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THE EFFECT OF BINAHONG LEAF (ANREDERA CORDIFOLIA) ON HEMOGLOBIN LEVELS IN ANEMIC PREGNANT IN THE COASTAL AREA OF NORTH KONAWE DISTRICT

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KEYWORDS
Binahong leaves (Anredera cordifolia), Fe, anemia, pregnant women.

ABSTRACT
Binahong leaves (Anredera cordifolia) in several regions in Indonesia are known as gandola which is usually used as a hedge plant. Binahong is believed to be an herbal plant that can bring health benefits. All parts of this plant such as roots, stems and leaves can be used in herbal medicine. One of the nutrients contained in binahong leaves is iron, namely in 100 grams there is 0.4 grams of iron. The research aims to determine the effect of giving decoction of Binahong leaves to pregnant women who experience anemia in the Coastal Area of North Konawe Regency. The results of this research are that giving binahong (Anredera cordifolia) decoction shows that there is a difference in the Hb levels of pregnant women between before and after being given binahong leaves (intervention group).

INTRODUCTION

Binahong (*Anredera cordifolia*) is a potential medicinal plant that can treat various types of diseases. This plant comes from China and spread to Southeast Asia. In Indonesia, this plant is often used as a decoration for circular gates on garden paths. However, this plant is not widely known by the Indonesian people (Sutrisno & Suliasih, 2022).

Binahong leaves in several regions in Indonesia are known as gondola which is usually used as a hedge plant. Binahong is believed to be an herbal plant that can bring health benefits. All parts of this plant such as roots, stems and leaves can be used in herbal medicine. One of the nutrients contained in binahong leaves is iron, namely in 100 grams there are 0.4 grams of iron (Feriyani, Maulanza, Lubis, Balqis, & Darmawi, 2021).

Binahong leaves contain nutrients such as iron, folic acid, Vitamin C, protein, calcium, flavonoids, riboflavin, and beta-carotene3. Binahong leaves are often used by people in North Konawe as traditional medicines. Several shoots are taken from the plant to be boiled and the boiled water is drunk. People in North Konawe use these plants as medicine only based on inheritance from generation to generation which then becomes a habit.

Anemia in pregnancy is currently a global problem, affecting almost half of all pregnant women worldwide. Based on the results of Basic Health Research (Riskesdas) in 2018, the prevalence of anemia in pregnant women in Indonesia was 37.1%, in 2013, and 48.9% (Ministry of Health of the Republic). Anemia is a condition in which the number and size of

red blood cells, or the concentration of hemoglobin is below normal values, which can damage the capacity of the blood to carry oxygen throughout the body (Sepriadi & Eldawaty, 2019).

(Latuhihin, Watuguly, Kakisina, & Samsuria, 2020), states that all parts of the binahong plant can be used as medicine, starting from the stems, roots, flowers, and leaves. However, what is most often used for health as herbal medicine is the leaves (Latuhihin et al., 2020). (Sumarlina, Darsa, & Permana, 2022), states that among the people, binahong leaves are used to treat anemia, pain, ulcers, and canker sores, provide extra stamina, and improve blood circulation and gout (Sumarlina et al., 2022). Apart from that, consuming binahong can also overcome swelling and blood clots, treat diabetes mellitus, lower cholesterol, and heal wounds. Based on the research background above, the author wants to conduct research using boiled binahong leaves as an herbal medicine to treat anemia in pregnant women.

Anemia in pregnant

Anemia in pregnancy is a condition of the mother with Hb levels < 11 gr% in the first and third trimesters, while in the second trimester < 10.5 gr %, pregnancy anemia is called a potential danger to mother and child or potential harm to the mother and child, therefore, Anemia requires serious attention from parties involved in the service (Stephen et al., 2018).

The two most common causes of anemia during pregnancy are iron deficiency anemia and acute blood loss. Iron deficiency anemia is anemia caused by a lack of iron in the body, so that the need for iron (Fe) for erythropoiesis is insufficient, which is characterized by the appearance of microcytic hypochromic red blood cells, decreased levels of serum iron (Sl) and transferrin saturation, total iron binding capacity (TIBC) is elevated and iron reserves in the bone marrow and other places are very low or non-existent. In pregnancy, the increase in plasma volume is higher than that of red blood cells, resulting in hemodilution and a decrease in hematocrit (Means, 2020). This condition causes pregnant women to be susceptible to anemia. In pregnancy the need for iron increases by 1000 mg, of this amount 300 mg for the fetus and placenta, 500 mg for expansion of maternal hemoglobin mass, and 200 mg excreted normally through the intestines, urine, and skin. During pregnancy transferrin and total iron capacity increase while serum iron decreases. So the anemia that most often occurs during pregnancy is iron deficiency anemia (Artym, Zimecki, & Kruzel, 2021)

The impact of anemia on pregnant women includes abortion, premature birth, threat of cord decompensation, premature rupture of membranes, labor bleeding, uterine atony, placental retention, post-partum bleeding, and easy infection during the postpartum period. Impact on the fetus: Intrauterine death, abortion, low birth weight, prematurity, congenital defects, easy infection (Lone, Qureshi, & Emmanuel, 2004).

Binahong (*Anredera cordifolia*)

Binahong leaves have a single leaf with a relatively short stalk. The shape of the leaves is pinnate and arranged alternately, the leaves of this plant are like hearts or cordate with a light green color measuring around 5-10 cm and 3-7 cm wide (Figures 1 and 2), each leaf is thin and limp, the base is split, while the tip of the leaf is tapered, However, Binahong leaves are quite flat, although some are wavy with a smooth and slippery surface (Anjani & Hanifah, 2022).

Binahong is a type of plant with rhizomes that grow horizontally and branch out, usually, Binahong shoots grow from the tip of the rhizome, however, the rhizome is not a root, but part of the stem which functions as a food reserve and a tool for reproduction, in general, rhizomes

It has leafy segments or nodes, but these leaves can also turn into a kind of scales. Apart from that, the rhizomes on Binahong have buds that are known to grow not towards the center of the earth or water. This bud sticks out from the ground surface (Feriyani, Darmawi, Balqis, & Lubis, 2020).

Figure 1. Green Binahong leaves

Figure 2. Red Binahong leaves

Table 1
The nutritional content of boiled binahong (*Anredera cordifolia*) leaves per 100 grams USDA (U.S. Department of Agriculture)

Nutritional content of binahong leaves	Total nutrient content of 100 grams
ash	1.04 g
watera	92.50 g
Asam pantotenat	0.135 mg
Ferrum, iron (Fe)	1.48 mg
Food Energy	23 kkal
Folat Total	114 mg
Phosporus	36 mg
Calium, Fotassium	256 mg
Calcium	124 mg
Carbohydrate	2.71 g
Fat	0.78 g
Magnesium (Mg)	48 mg
Manganese	0.255 mg
Sodium	55 mg
C6H5NO2, Niacin	0.787 mg
Protein	2.98 g
Riboflavin	0.129 mg
Selenium (Se)	0.9 mg

There are several benefits of binahong leaves, namely binahong leaves have anti-inflammatory properties that can help relieve inflammation in the body. The antioxidant content in binahong leaves helps fight free radicals in the body that can cause cell damage and

disease. Binahong leaves have been used traditionally to aid wound healing. The active ingredients in these leaves are known to have healing effects on wounds.

METHOD RESEARCH

Research design

This research is experimental research using a pre-test-post test control group design. In this design, a pre-test is carried out before the treatment and a post-test is carried out after the treatment. The population in this study were all pregnant women in the work area of the North Konawe Regency Health Center which is in the coastal area. The samples in this study were pregnant women who experienced anemia and were given Fe tablets and boiled binahong leaves during pregnancy, while the controls in this study were anemic pregnant women who consumed Fe tablets. The sampling method is using the Slovin formula with a confidence level of 0.1%. Sampling in this research was carried out using the Purposive Sampling technique.

Analysis Method

The instruments in this study used a digital Hb-level examination tool (in the laboratory) to determine the degree of anemia in pregnant women and a questionnaire to obtain data on the characteristics of pregnant women. Data processing using Paired Sample Test statistical tests. Paired Sample Test is used to determine differences in the degree of anemia in pregnant women before and after treatment.

HASIL DAN PEMBAHASAN

Results

The characteristics of upper arm circumference showed that all respondents in the intervention group had normal upper arm circumference (100%) and in the control group 29 respondents (96.7%). In terms of weight characteristics, it shows that the majority of respondents in the control group have a normal weight (70%), and for the gestational age category, it shows that in the intervention group, the majority of respondents whose gestational age is in the early pregnancy category (66.7%). Meanwhile, in the control group, most of the mothers' gestational age was in the old category (73.3%).

Table 2
Distribution of characteristics of respondents from Anemic Pregnant in the Intervention Group and Control Group

Respondent Characteristics		Intervetion		Control	
		Frequency	%	Frequency	%
Age	<20 years	4	13.3	0	0,0
	20-35 years	11	36.7	7	23.3
	>35 years	15	50.0	23	76.7
	Total	30	100.0	30	100.0
Level of education	Bachelor's degreed	17	56.7	6	20.0
	Diploma	5	16.7	0	0.0
	High school	6	20.0	20	66.7
	Middle school	1	3.3	2	6.7

	Elementary school	1	3.3	2	6.7
	total	30	100.0	30	100.0
Upper arm circumference	Abnormal	0	0.0	1	3.3
	Normal	30	100.0	29	96,7
	total	30	100.0	30	100.0
Pregnant weight	Abnormal	15	50.0	9	30.0
	Normal	15	50.0	21	70.0
	total	30	100.0	30	100.0
Maternal Age	Trimester 3	10	33.3	22	73.3
	Trimester 1	20	66.7	8	26.7
	total	30	100.0	30	100.0

Table 2, shows the characteristics of respondents regarding maternal age in the control group, namely in the age category > 35 years, there were 23 respondents (76.7%). Education consists of a Bachelor's Degree, Diploma, High School, Middle School, and Elementary School. The largest number of respondents in the intervention group were 17 respondents (56.7%) in the Bachelor's Degree level and 20 respondents (66.7%) were in the control group, namely those in high school education. This shows that the majority of respondents in the research were highly educated.

In the measurement characteristics of upper arm circumference, more respondents with anemia had abnormal upper arm circumference (100.0%) compared to respondents with normal upper arm circumference. The statistical test results obtained a p-value = 0.517. Because p-value (0.000) >lfa value (0.05) means Ho is accepted, it can be concluded that there is no relationship between LILA and anemia. In terms of body weight characteristics, the number of respondents with anemia was almost the same as respondents with abnormal weight (54.2%) with respondents with normal weight (50.0). The statistical test results obtained a p-value = 0.958. Because p-value (0.000) >lfa value (0.05) it can be concluded that there is no relationship between body weight and anemia.

Table 3
Chi-Square Test Analysis

Respondent characteristics	**Value**	**Hemoglobin (Hb) Levels**				**Total**		**p-value uji chi-square**
		Anemic		**Not Anemic**				
		n	**%**	**n**	**%**	**n**	**%**	
Mother's age	High risk	25	64.1	14	35.9	39	100	0,018
	Low risk	6	28.6	15	71.4	21	100	
	Total	31	51.7	29	48.3	60	100	
Level of education	Low education	31	96.9	1	3.1	32	100	0,000
	Higher education	0	0.0	28	100.0	28	100	
	total	31	51.7	29	48.3	60	100	
Upper arm circumference	Abnormal	1	100.0	0	0.0	1	100	0,517
	normal	30	50.8	29	49.2	59	100	
	total	31	51.7	29	48.3	60	100	

Weigh	Abnormal	13	54.2	11	45.8	24	100	0,958
	Normal	18	50.0	18	50.0	36	100	
	total	31	51.7	29	48.3	60	100	
Gestational age	**Trimester 3**	**29**	**90.6**	**3**	**9.4**	**32**	**100**	
	Trimester 1	**2**	**7.1**	**26**	**92.9**	**28**	**100**	
	total	**31**	**51.7**	**29**	**48.3**	**60**	**100**	

Table 3, Chi-Square test results show that 3 characteristics of respondents are related to anemia, namely maternal age, education, and gestational age (P<0.05). Regarding maternal age characteristics, the highest number of respondents with anemia (out of 60 respondents) were high-risk respondents (64.1%) compared to respondents whose age was in the low-risk category (28.6%). The statistical test results obtained a p-value = 0.018. Because the p-value (0.000) < alpha value (0.05), it can be concluded that there is a relationship between maternal age and anemia. At the educational level, there were more respondents with anemia who had low education (96.9%) compared to respondents with higher education. The statistical test results obtained a p-value = 0.000. Because the p-value (0.000) < alpha value (0.05), it can be concluded that there is a relationship between education and anemia. On the characteristics of gestational age, respondents with anemia were more likely to be respondents with older gestational age (90.6%) than respondents with young gestational age (7.1%). The statistical test results obtained a p-value = 0.000. Because the p-value (0.000) < alpha value (0.05), it can be concluded that there is no relationship between body weight and anemia.

Table 4
Paired Sample T-Test Analysis of Differences in Hemoglobin Levels Before and After

Comparison hemoglobin levels	**n**	**Mean>standard deviation**	**p-value**
pretest	30	10.103>0.54	0.000
posstest	30	12.003>1.022	

Table 4. Analysis of differences in HB levels in the pretest and posttest intervention groups shows that the mean value (average) of HB levels at the pretest was 10.103 with a standard deviation value of 0.54. Meanwhile, the mean (average) HB level at the posttest was 12.003 with a standard deviation value of 1.022. If we compare the mean (average) scores between the two intervention groups at the pretest and posttest, it can be seen that there are differences in scores where there was an increase in HB levels in pregnant women after being given the Binahong Leaf intervention. The results of statistical tests using the Paired Samples T Test obtained a p-value = 0.000. Because the p-value < alpha value (0.05), there is a difference in HB levels of pregnant women before and after being given binahong leaves (intervention group).

Table 5
Multiple Logistic Regression Test

Kategori variable	**B**	**S.E**	**Sig.**	**Exp (B)**	**CI 95%**	**upper**
					Lower	

High risk maternal age	0.120	9225.930	0.000	1.127	0.000
Low education	-39.003	9184.019	0.997	0.000	0.000
Late gestational age	-19.688	5300.571	0.997	0.000	0.000
Constant	38.252	7914.666	0.996	4.099E+16	

Table 5 shows all the significance values for the relationship between high-risk maternal age, low education, and advanced gestational age > 0.05, so it can be said that these three variables do not jointly influence the incidence of anemia.

DISCUSSION

Binahong(*Anredera cordifolia*) leaves contain nutrients such as iron, folic acid, vitamin C, protein, calcium, flavonoids, riboflavin, and beta-carotene. The active iron compound content in binahong leaves can trigger the production of red blood cells and can be an alternative treatment for anemia sufferers. Iron is an important element in the process of forming red blood cells. Apart from that, iron functions as a means of transporting oxygen from the lungs to body tissues, as a means of transporting electrons in cells, and as an integrated part of various enzyme reactions in body tissues (Abbaspour, Hurrell, & Kelishadi, 2014). Iron anemia is characterized by a low hemoglobin concentration or hematocrit threshold value caused by low production of red blood cells (erythrocytes) and hemoglobin, increased erythrocyte damage, or excessive blood loss.

Binahong (Anredera cordifolia) leaves contain folic acid. Folic acid is the main component in the formation of red blood cells. Folic acid deficiency can cause macrocytic anemia because folate is needed for the erytoprosthesis process. Binahong leaves also contain Vitamin C. Vitamin C plays a role in the absorption of iron in the intestine and mobilization from storage in ferritin. In addition, it can activate enzymes needed to convert folic acid in food into the active form of folic acid which can prevent megaloblastic anemia. Vitamin C is an antioxidant that can protect red blood cells from free radicals and plays a role in maintaining red blood cell permeability.

Pregnants are one of the groups at risk of developing anemia due to an increase in plasma volume which results in the dilution of hemoglobin (Hb) levels without changes in the shape of red blood cells (1). The impacts caused by anemia in pregnant women are various kinds of complications, in the form of disorders during pregnancy (inadequate gestational weight gain, abortion, prematurity), disorders during labor (uterine atony, prolonged labor, bleeding), disorders during the postpartum period (vulnerable to infection and stress due to decreased immune system, low breast milk production), and the worst case is mortality. Meanwhile, the consequences for the fetus are immaturity, prematurity, low birth weight (LBW) babies, impaired growth of the baby's organs and brain, and malnutrition or malformation in the baby being born (Balcha, Eteffa, Arega Tesfu, & Abeje Alemayehu, 2023).

Age is an important factor in considering the prevalence and impact of anemia in pregnant women. Research has shown that younger pregnant women are more susceptible to anemia due to limited nutritional reserves and the increased demands of pregnancy. Additionally, older pregnant women may also be at risk due to factors such as decreased iron absorption and underlying health conditions (Balcha et al., 2023).

Education plays an important role in preventing and managing anemia in pregnant women. Lack of knowledge about proper nutrition and the importance of iron-rich foods can contribute to high rates of anemia. Educational interventions aimed at increasing awareness about the prevention and management of anemia can significantly reduce the burden of anemia in pregnant women. Education plays a role in preventing and managing anemia. Women with lower levels of education may have limited knowledge about anemia and its prevention, leading to inadequate food choices and poor adherence to iron supplementation. Educational gaps in knowledge about preventing and treating anemia are also clearly visible among pregnant women. Those with a lower level of education may have limited awareness of anemia and its impacts, resulting in less-than-optimal prevention and treatment strategies. Furthermore, anemia in pregnant women can influence the educational gap in knowledge about the prevention and management of anemia. Women with low levels of education may have limited access to information and resources, making them more vulnerable to anemia. Bridging knowledge gaps and providing targeted educational interventions can help improve maternal health outcomes (Balcha et al., 2023).

Research suggests that decreased upper arm circumference may be associated with anemia, so it could be a potential screening tool for healthcare providers. Upper arm circumference (UAC) is a widely used indicator of nutritional status during pregnancy. Anemia may affect UAC, as it is often associated with poor weight gain and malnutrition. UAC monitoring can help health professionals identify pregnant women at risk of anemia and provide appropriate interventions to improve their nutritional status (Nainggolan et al., 2022).

Weight gain during pregnancy is an important aspect of maternal health and fetal development. Anemia can affect weight gain patterns, leading to inadequate weight gain or excessive weight gain, both of which pose a risk for adverse pregnancy outcomes. Maintaining a healthy weight during pregnancy is essential for the overall well-being of the mother and baby. Increasing evidence suggests that anemia during pregnancy may also influence weight gain patterns and the risk of gestational diabetes. Women who are anemic may be more susceptible to excessive weight gain or insufficient weight gain, both of which can impact maternal and fetal health (Abubakari, Asumah, & Abdulai, 2023).

Maternal gestational age refers to the duration of pregnancy, and anemia can also influence this. Pregnant women who suffer from anemia have a higher risk of premature birth, which can have long-term impacts on their baby's health. Anemia can also lead to age-related disparities in the utilization of prenatal services, leading to inadequate monitoring and management of anemia during pregnancy (Abu-Ouf & Jan, 2015).

CONCLUSION

Research shows that the response to giving binahong (Anredera cordifolia) decoction shows that there is a difference in the hemoglobin (Hb) levels of pregnant women between before and after being given binahong leaves (intervention group). This study also shows that there is a significant relationship between high-risk maternal age, low education, and late gestational age jointly influencing the incidence of anemia.

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