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Prevalence And Factors Associated with Anemia Among Adolescent in Jambi City Indonesia

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ABSTRACT

The prevalence of anemia in developing countries varies between 20-70% of which about 30% affects adolescent and women of childbearing age. Supplementation of iron tablets at school, however the program is not always successful in increasing hemoglobin levels. The aim of this study was to determine the prevalence and factors associated with anemia in adolescent in Jambi, Indonesia. This study had a descriptive analytic design with a cross sectional approach. The respondents had received 52 iron tablets, according to the National Program. After 52 tablet, anemia was measured using finger prick test. Factors associated with anemia were explored, including physical activity, menstrual patterns, adherence to iron tablet consumption, teacher support, side effects, knowledge, consumption of protein sources of iron, consumption of enhancers and consumption of inhibitors using validated questionnaire, including The physical activity instrument used the Questionnaire of Baecke and the measurement of adherence to consuming iron tablets used the Morisky Medication Adherence Scale (MMAS) and Food Frequency Questionnaire (FFQ). Data was analysed using x^2-test. In total, 260 students were included with the average age was 16-17 years SD±0.904) and the anemia was occurred in 78 (30 %) students. Only menstrual pattern was significantly associated with anemia (p 0.000, CI=2.825-8.798). There is a relationship between menstrual patterns with anemia in adolescents in Jambi, therefore, it is recommended to have regularly iron supplement during menstruation, as a consideration for iron supplement programs.

Keywords: Iron Deficiency Anemia, Iron Supplementation, Menstruation, Medication Adherence

INTRODUCTION

Anemia is a condition in which the number of red blood cells or the amount of hemoglobin is below the reference standard value. Hemoglobin is a protein compound that plays an important role in carrying oxygen throughout the body. One of the most common causes of anemia is iron deficiency, which is estimated to account for about 50% of all anemia (Nuradhiani et al., 2017).

Anemia impairs health and well-being in women and increases the risk of maternal and neonatal adverse outcomes. Anemia affects half a billion women of reproductive age worldwide (World Health Organization, 2016). Data on young women with anemia, namely 37.1%, increased to 48.9% in the 2018 with the proportion of anemia in the age group 15-24 years and 25-34 years.

The impact of anemia itself is considered a very serious health problem public. Public health problems related to the incidence of anemia in teenagers are pale, weak, tired, dizzy, in addition to decreased ability and concentration on learning, inhibits physical growth and development of brain intelligence, increases the risk of suffering

from infectious diseases because the body's immune system decreases. Impact Anemia in women can reduce the body's immune system so that they get sick easily and reducing work productivity, hemoglobin levels and work productivity show that there is positive correlation, this means that the lower the Hb level, the greater the work productivity drop (Gebre & Mulugeta, 2015).

Giving iron tablets to young women is carried out through school/madrasah health efforts at educational institutions by determining the day of taking iron tablets together. The dose given is one tablet every week throughout the year. The coverage of giving iron tablets to adolescents in Indonesia in 2020 is 39.1%. The province with the highest percentage was North Maluku (76.2%), while the lowest percentage was East Kalimantan (7.8%). Jambi Province is the second highest, namely 69% (Kementerian Kesehatan RI, 2018).

The program to prevent and treat adolescent anemia through supplementation of iron tablets in schools is not always successful in increasing hemoglobin levels, seeing the tendency of anemia prevalence, namely 28.2% and 27.84%. The decrease in the prevalence of anemia among young women in Jambi City is not significant so this problem remains a health problem Public. Several factors, both internal and external, contributed to the successful outcome of the program. In Jambi City, there is no data available on physical activity, menstrual patterns and adherence to taking iron tablets and several other factors that are thought to be related to the incidence of anemia in female adolescents after consuming 52 iron tablets. So far, the success of the program has been seen from the distribution of iron tablets. Furthermore, factors related to the incidence of anemia in program recipients have not been studied, including early detection of possible causes other than thalassemia (Dinas Kesehatan Kota Jambi, 2021).

The aim of this study was to determine the prevalence and factors associated with anemia in adolescent in Jambi Indonesia.

MATERIALS & METHODS

Study design

This research was an observational analytic study with a cross-sectional design.

Respondents dan data collection

Subject inclusion was adolescent State-5 Senior High School who had consumed 52 iron tablets. Anemia status of adolescent girls was assessed using the WHO (World Health Organization) classification. An individual adolescent girl was considered anemic if the Hb value was below 12.0 g/dL. Girls having anemia were further categorized into different grades such as mild (10–12 g/dL), moderate (7–9.9 g/dL) and severe (< 7.0 g/dl). Inclusion and exclusion criteria Adolescent girls of age between 15 and 19 years who were willing to participate in study and gave consent for the same and who were present on the day of visit in the school are included in the study while those adolescent girls who are not willing to participate or not giving consent were excluded from the study.

Hemoglobin measurement

After consent, hemoglobin status was measured by using a digital hemoglobin. The capillary blood sample was taken by pricking the tip of the finger in an aseptic way. After rubbing the fingertip with sterile cotton, (immersed in alcohol) a 10 µl blood sample was collected by finger pricking with a sterile disposable lancet and the second blood drop was taken for hemoglobin measurement. The Result was read within one minute. Hemoglobin level determination was done by trained laboratory technicians working out of the council.

Study Variables and questionnaire

The dependent variable was anemia, the independent variable was physical activity, menstrual patterns and compliance

medication adherence, while the external variables were teacher support, side effects of consuming iron tablets, knowledge, protein consumption patterns, enhancer consumption and inhibitor consumption. The physical activity instrument used The Questionnaire of Backe, and the measurement of adherence to consuming iron tablets used the Morisky Medication Adherence Scale (MMAS) and Food Frequency Questionnaire (FFQ).

Data Analysis

The data were analyzed using the SPSS software ver.23, including frequency, percentage. Were used to the distribution of the data was tested with a chi-squared test. The significance level was set at 0.05.

RESULT

Research data that has been processed and analyzed is then presented in the following table.

Table 1. Factors Associated with Anemia in Adolescent in Jambi City Indonesia

Variables	Categories	Anemia		No Anemia		p
		n	%	n	%	
Physical Activity						0.499
	Severe (>7,9)	2	18.2	9	81.8	
	Moderate (5,6-7,9)	63	29.6	150	70.4	
	Mild (<5,6)	13	36.1	23	63.9	
Menstrual Pattern						0.000*
	Abnormal	50	51	48	49	
	Normal	28	17.3	134	82.7	
Compliance						0.660
	Non Compliance	48	31.4	105	68.6	
	Compliance	30	28.0	107	72	
Teacher Support						0.319
	Good	31	34.4	59	65.6	
	Poor	47	27.6	123	72.4	
Side Effects						0.138
	Yes	27	37.5	45	62.5	
	No	51	27.1	137	72.9	
Knowledge						0.075
	Poor	27	39.1	42	60.9	
	Good	51	26.7	140	73.3	
Protein Consumption						0.735
	Rarely consumption	22	32.4	46	67.6	
	Frequent consumption	56	29.2	136	70.8	
Enhancer Consumption						0.670
	Rarely	53	31.2	117	68.8	
	Frequent	25	27.8	65	72.2	
Inhibitor Consumption						0.893
	With main Menu	63	30.4	144	69.6	
	Not with main menu	15	28.3	38	71.7	

Of 260 high school students the average age was 16-17 years (14-18 y, SD±0.904). The prevalence of anemia was 78 (30%), mild anemia (11-11.9 g/dl) was 49 (18.8 %), Moderate anemia (8-10.9 g/dl) was 27 (10.4%) and severe anemia (< 8 gr/dl) was 2 (0.8 %). There were various factors associated with anemia, among others: Physical Activity (0.499), Menstrual Pattern (0,000,CI=2.825-8.798), Compliance (0.660 CI=0.682-2.019), teacher support (0.319 CI=0.794-2.382), Side Effect (0.138 CI=0.907-2.865), Knowledge (0.075 CI=0.988-3.152), Protein Consumption (0.735 CI=0.640-2.107), enhancer consumption (0.670 CI=0.670-2.070) and inhibitor consumption (0.893 CI=0.569-2.159).

DISCUSSION

In the present study, the prevalence of anemia was found mild and moderate anemia, respectively. The finding of this study was higher than with a study conducted in rural towns of Bahir Dar, Ethiopia (11.1%) out of this (95.8%) and (2.2%) had mild and moderate (Mengistu et al., 2019). The prevalence of anemia in this

study was almost the same as research in Godey and Degehabur council, eastern Ethiopia which reached 31.5% (Ahmed & Mohammed, 2022). The prevalence of iron deficiency anemia in jatinangor, Bandung Indonesia a mild public health problem in the study sample. Based on hemoglobin levels, anemia can be classified into moderate in adolescents and mild in adults. The low level of MCH shows iron deficiency anaemia. Adequate protein intake does not prevent anemia due to intake of macronutrients and micronutrients (Sari et al., 2022).

Anemia in young women in Jambi City is still 30% even though the program of giving iron tablets as many as 52 tablets has been going on for a long time. Anemia is still a mild public health problem if the prevalence is 5% - 19.9%, a moderate health problem is 20.0% - 39.9% and a serious health problem if the prevalence is ≥ 40%(Widiastuti et all, 2020). Another study in Karawang found that the prevalence of anemia in adolescents reached 65.27%. Research in Depok City found an anemia prevalence of 35.7%. A previous study conducted in Bekasi City on junior high school students found an anemia prevalence of 38.3%. concluded that the prevalence of anemia has increased. This is because the program to prevent anemia with iron supplementation only started at the end of 2016 after the last time it was carried out in 2011 Widiastuti & Rusmini, 2019).

The program to prevent anemia in adolescents is based on Minister of Health Regulation No. 88 of 2014 concerning Standard Blood Supplement Tablets for Women of Reproductive Age and Pregnant Women. This is done because the prevention program for anemia has so far been focused on pregnant women. Even though young women are prospective mothers so that the incidence of anemia can be prevented earlier. Currently, several districts and cities have implemented iron tablet supplementation programs for junior and senior high school students (Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2019 Tentang Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia, 2019). According to the National Institute of Health, if anemia is a serious public health problem with a prevalence of ≥40%, then it is likely that 2/3 or ± 60% of that number will have iron deficiency anemia. Meanwhile, 2.5 times as many are predicted to experience iron deficiency.

Adolescent girls who experience severe anemia are recommended to receive iron supplementation with certain medication doses that are different from the program doses aimed at prevention, are recommended to receive referrals to the primary Health Care for further examination and counseling. Adolescents who experience anemia do not always show clinical symptoms because physiologically the stages of iron deficiency anemia require a certain time and are chronic (Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.01.07/Menkes/1/2018 Tentang Pedoman Nasional Pelayanan Kedokteran Tata Laksana Thalasemia, 2018). For the first time, iron marker and hepcidin response to interval running training during the three most characteristic hormonal environments of menstrual cycle, indicating that the phase of the menstrual cycle signifies significantly affect iron status in physically active eumen-orrheic women, but an overall hepcidin response was absent changes that are obvious and do not adjust simultaneously with this changes in iron status (Alfaro-Magallanes et al., 2022).

Seeing the high prevalence of 30% of the problem of anemia found in Jambi City, the program for preventing anemia with iron tablet supplementation should be continued and fought for sustainability so that it can become one of the priority health programs for school children, iron tablet supplementation was the first line of prevention of anemia in a vulnerable group. Prevention of anemia as early as possible through specific nutritional interventions with iron tablet supplementation is not only beneficial for improving nutritional status but also has the potential to break the

stunting chain. Adolescent girls with anemia have the potential to give birth to low-birth-weight babies (LBW) and stunting. In addition, there is also a great chance of experiencing labor complications and increasing the risk of death. Supplementation of iron tablets in pregnant adolescents reduces the risk of Low Birth Weight (Kementerian Kesehatan RI, 2018).

This study also did not pay attention to energy input specifically, but only looked at the value of body mass index. The method of calculating hemoglobin levels using a digital hemometer. There was no relationship between physical activity patterns and medical history with hemoglobin levels (Kurniasih et al., 2021).

There was no significant relationship between physical activity and hemoglobin levels in university students. excessive physical activity cannot reduce hemoglobin levels (Kosasi et al., 2016). There was no significant correlation between age, educational background and physical activity with anemia in female students of Islamic Boarding School in Surabaya (Priyanto, 2018). There was no significant difference in iron status with respect to differences type of exercise or maximum performance for different iron deficient groups. Adolescent and female athletes are more likely to have iron deficiency. Therapeutic concept for Therefore athletes should pay attention to an iron-rich diet (Roy et al., 2022).

Menstruation Hygiene management, bleeding during menstruation, religion, educational status, and nutritional status of adolescents are significant factors associated with anemia (Kumar et al., 2022). Women whose menstrual cycles are at risk (cycles <24 days) are at risk of suffering from anemia 20 times compared to respondents whose cycles are not at risk (Ansari et al., 2020).

Expenditure of blood in the body can be caused by the menstrual cycle. This menstrual cycle affects the level of hemoglobin in the blood. If there is a disturbance in the menstrual cycle, it will affect the amount of blood that comes out. For menstrual cycles that are at risk of bleeding more. When blood comes out a lot, iron will come out a lot. Iron is the main ingredient for the formation of hemoglobin. Hemoglobin in the blood will decrease and the risk of anemia. Conversely, if the menstrual cycle is not at risk of bleeding there will be less. The iron that comes out with the blood is less Hemoglobin will remain normal (Anggraeni et al., 2021).

There was a relationship between the menstrual cycle and anemia. Menstrual cycles were at risk of not experiencing anemia, there were respondents whose menstrual cycles were not at risk of anemia, this could be due to the length of menstruation and the volume of menstrual blood (Sirait, 2015).

In our study, no specific intervention was carried out, but only observed the implementation of 52 iron tablets supplementation which was carried out by looking at hemoglobin levels. No special intervention was carried out by controlling certain variables because they were interested in studying other phenomena that occur as related variables such as teacher support, menstrual patterns, physical activity, adherence to iron tablet consumption, consumption patterns of enhancers and inhibitors.

The most explicit risk factor for anemia among Saudi individuals of college and young professional ages was the female gender. Dietary lifestyle, heavy menstruation, pregnancy, and intake of non-steroidal anti-inflammatory drugs were additional important risk factors among these individuals, but they were statistically not significant (Alayoubi et al., 2019).

The results of the study in found that only 48.47% of Pregnant women in Indonesia consume iron tablets as recommended (≥ 90 tablets). That The proportion of non-compliance of pregnant women based on in regions in Indonesia in the consumption of iron tablets, there was a statistically significant difference (Noptriani & Simbolon, 2022). Giving iron tablets

supplementation once a week to female students for 13 weeks resulted in an average change in Hemoglobin levels of 0.39 gr/dl (Priyanto, 2018).

The results of research on adherence to consumption of iron tablets showed that the hemoglobin level before the intervention in the two groups that received daily iron supplements and the weekly iron supplementation group was 10.4 ± 1.1 gr/dl. The average increase in hemoglobin after 1 month in each group was almost the same. Adverse drug reactions were 8.3% in the weekly regimen compared to 13.35% in the daily regimen, abdominal pain being the adverse drug reaction. Compliance was calculated by means of iron tablets and Folic Acid that were not consumed was 6.1 ± 10.98 in the daily group, and in the 'Weekly Iron Folic Acid Supplementation' group, making the weekly regimen better than the daily regimen (Susanti & Ulfa, 2014).

Providing weekly iron and folic acid (WIFS) with health education once a month is effective in reducing the prevalence of anemia in female adolescents (Vir et al., 2008). Results of the study Giving the most weekly iron and folic acid tablets to girls, rural location, literacy, status below the poverty line, knowledge about anemia, and adequate consumption of iron tablets are associated with higher knowledge of WIFS (Kumar et al., 2022).

Adolescent adherence to consuming iron and folic acid tablets is still low for reasons not given by the teacher, taking iron tablets to prevent anemia, considering iron tablets as family planning medicine and unavailability of water in the classroom. Compliance with IFAS among young women is low. Level of education and occupation of the mother of young women, awareness about anemia, and good knowledge about anemia and the IFAS program are significant predictors of adherence to taking iron tablets. so it was necessary to educate young women about anemia and the benefits of iron tablets, providing iron tablets continuously, and involving parents, will help increase the level of adherence (Dubik et al., 2019).

The nutritional status of adolescents in both urban and rural areas is low, but severe emaciation is higher among adolescents in rural areas than adolescents in urban areas. The nutritional status of young women contributes to the nutritional status of society (Teji et al., 2016).

The intervention fosters a healthier food environment and higher consumption of meat and traditional foods naturally rich in vitamin C, which is known to increase iron absorption, and fight inflammation can lead to decreased high prevalence of anemia (Tahir et al., 2020).

CONCLUSION

There is a relationship between menstrual patterns and knowledge with anemia in adolescents. Recommended to provide counseling and regular iron supplement during menstruation, used as a consideration for iron supplement programs.

Declaration by Authors

Ethical Approval: This research has obtained ethical approval from the Research Ethics Commission of Padjadjaran University, Bandung, number. 1108/UN6.KEP/EC/2022.

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