Correlation of Menstrual Pattern, Nutritional Status and Level of Knowledge With the Incidence of Anemia on Teenage Girls

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Abstract— **Anemia is a condition in which the number of red blood cells, or hemoglobin concentration is below. The prevalence of anemia is mostly due to iron deficiency. About 50% of anemia in women worldwide is caused by iron deficiency (WHO, 2012). This study aims to determine the correlation of menstrual patterns (menstrual cycle and duration of menstruation), nutritional status, and level of knowledge with the incidence of anemia in teenage girls. This study used an observational analytic design with cross sectional design. The number of samples of this study is 78 teenage girls which were selected using proportional stratified random sampling. Data collection was carried out by measuring BMI / U, examination of hemoglobin levels, and filling in questionnaires, then analyzed using the chi square test. The results showed that there was a correlation between nutritional status and the incidence of anemia (p value <0.05), and there was no correlation between menstrual patterns (menstrual cycle, duration of menstruation), and the level of knowledge with the incidence of anemia in teenage girls (p value> 0, 05).**

Keywords— *Anemia, menstrual patterns, nutrional status, level of knowledge*

I. INTRODUCTION

Prevalence of anemia is the main nutrition problem in the world, and most of anemia is caused by iron deficiency [1]. Particularly, iron deficiency can also be found in adolescent (Desmawati, 2013). Prevalence of anemia in Indonesia is still categorized as quite high level; it was recorded number of prevalence of anemia in national scale by 23% [2]. According to group of age, there is 84,6 % of anemia suffers in the age of 15-24 years old. Anemia in group of women is relatively high than men namely 23,90%, meanwhile, men face 18,40% of anemia, Prevalence of women living in rural area has higher percentage namely by 22,80%, compared to women living in urban area namely by 20,60% [3], [4]. There is an important issue to prevent anemia in pregnant women namely ensuring fulfillment needs of nutrition at adolescence. Teenage girls is a group of vulnerable of anemia since in adolescence, they face menstruation period, in which in the first menstruation, it requires more iron, So far, anemia prevention program is only focused on pregnant women, in fact teenage girls are also prospective mothers which later must be prepared to give birth, so that they must be healthy so their babies will be able to grow and develop in a well-qualified manner [5]. In one period of menstruation, teenage girls will lose blood ranging from 25-60 cc per day (Ministry of Health RI, 2012). Such condition indicates that a teenage girl averagely loses iron by 20 mg per month; for some individuals, they can reach 58 mg per month due to menstruation, [6]. Teenage girls facing iron deficiency namely anemia can cause decreased learning concentration ability, disrupted growth so it can cause not-optimal body height and cause pale face look [7].

Teenage girls facing iron deficiency of anemia can get tired easily, decreased body resistance on any infection as well as decreased body stamina. There is a significant correlation between nutrition status, menstruation, level of family income and level of mother income on the incidence of anemia [8]. There is a correlation between family income, consumption of foods that inhibit iron absorption, nutritional status and menstrual patterns with the incidence of anemia in teenage girls [9]. Based on the results of screening that was conducted every new academic year by Community Health Center staffs, it was recorded in class X that there were 14 female students with very underweight nutrition status; there were 24 female students with under weight nutrition status; there were 9 female students with over weight nutrition status, and there were 12 female students with obese nutrition status. The data indicates that there are nutritional problems faced by teenage girls. This situation makes researchers interested in knowing "The Correlation between Menstrual Patterns, Nutritional Status and Level of Knowledge with Incidence of Anemia in Teenage Girls in Islamic State Senior High School Batu City". The purpose of this study is to determine the correlation of menstrual patterns (menstrual cycle, menstrual length), nutritional status, and level of knowledge with the incidence of anemia in Teenage Girls in Islamic State Senior High School Batu City.

II. METHOD

This study used an observational analytic design with a cross sectional approach. The population of this study is all teenage girls in Islamic State Senior High School Batu City, namely there are 78 female students as the research samples with a stratified random sampling proportional sampling

technique. The inclusion criteria in this study are respondents in class X and XI, respondents have faced menstruation, and those who were willing to submit informed consent. The exclusion criteria in this study are the respondents in the menstrual period, and respondents in fasting conditions. The instruments used are weight scales that have been tested at the UPT Legal Meteorology, Malang City, microtoice, validated questionnaires, and digital Hb measuring instrument with brand of family dr which have been calibrated by testing control solutions and checking the test strips regularly. The data analysis used was univariate and bivariate analysis using the chi square test.

III. RESULTS

The following is an illustration of the characteristics of respondents who were the subjects of the study, as well as the results of analysis between menstrual patterns (menstrual cycle, menstrual length), nutritional status, and level of knowledge with the incidence of anemia in Teenage Girls in Islamic State Senior High School Batu City.

TABLE I.   CHARACTERISTIC DESCRIPTIONS OF RESEARCH RESPONDENTS

Types of Variables	Total (N = 78)	Percentage
Age		
15 years old	19	24,4
16 years old	45	57,7
17 years old	14	17,9
Anemia (< 12 g/dl)	50	64,1
Mild level anemia (11-11,9 g/dl)	25	32,1
Moderate level anemia (7-9,9 g/dl)	23	29,5
Severe level anemia (< 8 g/dl)	2	2,6
No Anemia (> 12 g/dl)	28	35,9
Cycle of Menstruation		
21-35 days	46	59,0
< 21 days	23	29,5
> 35 days	9	11,5
Duration of Menstruation		
3-7 days	59	75,6
>7 days	19	24,4
Nutrition of Status		
Under weight	10	12,8
Normal	28	35,9
Over weight	32	41,0
Obesity	8	10,3
Level of Knowledge		
Good	38	48,7
Fairly Good	30	38,5
Less Good	10	12,8

Based on Table 1. it can be seen that based on the grouping of respondents based on age, it is known that most respondents were in the group of age by years old, namely by 57.7% (45 female students), there is 24.4% (19 female students) in the group of age by 15 years, and 17 , 9% (14 female students) in the group of age by 17 years old. Based on frequency distribution of respondents in anemia status in teenage girls, it can be seen that the incidence of anemia in Teenage Girls in Islamic State Senior High School Batu City is 64.1% (50 female students). Seeing at the anemia status category, it was

found that 32.1% (25 female students) is having mild anemia (Hb levels 11-11.9 g / dl), while 29.5% (23 female students) is having moderate levels of anemia (Hb levels). 7-9.9 g / dl), and the remaining 2.6% (2 female students) is having severe anemia (Hb level <8 g / dl). The frequency distribution of respondents based on menstrual cycles can be seen that there is 59% (46 female students) who experience normal menstrual cycles (21-35 days) and there is 29.5% (23 female students) who experience abnormal menstrual cycles with short cycles (<21 days), and there is 11.5% (9 female students) who experience abnormal menstrual cycles with long cycles (> 35 days). While based on duration of menstrual, it is known that there is 75.6% (59 students) girls who experience normal menstruation (3-7 days), while there is 24.4% (19 female students) who experience abnormal menstrual periods (> 7 days). Frequency distribution based on nutritional status revealed that there is 12.8% (10 female students) having underweight nutritional status, while there is 35.9% (28 female students) having normal nutritional status; there is 41% (32 female students) having obese nutritional status, and there is 10.3% (8 female students) having obesity nutritional status.

TABLE II.   BIVARIATE ANALYSIS RESULTS BETWEEN MENSTRUAL PATTERNS, NUTRIONAL STATUS, AND LEVEL OF KNOWLEDGE WITH INCIDENCE OF ANEMIA IN TEENAGE GIRLS IN ISLAMIC STATE SENIOR HIGH SCHOOL BATU CITY

Variabel	PR	p-value
V_1 Level of Knowledge	1,; 1,2	0,538
V_2 Nutrition Status	0,47; 0,45; 0,3	0,023*
V_3 Menstruasion cycle	0,69; 1	0,257
V4 Duration of Menstruation	1,14	0,709

Sign (*) shows a significant correlation (p < 0.05)

Based on Table 2, it shows that the level of knowledge variable has a p value of 0.538 (p> 0.05), which indicates that there is no significant correlation between the level of knowledge with the incidence of anemia in teenage girls; it also obtained the value of PR (poor/good) = 1.2 meaning that teenage girls with less good knowledge are likely to have 1.2 times to suffer from anemia than girls who have good knowledge. It also obtained the value of PR (not good / fairly good) = 1 meaning that girls with less good knowledgea have a chance to suffer anemia compared to teenage girls who have good knowledge. Based on the analysis test, it is known that the nutritional status variable has a p value of 0.023 (p <0.05), which shows that there is a significant correlation between nutritional status and the incidence of anemia in teenage girls. It is also obtained the value of PR (under weight / over weight) = 0.45, meaning that under weight teenage girls have a chance of 0.45 times to suffer from anemia compared to teenage girls with over weight nutritional status. And the value of PR (obesity) = 0.3, means that girls who have under weight nutritional status have a chance of 0.3 times to suffer from anemia compared to teenage girls who have obesity nutritional status. Based on the test analysis, it is known that the menstrual cycle variable has a p value of 0.257 (p> 0.05), which shows that there is no significant correlation between the menstrual cycle and the incidence of anemia in teenage girls. And it is also obtained the PR value of the menstrual cycle is not normal (<21 days) and normal (21-35 days) = 1, meaning that girls who have abnormal menstrual cycles namely short cycle (<21

days) have a chance to suffer anemia compared to teenage girls who have a normal menstrual cycle (21-35 days). It is also obtained the PR value of abnormal menstrual cycle by short cycle (<21 days) and abnormal long cycle (> 35 days) = 0.69, it means that teenage girls who have a short cycle of abnormal menstrual cycles (<21 days) have a chance of 0.69 times for anemia compared to young women who have a long cycle of abnormal menstrual cycles (> 35 days). Based on the analysis test, it is known that the duration of menstrual variable has a p value of 0.709 (p> 0.05), which shows that there is no significant correlation between duration of menstrual and the incidence of anemia in teenage girls with a p-value> 0.05. It is also obtained PR value of 1.14, meaning that teenage girls who have abnormal menstrual periods (> 7 days), have a chance of 1.14 times to suffer from anemia compared to teenage girls who have normal menstrual periods

IV. DISCUSSION

A. Correlation between knowledge level and Incidence of anemia

Referring to the data on the level of knowledge about anemia in teenage girls, it is known that the average true value of girls is 72, and if it is categorized The results of the study describe that the level of anemia knowledge among female students in Islamic State Senior High School Batu City in the good category was 48.7%, while for the fairly good category was 38.5%, and not good level of knowledge was 12.8%. Based on the cross tabulation analysis between the level of knowledge about anemia and the incidence of anemia, it is known the proportion of teenage girls with poor levels of knowledge and anemia is 14% (7 female students), girls with a fairly good level of knowledge about anemia and anemia was 42% (21 female students), and teenage girls with a good level of knowledge about anemia and anemia was 44% (22 female students).

The interesting thing in this study is the tendency of teenage girls who have good level of knowledge about anemia. Knowledge is a guide in forming one's actions (overt behavior). Based on experience and research, it was found that behavior based on knowledge is more lasting than behavior that is not based on knowledge [10].

The formation of behavior is not only influenced by the domain of knowledge but also the domain of attitude. One of the attitudes formation is influenced by personal experience which what has been experienced by someone will form and influence appreciation of social stimulation [11]. The response is one of the basic attitudes, so that someone can have a response and appreciation, a person must have experience related to psychological objects, then there will be formed appreciation as a positive attitude or negative attitude, depending on various other factors.

B. Correlation between duration of menstruation and Incidence of anemia

The results of the analysis show that there are 59% (46 female students) of teenage girls who have normal menstrual cycles (21-35 days), and there is 29.5% (23 female students)

who experience abnormal menstrual cycles with short cycles (<21 days) and there is 11.5% (9 female students) who experience abnormal menstrual cycles with a long cycle (> 35 days). Although there are still teenage girls with abnormal menstrual patterns, this is still considered normal because the age of adolescents is still within the tolerance limit for abnormal menstrual patterns, this is because the physical and psychological conditions of teenage girls including sexual hormones are not stable and by increasing age, the menstrual pattern can be more normal [12].

There is no significant correlation between the menstrual cycle and the incidence of anemia in teenage girls in Surabaya 3 State Senior High School with p value = 0.161 (p value> 0.05), this is because the menstrual cycle is influenced by duration and number (days) when the blood comes out a lot, and both have the opposite correlation namely more and longer and a lot (days) can increase the risk of anemia (decreased HB level) [13]. However, the results of this study contradict which show a correlation between hemoglobin level and menstrual cycle with moderate correlation strength and negative pattern of correlation, meaning that lower hemoglobin level will lead to longer menstrual cycle [14].

C. Correlation between duration of menstruation and Incidence of anemia

The results of the statistical test show that there is no significant correlation between the duration of menstruation and the incidence of anemia in teenage girls with a p-value = 0.709 (p value> 0.05). From the analysis results, it is also obtained the PR value of 1.14 meaning that teenage girls who have abnormal menstrual periods (> 7 days) have a chance of 1.14 times to suffer from anemia compared to teenage girls who have normal menstrual periods. There is no significant correlation between menstrual patterns and the incidence of anemia in teenage girls in the Depok City area with a p-value = 0.756 (p value> 0.05) [12]. There is no significant correlation between duration of menstruation and incidence of anemia in midwifery DIII students at the University of Muslim Indonesia with a p-value = 0.703 (p value> 0, 05) [15]. However, the results of this study contradict with a research stated that there is a correlation between the duration of menstruation and the incidence of anemia in teenage girls in MTS Zainul Hasan Genggong with a p-value = 0.006 (p value <0.05) [16]. The absence of significant correlation between the menstrual pattern and the incidence of anemia in teenage girls in Islamic State Senior High School Batu City in 2019 may be caused by that researchers only assess on the menstrual cycle and the duration of menstruation without assessing the amount of blood that comes out when girls are menstruating so that it is not known how much iron comes out together with blood during menstruation.

D. Correlation between duration of menstruation and Incidence of anemia

The results of cross tabulation analysis show that the proportion of teenage girls having underweight and anemic nutritional status is 6% (3 female students); the proportion of

teenage girls having normal nutritional status and suffered from anemia is 36% (18 female students); the proportion of teenage girls having overweight nutritional status and suffering from anemia is 42% (21 female students), and the proportion of teenage girls having obesity nutritional status and suffer from anemia is 16% (8 female students). The results of statistical tests show that there is a significant correlation between nutritional status and the incidence of anemia in teenage girls with a p-value = 0.023 (p value <0.05). From the analysis results, it is obtained also the value of PR (thin / normal) = 0.47, meaning that teenage girls who have underweight nutritional status have a chance of 0.47 times to suffer from anemia compared to teenage girls who have normal nutritional status. It is also as obtained the value of PR (under weight / over weight) = 0.45, meaning that teenage girls who have under weight nutritional status have a chance of 0.45 times to suffer from anemia compared to teenage girls who have over weight nutritional status. And the value of PR (obesity) = 0.3, means that teenage girls who have under weight nutritional status have a chance of 0.3 times to suffer from anemia compared to teenage girls who have obesity nutritional status.

Nutritional status is the most dominant factor related to the incidence of anemia in teenage girls; it is found that there is a significant correlation between BMI/anemia and the incidence of anemia in teenage girls, in which teenage girls having IMT/U classified as abnormal have a risk of 5,405 times affected by anemia [17]. However, the results of this study contradict with a research stated that there was no correlation between nutritional status and the incidence of anemia in teenage girls in Surabaya State Senior High School 3, this was because teenage girls consumed less animal protein and iron, and prefer consumption of foods with high in calories and low in iron such as junk food, snacks, soft drinks, and others [13]. People who had normal nutritional status, they can get anemia if they have not balanced eating habits, such as respondents who rarely eat vegetables and can be caused if they often eat foods that contain carbohydrates and fat without being balanced by eating food contains minerals, proteins and vitamins [18]. People who have very over weight nutritional status or can be called as obesity, they more often consume foods that are high in fat and carbohydrates compared to those containing minerals, proteins, and vitamins [19]. Based on research in Mexico, it is known that iron deficiency 2-4 times can occur in obese women and children, this is due to an increase in hepsidin production which can inhibit iron absorption [20]. Mechanically, obesity that has low hemoglobin is caused by excessive fat accumulation so that it can interfere with the work of hepsidin which is the main hormone that regulates iron homeostasis resulting in an increase in hepsidin which will inhibit iron absorption and restrict iron to erythropoietin [21].

Poor eating patterns will develop in childhood and adolescence and will be at high risk to continue into adulthood, this indicates that the importance of prevention as early as possible behavior of unhealthy eating habits so it is necessary for further intervention in individuals who have experienced poor dietary habits [22].

V. CONCLUSIONS

Based on the results of the analysis note that there is no relationship between menstrual patterns (menstrual cycle, duration of menstruation), and the level of knowledge with the incidence of anemia in teenage girls, and there was a correlation between nutritional status and the incidence of anemia. Base on study, researcher suggest to It is necessary for an increase in the dissemination of information on anemia health by increasing the role of UKS teachers or utilizing the Student Council as a school infrastructure in order to assist the information provision about symptoms of anemia, nutritious food for adolescents, to increase adolescents' self awareness of anemia, as well as work with health centers to give blood-added tablets regularly.

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