A Study of Anemia Prevalence and Dietary Habits among Adolescent Girls in Rural and Urban Area in North Sumatera, Indonesia

Sri Lestari[1*], Isti Ilmiati Fujiati[1], Sake Juli Martina[2] , Dina Keumala Sari[3], Siti Ardianti Ahmad Panjaitan[4] and Nur Hidayah Nasution[5]

[1]Departement of Public Health, Faculty of Medicine, Universitas Sumatera Utara, Jl. dr. Mansur No. 5 Kampus USU, Medan 20155, Indonesia

[2]Departement of Pharmacology, Faculty of Medicine, Universitas Sumatera Utara, Jl. dr. Mansur No. 5 Kampus USU Medan 20155

[3]Departement of Nutrition, Faculty of Medicine, Universitas Sumatera Utara, Jl. dr. Mansur No. 5 Kampus USU, Medan 20155, Indonesia

[4]Departement of Public Health Nutrition, Faculty of Public Health, Universitas Sumatera Utara, Jl. Universitas No. 21 Kampus USU, Medan 20155, Indonesia

[5]Master Student in Departement of Administration and Health Policy, Faculty of Public Health, Universitas Sumatera Utara, Jl. Universitas No. 21 Kampus USU, Medan 20155, Indonesia

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Abstract: Anemia is one of the public health problems in developing countries. Adolescent is a part of the groups at risk of anemia due to the increased need for iron during the age. Anemia in adolescent will lead to decreased resistance to disease, impaired physical and mental development and decreased performance in schools. This research aimed to determine the prevalence of anemia and associated with adolescent girls. This research is an analytic study with cross sectional approach. Total sample 300 adolescent girls aged 12-19 years old from Mei-October 2018. Data collected by using Food Frequency questionnaire (FFQ), anthropometric assessment and hemoglobinometer tool. Chi-square analysis was used to find the association between dietary habits and anemia. The overall prevalence of anemia was found to be 30.0%, moderate anemia (15.3%) was found to be more common than other forms of anemia. Anemia (23.0%) was found to be more prevalent among girls with aged 13-15 years (mid adolescent). The dietary habits associated with the anemia were consumption of heme sources, fruits, vegetables, tea (P <0.05). Anemia was more common in rural adolescent girls. There was significant association between anemia and dietary habits of adolescent girls.

1 INTRODUCTION

Anemia is still a global problem in the world especially in Indonesia. It has been proven to be a public health problem affected the low, the medium, and the high income countries and has been a significant adverse health consequences, detrimental to social and economic development (WHO, 2015). Anemia can occur for a number of causes; with the most important contributor is iron deficiency. Anemia affects half a million women at reproductive age worldwide. In 2011, 29% of non-pregnant women aged 15-49 years were anemia (WHO, 2015). More than 50% of girls aged 12-15 years old are reported to have anemia.

The results of a study conducted by (Stevens, 2013), the prevalence of anemia in Asia's highest continent in Uzbekistan was 51.7% and the lowest in Vietnam was 14.1%. The prevalence of anemia in Southeast Asian countries such as Malaysia, Thailand, and Philippines was 20.7%, 23.8%, and 25.4%, and the highest was in Cambodia with a prevalence of 43.8%. The prevalence of anemia in Australia showed a smaller number of 17.5%. The prevalence of anemia in Indonesia according to Basic Health Research (Riskesdas, 2013) was 21.7%, with the second highest prevalence among children and adolescents aged 5-14 years ie 26.4% (Ministry of Health Republic of Indonesia, 2013)

Anemia in young women has serious implications and almost all consequences of iron

deficiency are closely related to the severity of anemia. Anemia causes decreased resistance to infection, impaired physical growth and mental development, as well as reduced physical fitness, work capacity, and school performance (Tesfaye, 2015). The most visible impact on adolescents, especially those attending school, is the decline in learning achievement.

Studies linking eating habits with the incidence of anemia were among others done by (Thomas, 2015) who found that iron deficiency, folic acid, vitamin B12, low-meat diets and menstruation were associated with anemia in adolescents. Regular fruit consumption, especially those containing iron and vitamin C also decreases the risk of anemia in Indian adolescents (Ahankari., 2017). The energy intake influence the prevalence of anemia in pregnant women (Lestari., 2018a), stunting in children (Lestari, 2018), , and obesity in adult female (Lestari, 2017).

Meanwhile, research on anemia in young women in North Sumatera is still limited, so it is necessary to do research to examine the relationship of eating habits with anemia in young women in North Sumatera.

2 MATERIAL AND METHOD

This type of research is an analytic survey with cross sectional study design. Total samples of 300 adolescent girls aged 12-19 years coming from 4 areas : SMPIT Al USWAH, SMAIT AL USWAH from Langkat Regency, and SMP Negeri 41 Medan dan SMP Santo Yoseph from Medan City, of North Sumatera Province. Data was taken in February-July 2018.

Types of data collected in this study were primary data, using questionnaires and anthropometry measurements and hemoglobin examinations. Interviews with structured questionnaires were to find socio-demographic data, dietary habits and risk factors for anemia. While anthropometric measurements include height, weight and Body Mass Index (BMI). Food intake data obtained by using a food recall 24 hours. The measurement of anthropometry was included height and weight. Height measurement using gauge height "microtoice" with capacity measuring two meters and the accuracy of 0.1 cm. Anemia was diagnosed at haemoglobin level of less than 12g/dl (WHO, 2011). The level of hemoglobin (Hb) was measured using the HemoCue blood photometer (Kisworini, 2005) and (Akhtar, 2008).

Data analysis was univariate and bivariate. Univariate analysis used to describe the severity of

anemia, and age range in adolescent girls. The bivariate analysis used was a chi-square test to see the association of anemia with dietary habits. Data was analyzed using SPSS Software.

3 RESULT

Total of 300 adolescent girls were invited to participate in the present study. In this study found as many as 30.0% of respondents suffer from anemia. As many as 13% of adolescent girls were suffer from mild anemia, 15.3% had moderate anemia and 1.7% had severely anemia (table 1).

Table 1: Prevalence of anemia in adolescent girls

Anemia	Frequency	%
Severe (Hb <8,0 g/dL)	5	1.7
Moderate (Hb 8,0-10,9 g/dL)	46	15.3
Mild (Hb 11,0-11,9 g/dL)	39	13.0
Normal (Hb >12 g/dL)	210	70.0
Total	300	100.0

Table 2 shows that in the age group of 13-15 years (mid) adolescent girls suffered more the mild and moderate anemia. While in the age group 10-12 years (early) suffered more the moderate anemia and age group 16-19 years (late) suffered the mild anemia.

Table 2: Cross-distribution between age and severity of anemia

Age Group	Normal (%)	Mild (%)	Moderate (%)	Severe (%)
10-12 years (early)	10.7	1.3	3.3	0.0
13-15 years (middle)	51.7	10.3	11.0	1.7
16-19 years (late)	7.7	1.3	1.0	0.0
Total	70.0	13.0	15.3	1.7

In this study found that anemia of adolescent girls more experienced by respondents who come from rural (17.3%). Most girls in rural areas suffered the moderate anemia. This is likely due to lower socioeconomic status in rural areas. In addition, low nutrition and anemia knowledge and nutritional intake of young wom adolescent girls in rural areas are inadequate (Table 3).

Table 3: Prevalence of anemia in adolescent girls in rural and urban.

Region	Normal (%)	Mild (%)	Moderate (%)	Severe (%)
Rural	32.7	6.3	10.3	0.7
Urban	37.3	6.7	5.0	1.0
Total	70.0	13.0	15.3	1.7

The association between nutritional status and anemia is shown in Table 4. It was found that young women with mild anemia were found in Underweight group (BMI 16-18.4 and normal), whereas in an overweight group there was only 2% of adolescent anemia (Table 4).

Table 4: Cross distribution between Nutritional Status and anemia.

Nutritional Status	Normal (%)	Mild (%)	Moderate (%)	Severe (%)
CED grade III (BMI<16)	6.3	0.3	0.7	0.0
Underweight (BMI 16-18.4)	17.7	5.7	3.0	0.7
Normal (BMI 18.5-22.9)	34.0	6.0	9.3	1.0
Overweight (BMI 23.0-24.9)	6.3	0.3	1.7	0.0
Obese (BMI >25.0)	5.7	0.7	0.7	0.0
Total	70.0	13.0	15.3	1.7

Table 5 shows women's eating habits in consuming sources of heme, green vegetables, tea and breakfast in a week. It was found that adolescent girls with anemia sometimes consume food sources of heme (21.0%), sometimes consume green vegetables (21.7%) and often drink tea after-meal (20.0%).

4 DISCUSSION

In adolescence there is a significant increase in the need for iron. Deficiency of iron intake in this period will lead to anemia. Anemia in young women will decrease learning ability and physical capacity. Generally, the prevalence of anemia in this study was 30%. This figure is higher than the prevalence of anemia in adolescents nationwide results Riskesdas 2013 of 22.7%. Another study conducted on junior high school students in Semarang found 26.7% of respondents suffered from anemia (Indartanti and Kartini, 2014). Another study conducted on high school students in Jogjakarta found 17.0% suffered from anemia (Triwinarni, 2018). Greater prevalence was found by (Hapzah

and R. Yulita, 2011) in Polewali Mandar district of South Sulawesi, 67% of adolescent girls were anemic. A study by (Shaka and Wondimagegne, 2018) in South Ethiopia involving 443 adolescents found anemia of 22.0%. While research conducted by Jalambo (2013) in Gaza Palestine found the prevalence of anemia in female adolescents by 33.5%. The results of this study indicate that the majority of young women (15.3%) had Moderate anemia and mild anemia (13.0%). Research by (Chaturvedi, 2017) on 300 adolescent girls in Ranchi India showed an 82% prevalence of anemia, that was mild anemia (34.0%), moderate (30.3%) and severe anemia (17.6%). The high prevalence of anemia also found by (Gupta, 2012) found 77.3% adolescent girls had mild anemia. While anemia studies in the developed world showed a low prevalence of anemia, (Kim, 2014) in Korea's study involved 1312 the 10-18-year-old girls found only 5.4% with anemia.

Table 5: Association between dietary habits and anemia in adolescent girls.

Dietary habits	Categories	Anemic (%)	Normal (%)	P-value
Sources of heme	Daily-weekly	9.0	31.0	0.021
	sometimes	21.0	39.0	
Green vegetables	Daily-weekly	8.3	32.0	0.004
	sometimes	21.7	38.0	
Fruit	Daily-weekly	7.4	25.9	0.039
	sometimes	22.6	44.1	
Tea post meal	Daily-weekly	20.0	26.7	0.001
	sometimes	10.0	43.3	
Breakfast	Daily-weekly	17.3	45.0	0.286
	sometimes	12.7	25.0	

When viewed in terms of age, the results of this study showed anemia more experienced by young women in the age group 13-15 years (mid) that is equal to 23%. This study is in line with the (Amarnath and Lakshmanrao, 2013) in Andhra Prades involved 270 adolescent girls, 88.9% anemia and adolescents in the 12-15 year age group experienced the most anemia (54.8%). In this study found the prevalence of anemia in adolescent girls in rural (17.3%), higher than in urban areas (13.7%). The results of this study are in line with studies conducted by Shaka [14] in South Ethiopia, anemia in the countryside found at 67.5%, urbanized 32.5% anemia. Similarly, a study by (Sulakshana, 2014) which found an prevalence of anemia among girls in rural India by 75%. Lifestyle and socio-economic level in rural areas are relatively lower than in urban areas, which have an effect on anemia on young women. Cross-distribution between nutritional status and anemia in this study showed that adolescent girls with underweight nutritional status were more

anemic (10.7%) than those with overweight (2.4%). A similar study was conducted by (Kurniawan, 2006) in Tangerang Banten who found that the majority of adolescent girls suffered from anemia had underweight nutritional status (44.2%). A similar study was conducted by (Kanodia, 2016), in Nepal involve 433 adolescent girls and found no significant relationship between nutritional status and anemia, 75.4% of malnourished young women suffered from anemia.

The results of this study indicated that young women who rarely consume food sources of iron heme such as meat, chicken and fish suffered more anemia (21.0%). There was a significant correlation between meat consumption and anemia in adolescent girls. This result was in line with previous research conducted by (Lestari., 2018) in North Sumatera Province which found the influence of food consumption of heme and non heme sources with the incidence of anemia. Iron absorption is influenced by two factors, namely the absorption of heme iron and nonheme which indicate the existence of two different types of iron in the food. The sources of heme in human food are meat, fish, and poultry, whereas nonheme sources are cereals, nuts, vegetables and fruits (Briawan, 2012). Studies conducted by Mikki in adolescent girls in Palestine also showed a clear relationship between meat consumption and anemia. Other studies that supported the results of this study were conducted by (Bhargava, 2001) in Bangladesh that found an association of meat, fish and egg consumption with haemoglobin concentrations in women. (Zuffo, 2017) study in Brazil found a strong influence between the consumption of food sources of heme (meat) with anemia in school children.

The results of this study also showed that the consumption of green fruits and vegetables affect the anemia of young women. This result was in line with the (Jalambo, 2015) study in Gaza which concludes that there is a significant association of fruit and vegetable consumption with anemia in young women. A study by (Alquaiz, 2015) in Saudi Arabia with 495 adolescents concluded that adolescents who ate less fruit were at anemia three times more likely than adolescents who daily consumed fruit. In this study found there is a relationship to drinking tea after eating with anemia. Tannin in tea can inhibit the absorption of iron. Another similar study conducted by Tayel DI [29] in Egypt involving 405 adolescents, it was found that drinking habits had a significant effect on adolescence anemia. The previous study in North Sumatra also found a significant association of tea drinking habits with anemia (Lestari, 2018) Similarly, (Panat, 2013) study on 273 female students in India found anemia prevalence (74.85)

more experienced by respondents with daily tea habits.

5 CONCLUSIONS

The results of this study indicated that the prevalence of anemia in adolescent girls in North Sumatera was 30.0%. This prevalence number is above the national rate. Dietary habits associated with anemia incidence in adolescent girls (p <0.05) were consumption of heme sources and non heme, fruit, vegetable and tea post meal. So it is necessary to immediately do nutritional intervention in adolescent girls to reduce the incidence of anemia and improve the quality of life of adolescent girls in the future

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