oleifera are used ingredients very raw and cheap and can be planted in every house resident.

There are certain restrictions on this research, specifically that the confounding variable for consumption of coffee and tea with tannins is neither measured nor quantified. Data only describe ingredient food source of tannin consumed by respondents.

Conclusion

IFA and Moringa oleifera leaves capsules are consumed together, and hemoglobin levels in expectant mothers who were previously anemic improve. This is in contrast to IFA consumption alone without Moringa Oliveira. As a suggestion, Service health can think about supplementing IFAs with a capsule of Moringa oleifera leaves.

Conflicts of Interest

All writer no have interest finance or conflict interest in study this .

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Table 1 Characteristics of Respondents

Characteristics	Treatment	%	Control	%
Age				
Risk	9	30.00	6	20.00
Not Risk	21	70.00	24	80.00
Amount	30	100.00	30	100.00
parity				
nullipara	11	36.67	8	26.67
Primipara	7	23.33	14	46.67
Multipara	12	40.00	8	26.66
Amount	30	100.00	30	100.00
Education				
SD	0	0.00	2	6.67
JUNIOR HIGH SCHOOL	7	23.33	7	23.33
SENIOR HIGH SCHOOL	20	66.67	19	63.33
College	3	10.00	2	6.67
Amount	30	100.00	30	100.00
Work				
Working	8	26.67	3	10.00
Doesn't work	22	73.33	27	90.00
Amount	30	100.00	30	100.00
History Disease				
There is	0	0.00	0	0.00
None _	30	100.00	30	100.00
Amount	30	100.00	30	100.00

Table 2 Respondents Nutritional Status

Nutritional Status	Treatment	%	Control	%
SEZ status				
KEK	2	6.67	3	10.00
No KEK	2 8	93.33	27	90.00
Amount	30	100.00	30	100.00
Anemia Status				
No Anemia	27	90.00	18	60.00
Anemia	3	10.00	12	40.00
Amount	30	100.00	30	100.00
Anemia Rate				
Anemia Light	3	10.00	11	36.67
Anemia Currently	0	0.00	1	3.33
Not anemia	27	90.00	18	60.00
Amount	30	100.00	30	100.00

Table 3 Results of Respondents' Food Intake

Food Records	Group			
	Treatment	%	Control	%
Energy				
Not enough	22	73.33	25	83.33
Enough	8	26.67	5	16.67
Total	30	100.00	30	100.00
Carbohydrate				
Not enough	24	80.00	24	80.00
Enough	6	20.00	6	20.00
Total	30	100.00	30	100.00
Protein				
Not enough	16	53.33	21	70.00
Enough	14	46.67	9	30.00
Total	30	100.00	30	100.00
Fe consumption				
Not enough	28	93.33	29	96.67
Enough	2	6.67	1	3.33
Total	30	100.00	30	100.00
Consumption of Vitamin A				
Not enough	12	40.00	14	46.67
Enough	18	60.00	16	53.33
Total	30	100.00	30	100.00
Consumption of Vitamin C				
Not enough	21	70.00	22	73.33
Enough	9	30.00	8	26.67
Total	30	100.00	30	100.00

Table 4 Changes in Hemoglobin Level Values Before and After Group Intervention _ Treatment and Group Control

Variable	Score	mean	SD	Difference	P value
Hemoglobin levels Ex . Treatment	*Pre-test*	10,190	0.7053	1,743	0.000
	Post-test	11,933	0.8864		
Hemoglobin levels Ex . Control	*Pre-test*	10.353	0.4981	0.81	0.000
	Post-test	11,163	0.907		