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THE RELATIONSHIP OF THE MENSTRUAL CYCLE, MENSTRUAL LENGTH, FREQUENCY OF MENSTRUATION, AND PHYSICAL ACTIVITIES WITH THE INCIDENT OF ANEMIA IN ADOLESCENTS GIRLS AT ISLAMIC BOARDING SCHOOL

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ABSTRACT

Background*: Currently anemia is still a health problem. One of the causes of anemia is bleeding that occurs during menstruation. Menstrual disorders can be influenced by body weight, frequency of exercise, physical activity, diet, environmental exposure. Women with long menstrual periods cause more blood to flow, which can lead to anemia.*
Objectives*: This study aims to determine the relationship between menstrual cycles, menstrual length, menstrual frequency, and physical activity with the incidence of anemia in adolescent girls in Islamic boarding schools.*
Methods*: This study used an observational analytic method with a case-control approach. The calculation of the formula used hypothesis test for an odds ratio, obtained a total sample of 84 people. The sampling technique was quota sampling who met the inclusion criteria.Univariate analysis was analyzed using descriptive statistical tests. Bivariate analysis was analyzed using Chi Square and Fisher Exact Test that was carried out to determine the relationship between each independent variable and the dependent variable. The research instrument for variable menstrual cycle, menstrual length, and frequency of menstruation used questionnaires that used adolescents as respondents, while for variables of physical activity using an international physical activity questionnaire (IPAQ). Blood collection to determine anemia levels using a hemocue tool (easy touch).*
Results*The results showed the factors associated with anemia were menstrual cycle (p = 0.024; OR = 5.45), menstrual length(p = 0.026; OR = 8.2), and frequency of menstruation (p = 0.026; OR = 2.16), while the unrelated factor was physical activity.*
Conclusion*: Menstrual cycle, menstrual length, and frequency of menstruation is a factor affecting anemia, while physical activity is not a factor affecting anemia.*

Keywords*: Anemia; Frequency of menstruation; Menstrual cycle; Menstrual length; Physical activity.*

ABSTRAK

Latarbelakang: Saat ini anemia masih merupakan masalah kesehatan. Salah satu penyebab anemia adalah perdarahan yang terjadi pada saat menstruasi. Gangguan haid dapat dipengaruhi oleh berat badan, frekuensiolah raga, aktivitas fisik, pola makan, paparan lingkungan. Wanita dengan periode menstruasi yang lama menyebabkan lebih banyak darah mengalir, yang dapat menyebabkan anemia.
Tujuan: Penelitian ini bertujuan untuk mengetahui hubungan siklus menstruasi, lama menstruasi, frekuensi menstruasi, dan aktivitas fisik dengan kejadian anemia pada remaja putri di pondok pesantren.
Metode: Penelitian ini menggunakan metode analitik observasional dengan pendekatan case-control. Perhitungan sampel menggunakan hypothesis test for an odds ratio, sehingga diperoleh total sampel 84 orang. Teknik pengambilan sampel dengan quota sampling yang kriteria inklusi. Analisis univariat menggunakan uji statistik deskriptif. Analisis bivariat dengan uji Chi Square dilakukan untuk mengetahui hubungan antara masing-masing variabel independen dan variabel dependen. Instrumen penelitian, untuk variabel siklus menstruasi, lama menstruasi, dan frekuensi menstruasi menggunakan kuesioner penelitian untuk remaja, sedangkan untuk variabel aktifitas fisik menggunakan kuesioner aktivitas fisik internasional. Pengambilan darah untuk mengetahui kadar anemia menggunakan alat hemocue (easy touch).
Hasil: Hasil penelitian menunjukkan factor yang berhubungan dengan anemia adalah siklus menstruasi (p = 0,024; OR = 5,45), lama menstruasi (p = 0,026; OR = 8,2), dan frekuensi menstruasi (p = 0,026; OR = 2,16), sedangkan faktor yang tidak berhubungan adalah faktor aktivitas fisik.
Simpulan: Siklus menstruasi, lama menstruasi, dan frekuensi menstruasi merupakan faktor yang mempengaruhi anemia, sedangkan aktivitas fisik bukan merupakan faktor yang mempengaruhi anemia.
Kata Kunci: Aktivitas fisik;Anemia; Frekuensi menstruasi; Lama menstruasi;Siklus menstruasi.

INTRODUCTION

In adolescence, some changes are striking physically and psychologically commonly referred to as puberty. These changes are processes that naturally will be passed by each individual. Physical changes during adolescence will affect the health and

nutritional status of this adolescents.[1] Puberty involves dramatic biological changes. These changes are a long and complex process of maturity even starting before birth, and as a result of their psychological state, they can continue into adulthood.[2]

According to research conducted on adolescent in junior high school 4 Banjarbaru shows that factors associated with anemia include long and abnormal menstrual cycles due to more blood than the normal amount. In addition, mother's education level and income low parents cause of the fulfillment of the needs of children who are lacking.[3] Three factors cause a person to become anemic namely loss of chronic/acute bleeding, destruction of red blood cells, and production of red blood cells that are not enough. According to the etiology, iron deficiency anemia is divided into four. First, lack of nutrient intake as in PEM that a relative dietary deficiency accompanied by rapid growth. Second, iron absorption is less as in PEM and malabsorption syndrome. Third, increased nutritional needs such as infection and rapid growth. The last, increased iron secretion is due to ankylostomiasis, chronic amoebiasis, polyps and chronic intravascular hemolysis which causes hemosiderin.[4]

Factors that encourage the occurrence of nutritional anemia in adolescence (health media nutrition) are : Chronic infectious disease; Excessive menstruation; Sudden bleeding like an accident and Amount of food or poor diet absorption from iron, vitamin B12, vitamin B6, vitamin C, and copper.[4] Anemia occurs due to a lack of hemoglobin levels in the blood. There are four kind of anemia. First, anemia deficiency is anemia due to lack of erythrocyte-forming substances, namely iron, folic acid, and vitamin B12. Second, pernicious anemia caused by vitamin B12 cannot be absorbed by the intestine. Third, hemolytic anemia caused by the blood in the body is easily destroyed or lysis due to certain substances such as snakes or because of other diseases such as thalassemia. Fourth, aplastic anemia due to the process of erythrocyte formation is disrupted because of disruption in the bone marrow and anemia due to bleeding due to massive blood loss and renal anemia.[5]

Globally, anemia attacks 1.62 billion people worldwide, which is equivalent to 24.8%. The prevalence of reproductive women in Indonesia in 2016 was a 28.83% increase every year. Based on the 2018 Basic Health Research, the prevalence of anemia among adolescent girls aged 15-24 is 32.0%. The proportion of anemia in urban areas 18.4% and for rural areas it has a higher proportion of 23.9%.[6] According to the 2019 health profile, pregnant women aged 15-24 years have anemia as much as 84.6%, while the coverage of iron supplementation in East Java province is 87.09%, which is still below the target ratio of 95%.[7]

Energy expenditure and physical activity are not the same, energy expenditure is the result of the behavior or physical activity itself. The amount of physical activity habits is determined from several aspects (domains) of daily life, including physical activity during work (occupational physical activity); while driving or when moving from one place to another; while doing housework or while gardening; even while relaxing.[8] When a person performs a physical activity, there is an increase in high metabolic activity, the acid produced (hydrogen ions, lactic acid) increases, which results in a decrease in Ph. Low Ph will reduce the attraction between oxygen and hemoglobin. This causes hemoglobin to release more oxygen thereby increasing oxygen delivery to the muscles. Activity performance will decrease due to a decrease in hemoglobin concentration and iron-containing tissue.[9]

Adolescent girls in Islamic Boarding schools still have a relatively high prevalence of anemia. Sodik in his research said that prevalence of anemia in islamic boarding school was 29,93%[10] With this, this study aimed to determine the relationship between menstrual cycle, menstrual length, frequency of menstruation, and physical activity with the incidence of anemia in adolescents in Islamic Boarding School.

METHOD

This type of research is analytic observational with a case-control research design. This research was conducted at Islamic Boarding School from March to October 2020.The population in this study were all female adolescents in the Islamic Boarding School aged 15-19 years, totaling 1359 people. The calculation of the sample size was used hypothesis test for an odds ratio. Based on the calculation sample size, obtained a total sample of 84 people with the case group 42 people and the control group was 42 people.[11] The sampling technique was quota sampling who met the inclusion criteria.[12] The inclusion criteria used for case group were no history of blood disorders, not menstruating, not fasting and hemoglobin levels were <12 g/dl. The inclusion criteria used for control group were no history of blood disorders, not menstruating, not fasting and hemoglobin levels >12 g/dl. There are two variables in this study, namely the independent variable which consists of the menstrual cycle, menstrual length, menstrual frequency, and physical activity. Whereas for the dependent variable in this study, namely the incidence of anemia in adolescent girls.

The measuring instrument used is a questionnaire. For the variables of the menstrual

cycle, menstrual length, and frequency of menstruation using a questionnaire that used adolescents as respondents.[13,14] Meanwhile, the physical activity questionnaire was obtained from the International Physical Activity Questionnaire.[15] As well as checking the hemoglobin level using the Hemocue tool (easy touch). The research questionnaire was distributed by the researcher by being told how to fill it in advance while checking the hemoglobin level was carried out by an enumerator who had been briefed in advance and had an experience.

Each variable was divided into two, namely the variables of the menstrual cycle, menstrual length, and menstrual frequency were divided into normal and abnormal. Meanwhile, physical activity variables were divided into light and heavy. For the menstrual cycle is said to be normal 21-41/45 days and abnormal > 45 days[13]. Whereas for the length of menstruation it is said to be normal when occurred 3 - 5 / <7 days and abnormal when > 7 days.[14] The frequency of menstruation is said to be normal if 1x / month, abnormal > 2x / month.[13] Then for physical activity is said to be light a combination of moderate and light physical activity levels and weight is total individual MET scores > 3000 MET and > 7 days / week of physical activity.[15]

Univariate analysis were performed using descriptive statistical tests. This analysis aims to describe the number of adolescents with anemia and describe the menstrual cycle, menstrual length, frequency of menstruation, and physical activity that will be presented in data in tabular form. Bivariate analysis in this study using the chi square and fisher exact test significance test was carried out by comparing the significance value obtained with α. If the p-value <0.05, then there is a significant relationship. Bivariate analysis with chi squre test were carried out to determine the relationship between menstrual cycle, menstrual length, and physical activity with anemia, while Fisher Exact test was used to determine the relationship between frequency of menstruation with anemia because assumptions was not met in a chi square test. This research has received approval from the ethics committee of the Muhammadiyah University of Surakarta with number NO.2930 / B.2 / KEPK-FKUMS / III / 2020.

RESULT

This research was conducted at Islamic Boarding School which is a branch located in Mantingan Ngawi, East Java. This Islamic Boarding School is one of the favorite cottages for parents who want to send their children to school. The number of students in Islamic boarding schools in 2019/2020 was 4678 students, with the number of students in class 1, 2, 3, and 1 intensive or equivalent to junior high school as many as 1998 students. While the number of class 3 intensive, 4, 5, and 6 students which are equivalent to senior high schools is 2680 students.

Characteristics of Respondents

The results of research conducted at the Islamic Boarding School with a subjects of 84 adolescents (42 cases and 42 controls) obtained characteristics in the form of respondent age in Table 1. Based on table 1 presents the characteristics of the respondents. In this study, the highest frequency of respondents was in the anemia group, namely 17 years of age as many as 24 people (28.6%), while the highest proportion of the non-anemia group was 17 years old as many as 28 people (33.3%). Then the highest frequency of menarche age (first menstruation) of respondents in the anemia group was 13 people (15.5%) at 12 years old, while the highest proportion in the non-anemia group was 14 people (16.7%).

It can be seen in table 1 of the characteristics of respondents, in the anemia group, the majority had a normal menstrual cycle, namely 33 people (39.3%), while in the non-anemia group the highest proportion was adolescents who had a normal menstrual cycle 40 people (47.6%). Then the majority of adolescents in the anemia group had normal menstrual periods, namely 35 people (41.7%), while in the non-anemia group, the highest proportion of adolescents who had normal menstrual periods was 41 (48.8%).

Based on Table 1, the majority of the anemia group had a normal menstrual frequency with 36 people (42.9%), and in the non-anemia group, the highest proportion was adolescents who had normal menstrual frequency 45 people (50%). Then the majority of adolescents in the anemia group had light physical activity 22 people (26.2%), while in the non-anemia group the highest proportion of adolescents who had light physical activity were 24 people (28,6%).

Bivariate analyses were conducted to determine the relationship between the menstrual cycle, menstrual length, frequency of menstruation, and physical activity with the incidence of anemia in adolescents at the Islamic Boarding School which can be seen in Table 2.

Based on table 2 the results of the bivariate analysis carried out using the chi square test, it can be seen that the menstrual cycle at an odds ratio (OR) = 5,45 (CI 95% = 1,101 – 27.01), which means that abnormal menstrual cycles can increase the risk factor 5,45 times higher incidence of anemia compared to adolescents who have normal menstrual cycles. After doing the Chi Square test, the results obtained p-value = 0.024 (<0.05), therefore it can be concluded that there is a relationship between the menstrual cycle and the incidence of anemia in adolescent girls at Islamic Boarding School Modern Islamic School.

Table 1.Characteristics of Respondents

Characteristics of Respondents	Anemic*		Not anemic*	
	n	%	n	%
Age				
16 years	10	11.9	8	9.5
17 years	24	28.6	28	33.3
18 years	7	8.3	6	7.1
19 years	1	1.2	0	0.0
Total	42	50	42	50
Menarche's age				
10 years	3	3.6	2	2.4
11 years	8	9.5	7	8.3
12 years	13	15.5	14	16.7
13 years	9	10.7	7	8.3
14 years	5	6.0	10	11.9
15 years	4	4.8	1	1.2
16 years	0	0.0	1	1.2
Total	42	50	42	50
Menstrual Cycle				
Abnormal	9	10.7	2	2.4
Normal	33	39.3	40	47.6
Total	42	50	42	50
Menstrual Length				
Abnormal	7	8.3	1	1.2
Normal	35	41.7	41	48.8
Total	42	50	42	50
Frequencyof Menstruation				
Abnormal	6	7.1	0	0
Normal	36	42.9	42	50
Total	42	50	42	50
Physical Activity				
Hight	20	23.8	18	21.4
Light	22	26.2	24	28.6
Total	42	50	42	50

*Anemic = Case * Not Anemic = Control

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Based on table 2, the OR value is 8,2 (CI 95% = 0.962 – 69,92), which means that abnormal menstrual length had 8.2 times higher risk of having anemia compared to adolescents who have normal menstrual periods. After doing the Chi Square test, the results obtained p-value = 0.026 (<0.05), therefore it can be concluded that there is a relationship between the length of menstruation and the incidence of anemia in adolescent girls at Islamic Boarding School.

Based on table 2, the results of the calculation of the Odds Ratio (OR) obtained an OR value of 2,16 (CI 95% = 1,75 – 2,75), where the frequency of abnormal menstruation had 2.16 times higher risk of having anemia compared to adolescents who have normal menstrual frequencies. After the Fisher Exact test, the results obtained p-value = 0.026 (<0.05), therefore it can be concluded that there is a relationship between the frequency of menstruation and the incidence of anemia in adolescent girls at Islamic Boarding School Modern Islamic Boarding School.

Then it can be seen in table 2 that the calculation results of the Odds Ratio (OR) obtained an OR value of 1.21 (CI 95% = 0.513 – 2.865), which means that subjects with strenuous physical activity had a 1.21 times higher incidence of anemia compared to adolescents who have light physical activity. After doing the Chi Square test, the results obtained p-value = 0.661 (>0.05), therefore it can be concluded that there is no relationship between physical activity and the incidence of anemia in adolescent girls at Islamic Boarding School Modern Islamic Boarding School.

Table 2. Relationship Between Menstrual Cycle, Menstrual Length, Menstrual Frequency, And Physical Activity With The Incidence of Anemia In Adolescents at The Islamic Boarding

Variable	Anemic		Not Anemic		p-*value*	OR	CI 95%	
	n	%	n	%			lower	upper
Menstrual Cycle								
Abnormal	8	21.4	2	4.8	0.024^a	5.45	1.101	27.01
Normal	34	78.6	40	95.2				
Menstrual Length								
Abnormal	7	16.7	1	2.4	0.026^a	8.2	0.962	69.92
Normal	35	83.3	41	97.6				
Frequency of Menstruation								
Abnormal	6	14.3	1	2.4	0.026^b	2.16	1.705	2.754
Normal	36	85.7	41	97.6				
Physical Activity								
Hight	20	47.6	18	42.9	0.661^a	1.21	0.513	2.865
Light	22	52.4	24	57.1				

$a_{Chi\ Square\ Test}$ $b_{Fisher\ exact\ test}$

DISCUSSION

This research was conducted at Islamic Boarding School which is located in the area of Mantingan, Ngawi, East Java. In this study, 84 female adolescents were selected as respondents, divided into 2 groups, namely 42 people (cases) in the anemia group and 42 (control) groups without anemia. The majority of respondents who took part in the study were aged 17 years.

The period of puberty and sexual maturation is experienced quickly when a person has entered adolescence, due to hormonal changes that can accelerate growth and physical and secondary development.[16] With this, the study used adolescents girls respondents aged 15-19 years due to puberty or menstruation in late adolescence. Based on the results of the study, the average teenage girl in Islamic Boarding School experienced menarche at the age of 12 years. According to Kemenkes (2018), it is known that 37.5 percent of women started their reproductive age (menarche) at the age of 13-14 years, 0.1 women were found with menarche aged 6-8 years, and 19.8 percent of women had just had menstruation. First at the age of 15-16 years, and 4.5 percent at the age of 17 years and over.

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Based on table 2 after the Chi Square statistical test was carried out, the results obtained p-value = 0.026 <0.05, so it can be concluded that there is a relationship between the menstrual cycle and the incidence of anemia in adolescent girls at Islamic Boarding School Modern Islamic Boarding School.

Based on data reported in Kemenkes (2018), women aged 15-19 years who had regular menstrual cycles were 83.3%, while those who had abnormal menstrual cycles were 11.7%. This research is in line with the research conducted by Herlinadiyaningsih and Rahel (2019) on Adolescent girls at SMA Negeri 4 Palangkaraya. Obtained p-value = <0.001 which shows that there is a relationship between the menstrual cycle and the incidence of anemia.[17]

The results of this study are in line with research conducted by Abdul et al (2017), which was conducted on young girls at SMP Negeri 4 Banjarbaru, showing that there is a relationship between abnormal menstrual cycles and anemia p = 0.004 abnormal menstrual cycles can cause anemia due to the blood that is removed will be more than the normal amount.[3] However, this research is not in line with research by Yossinta (2019), which was conducted on young women at MA Roudlotut Tholibin, the PKM Purwosari work area of Metro City.[18]

According to Kusmiran E. (2011), menstrual disorders can be influenced by body weight, frequency of exercise, physical activity, diet, environmental exposure, working conditions, synchronization of the menstrual process, and endocrine disorders.[19] Every woman must experience menstruation, menstruation is bleeding that occurs in the uterus periodically and cyclically. Menstruation occurs due to the release (desquamation) of the endometrium due to ovarian hormones, namely estrogen and progesterone, which change at the end of the ovarian cycle, this starts on the 14th day after ovulation. Women have menstrual cycles between 21 - 35 days, if the menstrual cycle is more than 35 days, it is called oligomenorrhea, and if the menstrual cycle is less than 21 days, it is called polimenorea.[20] [21]. According to Rakhmawati and Denny (2013), the most frequent cause of someone experiencing oligomenorrhea is obesity, while the most frequent disorder so that someone experiences polimenorrhea due to stress.[22]

The more and longer the amount of blood that comes out during menstruation, the more iron is lost during menstruation. The risk of anemia increases if a person experiences menstruation longer and more blood is removed. If iron stores are sufficient, the need for the formation of red blood cells will always be fulfilled. However, if the amount of iron stores is lacking and the amount of iron obtained from food is also low, there will be an imbalance of iron in the body, which will cause hemoglobin levels to drop below the normal limit, which is called iron deficiency anemia. [23]

Relationship Between The Length Of Menstruation And The Incidence Of Anemia In Adolescent Girls At The Darussalam Islamic Boarding School

Based on the results of the study, 74 girls (84%) had normal menstrual periods and 14 girls (15.9%) had abnormal menstrual lenght. After the analysis was carried out, the Chi Square statistical test results obtained p-value = 0.026 <0.05, so it can be concluded that there is a relationship between menstrual length and the incidence of anemia.

This research is in line with research conducted by Andyarini (2018), a study conducted on Adolescent found that more than half of the respondents (45%) had normal menstrual periods so that the p-value = 0.002 indicated that there was a relationship between menstrual periods. with the incidence of anemia.[24] Several factors can affect differences in a person's menstrual length, namely psychological factors, environment, age, and hormonal imbalance. If a person has menstrual periods that are too long, they will cause cumulative more blood loss, so the possibility of anemia occurs.[25]

According to Maryana(2012), during menstruation, a person will experience blood loss of about 30 ml,which is the same as the need for an additional 0.5 mg of iron/day. If adolescence cannot maintain a positive iron balance, they will lose iron during menstruation.[26] Then if a person does not have an adequate supply of iron and has low iron absorption in the body, the mechanism in the body cannot replace the iron lost during menstruation so that they are prone to anemia.[27]

This study is also in line with that conducted by Febrianti et al. (2013) which shows a significant relationship between menstrual duration and anemia with a p-value = 0.028. The study was conducted at Madrasah Aliyah Negeri 2 Bogor in 2010 with a total sample size of 250 people, 40% of whom experienced abnormal menstrual periods.[28] As well as research conducted by Abdul et al (2017) on Adolescent girl at SMP Negeri 4 Banjarbaru, the p-value was obtained = 0.003, which means that there is a relationship between menstrual length and the incidence of anemia.[3] However, this study is not in line with the research of Suchi&Nurlina (2018), which shows that there is no significant relationship between the length of menstruation and the anemia status of students of DIII Midwifery, Faculty of Public Health, Muslim University of Indonesia.[29]

The Relationship Between The Frequency Of Menstruation And The Incidence Of Anemia In Adolescent Girls at The Darussalam Islamic Boarding School

Based on the results of research conducted by an Adolescent girl in Islamic Boarding School who had a normal menstrual frequency as many as 77 people (87.5%), while as many as 7 people were not normal. Fisher Exact test results obtained p-value = 0.024 <0.05, therefore it can be concluded that there is a relationship between the frequency of menstruation and the incidence of anemia in adolescent girls at Islamic Boarding School.

This research is in line with research conducted by Dzul (2018), which was conducted on class X adolescents at SMA Negeri 2 Pringsewu. Obtained p-value = 0.003 so that it was found that there was a relationship between the pattern (frequency) of menstruation and the incidence of anemia.[30] According to Amaylia (2012), 3 things cause anemia, namely reduced red blood cell production (can be caused by lack of nutritional intake, bone marrow disorders, or disease), increased red blood cell destruction, and blood loss.[31]

This study is also in line with Peni's research (2009) on female students at the Al-Hidayah Islamic Boarding School, Karangrayu District, the value of p = 0.007 which means there is a relationship between menstrual frequency and the incidence of anemia. However, this study is not in line with research by Yunarsih& Sumy (2014), which states that there is no significant relationship between the frequency of menstrual patterns and the incidence of anemia in seventh-grade girls at SMP 6 Kediri.[32]

The Relationship Between Physical Activity And The Incidence of Anemia In Adolescent Girls In Darussalam Islamic Boarding School

In this study, there were 50 girls (56,8%) who had light physical activity, while 38 (43,2%) had heavy physical activity. And after statistical tests using the Chi Square test, the p-value was obtained = 0.661> 0.05, so it can be concluded that there is no relationship between physical activity and anemia.

The majority of Adolescent girl at the Islamic Boarding School Modern Islamic Boarding School has a low level of physical activity because the activities they undertake include school, which starts from 07.00 WIB to 12.30 WIB, during the learning process Adolescent girl at Islamic Boarding School spend time sitting listening to the teacher and walking

to the canteen when it's time to break. And exercising twice for one week, as well as several other extracurricular activities.

This study is in line with the research conducted by Laura et al (2014), which states that there is no significant relationship between physical activity and anemia, the value of p = 0.265 which is greater than 0.05. The research was conducted on students who are members of the UKM PendekarAndalas University.[9] As well as research conducted by Dzul (2018), students at SMA Negeri 2 Pringsewu, the value of p = 0.152 which means there is no relationship between physical activity and the incidence of anemia.[30]

Research conducted by Renny and Ani (2017) also states that there is no relationship between physical activity and anemia, the results of the study obtained a value of p = 0.079, the study was conducted on female workers.[33] However, this study is not in line with Anis' research (2019), which was conducted on young women at senior high school, which stated that there is relationship betwen physical activity wit anemia with a p-value = 0.04.[34]

Strenuous physical activity is a combination of walking or activity with hard intensity for 7 days or more which results in total physical activity of at least 3000 MET minutes/week. While light physical activity is a combination of light physical activity and moderate physical activity which is carried out at least 20 minutes for 3 days or at least 5 days or you can also walk at least 30 minutes every day which results in total physical activity of at least 600 MET minutes/week.[29]

According to Laura et al (2014) when a person performs a physical activity, there is an increase in high metabolic activity, the acid produced (hydrogen ions, lactic acid) increases, which results in a decrease in Ph. Low Ph will reduce the attraction between oxygen and hemoglobin. This causes hemoglobin to release more oxygen thereby increasing oxygen delivery to the muscles. Activity performance will decrease due to a decrease in hemoglobin concentration and iron-containing tissue.[33]

In this study, there was no relationship between physical activity and the incidence of anemia, but there are other factors related to the incidence of anemia, namely menstrual cycle, menstrual length, and menstrual frequency. This is because the majority of young women at the Islamic Boarding School have a light level of physical activity, and the majority have menstrual cycles, menstrual length, and normal menstrual frequency.

CONCLUSION

There is a relationship between the menstrual cycle, menstrual lenght and frequency of menstruation with the incidence of anemia in adolescent girls at the Islamic Boarding School, conversely there is no relationship between physical activity and the incidence of anemia in adolescent girls at the Islamic Boarding School.

Suggestion for schools are to improve health promotion, especially about anemia and the factors that influence it, to increase the knowledge of young women in Islamic Boarding School, it can be in the form of counseling, posters, seminars, or other media. Adolescent girls who have menstrual cycles, menstrual length, and irregular or abnormal menstrual frequency are expected to consume foods rich in iron so that they can replace the iron that comes out during menstruation, as well as foods containing vitamin C to absorb iron. More optimal to avoid and reduce the risk of anemia. Suggestion for further researchers, it would be nice to examine more deeply on the relationship between menstrual frequency and anemia due to its high OR value, therefore there is a higher risk of experiencing anemia.

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