



Relationship Between the Degree of Premenstrual Syndrome (PMS) among Female Students's Haemoglobin levels



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ABSTRACT

Background: Red blood cells include a protein called haemoglobin, which is responsible for transporting carbon dioxide gas (CO₂) from the tissues back to the lungs and oxygen (O₂) from the lungs to every part of the body. Low hemoglobin levels may impact numerous bodily functions related to hemoglobin. One of the symptoms of Premenstrual Syndrome (PMS) is menstrual pain, which low haemoglobin levels can bring on because they can reduce the amount of oxygen in the blood and stimulate the myometrium's decreased blood flow. This leads to an increase in uterine muscle contraction. For one or two weeks before menstruation, women experience a collection of physical, emotional, and behavioural symptoms known as PMS, which arises during the luteal phase of the menstrual cycle. Students are generally in a transition phase where learning activities and imbalanced hormones trigger stress, thus worsening PMS levels.

Objective: Determining the correlation between haemoglobin levels and the intensity of PMS in students. An observational analytical research design was used in this study. The group consisted of all students who met the inclusion and exclusion criteria and comprised the sample. To choose the sample, basic random sampling was employed

Methods: : An observational analytical research design was used to investigate. The analysis's findings demonstrated a correlation between haemoglobin levels and the intensity of PMS among female students aged 20 to 23 years old enrolled in the Faculty of Medicine at Wijaya Kusuma University in Surabaya

Results: Haemoglobin levels and the severity of Premenstrual syndrome (PMS) among students were shown to be related, according to the analysis's findings. The Spearman Correlation test sig result of 0,002 (<0,05) demonstrates this.

Conclusion: This indicates a correlation between haemoglobin levels and the severity of PMS among female medical students in Wijaya Kusuma University of Surabaya.

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1. Introduction

All Hemoglobin is a protein particle found in red blood cells that functions to move oxygen (O₂) from the lungs to all body tissues and carry carbon dioxide gas (CO₂) from the tissues back to the lungs.¹ Low hemoglobin levels can affect various functions of hemoglobin in the body.² According to the World Health Organization (WHO), women aged 15-49 years who suffer from anemia in six countries, namely Africa, Americas, Asia, Europe, the Eastern Mediterranean, and the Western Pacific region, are 409-595 million people. The prevalence in Asia anemia in women aged 15-45 years reached 191 million people and Indonesia ranks 8th out of 11 countries in Asia after Sri Lanka, with a prevalence of anemia of 7.5 million people aged 10-19 years. The prevalence of anemia in Indonesia based on Riskesdas 2013 reached 37.1% and increased to 48.9% in the 15-24 age group in 2018.³

Premenstrual syndrome (PMS) is a group of somatic, emotional, and behavioral symptoms that occur in the luteal phase of the menstrual cycle and are felt by women for one or two weeks before menstruation.⁴ The incidence of PMS in Indonesia is 85% of all women of reproductive age, consisting of 60-75% experiencing moderate to severe PMS.⁵

Physical symptoms felt during SPM include breast pain, bloating, fluid retention, abdominal pain, acne, fatigue, dizziness, etc., while psychological symptoms and emotional disturbances felt include rapid mood changes, sensitive feelings, difficulty concentrating, frequent forgetfulness, and even depression.⁶ Premenstrual syndrome is probably the most well-known health problem reported by women of reproductive age. The prevalence of PMS itself is 20% of women who experience menstrual cycles. Epidemiological data show that 10% of women of childbearing age experience moderate to severe PMS, which places the risk of developing Premenstrual Dysphoric

Disorder (PMDD) at around 3% to 5% of pregnant women. About 80% of women are aware of the developments that occur during premenstruation, 40% feel upset about the condition, and 10% to 20% are helpless in dealing with the syndrome.⁷

In blood cells, hemoglobin plays a role in binding oxygen and is carried by hemoglobin in red blood cells. Oxygen supply to the entire body will also be fulfilled so that it will reduce the risk of ischemia, which can cause menstrual pain. Anemia in someone less active during menstruation can cause more severe menstrual cramps. The amount of menstrual blood produced by people with anemia is also greater.⁸

2. Methods

All respondents of this study used an observational analytical research design. The population used in this study was all students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya. The sample used in this study was female students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya, aged 20-23 years, who met the inclusion and exclusion criteria. Women who did not use medications that affected hormones and who had a monthly menstrual cycle were eligible to be included. Respondents who expressed no desire to be included in the sample were excluded based on the exclusion criteria. To determine the sample, the researcher used a simple random sampling method. The quantity of haemoglobin in the blood, expressed in milligrammes per decilitre, is known as haemoglobin levels. According to Suparisa et al. (2016), anaemia is indicated by low haemoglobin levels. Anaemia is classified if haemoglobin is less than 12 g/dL, and normal if it is between 12 and 15 g/dL (WHO, 2017). The selected samples were then given informed consent and to assess the presence or absence of anaemia with a digital haemoglobin checker, like the Autocheck hemoglobin checkers that come with a unique test strip.

Menstrual syndrome is a collection of physical and psychological symptoms that emerge one to two weeks before menstruation and go away when it does. These symptoms can be extremely upsetting. measurement using a survey that has the following sections: Classification, moderate is a score of 1–4 is considered moderate. Severe if the score of 5–12. The score should be greater than 12. The collected data were then processed for statistical analysis using SPSS software version 28 for Windows

3. Result

This study is about the relationship between anemia and the severity of premenstrual syndrome which was conducted at the Faculty of Medicine, Wijaya Kusuma University, Surabaya by giving questionnaires and providing hemoglobin check treatment to female students.

Description of Research Results The results of the questionnaire distribution can be seen in the table below.

Table 1. Age of female students aged 20-23 years

Age (years old)	Frequency	Percentage (%)
20	5	12,8
21	28	71,8
22	5	12,8
23	1	2,6
Total	39	100

Source: Research Results 2025

The respondents in this study were 21 years old, namely 28 people (71.8%), and the youngest were 20 years old, namely 5 people.

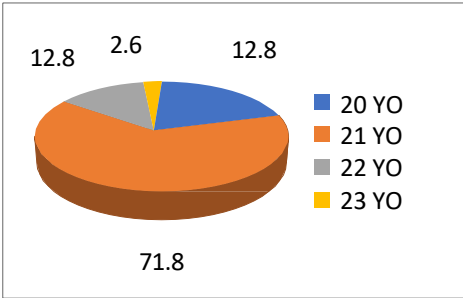
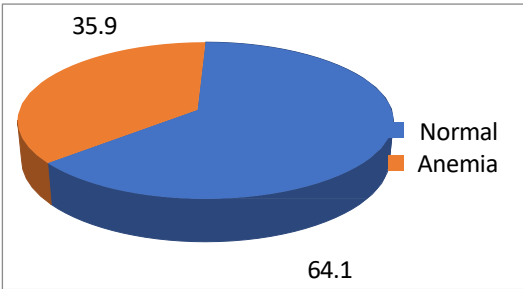


Figure 1. Distribution of Hemoglobin Levels of Female Students

Table 2. Haemoglobin level female students

Hemogoblin	Frekuensi	Percentage (%)
Normal	25	64,1
Anemia	14	35,9
Total	39	100,0

People (12.8%) and the oldest was 23 years old, namely 1 person (2.6%).



Source : Research Result 2025.

Figure 2 . Distribution of Hemoglobin Levels of Female Students.

Table 2 and Figure 2 show that most UWKS FK female students who were respondents in this study had haemoglobin levels. In 2025, who were respondents in this study had haemoglobin levels in the normal category, namely as many as 25 people (64.1%), and as many as 14 people (35.9%) had anaemic category haemoglobin levels.

Table 3. Premenstrual syndrome (PMS) in 2019 FK UWKS students

SPM	Frequency	Percentage (%)
Light	6	15,3
Medium	32	82,1
Heavy	1	2,6
Total	39	100.0

Source : Research Result 2025.

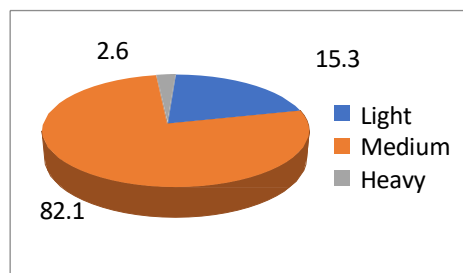


Figure 3. Distribution of Premenstrual Syndrome (PMS) in UWKS FK Female Students.

Table 3 and Figure 3 show that most of the 2019 UWKS FK students who were respondents in this study experienced moderate premenstrual syndrome, namely 32 people (82.1%), as many as 6 people (15.3%) experienced mild premenstrual syndrome and as many as 1 person (2.6%) other respondents experienced severe premenstrual syndrome. 6 people (15.3%) experienced mild premenstrual syndrome, and as many as 1 person (2.6%) of other respondents experienced severe premenstrual syndrome.

After knowing the characteristics of each variable (univariate), it can be continued with bivariate analysis to determine the relationship between variables. The following will present the test results using the Spearman correlation test.

Table 4. Relationship between Hemoglobin Levels and Severity of PMS Female Students of the Faculty of Medicine, Wijaya Kusuma University Surabaya.

Hemoglo bin Level	SPM			Total	p-value	r
	Light	Medium	Heavy			
Normal	6 24%	19 76%	0 0%	25 100%	0,022 *	0,367
Anemia	0 0%	13 92,9%	1 6,1%	14 100%		
	6 15,4%	32 82,1%	1 2,6%	39 100%		

* Statistically significant

r: correlation coefficient

Source : Processed Questionnaire Results.

The results of the Spearman correlation test showed a relationship between hemoglobin levels and the severity of premenstrual syndrome (PMS) in students at the Faculty of Medicine, Wijaya Kusuma University, Surabaya. This is evidenced by the sig value during the Spearman Correlation test of 0.022 (<0.05). Of the 100% of respondents who had normal hemoglobin levels, 24% experienced mild premenstrual syndrome, and 76% experienced moderate premenstrual syndrome. Of the 100% of respondents who have anemia category hemoglobin levels, it is known that 92,9% of respondents experience moderate premenstrual syndrome, and another 7,1% experience severe premenstrual syndrome.

4. Discussion

The results of the study showed that most of the female students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya, who were respondents in this study had normal hemoglobin levels, namely 25 people (64.1%) and 14 people (35.9%) respondents had anemia hemoglobin levels. The results of this study are higher than the results of Sholikhah's study, which found that the prevalence of anemia among female students in Surabaya City was around 26.1% with an average Hb level of 10.85 g/dl due to iron deficiency in food and the menstrual cycle.⁹ In addition, the prevalence of anemia in Indonesia according to Riskesdas in 2013 was 23.9% in women due to iron deficiency in their diet.¹⁰

Women have different menstrual cycles depending on their condition. But the longer the menstrual period, the lower the amount of hemoglobin, because of the loss of a lot of blood, so that anemia will easily occur.¹⁰ In blood cells, hemoglobin plays a role in binding oxygen and will be carried by hemoglobin in red blood cells. If the hemoglobin level in the body decreases, it can cause a decrease in oxygen flow in the blood.¹¹

The results of the study show in table 4, it was found that respondents in this study experienced moderate premenstrual syndrome, namely 32 people (82.1%), as many as 6 people (15.3%) experienced mild premenstrual syndrome and as many as 1 person (2.6%) other respondents experienced severe premenstrual syndrome. This is in line with the results of research conducted by Lestari, revealing that from the results of the research that has been carried out, the most respondents experienced moderate premenstrual syndrome, as many as 31 people (56.4%) and the fewest female students experienced premenstrual syndrome in the mild category, as many as 10 people (18.2%) due to hormonal imbalance, stress or anxiety and malnutrition.¹¹ In addition, according to the results of the Parahats study, it was found that the most respondents experienced moderate premenstrual syndrome, as many as 32 people (44.4%) and those who experienced mild

premenstrual syndrome, namely 25 people (34.7%) due to hormonal imbalance and malnutrition.¹²

Premenstrual syndrome is a syndrome that occurs in women 2-14 days before menstruation. Premenstrual syndrome is one of the common disorders that occur in women. Symptoms of premenstrual syndrome include physical, psychological and emotional symptoms. Common complaints are anxiety, fatigue, difficulty concentrating, insomnia, loss of energy, headaches, abdominal pain, and breast pain. Premenstrual syndrome has a high level of pain. Although premenstrual syndrome is not life-threatening, it can affect women's productivity and mental health. Around 75% of women complain of premenstrual syndrome symptoms and 30% of them require treatment. In young age groups, premenstrual syndrome is very common, indicating a very significant health problem.¹³

The results of the study showed that there was a relationship between haemoglobin levels and the severity of premenstrual syndrome (PMS) in female students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya. This was proven by the p-value during the Spearman Correlation test of 0.022 (<0.05).

The results of this study found that if the hemoglobin level of students is in the anemia category, the greater the possibility of experiencing the severity of premenstrual syndrome (PMS), 1 person (7.1%) experienced severe PMS, at most 13 people (92.9%) experienced moderate PMS, for mild degrees none were found 0% of people. Then those with normal hemoglobin levels were not found or 0% experienced severe PMS, at most moderate degrees were 19 people (76%), for mild degrees 6 people (24%). The results of this study are following research conducted by Baidya which revealed that 9 people (21%) experienced mild PMS, at most 32 people (78%) experienced moderate PMS, and for severe PMS 0%, this is due to hormonal changes, lifestyle such as diet.¹⁴

General therapy when experiencing premenstrual syndrome is the administration of analgesics, vitamins, and psychotherapy such as relaxation therapy and cognitive behavioral therapy which aims to reduce tension, anxiety, and emotional disturbances during premenstrual syndrome. Preventive efforts that can be done to reduce premenstrual syndrome complaints are lifestyle modifications such as lifestyle changes, namely exercising regularly to maintain normal body weight because weight gain is at risk of increasing premenstrual syndrome complaints, consuming vitamin B1 such as that found in bananas because it functions to improve mood by increasing serotonin to reduce complaints of mood swings, and limiting caffeine consumption to anticipate anxiety, tension, and insomnia. Therapy that can be given to anemia sufferers is by providing iron supplements, increasing food intake, especially iron, such as consuming foods high in iron,

namely red meat, poultry, fish, eggs, and milk regularly so that it can increase hemoglobin levels.¹⁴

This study highlights a significant association between anemia and the severity of dysmenorrhea symptoms in female subjects. Anemic individuals reported more intense menstrual pain, which aligns with previous findings suggesting that iron deficiency can exacerbate premenstrual symptoms. Iron plays a crucial role in oxygen transport and energy metabolism. In iron-deficiency anemia, reduced hemoglobin levels impair oxygen delivery to tissues, including the uterine muscles. Hypoxia in the myometrium may lead to increased production of prostaglandins, particularly prostaglandin F2 α , which induces stronger uterine contractions and pain during menstruation. This mechanism may partially explain the increased severity of dysmenorrhea in anemic females.

Furthermore, studies have indicated that iron deficiency may affect neurotransmitter metabolism, such as serotonin and dopamine, which are involved in pain perception and mood regulation during the menstrual cycle. Disruption of these pathways could enhance the subjective experience of pain and contribute to mood disturbances commonly reported in premenstrual syndrome (PMS). For example, a study by Kazama et al. (2013) reported that iron-deficient rats exhibited heightened pain sensitivity and anxiety-like behaviors, supporting the notion that iron deficiency influences central pain processing.¹⁵ In humans, research has shown that women with anemia often report more severe PMS symptoms, including fatigue, irritability, and abdominal cramping (Wang et al., 2020). These findings suggest that addressing iron deficiency in women of reproductive age may not only improve general health but also reduce the burden of menstrual-related symptoms. Further research is warranted to explore whether iron supplementation could serve as an adjunct treatment in managing dysmenorrhea, particularly in populations with a high prevalence of anemia.¹⁶

5. Conclusion

The results of the analysis showed a relationship between hemoglobin levels and the severity of premenstrual syndrome (PMS) female students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya. This is proven by the sig value during the Spearman Correlation test of 0.022 (<0.05). This shows that there is a relationship between hemoglobin levels and the severity of premenstrual syndrome (PMS) in female students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya. In further research will need to examine the degree of anemia in women, because it affects hemoglobin levels, thus affecting the appearance of PMS.

Ethical Approval

The Health Research Ethics Committee of the Faculty of Medicine, Wijaya Kusuma University, Surabaya, has permitted this research to be carried out with certificate No. 76/SLE/FK/UWKS/2022.

Conflicts of Interest

There is no conflict of interest in this research.

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Author Contributions

Conceptualization, WDP and DGA; methodology, DGA; software, DGA; validation, WDP, DGA, and YMM; formal analysis, DGA; investigation, WDP; resources, DGA; data curation, YMM; writing-original draft preparation, DGA; writing-review and editing, WDP and DGA; visualization, YMM; supervision, WDP; project administration, WDP; funding acquisition, WDP.

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