

Combination of Beetroot Juice, Honey and Green Apple on Hemoglobin Levels in Anemia Pregnant Women at Payung Sekaki Public Health Center, Pekanbaru

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Abstract: Anemia is a medical condition characterized by lower-than-normal hemoglobin (Hb) levels. In pregnant women, anemia can lead to prolonged delivery times, increased bleeding, and shock during contractions. The adverse effects of anemia on the fetus include premature birth, low birth weight (LBW), potential disabilities, and infant mortality. The recommended solution to overcoming anemia in pregnant women is to consume a combination of beetroot juice and green apples juice. Beets contain essential components that can elevate Hb levels, whereas green apples provide minerals and vitamin C, enhancing iron absorption (Fe). This study aimed to investigate the effect of a combination of beetroot juice and green apple juice on Hb levels in pregnant women with anemia. The study population was comprised of 200 normal pregnant women, with a sample size of 15 in trimester III (TM III) with anemia, selected through purposive sampling. The intervention involved administering the juice daily for seven days. Data were collected using observation sheets and easy-to-touch devices. The research design was pre-experimental, utilizing a one-group pre-test–post-test design. This study was conducted within the working area of the Payung Sekaki Public Health Center (PHC) from January to April 2022. Dependent T-test analysis was used for data evaluation. The average Hb level of TM III pregnant women before juice consumption was 9.7 g/dL, which increased to 10.6 g/dL after the intervention. The dependent t-test results, with a 95% confidence level (CI), indicated a p-value of 0.000, signifying a significant impact of fruit juice on the Hb levels of TM III pregnant women experiencing anemia. These findings suggest that clinical midwives should educate pregnant women about the importance of Fe tablets and the positive influence of fruit juice on Hb levels.

Keywords: *anemia, pregnant women, beetroot, green Apples, hemoglobin levels*

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1. INTRODUCTION

Anemia is a prevalent systemic complication among pregnant women, with iron deficiency anemia being the most frequently encountered type. Iron (Fe) deficiency is the most common micronutrient, especially among pregnant women and young children. This deficiency adversely affects pregnancy outcomes, immune functions, and neurodevelopment in children. Effective Fe supplementation programs have successfully alleviated this health burden.

The World Health Organization defines anemia as having a Hb concentration below 13 g/dL for men, below 12 g/dL

for non-pregnant women, and below 10 g/dL for pregnant women (Sari, 2020; Yueying, Yu Fan and Jun, 2020).

Fe is classified as a crucial micronutrient that plays a vital role in erythropoiesis. Its primary nutritional function is to prioritize the production of red blood cells (RBC) over all other organ systems, including the brain. Iron (Fe) is essential for proper development and subsequent metabolic function of every cell and organ system in the body. Maintaining adequate Fe levels during pregnancy aims to minimize maternal morbidity, enhance fetal health, and ensure newborns have sufficient nutritional reserves for the early postnatal period (Juul, Derman and Auerbach, 2019; Yueying, Yu Fan and Jun, 2020).

The prevalence of anemia in Indonesia is more than 50 %, so it is the focus of public health problems (Indonesia Health Profile, 2018). Riskesdas (2018) shows that data on pregnant women with anemia reaches 48.9 %. According to Setiowati and Nuriah (2019) there are various ways to overcome and prevent the problem of anemia in pregnant women, namely by means of pharmacology and non-pharmacology. The pharmacological treatment for nutritional deficiency anemia typically involves oral administration of Fe supplements or Fe tablets at 60mg/day. Meanwhile, non-pharmacological methods can consume protein-rich ingredients such as meat, liver and eggs. Meanwhile, vegetable sources include fruits, nuts, wheat, brown rice, and many others (Desta *et al.*, 2019; Georgieff, Krebs and Cusick, 2019; Yueying, Yu Fan and Jun, 2020).

Vegetable sources containing Fe are found in fruits and vegetables. One of the fruits that contain iron is beets/beetroot. Beetroot has a higher iron content than other fruits, such as dragon fruit and watermelon (Sari *et al.*, 2021). One hundred grams of beetroot contains 27mg of Ca, 43mg of P, 43mg of vitamin C, 23mg of Mg, 9.6 mg of carbohydrates, 7.4g of Fe. In addition to beets, the benefits of honey have been widely recognized in the medical field because of its complete and natural nutrition. Honey contains essential minerals such as Ca, Mg, K, P, Na, Fe, and Cu. Fe content in honey can increase the number of erythrocytes, thereby increasing Hb levels. In 100 grams of honey contains 304 kcal, Na 4 mg, P 52 mg, Total carbohydrates 82 g, Vitamin C 0.5mg, Fe 0.4mg, Mg 2mg, Ca 6mg (Setyianingsih, Widayati and Kristiningrum, 2020; Zamani *et al.*, 2021; Utami and Farida, 2022).

Sufficient vitamin C is needed to increase iron absorption in the body. One fruit that contains vitamin C and beneficial compounds for health is the green apple. One hundred grams of green apples contain 4 mg of Vitamin C.

The findings of Dheny Rohmatika *et al.* in 2019 concluded that administering a blend of Vitamin C and Fe supplements proved to be more efficacious in boosting RBC counts and Hb levels when compared to the individual administration of either Fe or vitamin C alone (Setyianingsih, Widayati and Kristiningrum, 2020; Utami and Farida, 2022).

2. METHODS

2.1 Type and Design Research

The research methodology employed in this study was pre-experimental, explicitly utilizing a one-group pre-test and post-test design. The selection of this design was adjusted to assess the effect of a combination of beetroot juice, honey, and green apples on Hb levels in pregnant women. The study adopted a one-group pre-test and post-test design, omitting the control group. Participants were observed both before and after the intervention. This study was conducted between January and April 2022 within the working area of the Payung Sekaki PHC in Pekanbaru City.

2.2 Population and Sample

The population in this study were all TM III pregnant women in the Working Area of the Payung Sekaki PHC, Pekanbaru City. Based on data for pregnant women in January 2022, it is estimated that there are 200 pregnant women with anemia. The sampling technique in this study was purposive sampling, amounting to 15 people. The data collection instrument in this study was to use an observation sheet to mark how many days it had been given a combination of beetroot juice, honey and green apple and write down the test results, a digital Hb tool to measure Hb levels in third trimester pregnant women.

2.3 Data Analysis

The univariate analysis aims to describe the Hb levels in

pregnant women before and after administering a combination of honey, beetroot juice and green apples to those experiencing anemia. Bivariate analysis was employed to ascertain the impact of each independent variable on the dependent variable. The study used a dependent t-test with a 95% CI ($\alpha = 0.05$) to evaluate the significance of the observed changes.

3. RESULTS AND DISCUSSION

The research was conducted between January and April 2022 in the Working Area of the Payung Sekaki PHC and investigated the effect of administering a combination of honey beetroot juice and green apple juice on the Hb levels of pregnant women with anemia. The research involved 15 respondents, each receiving a daily combination of honey, beet juice and green apple juice for seven days.

Table 1 demonstrated that the average Hb level before being given the combination of honey beet juice and green apple was 9.713 (SD 0.533). After being given the combination of honey beet juice and green apple, the average Hb level was 10.680 (SD 0.469). The average Hb level after the intervention (Post-test) is higher than the average Hb level before the intervention (Pre-test).

Table 1. Average Hb Levels Before and After Given a Combination of Beetroot Juice and Green Apple in Anemia Pregnant Women

Group	N	Mean	SD	Min	Max
Before intervention	15	9,713	0,5330	9,1	10,7
After Intervention	15	10,680	0,4693	9,8	11,4

Table 2. The Effect of the Combination of Beetroot Juice, Honey and Green Apple on Hb Levels of Anemia Pregnant Women in the Working Area of the Payung Sekaki Public Health Center

Group	N	Mean	t	P-Value
Hemoglobin (Hb) levels after and before	15	9,713 10,680	-17,602	0,000

The study was carried out among 15 pregnant women diagnosed with anemia within the working area of the Payung Sekaki PHC in Pekanbaru City. In this study, the authors used 250 grams of beets, 28 grams of honey, and 100 grams of green apples. The results showed that there was an average increase in Hb levels in anemic pregnant women before being given honey beet juice and green apple, which was 9.713 (SD 0.5330) and the average Hb level in pregnant women after being given honey, beetroot juice and green apple, is 10.680 (SD 0.4693). The results of the T-dependent statistical test at 95% CI prove that there is an effect of giving beetroot juice, honey and green apples juice on Hb levels in anemic pregnant women with $p=0.000$ ($\alpha=0.05$).

Anemia continues to pose a substantial global health challenge, particularly in low and middle-income countries, where approximately 50% of pregnant women are identified with this condition. Although anemia can stem from various factors, iron deficiency is a predominant contributor. There are two kinds of ways to treat anemia, namely pharmacological and non-pharmacological treatment. One of the non-pharmacological treatments is providing food sources of iron and high vitamin C (Yueying, Yu Fan and Jun, 2020).

Beets, also called *Beta Vulgaris L.*, are root vegetables characterized by a tuberous structure and distinctive reddish-purple color. Similar to potatoes in shape, beets are commonly consumed by juicing or further processed into foods with a smooth texture. (Zakiyah and Setyaningsih, 2019; Purba *et al.*, 2021). Beets have many extraordinary benefits. Beets benefit the entire body system and can strengthen the immune system with an iron content of 7.4 grams in 100 grams compared to spinach, which contains 3.9 grams of iron. Beets also cleanse and strengthen the blood so that blood can carry nutrients throughout the body and red blood cells will not be lacking in number (Georgieff, Krebs and Cusick, 2019; Juul, Derman and Auerbach, 2019; Utami and Farida, 2022).

Beets have a relatively high content of Vitamin B9 and Fe. Both of these substances are needed to form RBC and new Hb in the body. Several studies show that beets' benefits can increase pregnant women's Hb levels (Zakiyah and Setyaningsih, 2019; Sakdah and Idiana, 2022). Beets have several good ingredients for the body, including 34% Vitamin B9, which helps them grow and replace damaged cells. Potassium (K) 14.8%, which functions to facilitate the balance of fluids in the body. 13.6% fiber which functions to help overcome cholesterol disorders. Vitamin C 10.2% which functions to grow tissue and normalize blood vessels. 9.8% magnesium which functions to maintain muscle and nerve function. Tryptophan 1.4%. 7.4% Fe which functions as energy metabolism and the immune system. 6.5% Cu (copper) which functions to form RBC. Phosphorus (P) 6.5% which serves to strengthen bones. Caumarin which functions to prevent tumors. Betacyanin which functions to prevent cancer (Anggraini and Saragita, 2019; Setyianingsih, Widayati and Kristiningrum, 2020; Sari *et al.*, 2021).

Vitamin C converts Fe into ferrous iron within the small intestine, facilitating its absorption. Moreover, Vitamin C hinders the formation of hemosiderin, a compound that is challenging to mobilize for iron release when required (Setyianingsih, Widayati and Kristiningrum, 2020; Lestari *et al.*, 2022). Iron absorption in non-heme forms increases four times when there is vitamin C. Vitamin C plays a role in transferring iron from transferrin in liver plasma keferritin. Pregnant women are encouraged to consume vitamin C because it can help the absorption of Fe (Desta *et al.*, 2019; Setyianingsih, Widayati and Kristiningrum, 2020; Risnawati, Indanah and Sukesih, 2021; Sari *et al.*, 2021; Utami and Farida, 2022).

Beets, honey and green apples both contain Fe and vitamin C which are good for health. Fe is important in the synthesis of hemoglobin (Hb) and the maturation of RBC so that it can prevent anemia (Anggraini and Saragita, 2019; Risnawati, Indanah and Sukesih, 2021; Zamani *et*

al., 2021). Vitamin C is related to the pharmacokinetics of Fe, as a promoter that helps the absorption of non-heme iron in the small intestine through the process of reducing Fe³⁺ to Fe²⁺ so that it is easily absorbed and helps release iron from transferrin into body tissues and inhibits the formation of hemosiderin. blood protein) which is difficult to mobilize in iron liberation and increase blood formation. Meanwhile, antioxidants play a role in maintaining the resilience of erythrocyte membranes which are susceptible to free radicals Saula *et al.*, (2020). Iron as an antioxidant plays a role in the formation of lymphocyte cells that prevent infection and is related to the activity of superoxide dismutase, cell respiration, and enzyme cofactors that work by preventing the formation of free radicals. Antioxidant agents are supported by active phytochemical compounds such as betacyanins and flavonoids, as well as vitamin C, which are effective antioxidants in the immune system.

Beets, honey and green apples can be consumed in juice form. Consumption of fruit in the form of juice can increase the absorption of fruit nutrients in the body and make it easier to consume. Juice is defined as a liquid obtained from fresh fruit through a mechanical process so that it has the same color, aroma and taste as the original fruit (Syahridin, 2013). Juice consumption has increased in recent years and is widely consumed as part of a practical diet and can replace fresh fruit consumption directly and is a source of vitamins and minerals for the body (Kusuma *et al.*, 2019). Research by Stephana *et al.* (2018) shows that beetroot juice can increase Hb levels in anemic pregnant women. This shows that beetroot juice is an alternative drink that can potentially prevent and control anemia by helping to meet and increase iron intake and absorption, so that Hb levels in the blood increase. Beets contain much less vitamin C than green apples and have a pleasant taste, aroma, and a bland astringent taste. By combining beets, honey and green apples, it is hoped that it can disguise the unpleasant taste and smell of beets,

increase the nutritional content of the juice and is expected to be a potential alternative drink that helps increase Hb levels in anemia sufferers (Daru, Sobhy and Pavord, 2019; Georgieff, Krebs and Cusick, 2019; Zamani *et al.*, 2021).

4. CONCLUSION

The nutritional content of food or drink, in this case iron and vitamin C in a combination of beetroot juice, honey and green apples, needs to be analyzed so that people can know the amount that must be consumed to meet daily nutritional needs. In addition, as an effort to prevent and control anemia, because the higher the intake of Fe and vitamin C, the higher the Hb level. The average Hb level of pregnant women before being given the Combination of Beetroot Juice, Honey and Green Apples in the Working Area of the Payung Sekaki PHC, Pekanbaru City in 2022 is 9.713 (SD 0.533). The average Hb level after being given a combination of beetroot juice, honey and green apples in the Working Area of the Payung Sekaki PHC in Pekanbaru City in 2022 is 10.680 (SD 0.469). There is a significant effect of the combination of beetroot juice, honey and green apples on Hb levels in pregnant women in the Working Area of the Payung Sekaki PHC, Pekanbaru City, in 2022, with a p value of 0.000 ($p < 0.05$).

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