

Effectiveness of Moringa Honey on Hemoglobin Level in Pregnant Women with Anemia

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Abstract: Morbidity in pregnant and maternity women is a big problem in developing countries. According to WHO, 40% of maternal deaths in developing countries are related to anemia in pregnancy caused by iron deficiency and acute bleeding. Fulfillment of good nutrition and rich in macro and micro nutrients can improve the health status of pregnant women. Moringa honey is one of the innovations in developing honey products produced by Apis Mellifera bees, which are fed with Moringa leaf juice and processed, then stored in bee hive cells to produce Moringa honey. The study used a True Experiment type, with a Double Blind Randomized-Controlled Trial design. The research sample consisted of 29 anemic pregnant women. All subjects received the same treatment, a dose of 15 ml honey which was consumed for 8 weeks every morning before eating and all subjects continued to take Fe tablets at night. Data analysis used T-test and for the effectiveness used N Gain score. There are significant differences in Hb levels of pregnant women before and after intervention with Moringa honey. There are also significant differences in Hb levels of pregnant women before and after intervention with ordinary honey. Moringa honey intervention has a higher level of effectiveness (26%) than ordinary honey (16%) in increasing blood hemoglobin levels of pregnant women. Moringa honey can be given to pregnant women with anemia as a companion to Fe tablets to increase blood Hb levels more maximally.

Keywords: moringa, honey, hemoglobin, pregnant women, anemia

1. Introduction

One of the priority indicators of the Ministry of Health in the National Long-Term Development Plan (RJPN) 2005-2025 is the maternal and child health program. Morbidity in pregnant and maternity women is a major problem in developing countries. Anemia in pregnancy is the condition of the mother with hemoglobin (Hb) < 11 g% in the first and third trimesters, while in the second trimester the hemoglobin level is < 10.5 g%. Anemia of pregnancy is called "potential danger to mother and child" (potential to harm mother and child), that's why anemia requires serious attention from all parties involved in health services [1].

Pregnant women are very susceptible to iron deficiency anemia because during pregnancy the need for oxygen is higher, which triggers an increase in erythropoietin production. As a result, plasma volume increases and red blood cells (erythrocytes) increase. However, the increase in plasma volume occurs in a greater proportion when compared to the increase in erythrocytes so that the decrease in hemoglobin concentration (Hb) occurs due to hemodilution [2].

According to the World Health Organization (WHO) globally, the prevalence of anemia in pregnant women worldwide is 41.8%. According to WHO (2019), 40% of maternal deaths in developing countries are related to anemia in pregnancy caused by iron deficiency and acute bleeding [3]. Based on Riskesdas 2018, the prevalence of anemia in pregnant women increased from 37.1% in 2013 to 48.9% in 2018. The incidence of anemia in pregnancy is dominated by mothers aged 15-24 years [4].

The government has carried out a program to reduce the incidence of anemia by giving blood-added tablets (1 tablet of Fe containing 200 mg of ferrosulfate and 0.25 mg of folic acid) which are consumed as many as 90 tablets, the dose is given 1x1 day during pregnancy which is given in the second trimester pregnancy, in an effort to correct a severe deficiency in hemoglobin levels and ultimately restore iron stores. but this has not been able to overcome the problem of anemia, because compliance in consuming Fe tablets, access to health services, family support, lack of socialization, to side effects and local belief myths trigger pregnant women not to consume blood-enhancing tablets [5].

Efforts are being made to address risk prevention in pregnant women, among others, through the fulfillment of good nutrition and rich in macro and micro nutrients. Fulfillment of nutrition can improve the health status of pregnant women and prevent pregnant women from getting complications during pregnancy, childbirth, postpartum to the prevention of risks that can be experienced by the fetus [6].

Moringa honey is one of the innovations in developing honey products produced by Apis Mellifera bees, which are fed with Moringa leaf juice and processed, then stored in bee hive cells to produce Moringa honey. Moringa honey is an herbal supplementation that aims to improve the nutritional status and health of pregnant women [7]. The nutritional content of Moringa honey has been previously studied with higher carbohydrate, protein, fat, polyphenol and flavonoid content than honey plus Moringa [8].

A review of research on honey was further carried out by Bachtiar et al who suggested an increase in hemoglobin levels in the administration of honey for 2 months with an increase in hemoglobin levels (1.79-2.27 g/dL) [9].

2. Methods

The study used the True Experiment type, with a Double Blind Randomized controlled trial design, where the parties involved in the study such as researchers and subjects did not know the difference between Moringa honey or ordinary honey given. The research sample consisted of 29 anemic pregnant women consisting of 14 subjects with the moringa honey and 15 subjects with ordinary honey. All subjects received the same treatment, namely the administration of MK/MB at a dose of 15 ml which was consumed every morning before meals for 8 weeks. By continuing to consume Fe tablets that were obtained at the puskesmas or other health services or those given directly by the researcher. Fe tablets are taken at night. After 8 weeks of intervention, both groups will then be examined for Hemoglobin Levels (post-test) by taking a second blood sample from each group.

In this design, the intervention group receiving moringa honey will be measured. The results of the observations were then controlled and compared with the results of the observations in the control group that received ordinary honey. The population in this study were all pregnant women with anemia of gestational age 20-27 weeks with a total of 80 pregnant women from February to April at the Turikale Health Center and Lau Health Center, Maros Regency. Technique taking sample conducted by random sampling. The sample to be used is determined by the inclusion and exclusion criteria.

The criteria in the study help in reducing bias in the results of the study. The two criteria for the sample in the study are: (1) Inclusion criteria are pregnant women with anemia, gestational age 20-27 weeks, mothers are willing to be respondents and are willing to consume Moringa honey or ordinary honey for 8 weeks; single fetus; do not have serious diseases such as heart disease, pulmonary TB, malaria, infection, hemoglobinopathy, diabetes mellitus, hypertension, autoimmune preeclampsia and eclampsia. (2) Exclusion criteria is the mother moved to another area. (3) Drop out criteria are the mother who did not consuming Moringa honey or ordinary honey in 1 week; Refusing to continue consuming Moringa honey or ordinary honey. Data analysis used T-test and for the effectiveness used N Gain score in in SPSS version 25 and presented in tabular form.

3. Result

This study consisted of 29 samples, an intervention was carried out for 8 weeks with the provision of Moringa honey and ordinary honey. Based on the table, it can be seen that in this study, most of the pregnant women aged 26-30 years were 11 pregnant women (37.93%), then aged 20-25 years were 10 pregnant women (34.47%) and only 8 pregnant women (27.6%) aged 31-35.

Table 1. The Characteristics of participants (n: 29)

Characteristics		Total (n = 29)	Weighted (%)
Age (years)	20-25	10	34.47
	26-30	11	37.93
	31-35	8	27.6
Gestational Age (weeks)	20-23	20	69
	24-27	9	31

Table 1 also shows that the gestational age of most pregnant women is 20-23 weeks, namely as many as 20 pregnant women (69%), and only 9 pregnant women (31%) with a gestational age of 24-27 weeks.

Table 2. Effect of Consumption of Moringa Honey and Ordinary Honey on the increase in Hb of Pregnant Women (T-test)

Variable	mean	Std. Dev	SE	95% CI	P -Value
Moringa Honey pre-post test	1, 3857	1.6261	0.43461	-2.32 -0.44	0.007
Ordinary Honey pre-post test	9.9429	0, 9112	0, 2453	-1.17 -0.33	0.002

Table 2 shows that there is a significant difference ($p = 0.007$) in the average Hb value of pregnant women before and after being given Moringa honey. In addition, a significant difference was also found ($p = 0.002$) in the sample group intervention with ordinary honey on the Hb value of pregnant women before and after the intervention.

Table 3. The effectiveness of Moringa Honey and Ordinary Honey on the increase in Hb of Pregnant Women (N-Gain score test)

Variable	Minimum	Maximum	Mean
Moringa Honey	0.00	130.61	26,772
Ordinary Honey	0.00	66.67	16.511

Based on the results of the N-gain score test calculation above, it shows that the average N-Gain score for Moringa honey is 26,772 and for ordinary honey it is 16,511.

4. Discussion

Given the individual characteristics of pregnant women, it was noticed that most of the sample is in the ideal age range for reproduction, from 26 to 30 years. Extremes of maternal age (≤ 15 or ≥ 35 years) are known to be related to worse perinatal outcomes [10].

If the hemoglobin level in the blood of pregnant women is less than 11 g/dL in the first and third trimesters, and less than 10.5 g/dL in the second trimester, the condition is anemia [11]. In this study, most of the samples were between 20-23 weeks of gestation, this is in accordance with the high need for iron in Trimester II-III which is not enough if only supplied through the administration of Fe tablets, but must be balanced by consuming foods with nutritional content macro and micro. Maternal iron requirement during pregnancy is 1000 mg, this requirement is needed for fetal growth, formation of the placenta, increased mass of hemoglobin and red blood cells [12].

In this study, using the T test, it was found that the consumption of Moringa honey and ordinary honey had a significant effect on the increase in Hb. This is in line with research conducted by Sylvie. The results of the comparative hypothesis test with the Wilcoxon test between Hb levels before and after treatment obtained a significance value of 0.000 ($p < 0.05$), so it can be concluded that there is a significant difference between Hb levels before and after treatment [13].

Honey is a natural supplement that is good for mothers to consume during pregnancy. Honey contains a source of carbohydrates, protein, vitamins A, B1, B3, B12, B5, C, D, E, K, Beta carotene, as well as mineral content, salt and other substances such as iron, sulfur magnesium, calcium, potassium, sodium, phosphorus, as well as antibiotics, antioxidants and digestive enzymes [14].

Vitamin C in honey helps the process of iron absorption. vitamin B12 and folic acid, help the formation of new cells, so it can affect the Fe in the blood as an increase in hemoglobin. Iron with vitamin C forms a soluble and easily soluble iron ascorbate complex to be absorbed by the organs of the human body. The conversion of non-heme iron in the form of ferric metabolizing compounds to ferrous will be even greater when the pH is acid in the stomach. Vitamin C can increase acidity so that it helps increase iron absorption by 30.6%. In addition, the presence of folic acid is also important for the formation of new cells, so it can affect Fe in the blood and is expected to increase hemoglobin [15].

Another study was also conducted by Wardiyah and Ervina which revealed that giving honey to pregnant women in the third trimester can increase the hemoglobin levels of pregnant women with the average value of hemoglobin levels before being given honey was 9.973 gr/dL after being given honey increased to 10, 66 gr/dL [16].

Moringa contains 14 macronutrients and 21 micronutrients Fresh Moringa leaves contain protein, fat, carbohydrates, fiber, potassium, magnesium, Senium Vitamins B, B2, B3, C, E and Iron which play a role in help increase Rate Hemoglobin on mother pregnant [17]. High antioxidant content, with polyvenol compounds, flavonoids, and in Moringa can inhibit oxidation reactions due to free radicals in the body increase the number of erythrocytes. This is in line with research Yusnidar which has proven the effect of increasing hemoglobin levels in the mother pregnant with an average increase ($1,479 \pm 0.352$ g/dL) in the leaf meal group Moringa and increase (0.773 ± 0.420 g/dL) in the group receiving only iron tablets [18].

Based on the results of the N-gain test calculation shows that Moringa honey has a higher effectiveness than ordinary honey in increasing Hb in the blood, although categorically the figure of 26% on the effectiveness of Moringa honey is still in the ineffective category, these results still indicate that the use of Moringa honey Better than regular honey. Given this trend, it can be assumed that only a more precise composition or modification of the right consumption frequency is needed so that a better percentage of effectiveness can be obtained.

5. Conclusion

Consumption of Moringa honey and ordinary honey have a significant effect on hemoglobin levels in the blood. Consumption of Moringa honey and ordinary honey are both in the ineffective category. However, the presentation of the effectiveness of Moringa honey is higher than the presentation of the effectiveness of ordinary honey.

Conflicting Interest

All authors declare no conflict of interest.

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