




The Exploration of Potential Tropical Foods to Prevent Anemia in Adolescents in Samarinda

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Abstract: A period of transition from child to adult known as adolescence, which causes a lot of changes that need nutrients for their growth and development. If the intake of needs is not balanced, it will cause health problems such as anemia. The prevalence of anemia in Indonesia at the age of 15-24 years has experienced an increasing trend from 18.4% in 2013 to 32% in 2018. The prevalence of anemia in Samarinda in 2016 was 321 cases spread over 22 health center. This was an analytic survey method with cross-sectional approach to describe the pattern of tropical food consumption that has the potential to prevent anemia. Respondents were female students at the Hidayatullah Islamic Boarding School, Samarinda. From 69 respondents, 49.3% experienced anemia. The picture of consumption of food sources of iron is still quite low, including local foods that contain high iron. Increasing the consumption of food sources of iron is very important to prevent the risk of anemia, including by getting used to consuming local food which is widely available in the East Kalimantan. Further research regarding the relationship between local food consumption and the risk of anemia needs to be carried out based on specific local food type.

1 INTRODUCTION

Adolescence is a period of transition from child to adult which causes biological, cognitive and emotional changes. These changes make adolescents need a lot of nutrients for their growth and development (Wirenviona et al., 2021). If the intake of needs is not balanced, it will cause health problems. One of the health problems experienced by adolescents is anemia (Warner et al, 2022).


The prevalence of anemia in Indonesia at the age of 15-24 years has experienced an increasing trend from 6.9% in 2007, 18.4% in 2013 and 32% in 2018. The prevalence of anemia in Samarinda in 2016 was 321 cases spread over 22 health center in Samarinda City (Musrah & Widayawati, 2019).


Girl adolescents have a greater risk of anemia than boys. Girl adolescent experience menstruation which can cause anemia. Based on the results of a survey conducted at one of the middle schools in Samarinda


found that 79 out of 174 female students have symptoms of anemia (Santoso, 2022).

East Kalimantan is a province with humid tropical forests, which are rich in food diversity, especially fruits and vegetables which are high in vitamins and minerals as well as iron as a form of blood haemoglobin which can help optimize the absorption of iron in the blood through the gastrointestinal tract, this can indirectly increase haemoglobin levels (Wahdaningsih et al, 2020). The fruits contain a lot of vitamin C which can increase the absorption of both heme and non-heme iron (UVAHealth, 2018).

One of the factors that influence the occurrence of anemia is eating habits. Adolescents who have unhealthy eating habits are at risk of anemia. This is due to low nutritional eating habits or unhealthy diet so the food that consumed does not meet the nutrients that needed for the formation of haemoglobin (Sharief & Azrida, 2021).

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Based on the background, it is very important to explore the local food consumption that has the potential to prevent the risk of anemia.

2 METHOD

This study used an analytic survey method with a cross-sectional approach to describe the pattern of tropical food consumption that has potential to prevent anemia. Respondents to this study were female students at the Hidayatullah Islamic Boarding School Samarinda, East Kalimantan.

The aims and protocol of this study was explained to the guardians and all participants. The consent were obtained through written documentation before participant being recruited into the study.

This study was conducted on October 16th, 2022. Anemia screening has been carried out on 69 respondents using Haemoglobin Meter *Family Dr Hb check*. Respondents were classified as having the risk of anemia if their Hb level was less than 11.5 g/dL. The dietary intake of adolescents was assessed using a food frequency questionnaire but only 62 respondents filled out the questionnaire completely. Respondents were classified as rarely consuming local foods if the frequency of consuming local food was lower than the median consumption value for all respondents. Data were analyzed using bivariate analysis to describe the pattern of tropical food consumption that has the potential to prevent anemia.

3 RESULTS AND DISCUSSION

From the screening test of anemia, there was 4 9% respondents with anemia. The average of respondent’s haemoglobin level was 12 mg/dl from 5.4 to 15.3 mg/dl.

Table 1 shows the description of local food consumption with the incidence of anemia.

Table 1: Description of local food consumption with the incidence of anemia.

frequency of local foods consumption		anemia		non anemia	
		n	%	n	%
fruit	rare	19	52.8	17	47.2
	frequent	9	39.1	14	60.9
vegetable	rare	18	46.2	21	53.8
	frequent	10	50.0	10	50.0
Animal-based protein	rare	17	51.5	16	48.5
	frequent	11	42.3	15	57.7
Plant-based protein	rare	17	48.6	18	51.4
	frequent	11	45.8	13	54.2

Based on the table 1, the proportion of anemia is higher in respondents who rarely consumed fruit (52.8%) compared to respondents who often eat fruit (39.1%). The proportion of anemia incidence was lower among respondents who rarely consumed vegetables (46.2%) compared to those who frequently consumed it (50.0%).

Respondent who often consumed animal-based protein source had a higher proportion of not experiencing anemia (57.7%) compared to those who rarely consumed it (48.5%). Likewise for respondents who often consumed plant-based protein sources, the proportion was higher not experiencing anemia (54.2%) compared to those who rarely consumed it (51.4%).

Table 2 is an overview of the consumption of local fruit among non anemia respondents based on the type of local fruit generally consumed by people in east Kalimantan.

Table 2: Description of local fruit consumption in non anemia respondents.

local fruit	rarely		frequently	
	n	%	n	%
Dragon fruit	16	53.3	15	51.7
<i>Cempedak</i>	15	45.5	16	61.5
Pineapple	16	47.1	15	60.0
Banana	14	53.8	17	51.5
Papaya	15	46.9	16	59.3
<i>Elai</i>	20	51.3	11	55.0
<i>Kweni</i>	18	43.9	13	72.2
Soursop	18	47.4	13	61.9
Jackfruit	19	51.4	12	54.5
<i>Wanyi</i>	24	50.0	7	63.6
<i>Ihau</i>	22	48.9	9	64.3
<i>Rambai</i>	23	50.0	8	61.5
<i>Kapul</i>	26	52.0	5	55.6
<i>Keledang</i>	26	51.0	5	63.5
<i>Tarap</i>	27	51.9	4	57.1
<i>Maritam</i>	26	51.5	5	62.5
Orange	15	46.9	16	59.3
Guava	16	45.7	15	62.5
Mango	16	48.5	15	57.7

Based on table 2, the proportion of non anemia respondents is higher in respondents who frequently consume local fruit such as *cempedak*, pineapple, papaya, *elai*, *kweni*, soursop, jackfruit, *wanyi*, *ihau*, *rambai*, *kapul*, *keledang*, *tarap*, *maritam*, orange, guava, and mango. Especially in *kweni* fruit, proportion of non anemia respondents was much higher in respondents who often consumed the fruit (72,2%) compared to those who rarely consumed it (43.9%).

Table 3: Description of local vegetable iron-rich consumption in non anemia respondents.

Local vegetable iron-rich	rarely		frequently	
	n	%	n	%
Spinach	8	57.1	23	51.1
Water spinach	6	50.0	25	53.2
Ferns	21	50.0	10	58.8
<i>Kelakai</i>	27	50.9	4	66.7
Long beans	13	56.5	18	50.0
<i>Tunjuk langit</i>	28	50.9	3	75.0
<i>Kates</i> leaves	24	51.1	7	58.3
Cassava leaves	22	53.7	9	50.0
Moringa leaves	22	52.4	9	52.9

Table 3 is an illustration of local vegetable iron-rich consumption in non anemia respondents. The data showed that the proportion of non anemia was higher in respondents who often consumed vegetables such as water spinach (53.2%), ferns (58.8%), *kelakai* (66.7%), *tunjuk langit* (75.0%), *kates* leaves (58.3%), and moringa leaves (52.9%).

Table 4: Description of local protein source consumption in non anemia respondents.

Local protein source	rarely		frequently	
	n	%	n	%
Animal-based protein sources				
<i>Layang</i>	16	48.5	15	57.7
<i>Kakap</i>	16	44.4	15	65.2
<i>Tongkol</i>	13	43.3	18	62.1
<i>Kembung</i>	17	45.9	14	63.6
<i>Bawal</i>	18	45.0	13	68.4
<i>Tenggiri</i>	18	45.0	13	68.4
<i>Tuna</i>	16	47.1	15	60.0
<i>Teri</i>	17	51.5	14	53.8
<i>Bandeng</i>	16	48.5	15	57.7
<i>Nila</i>	16	48.5	15	57.7
<i>Mujair</i>	19	48.7	12	60.0
<i>Haruan</i>	18	52.9	13	52.0
<i>Patin</i>	17	48.6	14	58.3
<i>Lele</i>	18	52.9	13	52.0
<i>Mas</i>	1	50.0	14	56.0
Shrimp	16	47.1	15	60.0
Squid	19	51.4	12	54.5
Shellfish	17	45.9	14	63.6
Crab	17	48.6	14	58.3
Beef	18	51.4	13	54.2
Goat meat	21	53.8	10	50.0
Chicken meat	15	45.5	16	61.5
Duck meat	20	54.1	11	50.0
Chicken eggs	9	40.9	22	59.5
Duck eggs	20	52.6	11	52.4
Quail eggs	18	50.0	13	56.5
Beef liver	26	53.1	5	50.0
Chicken liver	21	53.8	10	50.0
Plant-based protein sources				
<i>Tempe</i>	6	60.0	24	50.0

<i>Tahu</i>	6	54.5	24	51.1
Peanut	19	51.4	11	52.4
Green beans	21	52.5	9	50.0
Cashew	19	47.5	11	61.1
Red beans	21	48.8	9	60.0

Table 4 is an illustration of local animal-based and plant-based protein sources consumption in non anemia respondents. The data showed that the proportion of non anemia respondents was higher in respondents who frequently consumed most of the local animal and vegetable protein sources.

4 DISCUSSION

The results of this research found that in general there is no relationship between fruits, vegetables, and protein source consumption with anemia, but from the proportion showed that respondents who consumed those food frequently was higher to not having anemia compared to those who rarely consumed it. Except for *kweni* fruit, there was a significant relationship between the frequency of *kweni* fruit consumption and the risk of anemia (p value < 0.05). Further research is needed to determine the effect of consuming *kweni* fruit in reducing the risk of anemia.

An experimental research on 2021 through supplementation of vitamin C and iron tablets found that supplementation of vitamin C and iron tablets can reduce the proportion of anemia in girl adolescents (Wahyuni, 2021). Iron consumed with vitamin C is more effective in increasing hemoglobin level (Agusmayanti R, et al. (2020); Rieni EG, et al (2021)). Fruits contain vitamin C which can help the absorption of iron (Krisnanda, 2020; Skolmowska & Głabska, 2022). Eating foods that contain vitamin C after consuming foods rich of iron has the potential to prevent anemia.

As well as fruit, dark leafy green vegetables also has the potential to prevent the anemia because it contain high iron (Taneja et al., 2020). Dark leafy green vegetables which are widely available in east Kalimantan are rich in iron. Kalimantan's local fruits also high of vitamin C. Routinely consuming local fruit, especially after consuming iron rich foods is expected to reduce the risk of anemia, especially in adolescent woman.

Iron deficiency is a cause of anemia. Consuming iron-rich foods is expected to reduce the risk of anemia. Based on a research in Klaten and Lombok Barat District on 2021, frequent consumption of animal-based iron-rich foods was significantly

associated with a lower risk of anemia (Knijff, Roshita, Suryantan, Izwardy, & Rah, 2021).

This research did not examine the consumption habits of respondents of foods or beverages that are iron inhibitor. Further research is needed by paying attention to the consumption behaviour of iron inhibitor and prohibitor.

5 CONCLUSION

Increasing the consumption of food sources of iron is very important to prevent the risk of anemia, including by getting used to consuming local food which is widely available in the East Kalimantan region. Further research regarding the relationship between local food consumption and the risk of anemia need to be carried out based on specific local food type.

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