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Article

Katuk Leaves (*Sauropus androgynus (L.) Merr)* on Hemoglobin Level among Pregnant Women in Third Trimester

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A B S T R A C T

Background: In 2018, 41,8% of amternal mortality in developing countries was caused by anemia in pregnancy, the prevalence of anemia in Indonesia is still very high at 44,2%. One of the causes of anemia is a lack of iron in the body. Anemia can be prevented by consuming foods that contain iron and vitamin C to help the absorbtion process, by consuming katuk leaves while continuing to consume Fe Tablets according to government recommendations.

Purpose: This study aims to determine the effect of Katuk Leaves (*Sauropus androgynus*) and Fe Tablets on hemoglobin levels among pregnant women in third trimester.

Methods: This research is aquassy experiment pre and post test with control group design. The population in this study was 86 third trimester pregnant women which 45 had anemia in last 6 month at Private Midwifery Practice N. The sample were divided by intervention group and cotrol group, each group was 15 pregnant women, according to sample theory of experimental research. The sampling technique used purposive sampling. The research instrument used observation sheets and Digital Hemoglobinometer. The data analyzed with parametric test, the t-test.

Results: The result of statistic tests showed that there was an effect of katuk leaves and Fe tablets on hemoglobin level with p value of 0,00 (<0,005).

Conclusion: Consumption katuk leaves and Fe tablet is more effective in changing hemoglobin levels compared to consuming Fe tablets only.

INTRODUCTION

Pregnancy is a series of processes, starting from conception, or when the healthy ovum meets with sperm, followed by fertilization, nidation, and implantation.(1) Approx. 51.4% of women experienced nausea, and 9.2% of women experienced vomiting.(2)

Iron deficiency anemia (ADB) is the type that most affects children worldwide, and most often in developing countries, namely Indonesia. This condition is a result of an increase in iron levels in the patient's urinary tract. According to estimates, 30% of people worldwide suffer from anemia, with the majority of cases occurring in developing countries.(3) According to World Health Organization (WHO) In 2019, global anaemia prevalence was 29.9% (95% uncertainty interval (UI) 27.0%,

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32.8%) in women of reproductive age, equivalent to over half a billion women aged 15-49 years. Prevalence was 29.6% (95% UI 26.6%, 32.5%) in non-pregnant women of reproductive age, and 36.5% (95% UI 34.0%, 39.1%) in pregnant women.(4)

According to data from the West Java Health Office over the past five years, there were approximately 80 million mothers with anemia in 2019 and around 60 million mothers with a decrease in 2020. Around 7002 anemia babies were found in Bogor Regency in 2019, and 4968 anemia babies were found in Bogor Regency in 2020. Despite the decline, Bogor Regency continues to increase and occupies the second highest number after Garut Regency was 5901 anemia mothers.(5)

The effect of iron supplementation upon the outcome of pregnancy in female rats with normal iron status at the commencement of pregnancy has been investigated in this present study. In the majority of previous investigations of animal models, primarily the rat, of the effects of iron supplements in pregnancy, the emphasis has been primarily on the effect of maternal iron depletion upon the developing foetus, e.g. low birth weights and its consequence upon the offspring e.g. elevated blood pressure at 3 months.(6)

The haematological results showed that iron supplementation at the commencement of pregnancy did not significantly alter parameters of iron adequacy, namely transferrin saturation and haemoglobin, despite the fact that the hepatic iron content in the supplemented pregnant rats was significantly higher than controls. However the literature states that these changes in blood parameters, caused by changes in blood volume with the resulting haemodilution as well as changes in red cell mass, are merely a normal physiological response to pregnancy and are not indicators of an underlying pathology.(7)

Indonesia is an agricultural country with many medicinal herbs and plants that can be used as herbal ingredients. One of these plants is Katuk (Sauropus androgynus), which many Indonesians have known as a rich plant in nutrients and secondary metabolites. Katuk is rich in provitamin A which plays an essential role in eye health, reproductive health in humans and animals, vitamin C as a natural antioxidant, iron as a preventative for anemia. Katuk is considered a cheap, nutritious vegetable in various regions in Indonesia. According to Hegnauer, in 1964, katuk contains essential oils, sterols, saponins, flavonoids, triterpenoids, organic acids, amino acids, alkaloids, and tannins. Tannin compounds are antichelators that can bind metals that enter the blood vessels to prevent the bonding between Pb and hemoglobin.(8)

According to Suprayogi (2000), katuk leaves contain several valuable substances such as carbohydrates, proteins, fats, iron, phosphorus, and vitamins (A, B, and C). Besides that, katuk leaves also contain several active compounds such as saponins, tannins, flavonoids, steroids, polyphenols, prostaglandins, and papaverines. Tannin compounds are antichelator compounds that can bend metal into blood vessels to prevent the bond between Pb and Hemoglobin from occurring.(9)

From the results of observations in PMB N, there are still many pregnant women who experience mild anemia in the third trimester, so the author is interested in conducting research with the title " Effect of Katuk Leaves (*Sauropus Androgynus*) and Fe Tablets on Hemoglobin Level among Pregnant Women in Third Trimester in Private Midwifery Practice N."

METHOD

This research is a quassy experiment pre and post test with control group design. The population in this study was 86 third trimester pregnant women which 45 had anemia in last 6 month at Private Midwifery Practice N. The sample were divided by intervention group and cotrol group, each group was 15 pregnant women, according to sample theory of experimental research. The sampling technique used purposive sampling with criteria was the pregnant women of moderate anemia; willing consumption katuk leaves and fe tablets for 14 days; and non consumtion another multivitamis and mineral during the research. The research instrument used an observation sheets to monitor of consumption the katuk leaves drinks and Fe Tablets, and we used a Digital Hemoglobinometer for checking of hemoglobin. The katuk leaves drinks, we gave 300 ml/day at the morning and evening for 14 days. The data analyzed with parametric test, the t-test.

RESULT DAN DISCUSSION

Table 1. Hemoglobin Levels on Pregnant Women in the Third Trimester in the intervention group and control group

Group	Hemoglobin Levels	Mean	SD	Min	Max
Intervention	Examination I	10.12	0.53	9	10.8
	Examination II	12.90	0.88	11.7	14.2
Control	Examination I	10.05	0.54	9.1	10.9
	Examination II	11.5	0.52	10.9	12.7

The hemoglobin level in the Hb group of Intervention I was 10.12 mg/dL with a standard deviation of 0.53, while in the control group, it was 10.05 mg/dL with a standard deviation of 0.54, as seen in Table 1. The second Hb test showed an average of 12.90 mg/dL and SD 0.88 in the intervention group and an average level of 11.5 mg/dL and SD 0.52 in the control group. Thus, it can be concluded that there is an average change in the intervention and control groups of the first and second Hb examinations.

Table 2. Effect of Katuk Leaves (*Sauropus Androgynus*) and Fe Tablets on Hemoglobin Level among Pregnant Women

Hemoglobin Levels	N	Before *Mean* *CI 95%*	After *Mean* *CI 95%*	Different Mean	*P- Value*
Intervention	15	10.12	12.90	2.78	0.00
Control	15	10.05	11.51	1.46	0.00

Table 2 showed that after analyzed with paired t-test, in intervention group, if pregnant women drinking katuk leaves and Fe tablets, the average hemoglobin level increased from 10.12 mg/dL to 12.90 mg/dL, with a p-value of 0.00. Pregnant women in the third trimester had lower hemoglobin levels when drank katuk leaves (*sauropus androgynus*) and fe tablets, suggesting that this intervention had an impact (p-value 0.05). In the control group only drank Fe Tablets, the average hemoglobin level increased from 10.05 to 11.51 mg/dL (p 0.001). Thus, it can be concluded (p-value 0.05) that drinking Fe tablets only have an effect on hemoglobin levels in pregnant women during the third trimester.

Table 3. Comparison of Hemoglobin Levels after Giving Katuk Leaves and Fe Tablets with Fe Tablets Only

Hemoglobin Levels	N	t	Mean	Different Mean	SD	*P-Value*
Intervention	15	5,27	12,90	1,39	0,88	0,00
Control	15	5,27	11,51		0,52	

Table 3. showed the average hemoglobin level of 12.90 mg/dL after the drinking katuk leaves and Fe tablets while 11.51 mg/dL after the drinking of Fe tablets only, after analyzed with independent t-test showed with a difference of 1.39 mg/dL with a t-value of 5.27 p-value = 0.00 (<0.05) so that the HO is rejected. This suggests that the combination of katuk leaves and Fe tablets is more effective in altering hemoglobin levels than the consumption of either supplement alone.

Hemoglobin Levels in Intervention Group

The mean hemoglobin level in the intervention group increased from 10.12 mg/dL before treatment to 12.90 mg/dL after the trial, with a p-value of 0.00. This showed that after being given the intervention, the average hemoglobin levels of the intervention group were higher compared to the control group.

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Iron-rich diets have been shown to reduce the risk of anemia. In addition, deworming and using Fe pills mixed with vitamin C can help prevent iron deficiency anemia, as vitamin C facilitates the absorption of iron by the body. Citrus fruits, broccoli, tomatoes, melons, strawberries, and katuk leaves are examples of plants rich in vitamin C. (10)(11)

Anemia status in pregnant women from the treatment group before intervention is given Katuk leaves most research respondents have moderate anemia (Hb level 7-8 g/dl) as many as 11 respondents (73.3%), and after being given katuk leaf intervention got most of it, the respondent experienced anemia mild (Hb level 9-10 g/dl), namely as many as 10 respondents (66.7%). The results of the analysis can be done, and it can be concluded that consuming katuk leaf tea is effective against changing anemia status in pregnant women in Gayaman Community Health Center, UPT Mojokerto Regency.(12)

Based on previous discussions, researchers hypothesize that hemoglobin levels can be affected if pregnant women consume katuk leaves and Fe pills every day for 7 days. The concentration of erythropoiesis and hemoglobin is driven by the combination of iron and vitamin C, which aids in the reabsorption of iron tablets by converting iron back into iron.

Hemoglobin Levels in Control Group

The mean hemoglobin level in the control group was 10.05 mg/dL before being given Fe tablets and increased to 11.51 mg/dL after being given Fe tablets, with a difference of 1.46 mg/dL and a p-value of 0.00 to 0.05. Following the research results on compliance with iron (Fe) consumption on the incidence of anemia in pregnant women. Obtained based on statistical tests using Fisher's exact test, the p-value was obtained = $0.011<\alpha(0.05)$, then it can be concluded that H0 is rejected and Ha is accepted, which means there is a significant relationship between compliance with taking Fe tablets and the incidence of anemia in pregnant women at Private Midwifery Practice Diana Ernawati, Laren Village, Laren District, Lamongan Regency.(13)

The results of this study are in line with research. Previously, there was a significant relationship between pregnant women's compliance with consuming Fe tablets with anemia, the iron absorbed from food was not enough to fulfil daily needs of the mother and fetus, so additional iron intake is needed, which is given via iron tablets. But effectiveness for this program is often hampered by the compliance of pregnant women. Pregnant women who are disobedient to consuming iron tablets mean not being able to meet iron needs during pregnancy. As a result, the risk of pregnancy anemia, especially iron deficiency anemia, increases.(14)

In line with this, Umi (2017) found that the average level of pregnant women before the administration of Fe pills was 10.53, with a standard deviation of 1.12 and a range of 12.2 to 8.0 for Hb. Statistically, there was an effect of the administration of Fe tablets on the increase in hemoglobin levels in pregnant women, namely the average Hb level of mothers given Fe tablets was 12.14, with a standard deviation of 0.65, the highest Hb level was 13.6, and the lowest Hb level. is 10.8, and the p-value is less than 0.05.(15)

Almatsier (2011) that fetal development requires a lot of iron blood, placental growth, and increased maternal blood volume. The number of enzymes is 1000 mg during pregnancy, so the government has a program to provide this important nutrient for pregnant women. During pregnancy, each woman is given 90 iron pills. 320 milligrams (60 milligrams) of iron (as FeSO4) and 0.25 milligrams (0.04 milligrams) of folic acid are included in each pill. The main focus of this program is to prevent and treat anemia in pregnant women.(16)

The physiologic demand for iron is especially high in pregnancy and infancy with an estimated 1000–1200 mg of iron needed during pregnancy. (17)(18) About two thirds of this iron is for maternal needs, and 1/3 is for placental-fetal tissue needs.(18) However, the need varies across gestation with lower need in the first trimester (0.8 mg/day) than the need before pregnancy and much higher need in the third trimester (3.0–7.5 mg/day). This progressive increase reflects the temporal pattern of hematopoiesis and fetal growth.(18)

From the explanation above, researchers assume that the existence of the government program can help the welfare of mothers and babies, and as a prevention of anemia, regular consumption of Fe tablets can change hemoglobin levels in pregnant

women because it follows the needs of mothers during pregnancy who require higher iron intake. Iron is a tablet that helps the process of erythropoiesis, and pregnant women experience an increase in hemoglobin levels.

Comparison of Hemoglobin Level in Two Group

The mean result in the intervention group was 12.90 mg/dL, while the average result in the control group was 11.51 mg/dL, for a difference of 1.39 mg/dL and a p-value of 0.00 0.05 from the independent test t-test. The mean post-treatment hemoglobin levels in the intervention group were higher than in the control group. In a 2012 study.(19)

Hemoglobin levels in pregnant women who are anemic and given a decoction of katuk leaves in addition to Fe pills for 7 days increased 1.39 times compared to pregnant women who only consume Fe tablets. This shows that increased nutritional intake from katuk will be more effective in modifying hemoglobin levels. Adnyana et al. (2012) According to the Indonesian Ministry of Health (2019), Katuk leaves *(Sauropus androgynus)* also contain energy, carbohydrates (11 grams), water (81 grams), fat (1 gram), calcium (204 mg), iron (3.5 grams), protein (6.4 grams), and phosphorus (83 mg). Not only that, katuk leaves have vitamin C content, which is quite useful. Iron in the body can bind to oxygen thanks to the vitamin C in katuk leaves, which in turn increases the synthesis of red blood cells and, subsequently, hemoglobin levels. Therefore, katuk leaves can be combined with Fe tablets because they help the absorption process of Karen Iron, which contains a lot of vitamin C.(19)

Diferent ethnic foods may be prepared from a single plant showing the diversity of ethnic food preparations and their biocultural signifcance.(20) The ethnic delicacies obtained from the plants may not be very popular globally, but they hold very high local and regional importance in a region or among a community or a society. The traditional recipes vary from one region to the other and formal documentation of preparation of ethnic cuisines may not be available. The knowledge of the ethnic preparations is orally transmitted and sustained through practice.(21) The S. androgynus is distributed throughout the Southeast Asian mainland and Australia.(22) S. androgynus possess medicinal properties due to its unique phytochemical composition.(23)Various metabolites have been identifed and quantifed from S. androgynus that suggest its medicinal value.(24) Elemental composition studies showed that fully matured leaves of S. androgynus have elevated quantities of iron and zinc.(25) Calcium content of fully matured leaves is also higher than the tender leaves. Iron is an abundant element found in this plant and has a high concentration that reaches greater than 100 mg/ kg.(26)(27)

Azima et al. investigated the infuence of diferent cooking methods on the phenol, vitamin C, Fe, Mg and Zn content of S. androgynus leaves. This study reported that stir-frying cooking increased the content of Zn, Mg, Fe and phenol in the leaves, while it reduced vitamin C content. The boiling and steaming method resulted in the reduction of these components. From the studies, it is clear the mode of consumption or mode of cooking have a crucial role in the contribution of nutrients to consumers from the plant.(28)

This is supported by the findings of the study by Adnyana et al. (2021), which found that the hematological profile of anemia rats could be improved by administering katuk leaf juice, sweet potato leaf juice, and kefir compared to the control group. It was also shown that mice with anemia could stay alive with the help of all three treatments. When compared to sweet potato and kefir leaf juice, katuk leaf juice is superior in its ability to improve the hematological profile.(19) The findings of this study corroborate a similar study conducted by Yuyun (2022) in the same work area as the West Bogor Health Center, which found an average increase in hemoglobin levels before and after the administration of katuk leaf cookies and Fe tablets of 2.2 mg/dL, and administration of Fe tablets of 0.9 mg/dL, showed a difference between the Experimental Group and the Control Group and the resulting significance of 0.00. Taking katuk leaves and Fe pills daily for 7 days can affect hemoglobin levels, so the researchers reasoned that there would be a difference in the mean change in Hb levels between the intervention and control groups.(29)

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The iron content of Fe tablets and the ability of vitamin C to convert iron into iron explain why the latter causes an increase in hemoglobin levels while the former triggers the erythropoiesis process. Non-heme iron absorption can be improved by a factor of four more than just eating iron alone because of the function of vitamin C in the transfer of iron from transferrin in plasma to liver ferritin. In addition to being cheap and easy to get, katuk leaves also have very minimal side effects as long as consumption is not excessive.

CONCLUSION

Based on the results of research conducted on the effect of giving Katuk Leaves boiled water on the increase in hemoglobin levels of anemia pregnant women in Private Midwifery Practice N. In the intervention group it was 10.12 mg/dL and 10.5 mg/dL in the control group. The average hemoglobin level of the second examination after treatment in the intervention group was 12.9 mg/dL and 11.5 mg/dL in the control group. It can be concluded that there is a change in the average hemoglobin levels of the control and intervention groups. There is a difference in the application of Katuk Leaves (*Sauropus Androgynus*) and Fe tablets with the administration of Fe tablets alone on hemoglobin levels in pregnant women in the third trimester of the intervention group and the control group in Private Midwifery Practice N (P-Value 0.00).

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