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Beetroot ice cream as an alternative improvement of hematology status in anemic postpartum mothers who get Fe tablet supplementation

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Abstract
Background: Anemia is a condition where the number of red blood cells or hemoglobin concentration falls below the normal threshold value. Postpartum mothers are prone to anemia due to the loss of blood during labor. Anemia prevention by pharmacology and non-pharmacology. Management of anemia in a non-pharmacological way by consuming iron-containing foods such as beets. Beets contain iron, vitamin B12 and vitamin C, so they are believed to increase postpartum maternal hemoglobin.
Objective: To explain the effect of beetroot ice cream on hemoglobin levels in anemic postpartum mothers who get 11 gr of beetroot ice cream with Fe tablet supplementation.
Method: This type of research is a Quasy experiment with pretest posttest with control group design. Technique sample random sampling a method accidental sampling was used to get a sample of postpartum mothers as many as 30 respondents based on inclusion and exclusion criteria which were divided into 2 groups: 15 treatment groups and 15 control groups. The independent variable was the provision of beet ice cream and Fe tablets, while the dependent variable was the examination of hemoglobin levels. The research was conducted for 7 days, then the hematology analyzer was examined at the Semarang City Health Center Laboratory.
Results: The results of the statistic independent t test showed that the p value was 0.035 (<0.05) with an average of 2.813 gr/dl so that it could be concluded that giving 11 gr of beetroot ice cream to anemic postpartum mothers affected the increase in hemoglobin levels. However, when viewed from the average hemoglobin levels before and after the intervention, there was a better increase in the treatment group compared to the control group.
Conclusion: The results of the study after being given 11 gram beet ice cream treatment together with Fe tablets for 7 days there was an increase in hemoglobin levels in anemic postpartum mother.

Keywords: beetroot ice cream, anemic, postpartum mother

1. Introduction

The degree of maternal health can be seen from the maternal mortality indicator (MMR), maternal health is one aspect in supporting Indonesia's health program, the higher the MMR the poor health status of the country. AKI is the number of maternal deaths during pregnancy, childbirth and postpartum caused by accidents other than the factors of pregnancy, childbirth, postpartum and its handling in every 100,000 live births [1].

According to the AKI World Health Organization (WHO) in 2015, 216 / 100,000 live births, in Indonesia in 2015, 305 / 100,000 live births and in 2016, 235 / 100,000 live births [2, 4]. In Central Java Province in 2015, 619 cases with a mortality rate of 111.16 / 100,000 live births, in 2016 decreased by 602 cases with a mortality rate of 109.65 / 100,000 live births and in 2017, 88.58 / 100,000 live births [5, 7]. In Semarang City in 2015, 128.05 per 100,000 live births (35 people), in 2016 increased 121.5 per 100,000 live births (32 people) and in 2017, 88.3 per 100,000 live births (23 people) [8, 10].

Various efforts have been made to reduce the MMR and infant mortality rate (IMR), namely the health development of Millennium Development Goals (MDGs) 2000-2025, but the MDG target until 2015 has not been achieved namely reducing the MMR ratio to 102 / 100,000 live births so that the government's efforts continue on the indicators of the Resistance Development Goals (SDGs) which target in 2030 to reduce the MMR to 70 / 100,000 live births [11]. Maternal health efforts include health services for pregnant women, maternity women, postpartum mothers, services at the Puskesmas and contraceptive services [1]. The postpartum period needs to be considered in maternal health or is a challenge for new mothers giving birth. Postpartum mothers are prone to anemia due to the process of childbirth, loss of blood that affects the mother in daily activities, fatigue, postpartum blues and decreased cognitive abilities [12].

Iron deficiency anemia is a common cause due to lack of iron intake and blood loss during labor. Anemia is hemoglobin levels less than normal, usually around 11-12gr / dl before giving birth [13]. The incidence of anemia found throughout the world, especially in developing countries, often occurs in reproductive women such as pregnancy and postpartum because of iron deficiency. The incidence of anemia in developing countries is 45% and in developed countries is 13% [14]. According to WHO the incidence of anemia in postpartum mothers is 56%, in India deaths from anemia in 19% of cases of anemia in postpartum mothers are 65% -75% [15]. Whereas in Indonesia maternal mortality due to anemia is 30% [4]. Most of the causes of anemia are iron deficiency which is characterized by low levels of hemoglobin, hematocrit, erythrocyte counts and a decrease

in ferritin levels. Erythrocytes carry oxygen to the body's tissues while hematocrit is used to measure the condition of erythrocytes [16]. Ferritin is a protein that stores iron, plays an important role in the formation of hemoglobin and erythrocytes [16]. Serum ferritin levels represent a state of total iron stores [16]. Postpartum mothers with anemia cause difficulty in caring for their babies, affecting the emotional relationship between mother and baby, increasing prevalence of shortness of breath, fatigue, palpitations, slowing of uterine involution and lack of milk production [17].

Treatment of anemia in pregnant women is pharmacological therapy in the form of Fe tablets for 40 days after delivery [18] and non-pharmacological therapy, namely by using herbal therapy which is a therapy that utilizes plants and fruits.[19] Beets contain iron, vitamin C, amino acids (tryptophan, lysine), calcium, phosphorus, sulfur, vitamin A, vitamin B1 and betacyanin as antioxidants. Vitamin C in beets is higher, which is two to four times the vitamin C content of oranges [20]. By providing an intake of nutrients that are rich in iron and vitamin C are good for preventing anemia. Vitamin C increases the absorption of non-hemic iron up to four times. Vitamin C with iron has complex iron ascorbate compounds which are soluble and easily absorbed [21].

Beets contain 34% folic acid, 14% potassium, 13.6% fiber, 10.2% vitamin C, 9.8% magnesium, tryptophan 1.4%, 7.4% iron, 6.5% copper, 6. 5% phosphorus. Also other minerals namely Sodium (Na), Zinc (Zn), Calcium (Ca), Potassium (K), Magnesium (Mg) and Phosphorus (P) [22]. Beets play a role in cellular metabolism needed in the development of erythrocytes, stimulates blood circulation and helps build erythrocytes because they contain folic acid and B12 [23]. Ice cream is a frozen food in the form of frozen which is loved by many people ranging from children, adolescents, adults, to the elderly, because it tastes delicious, sweet and soft texture [24].

Based on the research, anemic pregnant women who received Fe supplementation were given beet juice for 7 days, the average hemoglobin level of pregnant women was 11.27 and the average hemoglobin level of pregnant women who received iron supplementation without beetroot juice was 9.22 Beet juice is effective against hemoglobin levels in pregnant women with anemia [25].

According to WHO the normal Hb level in postpartum mothers is 11-12 gr%. The process of formation or synthesis of hemoglobin takes approximately 7-10 days to mature and is ready to be circulated throughout the body with erythrocytes, so the life span is the same as the life span of erythrocytes which is around 120 days.[26] Based on the results of consultations by the Health Polytechnic of the Ministry of Health Semarang, a dose of 11 grams was obtained to meet the needs of Fe and vitamin C in postpartum mothers. From this description, it is necessary to conduct a study that aims to determine the effect of 11 grams of beet ice cream for 7 days on hemoglobin levels in postpartum anemia mothers.

2. Methods

This type of research uses Quasy Experiment with pre-test-post-test with control group design. Researchers arranged two groups, namely the treatment group that was given beet ice cream with Fe tablets, While the control group was given Fe tablets without beet ice cream. Giving beet ice cream with a dose of 11 grams and Fe tablets both of which were done for 7 days. Hematologic examination was conducted at the Semarang City Health Center Laboratory using a hematology analyzer and in collaboration with the health center to determine hemoglobin levels of postpartum anemic mothers with alcohol cotton instruments, 3 cc syringes, tourniquet, gloves, plaster and blood tubes. Examination of hemoglobin levels was carried out 2 times, namely before and after the intervention was given.

The population in this study was postpartum mothers who were diagnosed with anemia in Semarang City Health Center in June to September 2019. Determination of the minimum sample size using technique sample random sampling with method accidental sampling and based on inclusion and exclusion criteria as many as 30 respondents were divided into two groups with 15 respondents each in the intervention group and 15 respondents in the control group.

In this study researchers conducted data collection by observation, identification, interviews and filling out questionnaire sheets. The data collected was analyzed through the IBM SPSS program version 24.0, and continued with a different test, namely the parametric test (Paired t test and Independent t test). The processed data is used as a basis for discussing statement matters, which are then presented in tabular form so that conclusions can be drawn.

3. Result

Table 1: Distribution frequency of respondent characteristics based on nutritional status, parity, education and profession based on demographic data

Characteristics	Intervention Group (n=15)		Control Group (n=15)		P-value
	N	%	N	%	
Nutritional Status					
No LCE = ≥ 23,5 cm	14	93.3	11	73.3	0.152
LCE = <23.5 cm	1	6.7	4	26.7	
Total	15	100	15	100	
Parity					
Primiparas	3	20	7	46,7	0.130
Multipara	12	80	8	53,3	
Grande multipara	0	0	0	0	
Total	15	100	15	100	
Education					
Elementary school	0	0	0	0	0.443
Middle school	1	6.7	4	26.7	
High School	9	60	6	40	
College	5	33.3	5	33.3	
Total	15	100	15	100	
Profession					
Work	4	26.7	5	33.3	0.702
Does not Work	11	73.3	10	66.7	
Total	15	100	15	100	

*Levene's Test Explanation: LES: Lacking Chronic Energy

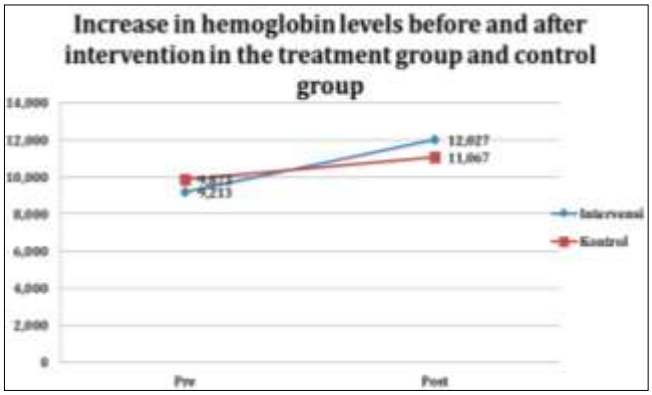
Based on the table above, this study shows that between the intervention group and the control group in terms of nutritional status, parity, education and profession are homogeneous data because p value >0.05 or there is no significant difference.

Table 2: Analysis of differences in hemoglobin levels before and after the intervention in the treatment group and control group

Variables and Group (N = 15)	Intervention Mean± SD	Control Mean±SD	P-value (t test)
Hemoglobin levels			
Pre	9.213±0.9546	9.873±1.0793	0.087
Post	12.027±1.2578	11.067±1.1127	0.035
P-value (paired t-test)	0.000	0.000	
Difference	2.813±0.7328	1.193±0.2840	0.000

*Paired t test & independent t test

Based on the table above, shows the results of the paired t test, showing that hemoglobin levels before and after the intervention in the treatment group and control group were significant differences with a p-value of 0.000 <α (0.05). While the independent t test results from the difference average hemoglobin levels before and after the intervention between the treatment group and the control group showed a significant difference with the p-value of 0.035 <α (0.05). The conclusion is that the administration of beet ice cream with Fe tablets is better in increasing hemoglobin levels than only Fe tablets.



Graph 1: Increase in hemoglobin levels before and after intervention in the treatment group and control group

Graph 3 above, shows that an increase in hemoglobin levels before and after the intervention in the treatment group is greater than the control group.

4. Discussion

Based on the results of statistical analysis shows that there are differences in hemoglobin in the intervention group who consumed beet ice cream as well as Fe tablets and the control group who consumed Fe tablets carried outstatistical independent t-testtests. Based on the results of the independent t-test in table 2 obtained p-value of 0.035 <0.05, it can be concluded that the provision of beet ice cream and Fe tablets for 7 days on a regular basis significantly influence the increase in hemoglobin.

The above results can be explained that the administration of beet ice cream in postpartum anemia mothers can increase hemoglobin levels, this is because beet ice cream is an additional food supplement which is one alternative to overcome anemia in postpartum mothers.

The imbalance between nutrients with the body's needs increases in the postpartum period for the recovery process of the organs of the body after childbirth and the lactation process. Malnutrition experienced by postpartum mothers will affect the incidence of iron deficiency anemia in the body [28]. Adequacy of iron in the body can affect hemoglobin levels. Iron is needed for hemoglobin production so that iron nutrient anemia will cause the formation of smaller erythrocytes and low hemoglobin content. Iron plays a role in the synthesis of hemoglobin in erythrocytes and myoglobin in muscle cells. The content of ± 0.004% body weight (60-70%) is found in hemoglobin which is stored as ferritin in the liver, hemosiderin in the spleen and bone marrow.[29] Beets contain mostly vitamin A and vitamin C, calcium iron, phosphorus, protein and carbohydrates. Beets are also high in folate and betacyanin so they can increase hemoglobin levels in the blood [30].

In the study of Wenda *et al*, administration of beet juice was effective in increasing maternal hemoglobin levels of anemia with an increase in average Hb levels before and after the intervention in the treatment group was 0.37. Then the statistical test results of the difference between the intervention group and the control group obtained p value 0,000 <0.005. This shows that beet juice is effective in increasing levels of hemoglobin in pregnant women with anemia [31]. The process of formation or synthesis of hemoglobin takes approximately 7-10 days to mature and is ready to be circulated throughout the body with erythrocytes, so the life span is the same as the life span of erythrocytes which is around 120 days [32].

Beets are an alternative food that can be substituted in ice cream. The iron content in beets is needed in the prevention of iron deficiency which ferritin levels are an indicator. So that this research proves that by consuming additional beet ice cream for 7 days together with consuming Fe tablets can increase hemoglobin levels in postpartum anemia mothers.

5. Conclusion

Based on the results of research and discussion about the effect of giving 11 grams of beet ice cream with Fe tablets on hemoglobin levels in postpartum anemia mothers can be concluded that:

5.1 Increased hemoglobin levels with an average difference in the treatment group of 2.813 gr/dl and the control group of 1.193 g/dl.

5.2 There is an effect of beetroot ice cream on improving hematological status in postpartum anemic mothers who get Fe tablet supplementation.

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