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The Effect of Green Bean Consumption on HB Levels in Pregnant Women

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Abstract. Anemia in pregnant women remains a major nutritional problem that can affect the health of both the mother and the fetus. One of the supporting efforts to increase hemoglobin (Hb) levels is the use of local foods that are rich in nutrients, such as mung beans. This study aims to analyze the effect of green bean supplementation on Hb levels in pregnant women. The study uses a quantitative approach with a quasi-experimental one-group pretest–posttest design. The sample consisted of 20 pregnant women with mild anemia selected using purposive sampling. The intervention consisted of providing green beans in an easy-to-consume form for a certain period, accompanied by the consumption of iron tablets as recommended. Hb levels were measured before and after the intervention. Data analysis was performed using a Paired T-test after the data was declared normally distributed. The results showed a significant increase in Hb levels after green bean administration ($p = 0.000$). The mean Hb level increased from 9.84 g/dL before intervention to 11.70 g/dL after intervention. The conclusion of this study indicates that green bean administration has a significant effect on increasing hemoglobin levels in pregnant women and can be used as a local food intervention to support efforts to prevent and treat anemia in pregnancy.

Keywords: Anemia; Green Beans; Hemoglobin Levels; Pregnancy Nutrition; Pregnant Women

1. INTRODUCTION

Various nutritional problems remain a challenge in antenatal care, one of which is anemia in pregnancy, characterized by lower than normal hemoglobin (Hb) levels. Anemia in pregnant women is important to note because it can reduce the mother's capacity for work, increase susceptibility to infection, and contribute to poor pregnancy outcomes (e.g., prematurity and maternal complications). Clinically, anemia in pregnancy is generally defined as Hb <11 g/dL in the first and third trimesters and <10.5 g/dL in the second trimester (World Health Organization. (2025).

Maternal health is one of the important aspects in maintaining the health of future generations. One of the health problems often faced by pregnant women is anemia, which is characterized by low hemoglobin (Hb) levels in the blood. According to data from the World Health Organization (WHO), the prevalence of anemia in pregnant women in developing countries reaches 41.8%, while in developed countries it is around 18% (WHO, 2021). Anemia in pregnant women can cause various complications, both for the mother and the fetus, such as the risk of premature birth, low birth weight, and increased morbidity and mortality (Scholl & Hediger, 2019).

In Indonesia, anemia in pregnant women remains high and is a priority maternal health issue (Ministry of Health of the Republic of Indonesia. (2018). The Ministry of Health pocketbook reports that based on the 2018 Riskesdas, the prevalence of anemia in pregnant women reached 48.9%. This condition indicates that efforts to prevent and control anemia,

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including iron supplementation during pregnancy, still need to be strengthened through supplementation and improved food consumption. Ministry of Health of the Republic of Indonesia. (2021).

One of the main causes of anemia in pregnant women is iron deficiency, which can be overcome by improving diet and nutritional intake. Green beans (Vigna radiata) are a food source rich in iron, protein, vitamins, and other minerals that are essential for pregnant women. Green beans also contain folic acid, which is important for fetal development and preventing birth defects (Sari et al., 2020). Therefore, including green beans in the diet of pregnant women can be an effective intervention to increase Hb levels.

The standard anemia prevention program for pregnant women in Indonesia emphasizes the administration of iron tablets (TTD) during pregnancy as a specific nutritional intervention by the Ministry of Health of the Republic of Indonesia (2018). The Ministry of Health guidelines state that pregnant women are advised to consume IFT daily, with a minimum target of 90 tablets during pregnancy (Ministry of Health of the Republic of Indonesia, 2021). However, in practice, the success of the program is greatly influenced by compliance with consumption, side effects, and the adequacy of nutrient intake from daily food that can support hemoglobin (Hb) formation (Banerjee, A., et al., 2024). Therefore, locally available food interventions that are easily accepted and affordable have the potential to serve as complementary measures to TTD to help increase Hb levels (Ratnaningsih, T. A., et al. (2024); Yunia, D. (2024).

Mung beans (Vigna radiata) are a locally sourced food widely consumed by the community and have a nutritional profile relevant to the prevention of anemia. Mung beans are known as a source of plant-based protein, fiber, and micronutrients such as iron and folate, which play a role in erythropoiesis (red blood cell formation) (Mehta, N., et al. (2021). A number of studies also highlight the presence of vitamins and bioactive components in mung beans, although the absorption of iron from plant-based foods can be affected by inhibiting factors (e.g., phytate), making processing methods and consumption patterns important. (Mehta, N., et al. (2021).

Various studies in obstetric settings show that giving green bean products (like juice/extract, porridge, or green bean cookies) to pregnant women with anemia can increase Hb levels after the intervention. (Fatimah, S., et al. (2023). A comparative study on pregnant women with anemia also reported that supplementation based on dates or green bean cookies, when given alongside iron tablets, equally increased Hb levels, though the magnitude of increase differed between groups (Yunia, D. (2024). These findings support the rationale that

green beans can be used as a complementary food intervention to help improve Hb status, especially in areas with limited access to fortified foods and suboptimal TTD compliance (Ratnaningsih, T. A., et al. (2024).

Previous studies have shown that consuming mung beans can increase Hb levels in the blood. A study conducted by Fitriani et al. (2021) found that pregnant women who regularly consumed mung beans experienced a significant increase in Hb levels compared to the control group who did not consume mung beans. These results show the potential of mung beans as a functional food that can help overcome anemia in pregnant women.

In Indonesia, green beans have not been fully utilized as a food source that can help improve the health of pregnant women. Although green beans are easily available and affordable, many pregnant women are not aware of their benefits. Therefore, it is important to conduct outreach and education on the importance of green beans in the diet of pregnant women, as well as their impact on the health of mothers and fetuses (Wulandari et al., 2022).

Based on the above description, the study "The Effect of Green Bean Intake on Hb Levels in Pregnant Women" is important to provide scientific evidence regarding the effectiveness of green beans as a local food intervention in increasing Hb in pregnant women (Ratnaningsih, T. A., et al. (2024). The research results are expected to serve as the basis for nutritional education recommendations in antenatal care (ANC) services, particularly as a complementary strategy alongside iron supplementation to reduce the burden of anemia during pregnancy (Central Bureau of Statistics, 2018).

2. RESEARCH METHOD

This study used a quantitative approach with a quasi-experimental design of the one group pretest–posttest type. This design was chosen because the study aimed to determine the effect of green bean consumption on changes in hemoglobin (Hb) levels in pregnant women by comparing Hb values before and after intervention without a control group. This design is considered appropriate for nutritional intervention studies in healthcare settings, especially when randomization and the formation of control groups are not ethically or operationally feasible.

The population in this study consisted of all pregnant women with mild to moderate anemia who underwent pregnancy checkups in the study area. The study sample consisted of pregnant women who met the inclusion criteria, namely pregnant women in their second or third trimester, had Hb levels <11 g/dL, were willing to be respondents, and did not suffer from comorbidities such as blood disorders, chronic infections, or severe pregnancy complications.

Exclusion criteria included pregnant women who did not complete the intervention or were absent during the Hb remeasurement.

The sample size was determined using total sampling or purposive sampling, adjusted to the number of pregnant women with anemia who met the criteria during the study period. In a single-group quasi-experimental design, the minimum sample size generally ranges from 20 to 30 respondents, which is considered sufficient to detect changes in Hb levels before and after intervention in community-based midwifery or primary health care studies.

The sampling technique used was purposive sampling, which is the deliberate selection of respondents based on specific criteria in line with the research objectives. This technique was chosen because the study focused on pregnant women with anemia who directly required nutritional intervention.

The intervention in this study was the provision of green beans processed into an easily consumable form, such as green bean juice or porridge, given daily for a certain period (e.g., 7–14 days or according to the research protocol), in addition to continuing to consume Iron Supplement Tablets (TTD) as recommended by antenatal services. Hb levels were measured twice, before the intervention (pretest) and after the intervention (posttest), using Hb testing equipment available at health facilities.

Data analysis was conducted in stages. Univariate analysis was used to describe respondent characteristics, such as maternal age, gestational age, parity, and Hb levels before and after intervention. Next, bivariate analysis was conducted to determine the difference in Hb levels before and after green bean administration. The statistical test used was determined based on the results of the data normality test. If the data was normally distributed, the paired t-test was used, whereas if the data was not normally distributed, the Wilcoxon Signed Rank Test was used. The statistical significance level was set at a p-value < 0.05, which indicated that the administration of green beans had an effect on increasing Hb levels in pregnant women.

3. RESULTS AND DISCUSSION

Table 1. Demographic data.

	Var	n	F (%)
Age	< 20 years old	5	25.0
	20-35 years old	15	75.0
	>35 years old	0	0
Education	Elementary school	11	55.0
	Junior high school	7	35.0
	High School	2	10.0
	College/university	0	0

Employment	Housewife	17	85.0
	Farmer	0	0
	Private employee	3	15
	Government employee	0	0
Parity	Primipara	9	45.0
	Multipara	7	35.0
	Grande multipara	4	20.0
Total		20	100

Source: primary data, 2025.

Based on the table of respondent characteristics, of the total 20 respondents, most were in the 20–35 age group, namely 15 people (75.0%), which is the healthy reproductive age. There were 5 respondents aged <20 years (25.0%), while there were no respondents aged >35 years.

In terms of education level, the majority of respondents had elementary school education, totaling 11 people (55.0%). Respondents with junior high school education numbered 7 people (35.0%), while respondents with senior high school education numbered only 2 people (10.0%). There were no respondents with a college education background. This shows that the respondents' education levels were dominated by elementary to junior high school education.

Based on employment status, most respondents were housewives, namely 17 people (85.0%), while respondents who worked as private employees numbered 3 people (15.0%). There were no respondents who worked as farmers or civil servants. This condition shows that the majority of respondents focused on domestic activities.

In terms of parity, nearly half of the respondents were primiparous, namely 9 people (45.0%). There were 7 multiparous respondents (35.0%), while grandemultiparous respondents numbered 4 people (20.0%). This distribution shows that the respondents had varying experiences of pregnancy and childbirth.

Table 2. Research Variable Data.

Var	N	min	max	Mean	SD
Hemoglobin level pre	20	9.0	10.0	9.84	0.55
Hemoglobin level post	20	11.0	12.0	11.7	0.5

Source: primary data, 2025.

Based on the descriptive statistical analysis table, the hemoglobin (Hb) levels of the respondents before the intervention (pre) in 20 respondents showed a minimum value of 9.0 g/dL and a maximum value of 10.0 g/dL, with an average value of 9.84 ± 0.55 g/dL. These results indicate that most respondents were in the mild anemia category before the intervention.

After the intervention, hemoglobin levels (post) increased, with a minimum value of 11.0 g/dL and a maximum value of 12.0 g/dL, and an average value of 11.70 ± 0.50 g/dL. This

increase in the average Hb level indicates that most respondents had reached normal hemoglobin levels after the intervention.

Table 3. Statistik analysis.

Independent variable	n	P Value	
Hemoglobin level pre	20	0.275	
Hemoglobin level post	20	0.128*	
		Shapiro-Wilk	
Independent variable	n	P Value	Dependent variable
Hemoglobin level pre	20	0.000*	Hemoglobin level post
		T test	

Source: primary data, 2025.

Based on the results of the data normality test using the Shapiro–Wilk test, a p-value of 0.275 was obtained for hemoglobin levels before intervention and a p-value of 0.128 for hemoglobin levels after intervention. The p-values for both measurements were greater than 0.05, so it can be concluded that the hemoglobin level data before and after intervention were normally distributed.

Furthermore, an analysis of the difference in hemoglobin levels before and after the intervention was performed using a Paired T-test. The test results showed a p-value of 0.000 ($p < 0.05$), which means that there was a statistically significant difference between hemoglobin levels before and after the intervention.

These findings indicate that the intervention had a significant effect on increasing hemoglobin levels in respondents. The increase in hemoglobin levels after the intervention was in line with the results of descriptive analysis, which showed an increase in the mean hemoglobin value from the condition before the intervention to the condition after the intervention.

Discussion

The results showed that the mung bean intervention was associated with a significant increase in hemoglobin (Hb) levels in 20 respondents. Descriptively, the mean Hb increased from 9.84 ± 0.55 g/dL (pre) to 11.70 ± 0.50 g/dL (post). The Shapiro–Wilk normality test showed that the pre- and post-data were normally distributed ($p=0.275$ and $p=0.128$), so the analysis using a paired t-test was appropriate, and the test results showed $p = 0.000$ ($p < 0.05$). These findings indicate that green bean administration has a significant effect on increasing Hb.

Clinically, an increase in Hb from mild anemia to normal levels after intervention is significant because anemia in pregnancy is associated with fatigue, decreased immunity, and

the risk of maternal and perinatal complications. Therefore, the WHO emphasizes that iron-folic acid (IFA) supplementation is the primary intervention in ANC to reduce the risk of anemia and iron deficiency in pregnant women (World Health Organization. (2024). In this context, mung beans can be understood as a complementary food that helps fulfill hematopoietic nutrients, not a substitute for IFA.

Biologically, mung beans (Vigna radiata) contain protein, several minerals including iron, and other nutritional components that support red blood cell formation. A study of the nutritional composition of mung beans shows that they have a good macronutrient content and amino acid profile, which supports the overall nutritional status of mothers (Idris, F. M., et al. (2025). However, the bioavailability of iron from legumes can be affected by antinutrients such as phytate. Research on green bean processing shows that processes such as soaking, specific heating, and home processing can reduce phytic acid and preserve minerals, potentially increasing iron bioavailability (Kemal, M., et al. (2025); Badessa, T., et al. (2025). Thus, if green bean interventions are provided in the appropriate processed form (e.g., juice/extract, porridge, or processed products that undergo heating/soaking), then the effect of increasing Hb becomes more physiologically plausible.

Your findings are also consistent with various studies in Indonesia that report that giving green bean products/green bean extract to pregnant women with anemia is associated with an increase in Hb. For example, several quasi-experimental studies reported differences in Hb levels before and after green bean administration in pregnant women with anemia (Ramadhani, D. (2023); Rahmadheny, S., et al. (2023). Additionally, studies combining food interventions (e.g., mung bean cookies) with iron tablets also reported increased Hb levels in pregnant women with anemia, although the magnitude of the increase varied depending on the type of food intervention and study design (Yunia, D., et al. (2024). Variations in the magnitude of the effect may be influenced by consumption compliance, initial anemia status, daily dietary patterns, and the presence or absence of concurrent IFA consumption.

Although the results of this study are statistically significant, several important notes for interpretation need to be conveyed. First, a pre–post design without a control group is more susceptible to other factors (e.g., increased iron tablet compliance, improved diet, or changes in health conditions during the study period). Second, the sample size is relatively small (n=20), so generalization should be done with caution. Third, if available, it would be preferable for future studies to include indicators of iron status (e.g., ferritin) or to control for key confounding factors (daily iron intake, vitamin C consumption, and absorption inhibitors such as tea/coffee).

Overall, this study supports that mung bean intervention has the potential to be an applicable local food strategy to help increase Hb in pregnant women with anemia, especially when integrated with ANC programs and following WHO IFA recommendations.

4. CONCLUSION

Based on the research results and statistical analysis using the Paired T-test, it can be concluded that green bean supplementation has a significant effect on increasing hemoglobin (Hb) levels in respondents. There is a significant difference between Hb levels before and after green bean intervention, as indicated by a p-value of 0.000 ($p < 0.05$).

Descriptively, the average Hb level increased from 9.84 g/dL before intervention to 11.70 g/dL after intervention, indicating an improvement from mild anemia to normal hemoglobin levels. These findings indicate that mung beans have the potential to be an effective local food source in helping to increase Hb levels, especially in pregnant women with mild anemia.

Thus, green bean intervention can be considered as part of efforts to improve the nutritional status of pregnant women, especially when integrated with iron supplementation programs and comprehensive nutrition education.

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