Journal of Bulletin of Inspiring Developments and Achievements in Midwifery
Vol. 01, No. 2, December 2024, 1-9
***e*-ISSN: 3089-672X**

Prevalence of Anemia and its Association with Dysmenorrhea Severity Among Female Students: an Epidemiological Study

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Article Information

Received: October 19, 2024
Revised: December 19, 2024
Online: January 17, 2025

Keywords

Anemia, Dysmenorrhea, Reproductive Health

ABSTRACT

Dysmenorrhea refers to menstrual pain frequently encountered by adolescent girls, which can significantly disrupt their daily activities. The severity of dysmenorrhea can be influenced by factors such as anemia and nutritional status. A survey conducted among 46 high school and vocational students revealed that 39 students reported experiencing menstrual pain, while 7 did not. Additionally, students expressed feelings of fatigue, exhaustion, lethargy, and weakness during their menstrual periods.The objective of this study was to investigate the correlation between the occurrence of anemia and the intensity of dysmenorrhea among high school/vocational students. Utilizing an analytical survey method with a cross-sectional design, the study included a population of 306 students, from which a random sample of 73 was selected. Data were gathered using questionnaires. The findings indicated that only a few students suffered from severe dysmenorrhea, yet more than half exhibited signs of anemia. A significant relationship was identified between anemia and the severity of dysmenorrhea among the participants.In conclusion, the study highlights that anemia is associated with increased dysmenorrhea severity. It emphasizes the need for schools to enhance health facilities for female students experiencing dysmenorrhea and to provide education on the importance of reproductive health.

Keywords *: Anemia, Dysmenorrhea, Reproductive Health*

http://doi.org/10.69855/bidan.v1i1.72
https://gpijournal.com/index.php/bidan

INTRODUCTION

The time between childhood and adulthood known as adolescence is characterized by social, psychological, and physical changes. Menstruation, which is frequently accompanied by pain or cramps known as dysmenorrhea, is one of the physical changes that teenage females go through. Daily activities, academic achievement, and general quality of life can all be impacted by dysmenorrhea. Up to 61% of unmarried women experience dysmenorrhea, which is common in women between the ages of 20 and 25. In 2020, according to data from the World Health Organization (WHO), 1,769,425 women (90%) experienced dysmenorrhea, with 10–16% experiencing severe dysmenorrhea. The incidence of dysmenorrhea in the world is very high (F. Indah and T. Susilowati, 2022). Based on the incidence of dysmenorrhea in Indonesia, it was 107,673 people (64.25%), consisting of 59,671 people (54.89%) experiencing primary dysmenorrhea and 9,496 people (9.36%) experiencing secondary dysmenorrhea (P. Oktorika et al., 2020) .

According to available data, the prevalence of dysmenorrhea in Indonesian adolescents is fairly high, and one risk factor that contributes to this condition is anemia, which is caused by the body producing a small number of red blood cells and losing too many of them, which makes it difficult for the red blood cells to carry oxygen to the tissues, and which is more common in adolescent girls. In addition to the monthly menstrual cycle, adolescents who frequently diet or maintain their body shape also increase their risk of iron deficiency, which can lead to anemia (Zakiah., 2022).

Primary dysmenorrhea is generally linked to anemia, psychological disorders, age, smokin g, nutritional status, childbirth status, stress, age of menarche, family history, and physical activity (R. Rahmatanti et al., 2020) . The impact of anemia on adolescents will cause cognitive dysfunction, low academic ability and decreased physical capacity. In addition, the impact of anemia experienced during adolescence will continue when entering the process of pregnancy, childbirth and breastfeeding. Most studies show that maternal and newborn deaths are caused by anemia.

According to research conducted by Nana Aldriana et al, the results showed that there was a significant relationship between hemoglobin levels and the incidence of dysmenorrhea with a p value of 0.001 (N. A and Afriliana., 2018) . Another study conducted by Riris Rahmatanti et al, the results of the study also found a significant relationship between anemia and the incidence of dysmenorrhea with a p value of 0.001 (R. Rahmatanti et al., 2020) . It is well known that a number of risk factors are thought to contribute to the development of dysmenorrhea, including anemia (low hemoglobin levels), which can be brought on by a person's iron deficiency, which is caused by inadequate absorption and a lack of iron intake, as well as other factors like the length of women's periods (PH Nazihah.,2020).

According to data from the Padang Pasirn Health Center in 2020, 12 *high school/vocational high school students* (0.8%) were categorized as very thin, 27 people (2.0%) were categorized as thin, 276 people (20.0%) were categorized as normal, 24 people (1.7%) were categorized as fat and 11 people (0.81%) were categorized as obese. In addition, 84 female students (6.2%) were declared anemic. The results of a preliminary survey conducted by researchers on 46 female students in high

school/vocational high school found that the number of female students who experienced menstrual pain was 39 female students and 7 female students did not experience pain during menstruation. With 12 people experiencing mild pain, 32 people experiencing moderate pain and 2 people experiencing severe pain. Female students also complained of feeling tired, exhausted, lethargic, limp, and weak (5 L) during menstruation.

Anemia in adolescent girls is often caused by iron loss due to menstruation that occurs every month. In addition, poor nutritional status, both overweight and malnutrition, can affect reproductive function and increase the risk of dysmenorrhea. This study aims to analyze the relationship between the incidence of anemia and nutritional status with the degree of dysmenorrhea in high school/vocational school students .

METHODS

This study used a cross-sectional design with an analytical survey approach. The population in this study were all 306 female high school/vocational high school students. The research sample was determined as many as 73 female students using *systematic random sampling technique* . The independent variable in this study was anemia, while the dependent variable was the degree of dysmenorrhea.

Data collection was conducted by measuring hemoglobin levels using the Nesco Digital Hb device to determine the incidence of anemia. The degree of dysmenorrhea was assessed through a questionnaire using a pain assessment scale. Data were analyzed using the chi-square statistical test to see the relationship between the variables studied.

RESULTS

1. Univariate

a. Dysmenorrhea Occurrence

Table 1. Frequency Distribution of Dysmenorrhea Degree in High School/Vocational High School Students

No.	Degree of Dysmenorrhea	Frequency (*f*)	Percentage (%)
1.	Heavy	12	16.4
2.	Currently	21	28.8
3.	Light	40	54.8
Amount		73	100

Based on the table above, it can be seen that out of 73 female students, 12 female students (16.4%) experienced severe dysmenorrhea and 40 female students (54.8%) experienced mild dysmenorrhea.

b. Anemia Occurrence

Table 2. Frequency Distribution of Anemia in High School/Vocational High School Students

No.	Anemia	Frequency (*f*)	Percentage (%)
1.	Anemia	48	65.8
2.	No Anemia	25	34.2
Amount		73	100

Based on the table above, it can be seen that of the 73 female students, 48 female students (65.8%) had anemia **.**

2. Bivariate

Table 3. Relationship Between the Incidence of Anemia and the Degree of Dysmenorrhea in Female Students High School/Vocational School

No.	Anemia	Degree of Dysmenorrhea								*P-value*
		Heavy		Currently		Light		Total		
		f	%	f	%	f	%	f	%	
1.	Anemia	11	22.9	16	33.3	21	43.8	48	100	**0.021**
2.	No Anemia	1	4.0	5	20.0	19	76.0	25	100	
Amount		12	16.4	21	28.8	40	54.8	73	100	

From the table above, it can be seen that of the 48 female students who experienced anemia, a small portion experienced severe dysmenorrhea, namely 11 female students (22.9%), more than female students who were not anemic who experienced severe dysmenorrhea, namely 1 female student (4.0%). The results of the statistical test obtained *a p value* = 0.021. So Ho is rejected and this shows that there is a relationship between the incidence of anemia and the degree of dysmenorrhea in high school / vocational high school students .

DISCUSSION

A. Univariate

1. Degree of Dysmenorrhea

From table 4.1 it can be seen that out of 73 female students, 12 female students (16.4%) experienced severe pain, 21 female students (28.8%) experienced moderate pain and 40 female students (54.8%) experienced mild pain. Dysmenorrhea is menstrual pain that is usually crampy and centered in the lower abdomen that is felt before or during menstruation, sometimes it can interfere with activities. From the results of the WHO *systemic review* in 2008, the average incidence of dysmenorrhea in young women is between 16.8 - 81%.

This study is in line with the research of (Hana, et al., 2023) with the results of the study showing that the incidence of dysmenorrhea was greater than without dysmenorrhea. Respondents who experienced mild dysmenorrhea were 43.3%, moderate dysmenorrhea were 23.3% and severe dysmenorrhea were 3.3%, while those without dysmenorrhea were 30%.

Moderate cases include lower back or inner thigh pain, along with other symptoms like diminished appetite, difficulty focusing during learning, and disruption of many tasks. In extreme situations, the discomfort has extended to the inner thighs, back, and pelvis. Symptoms include headache, nausea, vomiting, weakness, diarrhea, and difficulty concentrating, which can result in unconsciousness (G. Prevalensi et al., 2024) .

Deficiencies in prostaglandins affect dysmenorrhea. Compared to women without dysmenorrhea, women with dysmenorrhea will have 5–13 times greater levels of prostagladin. The body's prostagladin causes pain and contractions in the uterus. The endometrium's blood supply will narrow as a result of muscle contraction. During menstruation, leukotriene molecules will react to inflammation that results in stomach cramps. Lower abdomen pain that radiates to the legs and lower back is a common complaint. Pain manifests as intermittent cramping. Usually the pain occurs shortly before or before menstruation and reaches its peak within 24 hours and after 2 days will disappear. Headaches, diarrhea, nausea, and erratic moods can occasionally accompany certain people (Zuhrotunida et al., 2022) (R. Handayani et al., 2021) . In this study, dysmenorrhea experienced by high school / vocational school students had varying degrees, a small number experienced severe dysmenorrhea and more than half experienced mild dysmenorrhea.

2. Anemia

From table 4.2 it can be seen that out of 73 female students, 48 female students (65.8%) have anemia. This shows that more than half of the female students who are class students are teenagers who have anemia. Anemia is a condition where hemoglobin and erythrocyte levels are lower than normal limits. According to WHO, the normal limit for female hemoglobin levels is 12 gr/dl. Anemia is a condition where hemoglobin levels decrease so that the oxygen transport capacity of the blood is reduced.

Research conducted by Ansari, et al in 2019. The results of this study showed that respondents who experienced anemia were 42% and not anemic 58%, menstrual cycles were at risk 40% and not at risk 60%, menstrual duration was at risk 42% and not at risk 58%, and menstrual blood volume was at risk 16% and not at risk 84%. The results of the chi square test analysis showed that there was a relationship between the cycle and duration of menstruation with the incidence of anemia in adolescent girls at SMPN 18 Banjarmasin p = 0.000, p = 0.000. The results of the fisher exact test analysis showed that there was no relationship between menstrual blood volume and the incidence of anemia in adolescent girls at SMPN 18 Banjarmasin p = 0.056. The researcher concluded that adolescent girls are susceptible to anemia, because menstruation is every month and the growth period so that iron is needed a lot. Adolescent girls during menstruation will lose blood which contains iron. Iron is the main ingredient in the formation of hemoglobin (M. Hafiz Ansari, et al., 2021) .

The second most common cause of disability worldwide is anemia. Because of this, anemia is a major global public health issue. Everyone, with the exception of young teenagers, can suffer from anemia. Adolescent females are more likely than males to suffer from anemia. This is because

female adolescents lose iron (Fe) during menstruation so they need more iron (Fe) intake. The behavior of female adolescents who consume more plant foods results in iron intake that is not sufficient for daily iron needs. The habits of female adolescents who want to appear slim make them limit their daily food intake which makes female adolescents susceptible to anemia (U. Djunaid and F. Hilamuhu., 2021) .

Adolescent girls are susceptible to anemia, because they menstruate every month and during growth, so iron is needed a lot. Adolescent girls will lose blood during menstruation which contains iron. Iron is the main ingredient in the formation of hemoglobin. Menstruation in women has a distance from the first day of the previous menstruation to the next menstruation or commonly called the menstrual cycle, normally 24-35 days. Menstruation lasts for 4-7 days and normally loses 30-80 ml of blood/day. In this study, more than half of the female students experienced anemia, with categories of mild anemia, moderate anemia and severe anemia (SR Kas and Musyahidah Mustakim., 2022) .

B. Bivariate

From the results of the study, it can be seen that of the 48 female students who experienced anemia, a small portion experienced severe dysmenorrhea, namely 11 female students (22.9%), more than female students who did not experience anemia, namely 1 female student (4.0%). Statistical tests showed a *p value* = 0.021. This shows that there is a relationship between the incidence of anemia and the degree of dysmenorrhea in high school / vocational high school students .

This study is in line with the research conducted. The results of the analysis in this study on the relationship between anemia and the incidence of dysmenorrhea obtained that there were 27 (20.1%) female students who were not anemic experiencing dysmenorrhea, while among the female students who were anemic, there were 46 (34.3%) female students who experienced dysmenorrhea. The results of the statistical test obtained a P value of 0.004, so it can be concluded that there is a difference in the proportion of dysmenorrhea between female students who are anemic and those who are not anemic (there is a significant relationship between anemia and the incidence of dysmenorrhea) (M. Hastuty., 2020).

Furthermore, Paramitha's research revealed that mild to moderate dysmenorrhea was reported by adolescents who were not anemic. In contrast, there were three different levels of dysmenorrhea in teenagers with anemia: mild, moderate, and severe. This is feasible because dysmenorrhea can still be caused by a variety of factors besides anemia. These include endocrine, psychological, athletic, and dietary aspects. Emotional instability and a lack of readiness for his own development and evolution are examples of psychological problems that could arise. As one of the relaxation methods to lessen pain, moderate activity is strongly advised in sports to lessen dysmenorrhea. This is because when exercising, the body will produce endorphins which are natural calming substances produced by the brain so that they can create a sense of comfort (PA Kusumawardani and Cholifah., 2018) .

According to one idea, teenage girls' anemia is one of the main factors influencing the occurrence of dysmenorrhea during menstruation because it causes ischemia, a transient and reversible oxygen shortage in the tissue. A chemical called hemoglobin is responsible for binding and transporting oxygen throughout the body; the more hemoglobin there is in red blood cells, the more oxygen that the tissue will require (G. Prevalensi et al., 2024) .

Anemia is one of the factors that influence the occurrence of dysmenorrhea during menstruation, because ischemia occurs which is a condition of temporary and reversible oxygen deficiency in tissue. Ischemia can cause the release of phospholipids, arachidonic acid, calcium ions, prostaglandins and vasopressin. Prostaglandins and vasopressins can cause vasoconstriction of the spiral artery blood vessels and the occurrence of upper endometrial ischemia which can release a lot of phospholipids, so that it can trigger excessive prostaglandin release, causing dysmenorrhea (M. Hastuty., 2020). . This study showed that students who experienced anemia, a small portion experienced severe dysmenorrhea, namely 22.9%, more than non-anemic students who experienced severe dysmenorrhea only 4.0%. Researchers argue that the degree of dysmenorrhea in each woman is different and the incidence of anemia is related to the degree of dysmenorrhea. The lower the hemoglobin levels in adolescent girls, the easier it is for dysmenorrhea to occur in adolescent girls, and the degree of dysmenorrhea felt is also more severe.

According to some female students with anemia, they have irregular eating habits, prefer to eat low-iron foods like instant noodles, and dislike eating vegetables or foods that contain iron. Additionally, the numerous activities they engage in can lead to an imbalance between their nutritional intake and physical activity, which can cause anemia. Female students with anemia also report feeling exhausted, frequently drowsy, lightheaded, and pale. Students with low hemoglobin levels and dysmenorrhea also report difficulty concentrating in class and reduced physical activity, which makes them uncomfortable during the teaching and learning process. Some of these students even choose not to attend school.

CONCLUSIONS

This study proves a significant relationship between anemia and the degree of dysmenorrhea in high school/vocational high school students . Efforts to prevent anemia and improve nutritional status are very important to reduce the prevalence of dysmenorrhea and improve the quality of life of adolescent girls. Nutrition interventions and health programs in schools need to focus on promoting reproductive health and preventing anemia in adolescents.

ACKNOWLEDGMENT

Thank you to the respondents and all related parties who have helped in the research process and provided input for the perfection of this research report, so that the researcher can complete this research well.

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