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The Effectively of Papaya Consumption (*Carica papaya* Linn.), Vitamin C, and Fe Tablets in Improving Hemoglobin Levels for Adolescent Girls with Anemia in Polytechnic of Health-Ministry of Health, Aceh

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Abstract

BACKGROUND: Anemia is a nutritional problem that affects the amount of hemoglobin in red blood cells experienced by many young women in the Polytechnic of Health-Ministry of Health. Aceh. One of the alternatives for preventing and controlling anemia is to consume papaya fruit and tablet extraction.

AIM: Analyzing the benefits of taking Papaya (*Carica papaya* Linn.) Vitamin C and Fe tablet to increase hemoglobin levels in anemia adolescent girls.

METHODS: About 45 participants were involved. They were divided into three groups for 15 correspondents in each group. The participants with anemia were all girls who were students of Aceh Health Polytechnic. A quasi-experimental design was used with a non-randomized pretest-posttest control group design. The first group was given papaya and Fe treatment; then the second group was given Vitamin C and Fe treatment, and the third group was given Fe treatment. To analyze the data, univariate analysis and bivariable analysis were used to test paired t-test and one-way ANOVA.

RESULTS: The results show that there was an increase in hemoglobin levels in all groups (Papaya and Fe groups, Vitamin C and Fe, Fe). The statistical results of the one-way ANOVA test showed that there were significant differences in changes in hemoglobin levels ($p > 0.05$). The administration of papaya + Fe increases hemoglobin levels more than Vitamin C + Fe. The difference in average hemoglobin levels in each group due to the consumption of papaya containing Vitamin C together with Fe tablets was effective for increasing hemoglobin levels. This is in line with the prevention of anemia. Naturally, one of these can be done by eating fruits that contain lots of Vitamin C.

CONCLUSION: Giving papaya + Fe has been proven to be more effective in increasing hemoglobin levels in adolescent girls suffering from anemia.

Introduction

Anemia is a nutritional problem that is experienced by many people around the world. Anemia is a global public health problem affecting 305 million school children (SC) worldwide [1]. The prevalence of anemia in the world of reproductive age (15–49 years) is 29.4%, while in Indonesia, it is 22% [2]. Nationally, with anemia patients aged 15–24 years by 18.4%. Based on sex, it was found that the prevalence of anemia in women was higher (22.8%) than in men (20.6%). The 2012 Household Health Survey (SKRT) stated that the prevalence of anemia in adolescent girls aged 10–18 years was 57.1% and those aged 19–45 years were 39.5% [3].

Anemia is a condition where the level of hemoglobin or red blood cells in the body is below normal so that if left unchecked, it can cause health problems for those who suffer from it [4]. Anemia is measured by hemoglobin levels, i.e., for women in groups fertile age (15–49 years) with hemoglobin levels <12.0 g/dL, whereas men aged ≥15 years with hemoglobin levels <13.0 g/dL [3]. The contributing factors of anemia are low socioeconomic status, the onset of menarche, small family size, and vegetarian [5]. One problem that is often experienced by adolescents is anemia. It can affect the level of productivity which causes a decrease in physical activity and academic and non-academic achievement. Anemia in adolescents can cause growth disorders, easily tired, susceptible to infection, and reduced physical ability [6], [7]. Normally, anemia is significantly related to women who experience regular menstruation compared to irregular ones [8], [9], [10]. In general, the high prevalence of anemia is caused by several factors, namely, low intake of iron and other nutrients such as Vitamin A, Vitamin C, folate, riboflavin, and B12. Giving blood added tablets are one of the efforts in preventing and controlling anemia. Consumption of papaya fruit can be an alternative to prevent anemia because it contains Vitamin C, namely, Vitamin C (78 mg/100 g) and folate (38 μg/100g) [10]. The content of Vitamin C in papaya is thought to meet the needs of Vitamin C and folate for adolescents. The prevalence

of adolescents who get blood-supplemented tablets in Indonesia is 10.3% and adolescents who get blood-added tablets in Aceh are 24.7%. This study aimed to analyze the consumption of Papaya (*Carica papaya* Linn.) Vitamin C and Fe tablet can increase hemoglobin levels in young girls who experience anemia.

Methods

The design of this study is a quasi-experiment. The design used was a non-randomized pretest-posttest control group design. This research was successfully conducted at the Department of Midwifery at the Polytechnic of the Ministry of Health in Aceh on January 23, 2019 to April 12, 2019. The population in this study was all adolescent girls who were anemic in Polytechnic of Health-Ministry of Health, Aceh. The sample was chosen about 45 people using a purposive sampling technique. The basis of sample selection is due to experimental research. They were divided into three groups for 15 correspondents in each group that was all young women who were suffered from anemia. The treatment went on and the first group was given papaya and Fe treatment then the second group was given Vitamin C and Fe treatment, and the third group was given Fe treatment. The treatment is given for 12 weeks. After data were collected, then analyzed using univariate analysis and bivariable analysis to test paired t-test and one-way ANOVA.

Results

Characteristics of respondents

Respondent characteristics are inherent characteristics in individuals; in this study includes the age of Midwifery Department Students and the age of Menarche.

Table 1 shows that in the papaya and Fe group the majority of adolescent girls were 18–19 years old (60%), the majority of Vitamin C and Fe group were 21–22 years of age (93.3%), and the majority of the Fe group were 21–22 years (66.7%). In all three groups, the menarche was detected in the age group 13–14 years (53.3%), (46.6%), and (60%), respectively.

Univariate analysis

The univariate analysis aims to explain or describe the characteristics of each research variable. Univariate analysis was conducted to see changes in hemoglobin levels before and after treatment.

Table 1: Distribution of student age and menarche age student of midwifery department

Age respondent	Group		
	Papaya + Fe	Vitamin C + Fe	Fe
17–18	9	0	1
19–20	4	0	4
21–22	2	14	10
23–24	0	1	0
	15	15	15
Age menarche.	Papaya + Fe	Vitamin C + Fe	Fe
11–12	5	4	4
13–14	8	7	9
15–16	2	4	2
	15	15	15

The average hemoglobin level in the papaya and Fe group was 10.02% g, the Vitamin C and Fe group was 10.74% g, and the Fe group was 10.54% (Table 2).

Table 2: Hemoglobin levels before intervention

Groups	Means	Deviation standard	Min.	Max.
Papaya and Fe	10.2	1.11	7.20	11.50
Vitamin C and Fe	10.74	0.76	9.50	11.90
Fe	10.54	1.08	9.50	11.80

The average hemoglobin level in the papaya and Fe groups was 12.02% g, the treatment Group II was 12.08% g, and the control group was 11.40% (Table 3).

Table 3: Hemoglobin levels after intervention

Groups	Means	Deviation standard	Min.	Max.
Papaya and Fe	12.02	0.79	10.50	13.50
Vitamin C and Fe	12.08	1.27	8.60	13.50
Fe	11.40	1.08	9.60	13.10

The average hemoglobin level in the papaya group and Fe 2.00% g, the Vitamin C and Fe group 1.34% g, and the Fe group 0.85% g (Table 4).

Table 4: Hemoglobin levels before and after treatment

Treatment group	Before Mean ± SD	After Mean ± SD	Δ Mean ± SD
Papaya and Fe	10.02 ± 1.11	12.02 ± 0.79	2.00 ± 0.94
Vitamin C and Fe	10.74 ± 0.76	12.08 ± 1.27	1.34 ± 1.27
Fe	10.54 ± 1.08	11.40 ± 1.08	0.85 ± 1.17

One-way ANOVA test results showed a significant difference in changes in hemoglobin levels ($p<0.05$) (Table 5 and Figure 1).

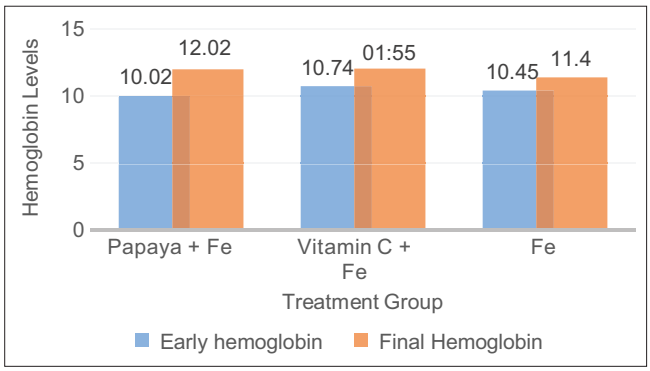

Figure 1: Changes in hemoglobin levels

Bivariate analysis

Bivariate analysis was performed to see the relationship between variables in the hemoglobin level change group.

To find out which intervention groups differed in meaning between the three groups, then post-tests

were conducted with Tukey HSD. The results showed that the changes in the average Hb levels of papaya + Fe groups differed significantly from those of the Fe group, while the average change in the Papaya + Fe group with Vitamin C + Fe and the Vitamin C + Fe group with the Fe group did not differ in meaning (Table 6).

Discussion

Anemia in any form is harmful and the consequences discussed are applicable to all types of anemia [11]. Anemia is the most common morbidity among micronutrients and affects health, education, economy, and productivity of the entire nation [2]. Menstruating girls were at around double the risk of being anemia than non-menstruating girls [12]. One of the efforts in preventing and controlling anemia in adolescent girls is by giving Vitamin C samplings, consumption of papaya, and Fe. The results of research in the midwifery group of the Department of Midwifery showed that there was an increase in hemoglobin levels in all groups. The increase in hemoglobin levels was relatively higher in the papaya + Fe group. The statistical results of the one-way ANOVA test showed that there were significant differences in changes in hemoglobin levels ($p > 0.05$). The consumption of papaya + Fe increases hemoglobin levels more than

Table 5: Average difference test results (one-way ANOVA test) in the changes in hemoglobin levels

Hemoglobin level	Mean±SD	CI 95%	p value
Change	1.37±1.21	1.00–1.74	0.03

Vitamin C + Fe. The average difference of hemoglobin levels in each group due to the consumption of papaya containing Vitamin C together with Fe tablets was effective for increasing hemoglobin levels. Prevention of anemia naturally can be done by eating fruits that contain lots of Vitamin C such as papaya. Papaya also contains Vitamin A and folic acid. Vitamin A and folic acid help the formation of red blood cells, so they can interact with iron. Giving Vitamin C 100 g and Fe 60 mg 9 times in 3 weeks can increase hemoglobin levels. An intensive iron supplementation program and a combination of nutritional education/monthly counseling can reduce anemia [13]. The results of other studies show that the use of fortified foods is more effective in reducing anemia in developing countries compared to non-fortified food products [14].

Table 6: Average difference test results (Tukey HSD) in the changes in hemoglobin levels

(I) Group	(J) Group	Δ Mean (I-J)	p value	CI 95%
Tukey HSD				
Papaya + FE	Vitamin C + Fe	0.72	0.21	−0.29–1.73
	FE	1.14	0.02	0.13–2.15
Vitamin C + FE	Papaya + Fe	0.72	0.21	−1.73–0.29
	Fe	42	0.58	0.59–1.43
FE	Papaya + Fe	−1.14	0.02	−2.15–−0.13
	Vitamin C + Fe	−0.42	0.58	−1.43–0.59

Multi-nutrient powder (MNP) interventions are relatively effective in increasing hemoglobin levels [15]. Other studies in Indonesia showed that the combination of intensive educational interventions and MNP can increase hemoglobin levels [16]. The prevalence of iron deficiency anemia is higher in children from poor families [17]. The study results showed that maternal education and family income influenced anemia status [1]. Cross-sectoral collaboration between the health sector and the education sector in providing education and nutritional counseling based on age and menarche status can reduce anemia prevalence [18]. The two-pronged strategy of increasing iron intake (dietary diversification and use of iron-fortified iodized salt) can accelerate the reduction in anemia [19]. The high prevalence of anemia in the present study might be related to the lifestyle of female students as well as their dietary habits. It is recommended that female students never skip breakfast as it is essential for their cognitive functions and physical activities [20].

Conclusion

Anemia is a serious health issue among young girls in Polytechnic of Health-Ministry of Health, Aceh. The consumption of papaya + Fe is more effective in increasing hemoglobin levels in young women who suffer from anemia. Respondents are advised to consume Fe tablets together with fruits or vegetables that contain Vitamin C to prevent anemia. Cross-sectoral collaboration between the health sector and the education sector in providing education and nutritional counseling based on age and menarche status can reduce anemia prevalence.

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