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EFFECT OF CONSUMING PAPAYA (*CARICA PAPAYA* LINN.) ON THE LEVEL OF HEMOGLOBIN AND HEMATOCRIT IN PREGNANT WOMEN WITH ANEMIA

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ABSTRACT

Background: The prevalence of anemia among pregnant women is still high in Indonesia, especially in Bengkulu. Consuming papaya is considered as one of the solutions to increase hemoglobin and hematocrit level.

Objective: This study aims to examine the effect of consuming papaya on the level of hemoglobin and hematocrit in pregnant women.

Methods: This study employed a true experiment with randomized pretest and posttest design with control group. There were 42 respondents recruited in this study using simple random sampling. Randomization was performed to divide the samples into two groups, namely 21 respondents in a treatment group and 21 respondents in a control group. A total of 110 grams of papaya was given to the intervention group every day for 14 days. Data were analyzed using dependent t-test and independent t-test.

Result: There was a significant effect of consuming papaya on the hemoglobin and hematocrit level with p-value 0.000 (< .05). The mean difference between two groups showed that hemoglobin level (control group 10.010 gr/dL; intervention group 10.838 gr/dL) and hematocrit level (control group 27.43 %; intervention group 30.10 %).

Conclusion: Consuming papaya has a significant effect on changes in hemoglobin and hematocrit levels. It is suggested that consuming papaya should be one of alternative treatments for midwives to prevent anemia in pregnant women.

Keywords: papaya, Fe tablet, pregnant women, anemia

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INTRODUCTION

According to the World Health Organization (WHO), every day, approximately 830 women die from preventable causes related to pregnancy and childbirth, and 99% of all maternal deaths occur in developing countries.[1] The major complications that account for nearly 75% of all maternal deaths are severe bleeding (mostly bleeding after childbirth), infections (usually after childbirth), high blood pressure during pregnancy (pre-eclampsia and eclampsia), complications from delivery, and unsafe abortion.[1]

In Indonesia, the highest causes of maternal death are hemorrhage, eclampsia, infections, and etc.[2] Data from the Health Department of the Province of Bengkulu in 2014 showed that the maternal death amounted to 146 per 100,000 live births, which was increased from data in 2013 that were 139 per 100,000 live births.[3]

The number of pregnant women in Bengkulu in 2014 was 38.706, and those who got the iron tablet were 37.115 women (95.89%). The prevalence of anemia was still high, 49.3% (19.084 women) of the total of pregnant women (38.709 women) were suffering from anemia.[3] Meanwhile, the total number of pregnant women in Rejang Lebong in 2015 was 5.326 women, with 3.109 pregnant women suffered from anemia; and of 643 pregnant women in the Health Center (Puskesmas) of Perumnas, there were 384 pregnant women had anemia.[4]

In response to anemia in pregnant women, giving Fe tablets during pregnancy is one of the operational implementation of the standard of antenatal care service, which pregnant women are expected to take 90 Fe tablets during pregnancy.[5] But in fact, the percentage of mothers who reported taking iron tablet was just only 33.3% based on the number of days.[5] In addition, giving oral iron is found to cause adverse effects on the gastrointestinal tract, including nausea, vomiting, epigastric pain, eructation, pyrosis, meteorism, borborygmi, colic pain, flatulence, constipation, thin feces, diarrhea, and black feces.[6]

Another way to reduce the incidence of anemia among pregnant women is to provide nutrition rich in iron. Vitamin C is considered able to increase the absorption of nonheme iron to four-fold.[7] Nonheme iron is less readily absorbed by the body and is found in foods such as fortified cereal, rice, black beans, soybeans, eggs, wheat, and spinach.[8] Vitamin C is known as ascorbic acid, a water-soluble vitamin thought to increase the absorption of nonheme iron. Vitamin C acts as a reducing agent to facilitate iron absorption from the GI tract. The vitamin C and iron combine to form an iron chelate complex, which increases the solubility of iron in the small intestine, resulting in increased uptake across the mucus membranes of the duodenum.[7,8] The role of vitamin C in the process of absorption of iron is reduction of Ferric iron (Fe 3+) into Ferro (Fe 2+) in the intestine in order to be easily absorbed.[7] This reduction process will be even greater if the pH in the stomach is more acidic. Vitamin C increase acid in the stomach that will also increase iron absorption by up to 50%.[8] For this reason, the vitamin C must be consumed at the same time as the iron in order to be effective.

As current recommendations indicate that pregnant women should consume 85 mg/day of vitamin C.[9] Food such as papaya is considered excellent source of vitamin C. The content of vitamin C is high enough in pepaya, which is 78 mg/ 100 grams[10] of papaya. Additionally, papaya also has another benefit to keep fit, maintain the digestive tract, anti-inflammatory, anti-microbial, diuretic, strengthen the immune system,

and bone nourish, etc.[11] The effect of papaya in increasing the hemoglobin had been conducted among adult women.[12] But limited studies found in the literatures regarding the effect of papaya in the pregnant women suffering from anemia. Therefore, this study aimed to examine the effect of papaya (*Carica papaya* Linn.) on hemoglobin and hematocrit level in pregnant women with anemia.

METHODS

Design

This was a true experimental study with randomized pretest and posttest design with control group.

Setting

This study was conducted between November 9, 2016 to December 3, 2016 in the working area of the Health Center (Puskesmas) of Rejang Lebong in Bengkulu province.

Research sample

There were 42 respondents recruited in this study using simple random sampling. Randomization was performed to divide the samples into two groups, namely 21 respondents in the treatment group and 21 respondents in the control group. The inclusion criteria of the sample were: (1) Pregnant women with Hb <11 g/dL, (2) consuming Fe tablet, (3) no nausea and vomiting, (4) pregnant women in trimester II, (4) willing to be a respondent, and (5) willing to follow the prescribed diet. The criteria of exclusion were: (1) pregnant women aged <20 years and >35 years, (2) had bleeding history, (3) short interval between pregnancy <2 years, (4) had >5 children.

Instrument

To check the blood profile (hemoglobin and hematocrit), autoanalyzer was used in this study as an advanced laboratory tool equipped with a system of multiple sequential analysis. This tool has the ability to audit more functions to the chemical analysis automatically. Blood profile checking was performed three times, namely pretest, posttest 1 (the 8th day), and posttest 2 (the 15th day).

Intervention

A total of 110 grams of papaya was given to the intervention group every day for 14 days. California papaya was chosen as having good quality, red and sweet. In this study, all pregnant women got the same food in 3 times, plus 2 times snacks per day for 14 days, which everyday's menu was different provided by the researchers. It was expected that to be given the same diet every day could minimize confounding variables in this study.

Data analysis

Data were analyzed using dependent t-test to compare the average of the two data (data before and after) in the treatment group and the control; and independent t-test was also used to identify differences in levels of hemoglobin, hematocrit and erythrocytes in the control group and the intervention group.

Ethical consideration

Prior to data collection, ethical approval has been approved by the Health Research Ethics Committees (K.E.P.K) of the Health Ministry Polytechnic Semarang. The study permission was also obtained from the Head of the Health Center (Puskesmas) of Rejang Lebong in Bengkulu province. Informed consent was also performed to each respondent before collecting data.

RESULTS

The characteristics of the respondents based on table 1 showed that the majority of the respondents had senior high school background (54.8%), not working (83.3%), and multigravida (54.8%).

Levene's test showed that the p-value of education, job, and gravida were > 0.05, which means there were no difference of samples between both groups based on education, job, and gravida.

Table 1 Characteristics of the Respondents (n=42)

Characteristics	Control group n=21		Intervention group n=21		Total		*p-value*
	n	%	n	%	n	%	
Education							
Junior high	3	14.3	7	33.3	10	23.8	0.694
Senior high	12	57.1	11	52.4	23	54.8	
University	6	28.6	3	14.3	9	21.4	
Job							
Working	3	14.3	4	19	7	16.7	0.420
Not working	18	85.7	17	81	35	83.3	
Gravida							
Primigravida	12	57.1	7	33.3	19	45.2	0.246
Multigravida	9	42.9	14	66.7	23	54.8	

Table 2 Mean of Hemoglobin and Hematocrit Before and After Intervention

Variable		Mean ± SD	
		Control group	Intervention group
Hemoglobin	Pretest	9.876 ± 0.5137	9.910 ± 0.5540
	Posttest 1	9.952 ± 0.5335	10.114 ± 0.5868
	Posttest 2	10.010 ± 0.4898	10.838 ± 0.5054
Hematocrit	Pretest	26.43 ± 1.287	26.05 ± 1.161
	Posttest1	26.86 ± 1.014	27.14 ± 1.621
	Posttest 2	27.43 ± 1.399	30.05 ± 1.962

Table 2 shows the difference of the mean of hemoglobin in the intervention group, which in pretest was 9.910 gr/dL, gently increased in the posttest 1 to be 10.114, and in posttest 2 was 10.838 gr/dL. The increase of hemoglobin also occurred in the control group, but lower than the mean of hemoglobin in the intervention group, which were 9.952 in posttest 1 and 10.010 in posttest 2.

On the other hand, the mean of hematocrit level also increased in both groups, but it could be seen the difference of the mean in posttest 1, which in the intervention group was 27.14 and 26.86 in the control group, while in posttest 2 the mean of hematocrit in the intervention group was 30.05 and 27.43 in the control group.

Table 3 Analysis of the Mean Difference of Hemoglobin and Hematocrit in the Intervention and Control Group Before and After Given Intervention

Variable	Mean	SE	Mean Difference	*p-value*
Hemoglobin Level				
Control	10.010	0.1536	0.8286	0.000
Intervention	10.838			
Hematocrit Level				
Control	27.43	0.514	2.667	0.000
Intervention	30.10			

Table 3 shows a significant effect of intervention on the hemoglobin and hematocrit level with p-value 0.000 (< .05). However, it could be seen the difference of the mean between both groups, namely hemoglobin level (control group 10.010; intervention group 10.838) and hematocrit level (control group 27.43; intervention group 30.10), which indicated that hemoglobin and hematocrit level in the intervention group were higher than the control group.

DISCUSSION

The finding of this study proved that consuming 110 grams of papaya per day regularly in pregnant combined with Fe tablet can increase the levels of hemoglobin and hematocrit levels in pregnant women with anemia. This is consistent with the study reported that by giving vitamin C in tablet form or in the form of papaya can increase iron absorption in pregnant women.[7] Giving tablets of 100 mg vitamin C increases iron absorption 37.5% -46.0% in pregnant women with a basic meal of rice, corn, and "Tiwul", while the vitamin C in the form of food (250 grams papaya) can increase the absorption of 42-54.2%.[13] This could be described that another way to reduce the incidence of anemia among pregnant women is not only with the supplied iron tablet, but must be supported with giving nutrition rich in iron, which papaya in this study. Papaya not only contains vitamin C (78 mg/100 grams of papaya) and iron, but also helps absorbing iron in the body.

The role of vitamin C in the process of absorption of iron is to reduce Ferric iron (Fe 3+) into Ferro (Fe 2+) in the intestine in order to be easily absorbed.[7] In addition, vitamin C can increase acid in the stomach and also increase iron absorption by up to 50%.[8] Thus, papaya that contain lots of vitamin C are good to prevent anemia. This is supported by the results of the research revealed that there was an excellent iron binding capacity in anemic woman given vitamin C, folic acid, and iron.[14]

The response to treatment in this study was observed through the improvement of hemoglobin values at least 0.3 g/dL/week. Physiologically, hemodilution occurs due to buildup of blood cells compared with the increase in plasma, which is resulting in blood dilution. The addition of this value as follows: 30% of plasma, 18% of blood cells, and 19% of hemoglobin.[15]

On the other hand, this study revealed that there was an increase of the level of hemoglobin and hematocrit in the control group. It was because the respondents were given Fe tablet every day to maintain the iron in the body as their routine care. They need to start consuming Fe tablet from 12 weeks' gestation until 12 weeks after delivery. However, this study revealed that Fe tablet combined with papaya had a very significant effect on the hemoglobin and hematocrit level compared with the Fe tablet alone.

CONCLUSION

In conclusion, this study revealed that there was a significant effect of consuming papaya in increasing the hemoglobin and hematocrit level in pregnant women. It is suggested that consuming papaya should be one of alternative treatments for midwives to prevent anemia in pregnant women.

Declaration of Conflict of Interest

None declared.

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Authorship Contribution

The authors equally contributed in this study.

References

1. World Health Organization. Fact sheet: Maternal mortality. 2016; http://www.who.int/mediacentre/factsheets/fs348/en/. Accessed 25 March, 2017.
2. Ministry of Health. *Basic health research 2013*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan, Minsitry of Health of Indonesia; 2013.
3. Department of Health of Bengkulu. *Health profile of Department of Health of Bengkulu.* Bengkulu: Department of Health of Bengkulu; 2014.
4. Department of Health of Rejang Lebong. *Health profile of Department of Health of Rejang Lebong.* Indonesia: Department of Health of Rejang Lebong; 2015.
5. InfoDatin. *Situasi kesehatan ibu [Maternal health situation].* Jakarta: Ministry of Health of Republic of Indonesia; 2014.
6. Milman N, Byg KE, Bergholt T, Eriksen L. Side effects of oral iron prophylaxis in pregnancy–myth or reality? *Acta Haematologica.* 2006; 115(1-2):53-57.
7. Hallberg L, Brune M, Rossander L. The role of vitamin C in iron absorption. *Internationale Zeitschrift fur Vitamin und Ernahrungs-forschung.* 1989; 30:103-108.
8. Beck J. Effect of Vitamin C on iron absorption. 2014; http://www.icppharm.com/News-Resources/Articles/Effects-of-Vitamin-C-on-Iron-Absorption.aspx. Accessed 2 March 2017.
9. Gabbe SG, Niebyl JR, Simpson JL, et al. *Obstetrics: Normal and problem pregnancies.* Philadelphia: Elsevier Health Sciences; 2016.
10. Kalie M. Baga. 2008. *Bertanam pepaya.* Jakarta: Penebar Swadaya
11. Krishna KL, Paridhavi M, Patel JA. Review on nutritional, medicinal and pharmacological properties of Papaya (Carica papaya Linn.). *Natural Product Radiance.* 2008;7(4): 364-373.
12. Dwi Prafitri L, Ersila W. Efektifitas pemberian tablet zat besi ditambah pepaya (Carica Papaya L.) terhadap peningkatan kadar hemoglobin pada remaja putri anemia di Stikes Muhammadiyah Pekajangan tahun 2016 [Effectiveness of Fe tablet consumption and Caica Papaya L. on the increase of hemoglobin level in female adolescents with anemia at Stikes Muhammadiyah Pekajangan in 2016]. 2016; Paper presented in the 4th University Research Coloquium, Yogyakarta, Indonesia.
13. Makola D, Ash DM, Tatala SR, Latham MC, Ndossi G, Mehansho H. A micronutrient-fortified beverage prevents iron deficiency, reduces anemia and improves the hemoglobin concentration of pregnant Tanzanian women. *Journal of Nutrition.* 2003;133(5):1339-1346.
14. Mehnaz S, Afzal S, Khalil S, Khan Z. Impact of iron, folate, and vitamin C supplementation on the prevalence of iron deficiency anemia in non-pregnant females of Peri-Urban Areas of Aligarh. *Indian Journal of Community Medicine.* 2006;31(3):30-32.
15. Leveno K, Williams JW, Leveno KJ. *Williams manual of obstetrics*. United States: McGraw-hill; 2003.

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