



Consuming Mung Beans (*Phaseolus radiatus* L.) Increase Hemoglobin Levels among Pregnant Women with Anemia in The Second Trimester at Klenang Public Health Centre, Probolinggo District

Tutik Hidayati¹, Roviatus Holila¹

¹ Sikes Hafshawaty Pesantren Zainul Hasan, Probolinggo, Jawa Timur, Indonesia

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CORRESPONDENCE

E-mail: afithuaafda2702@gmail.com

A B S T R A C T

Anemia in pregnancy is a pregnant mother with hemoglobin levels below 11 g/dL in the first and third trimesters or hemoglobin levels less than 10.5 g/dL in the second trimester. This paper investigates the effect of consuming mung beans (*Phaseolus radiatus* L.) on hemoglobin levels in the Second trimester of pregnant women with anemia. This research used a quasi-experimental design with randomized pretest-Posttest with a control group design. The population was 37 pregnant women in the second trimester who experienced anemia at Klenang PHC. Meanwhile, the sample was 34 respondents by simple random sampling. The independent variable was consuming mung beans, while the dependent variable was the hemoglobin levels. In the control group, the authors observed the consumption of Fe tablets once a day for 20 days in 17 respondents. While in the intervention group, we monitored the consumption of Fe tablets once a day and were given mung bean juice every day for 20 days in 17 respondents. The instrument used an observation sheet and a digital hemoglobin measuring device. Then, data analysis utilized the paired sample t-test with a significance of 0.05. After consuming mung beans and Fe supplements, the average hemoglobin levels in the intervention group were 12.1588g/dL. Meanwhile, in the intervention group, after Fe observation were 10.6412d/dL. There was a significant difference between the control and intervention groups $p=0.000$ ($p<0.05$). In conclusion, consuming mung beans increases hemoglobin levels among pregnant women with anemia in the second trimester.

INTRODUCTION

Anemia in pregnant women potentially can harm both mother and child (Vina Aulia et al., 2018). Anemia is a decreased red blood cells (erythrocytes) or hemoglobin (Hb) in the blood circulation, resulting in impaired oxygen transport to all body tissues (Adriani and W, 2012)

Anemia with a prevalence above 5% can be defined as a health problem in a community. However, there is no official data from the Health Office or literature reporting the prevalence of anemia in pregnant women in Probolinggo Regency (Amini et al., 2018). Pregnant women experience an increased blood volume so that the need for iron also increases. The total amount of iron needed during pregnancy is around 800-1000 mg to meet the needs of increased red blood cells. It consists of the need for 300-400 mg of iron until 32 weeks of gestation, 100-200 mg of iron to meet the fetus's needs, and 100-200 mg of

iron to meet the growth of the placenta. In addition, about 190 mg of iron is lost after delivery (Poltekkes Kemenkes Yogyakarta, 2016).

The prevalence of anemia is still relatively high. In 2015, the Health Organization (WHO) estimated the global prevalence of anemia in pregnancy was 75% in the Gambia and 5.7% in the United States. In addition, the Association of Southeast Asian Nations (ASEAN) also reported that the anemia incidence in pregnant women in developing countries was between 20-89%. The highest incidence of anemia in pregnant women in Indonesia was around 70% (Amalia, 2016)

Based on Basic Health Research in 2018, the prevalence of pregnant women with anemia in Indonesia increased from 37.1% in 2013 to 48.9% in 2019 (Maulina & Sitepu, 2015). In addition, according to the Directorate General of Nutrition, the anemia prevalence in pregnant women in 2015-2019 was 28% (Kemenkes RI, 2015). Furthermore, the East Java Provincial Department of Health stated that in 2013 the number of pregnant women with anemia in East Java was 37.02% (Simbolon, 2018). This figure still does not meet the National target in The Medium-Term National Development Plan (2015-2019) of 28% (Natalia et al., 2017).

In Probolinggo Regency, the prevalence of pregnant women with anemia reached 70% (Sumbono, 2016). Data from the Klenang Public Health Center (PHC) in Banyuwangi District in 2019 showed that anemia incidence in pregnant women was around 23%. A preliminary study was conducted in January 2021 by interviewing four pregnant women with anemia. The study showed that all respondents had received Fe tablets but did not know about foods that could increase hemoglobin levels.

Iron deficiency anemia is anemia associated with the lack of iron (Susiloningtyas, 2012). The causes of anemia during pregnancy – particularly in developing countries – are nutritional deficiencies, especially iron, folate, and vitamin deficiencies. Vitamin A deficiency during pregnancy can cause anemia (Maulina, 2015). In addition, investigations at the Klenang Public Health Center (PHC) reported that the cause of anemia was due to nutritional deficiencies, especially iron deficiency.

Anemia negatively impacts pregnant women and babies, including abortion, lack of energy during childbirth, premature birth, and low birth weight. In addition, the fetus can experience malnutrition and congenital disabilities during pregnancy (Amalia, 2016). Furthermore, anemia can also increase the risk of maternal death, perinatal death, antepartum and postpartum hemorrhage. It is because pregnant women with anemia cannot tolerate blood loss (Natalia et al., 2017).

In addition to giving Fe tablets, consumption of mung beans can be a solution to meet the iron needs in pregnant women. Mung beans are legumes with high iron content, especially in the embryo and seed coat. Its nutritional content is beneficial for pregnant women to produce red blood cells and prevent anemia. Mung beans contain phytochemicals that help the process of hematopoiesis. In addition, other nutrients in mung beans are calcium, phosphorus, iron, sodium, and potassium, which are beneficial for pregnant

women (Rai & Mayulu, 2016).

Furthermore, mung beans contain vitamin C and zinc, playing a role in treating iron-deficiency anemia. It also has seven mcg of vitamin A in half a cup. Vitamin A deficiency can worsen iron deficiency anemia (Maulina, 2015). This paper investigates the effect of consuming mung beans (*Phaseolus radiatus L.*) on hemoglobin levels among pregnant women with anemia in the second trimester.

METHOD

This research used a quasi-experimental design with randomized pretest-Posttest with a control group design. The population was all pregnant women who experienced anemia at Klenang PHC as many as 37 people. The sample was 34 pregnant women in the second trimester who experienced anemia at the Klenang PHC. Sampling in this study applied simple random sampling. The independent variable was consuming mung beans, while the dependent variable was the hemoglobin levels. In the control group, the authors observed the consumption of Fe tablets once a day for 20 days in 17 respondents. While in the intervention group, we monitored the consumption of Fe tablets once a day and were given mung bean juice every day for 20 days in 17 respondents. The instrument used an observation sheet and a digital hemoglobin measuring device. Data collection included editing, coding, scoring, tabulating, entering, and cleaning. Furthermore, data analysis utilized the paired sample t-test with a significance of 0.05.

RESULT

In this study, the characteristics of respondents consisted of maternal age, education level, and income. Most respondents were 20-35 years old (74.9%) and graduated from Senior High School (70.6%). In addition, their income were mostly IDR 500,000- 1,000,000 per month. The characteristics of respondents could be seen in table.1 in detail.

Table 1. The characteristics of respondents

Characteristics of respondents	Frequency	Percentage (%)
Maternal age (years old)		
< 20	3	8.8
20-35	27	74.9
>35	4	11.7
Education Level		
Elementary School	4	11.7
Junior High School	2	6
Senior High School	24	70.6
College	4	11.7
Income (per month)		
< IDR 500,000	0	0
IDR 500,000- 1,000,000	32	94
>IDR 1,000,000	2	6

Table 2. The average Hemoglobin Levels in Respondents Before Intervention in The Intervention and Control Groups

Group	Hemoglobin Levels (g/dL)			
	Mean	SD	Min	Max
Intervention	9.3529	0.82167	7.50	10.00
Control	10.0471	0.40792	8.90	10.40

Table 2 shows that the respondents' average hemoglobin levels before intervention are 9.3529 g/dL in the intervention group and 10.0471 g/dL in the control group.

Table 3. The average Hemoglobin Levels in Respondents After Intervention in The Intervention and Control Groups

Group	Hemoglobin Levels (g/dL)			
	Mean	SD	Min	Max
Intervention	12.1588	1.03565	10.70	14.60
Control	10.6412	0.64717	9.40	11.50

Table 3 indicates that the respondents' average hemoglobin levels after intervention are 12.1588 g/dL in the intervention group and 10.6412 g/dL in the control group.

Table 4. The Paired Sample T-Test Result

Variable	Mean	SD	N	<i>p</i>
Intervention group	12.1588	0.82167	17	
Control group	10.6412	0.64717	17	0.000

After consuming mung beans and Fe supplements, the average hemoglobin levels in the intervention group were 12.1588g/dL. Meanwhile, in the intervention group, after Fe observation were 10.6412d/dL. The paired sample t-test result obtained $p=0.000$ ($p<0.05$). Thus, there was a significant difference between the control and intervention groups (Table 4).

DISCUSSION

Most respondents in this paper were 20-35 years old. Anemia or lack of hemoglobin levels in the blood during pregnancy is caused by several factors, including maternal age and parity. The mother's age is too young (<20 years) not ready for fetal growth (Amini et al., 2018). In addition, pregnant women in the old reproductive age group (over 35 years old) are more likely to experience anemia (Indah et al., 2016).

Most respondents in this study graduated from Senior High School. The low education of pregnant women affects the acceptance of health information, so knowledge about iron (Fe) is limited. As a result, it impacts the incidence of iron deficiency anemia (Adriani, 2012).

Furthermore, respondents' income were mostly IDR 500,000- 1,000,000 per month. Previous research showed that anemia in pregnant women was more common in respondents with low economic status than those with high financial levels. The economic status could affect anemia in pregnancy (Ngurah Rai, I. G. B., Kawengian & Mayulu, 2016). Lack of income can lead to a lack of fulfillment of daily food needs. As a result, it affects the amount and quality of food consumed. Furthermore, it has an impact on the decline in the nutritional status of pregnant women.

The author concludes that there is a gap between the theory and the results of this study. The theory states that anemia during pregnancy is caused by mothers who are too young (less than 20 years) and too old (over 35 years). Meanwhile, most of the pregnant women with anemia in this study were 20-35 years. Thus, in this study, age was not the cause of anemia in pregnancy.

In addition, there is also a gap between theory and this study results at education levels. According to the theory, a low education affects the acceptance of information, so that it has an impact on the incidence of iron deficiency anemia. Meanwhile, most respondents in this study were high school graduates, so the education level was not low.

Mung bean contains iron, vitamin C, and zinc, helping iron deficiency anemia treatment. In addition, it also has vitamin A of 7 mcg in half a cup. Vitamin A deficiency can worsen iron deficiency anemia (Nora Maulina & Sitepu, 2015).

We deduce that there is no gap between theory and study results. According to theory, iron, vitamin C, and zinc in mung beans help iron deficiency anemia treatment. The research results also showed that consuming mung beans for 20 days increased hemoglobin levels in the intervention group.

Before the intervention, the average hemoglobin levels in the second trimester of pregnant women with anemia in the control group was 10.0471 g/dL, while in the intervention group was 9.3529 g/dL. In addition, the average hemoglobin levels in the control group after the observation of consuming Fe tablets was 10.6412g/dL. Meanwhile, in the treatment group, the hemoglobin level after consuming Fe supplement and mung beans was 12.1588g/dL. Furthermore, mung bean consumption affected increased hemoglobin levels in the second trimester of pregnant women with anemia.

Anemia prevention and management in pregnant women can be done by pharmacological and non-pharmacological. One way to overcome anemia is to identify the cause. The causes of anemia in pregnant women are insufficient iron intake, increased maternal need for iron, increased blood plasma volume that is not matched by an increased red blood cell (Simbolon, 2018). The discrepancy between increased plasma volume and erythrocyte count is most common in the second trimester of pregnancy.

According to the Indonesian Ministry of Health, one of the efforts to overcome anemia is iron supplementation administration (Aulia et al., 2018). In the current government program, every pregnant woman gets 90 tablets of iron supplementation during her pregnancy. The tablet contains 320 mg FeSO₄ (60 mg iron) and 0.25 mg folic acid (Susiloningtyas, 2012).

In addition, non-pharmacological methods for anemia prevention and control are nuts consumption, one of which is long beans. Previous research revealed an effect of giving long bean juice to increase hemoglobin levels in anemic pregnant women (Setyaningsih, 2017).

In addition to long beans, beans that contain high iron are mung beans. The iron content in mung beans is 6.7 mg per 100 grams, while in the red beans is 5.0 mg and in the long beans is 6.2 mg per 100 grams

(Sumbono, 2016). Research stated that mung bean drink increased hemoglobin levels in the midwifery study program (Amalia, 2016). In addition, a study in Wistar white rats (*Ratus norvegicus*) showed that mung beans (*Phaseolus radiatus*) administration increased hemoglobin levels in white male rats. In the study, the dose of mung beans administration was 18 g/kg/BW/day and 36 g/kg/BW/day (Maulina, 2015) Fe content in mung beans is high and superior to red beans and long beans. Thus, it is proven that consuming mung beans increase hemoglobin levels in pregnant women with anemia

CONCLUSIONS

In conclusion, consuming mung beans (*Phaseolus radiatus L.*) increases hemoglobin levels among pregnant women with anemia in the second trimester. Health workers should provide health education to consume mung beans to complement iron supplementation. So that anemia in pregnant women can be prevented and overcome.

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