



Comparative Analysis of Beet Juice and Red Guava Juice against Erythrocyte and Hematocrit Levels in Post-partum Women

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Abstract

BACKGROUND: Post-partum physiological bleeding can cause post-partum mothers to experience anemia; often, post-partum mothers are limited by nutrient and fluid intake to keep the body strong and have ideal body weight.

AIM: The aim of the study is to knowing the difference between beet juice and Guava juice on erythrocyte and hematocrit (HTC) levels in post-partum mothers at Darul Imarah Health Center, Darul Imarah District, Aceh Besar District.

METHODS: This was a quasi-experimental study with a pre-post test design using a randomized controlled trial. The population of post-partum mothers in the Darul Imarah Health Center, Darul Imarah District, Aceh Besar District. The sample selection is purposive sampling with inclusion and exclusion criteria; the sample is 45 people.

RESULTS: The results showed differences in erythrocyte and HTC levels between before and after giving guava and iron (Fe) juices with a p-value of 0.00 <0.05. Beet juice increases the average erythrocytes and HTC levels higher than guava juice. There were significant differences in erythrocyte levels in the guava + Fe, beet + Fe, and control (Fe) treatment groups with a p-value of 0.001 <0.05. the difference in the average difference in erythrocyte levels between the guava and beet treatment groups was 0.03. The treatment group Bit + Fe had a higher mean erythrocyte level different than the guava + the treatment group and the control group (Fe). There was a significant difference in HTC levels in the guava + Fe, beet + Fe, and control (Fe) treatment groups with a p-value of 0.001 <0.05. the difference in the average difference in erythrocyte levels between the guava and beet treatment groups was 0.03. The treatment group Bit + Fe had a higher mean difference in HTC levels than the guava + the treatment group and the control group (Fe).

CONCLUSION: There is a significant difference in erythrocytes and HTC levels between before and after giving guava juice and beet juice to post-partum mothers with a p-value of 0.00 <0.05. Beet juice increases the average level of erythrocytes and HTC, which is higher than guava juice in post-partum mothers at the Darul Imarah Health Center.

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Introduction

According to the World Health Organization, anemia affects about 1.5 billion people worldwide. The prevalence is very high in Africa, Asia, India, Latin America, Eastern Europe, and China; however, this rate is also high in developed countries [1]. Globally, anemia in pregnancy is a severe hematologic disorder affecting 32.4 million pregnant women [2].

The association between high hemoglobin (Hb) and hematocrit (HTC) levels and complications such as preterm labor, low birth weight, intrauterine growth restriction, and intrauterine fetal death has also been demonstrated in several studies [3].

According to Stoev *et al.* carried out in Bulgarian pregnant women, an increase in HTC, Hb, and red blood cell (RBC) mass in early pregnancy can be considered a risk factor for preeclampsia, intrauterine growth restriction, and fetal death in the later stages of pregnancy [4]. The puerperium is divided into three

phases, namely, the acute phase - the first 24 h after the placenta is born, early - up to 7 days, and late - up to 6 weeks to 6 months; each phase has its unique clinical considerations and challenges [5], [6].

Iron (Fe) deficiency has been associated with maternal and perinatal morbidity during the postpartum period, including postpartum depression, impaired motherchild interaction, maternal stress, and impaired cognitive function [7], [8], [9]. Fe requirements increase exponentially during pregnancy to meet the increased demand for the fetoplacental unit, increase maternal erythrocyte mass and compensate for Fe loss during labor [10], [11]. A study found that maternal age, education, family income, religion, number of family members at home, and children's number were determinants that contributed to anemia [12]. Postpartum maternal anemia may be associated with shortness of breath, lethargy, infection, lactation failure, and depression [13], [14]. Postpartum mothers who experience anemia can cause bleeding, nutrition, and insufficient breast milk, leading to the failure of exclusive breastfeeding and malnutrition in infants. This condition

strengthens the formation of a cycle of malnutrition in children under five, and the next cycle, if it is not successful, is decided by efforts to prevent and treat anemia in postpartum mothers [15]. To prevent and treat anemia in postpartum mothers, one government program is to provide Fe tablets from pregnancy to postpartum for 1 month. Besides, mothers are encouraged to consume foods in the form of vegetables or fruit that contain high Fe and Vitamins that help Fe absorption faster [15].

Nonpharmacological treatment can use vegetables and fruits that are simple and easy to obtain. One of the fruits that can increase Hb levels in pregnant women is guava and beets. Today, beets are grown in many countries worldwide, are regularly consumed as part of food, and are commonly used in factories as food coloring [16], [17]. Beets have many advantages for health and medicine. The betanin content in beets is helpful as an anti-cancer because these substances can destroy tumors and cancer cells. Beets (*Beta vulgaris*) contain 109 mg of folic acid and 10.0 mg of Vitamin C. The incidence of anemia reached 18.4%, while in Aceh Besar District, anemia's incidence reached 15.3%. Data at the Darul Ijarah Health Center, the number of postpartum mothers with mild anemia, is 579 people, moderate anemia is 99 people, and severe anemia is eight people. The research objective was to compare beet juice with red guava juice on erythrocyte and HTC levels in postpartum mothers in the Darul Ijarah Health Center, Aceh Besar District.

Methods

This type of research is a quasi-experiment with a pre-post test design using a randomized controlled trial. The research was conducted in the Darul Ijarah Health Center's Work Area from July to September 2020. The study population was all post-partum mothers in the Darul Ijarah Community Health Center, Darul Ijarah District, Aceh Besar District, purposive sampling totaling 45 people with inclusion and exclusion criteria. The sample criteria consisted of inclusion and exclusion criteria. The inclusion criteria were post-partum mothers who had erythrocyte levels <4 million per microliter and HTC <37%, were willing to be sampled, had no disease complications, had healthy babies. The exclusion criteria were mothers with digestive problems, taking vitamins. All subjects were divided into 3 (three) groups: treatment group I amounted to 15 people, treatment group II amounted to 15 people, and group III control. A total of 15 people were carried out to test the differences in initial and final erythrocyte and HTC levels in treatment groups I, II, and III using the dependent t-test if the data were not normally distributed Wilcoxon Signed Ranks test. The Wilcoxon test data analysis was used to test

the normality of the data. Paired t-test to test each intervention's average pre and post value provided that the data must be normally distributed. Therefore, this study used three intervention groups to test the effect of the intervention between groups using the One-way ANOVA method.

Results

Data analysis was performed using the Kolmogorov Smirnov test. The Kolmogorov Smirnov test carried out the normality test of this study. The test results are in the Tables 1-4.

Table 1: The results of the test for normality of Erythrocyte and HTC levels after giving guava juice, beet juice, and Fe

Group	p-value	n
Erythrocyte levels After Treatment	0.001	15
Hematokrit level After Treatment	0.001	15

HTC: Hematocrit, Fe: Iron.

Table 2 The results of the normality test showed a p-value of 0.001 <0.05, which means that the erythrocyte and HTC levels of the treatment and control groups were not normally distributed. Furthermore, data analysis was performed using the Wilcoxon Test.

Table 2: Differences in erythrocyte and HTC levels between before and after giving beet juice

Group	Mean	p-value	n
Eritrosit Before after	8.00	0.00	15
HCT Before and after	8.00	0.00	15

HTC: Hematocrit.

The results of the table analysis The difference in levels of Erythrocyte and HTC levels between before and after giving beet juice with a p-value of 0.00 <0.05 means that it has a significant difference.

Table 3: Differences in Erythrocyte and HTC levels between before and after treatment of guava juice and Fe

Group	Mean	p-value	n
Eritrosit Before and After	8.43	0.00	15
Hematokrit Before and after	8.50	0.00	15

Fe: Iron, HTC: Hematocrit.

Data analysis was performed using the Wilcoxon test

The difference in erythrocyte and HTC levels between before and after giving guava and Fe juice with a p-value of 0.00 <0.05 means that it has a significant difference.

Table 4: Differences in erythrocyte levels between the guava group treatment with the beet group and the Fe control group

Treatment Group	Mean difference	p-value	n
Group Guava+Fe	28.20	0.001	15
Group Bit+Fe	28.23		15
Group Fe	12.57		15

Fe: Iron.

Table 5 Differences in erythrocyte levels in the Guava + Fe, beet + Fe, and control (Fe) treatment

Table 5: Differences in HTC levels between the guava group treatment with the beet group and the Fe control group

Treatment group	Mean Difference	p-value	n
Group Guava+Fe	25.77	0.001	15
Group Bit+Fe	30.37	0.001	15
Group Fe	12.87	0.001	15

Fe: Iron, HTC: Hematocrit.

groups had a significant difference with a p-value of 0.001 <0.05. The difference in the mean difference in erythrocyte levels between the guava and beet treatment groups was 0.03. It can be concluded that the Beet + Fe treatment group had a higher average difference in erythrocyte levels than the Guava + Fe treatment group and the control group (Fe). Differences in HTC levels between the Guava, Beet, and Fe treatment groups. The analysis of the differences in HTC levels between the guava + Fe group and the beet + Fe group and the control group (Fe tablet) used the Kruskal Wallis test.

Table 5 HTC levels in the Guava + Fe, beet + Fe, and control (Fe) treatment groups had a significant difference with a p-value of 0.001 <0.05. The difference in the mean difference in erythrocyte levels between the guava and beet treatment groups was 0.03. The Bit + Fe treatment group had a higher average difference in HTC levels than the Guava + Fe treatment group and the control group (Fe).

Discussion

The postpartum period is a challenge for many new mothers. Recovery from childbirth requires care and medication, ranging from self-care to care that requires health workers' role. Losing the amount of blood during childbirth causes postpartum mothers to be prone to anemia. Postpartum anemia affects the mother in daily activities, fatigue, postpartum blues, and decreased cognitive abilities. The results showed that there were differences in Erythrocyte and HTC levels before and after Giving Beet Juice. The results showed a significant difference in Erythrocyte and HTC levels between before and after giving beet juice with a p-value of 0.00 <0.05. There were significant differences in erythrocyte levels in the Guava + Fe, beet + Fe, and control (Fe) treatment groups with a p-value of 0.001 <0.05. the difference in the average difference in erythrocyte levels between the guava and beet treatment groups was 0.03. Bit + Fe had a higher mean erythrocyte level, different from the Guava + treatment and control groups (Fe). There was a significant difference in HTC levels in the Guava + Fe, beet + Fe, and control (Fe) treatment groups with a p-value of 0.001 <0.05. the difference in the average difference in erythrocyte levels between the guava and beet treatment groups was 0.03. Bit + Fe had a higher mean difference in HTC levels than the Guava + treatment and control groups (Fe). There was a significant increase

in the value of the Erythrocyte Index after consuming beets. Consumption of 8 grams of beetroot for 20 days led to an increase in Hb, ferritin, and serum Fe levels, as well as a decrease in transferrin and total Fe-binding capacity levels in seven women aged 22–24 years [18]. Consumption of beets in juice (100–200 mL) increases Hb levels [19]. Also, administering 200 mL of beet juice for six weeks led to elevated levels of HTC, RBC, Fe, and ferritin [20]. Giving beetroot in powder form and Fe-based supplements for 14 days in women with anemia causes an increase in Hb levels, HTC, and the number of erythrocytes [21]. Beet juice lowers blood pressure and is consumed as part of a regular diet in adults [22]. The pigment content in beets is an antioxidant compound that affects the resistance of erythrocyte walls. The erythrocyte membrane is one of the cell membranes that are susceptible to free radical attack. If free radicals attack the erythrocyte membrane, the fluidity of the cell membrane will be disturbed, which can cause cell death so that there will be changes in the number of erythrocytes and Hb levels. The results also found differences in erythrocyte and HTC levels between before and after giving Guava and Fe juices with a p-value of 0.001 <0.05. This value implies that it has a significant difference between before and after treatment. The beet + Fe treatment group had a higher mean difference in erythrocyte levels compared to the Guava + fe treatment group and the control group (Fe). HTC levels in the Guava + Fe, beet + Fe, and control (Fe) treatment groups had a significant difference with a p-value of 0.001 <0.05. The difference in the average difference in erythrocyte levels between the guava and beet treatment groups was 0.03. It can be concluded that the Beet + Fe treatment group had a higher average difference in HTC levels than the Guava + fe treatment group and the control group (Fe). Guava juice providing 200 mg A.A. has marginal effects on Hb and P.F. concentrations and is rich in Fe [23]. Consumption of guava fruit simultaneously with rice-based foods increases the bioavailability of Fe [24]. Guava has anti-oxidative, anti-inflammatory, anti-diabetic properties, lots of Vitamin C, flavonoids, and polyphenol compounds [25], [26]. In previous studies, guava extract can reduce reactive oxygen species (ROS) levels, interleukin-6, tumor necrosis factor- α , and interleukin-1 β in the kidney of type 1 diabetic rats [27].

Conclusion

There was a significant difference in the levels of erythrocytes and HTC between before and after giving guava juice and beet juice to postpartum mothers with a p-value of 0.00 <0.05. Beet juice increases the average level of erythrocytes and HTC, which is higher than guava juice in postpartum mothers at the Puskesmas, Darul Imarah District, Regency.

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