

Artikel Penelitian

The Relationship Between Physical Activity and Stress Levels With The Menstrual Cycle in Female Students of The Faculty of Medicine, Mulawarman University

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Abstract

Menstrual cycle is often regarded as an important indicator of women's reproductive health, and changes in this cycle can affect their quality of life. This study aimed to explore the relationship between physical activity, stress levels, and menstrual cycles among female students at the Faculty of Medicine, Mulawarman University. This study used an observational analytical design and a cross-sectional approach. Statistical analysis was conducted using the chi-squared test. The results showed that 66% of the female students experienced normal menstrual cycles, while 34% had abnormal menstrual cycles. Light physical activity was found in 5.7% of the students, moderate physical activity in 68.7%, and intense physical activity in 25.7%. Mild, moderate, and severe stress levels were experienced by 6.4 %, 83.4%, and 10.2% of students, respectively. The relationship between physical activity and menstrual cycle showed a p-value of 0.215, while the relationship between stress level and menstrual cycle showed a p-value of 0.000. Based on these results, it can be concluded that physical activity is not associated with the menstrual cycle, but stress levels are related to it among female students at the Faculty of Medicine, Mulawarman University.

Keywords: Menstrual Cycle, Physical Activity, Stress Levels

Diterima: 28 Juli 2025
Disetujui: 05 Oktober 2025
Publikasi : 28 Oktober 2025

Sitasi :

H. Rahman, E. Sawitri, and H. Irawiraman, "The Relationship Between Physical Activity and Stress Levels With The Menstrual Cycle in Female Students of The Faculty of Medicine, Mulawarman University," J. Sains. Kes, vol. 6, no. 3, pp. 170-176, Oct. 2025, doi: 10.30872/jsk.v6i3.952

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1 Introduction

Menstruation is a physiological process in women that is influenced by reproductive hormones and is characterized by the discharge of blood from the vagina [1]. There are three types of menstrual cycle disorders: polymenorrhea, oligomenorrhea, and amenorrhea [2]. The prevalence of regular menstrual cycles among women aged 10-59 years in Indonesia reached 68.0%, whereas irregular menstrual cycles accounted for 13.7%. In East Kalimantan, irregular menstrual cycles accounted for 13.9% of cases [3].

Various risk factors that can cause menstrual cycle disorders include hormonal imbalances, stress, age, metabolic diseases such as diabetes mellitus, contraceptive use, and ovarian tumors [4]. Lifestyle factors resulting from physical activity and P. niruri L often lead to disturbances in the menstrual cycle [5].

Physical activity in daily life includes activities such as working (occupational), exercising, conditioning, and performing household chores [6]. Intense physical activity is associated with hypothalamic dysfunction and disturbances in the pulsation of gonadotropin-releasing hormone (GnRH), which can lead to menstrual cycle disorders [7].

Stress can affect the body's hormonal system by activating the hypothalamic-pituitary-adrenal (HPA) axis, which then produces cortisol that can inhibit the secretion of GnRH [8]. Students are among age groups that often experience stress [9].

Disruptions in the menstrual cycle, whether long or short, indicate disturbances in the metabolic and hormonal systems that can affect fertility [10]. The high risk of harm that may arise if these menstrual cycle disorders continue to occur without proper prevention or treatment during early adulthood has made researchers increasingly interested in studying the relationship between physical activity and stress levels, and the menstrual cycle among female students at the Faculty of Medicine, Mulawarman University.

2 Research Methods

This was an observational analytic study with a cross-sectional approach conducted after obtaining ethical feasibility approval in January 2021. The sample was obtained from a portion of the population using a cluster sampling technique at the Faculty of Medicine, Mulawarman University.

The inclusion criteria for this study were preclinical and clinical female students who were actively enrolled at the Faculty of Medicine, Mulawarman University at the time the study was conducted, had experienced menstruation, and were willing to participate as respondents by joining the Zoom Meeting and signing an informed consent form. This study excluded female students who had been diagnosed by a gynecologist with obstetric diseases such as Polycystic Ovary Syndrome (PCOS), Dysfunctional Uterine Bleeding (DUB), ovarian cysts, uterine myomas, and other reproductive tumors; female students diagnosed by a doctor with hypothyroidism or hyperthyroidism; female students who could not recall the date or week of their last menstrual period; those who did not attend the Zoom Meeting during the study; and those whose questionnaires were not fully completed.

The instrument used was a questionnaire that included identity (name, age, and address), menstrual patterns/cycle, physical activity, and stress. Physical activity was measured using the Baecke questionnaire (1982), which is divided into three sections: sports, work, and leisure activities [11]. The Perceived Stress Scale questionnaire, comprising 10 items was utilized to assess stress [12]. The analysis focused on detailing the participants' profiles, which included aspects such as menstrual cycle, physical activity, and stress levels. Additionally, the chi-square test was employed to explore the connection between physical activity, stress levels, and the menstrual cycle.

3 Results and Discussion

This study obtained data regarding the profiles of menstrual cycles, physical activity, and stress levels from 265 respondents. The results of the study concerning the profile of the respondents' menstrual cycles are shown in Figure 1.

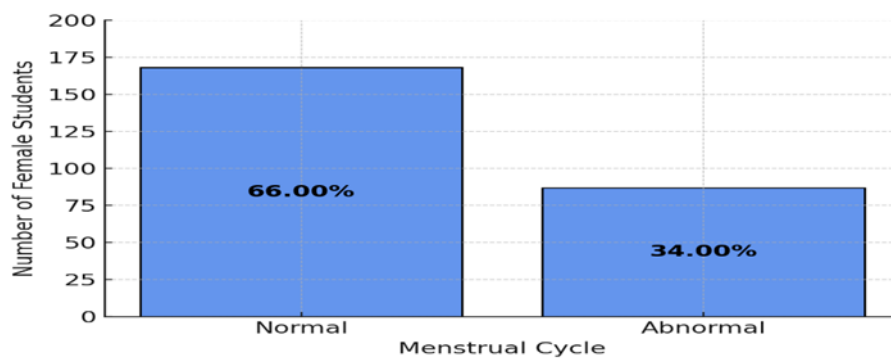


Figure 1. Illustration of the Menstrual Cycle of Research Respondents

The results of this study showed that 66.00% (175 female students) had normal menstrual cycles, while 34.00% (90 female students) had irregular menstrual cycles. Previous studies conducted in several locations also showed that the percentage of respondents experiencing irregular menstrual cycles was 32.4% and 46.1% [13,14]. Differences in the duration of menstrual patterns among women are usually caused by imbalances in estrogen, progesterone, LH, and FSH hormones, which can result from illness, nutritional status, stress, or physical activity [15]. Hormonal imbalances can also be caused by varying levels of hormone production, which in turn affect the cycle, amount, and duration of menstrual bleeding [16].

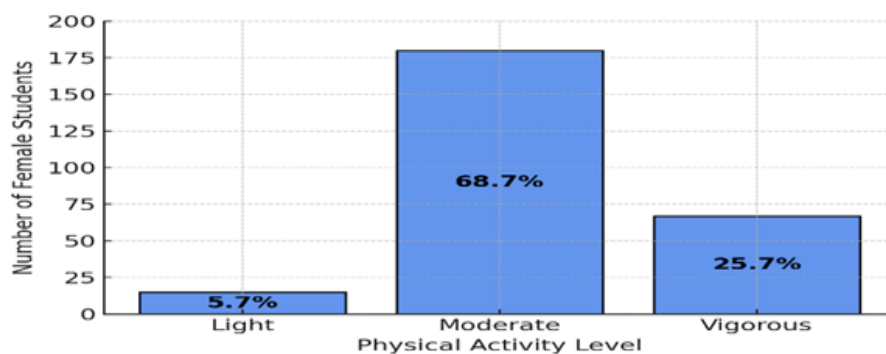


Figure 2. Overview of the Respondents' Physical Activity

The results of the study regarding the respondents' physical activities are shown in Figure 2. Most respondents indicated that they participate in moderate physical activity, representing 68.70% (182 female students). This is followed by those engaging in vigorous physical activity at 25.70% (68 female students) and light physical activity at 5.70% (15 female students). These results align with several other studies, which also suggest that the majority of female students in the Faculty of Medicine partake in moderate physical activity [14,17].

Physical activity is any body movement produced by skeletal muscles that requires energy expenditure [18]. The level of physical activity can be influenced by non-modifiable factors such as age, sex, race, and ethnicity, as well as modifiable factors including individual characteristics, social support, residential environment, economic status, occupation, physical limitations, level of education/knowledge, and opportunities to access healthcare services [19]. The results of the study regarding respondents' stress levels are shown in Figure 3. The highest number of respondents fell into the moderate stress category at 83.40% (221 female students), followed by severe stress at 10.20% (27 female students) and mild stress at 6.40% (17 female students). These results are supported by a previous study at the Faculty of Medicine, Tarumanagara University, which showed that the moderate stress category was the most prevalent [20]. Stress is defined as a mismatch

between the desired situation, where there is a gap between environmental demands and an individual's ability to meet them, which is considered potentially harmful, threatening, disruptive, and uncontrollable, or exceeding the individual's coping capacity [21]. One of the effects of stress affecting three-quarters of all women is menstrual cycle disorder [22].

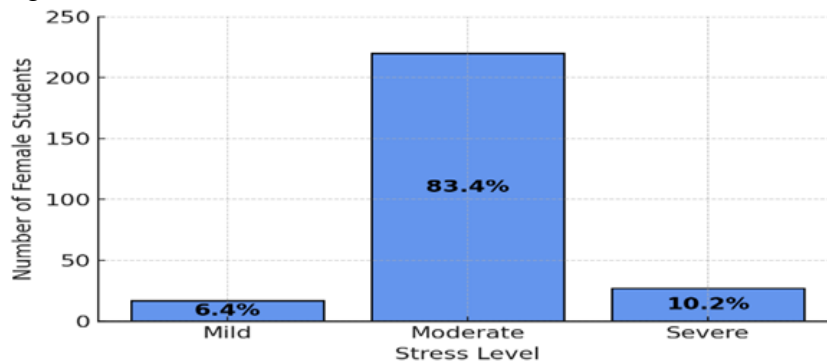


Figure 3. Illustration of the Respondents' Stress Levels in the Study

After obtaining information on menstrual cycles, physical activity, and stress levels from the respondents, the next step was to analyze the relationship between physical activity and menstrual cycles, as well as the relationship between stress levels and menstrual cycles. The results of this analysis are presented in Tables 1 and 2, respectively.

Table 1. Taboos about Physical Activity during Respondents' Menstrual Cycle

Physical Activity	Irregular menstrual cycle		Normal menstrual cycle		Total		P Value
	n (student)	Percentage (%)	n (student)	Percentage (%)	n (student)	Percentage (%)	
Light	3	1.1	12	4.5	265	100	0.215
Medium	59	22.3	123	46.4	265	100	
Berat	28	10.6	40	15.1	265	100	

Table 1 shows the pattern of this relationship, which was statistically tested using the chi-squared test, resulting in a significance value of 0.215 ($p > 0.05$). This indicates that the hypothesis that there is a relationship between physical activity and menstrual cycle cannot be accepted. This finding is consistent with several previous studies that also showed no relationship between physical activity and menstrual cycle [4,23]. Theoretically, physical activity is considered one of a risk factor for menstrual cycle disorders. This is due to hormonal changes in women with high physical activity, which result in a significant decrease in FSH levels, an increase in LH levels, a decrease in progesterone during the luteal phase, a decrease in estrogen levels in the follicular phase, and an imbalance in the FSH-LH environment compared to women who do not engage in high physical activity [24]. As a result, this can lead to lengthening of the follicular phase and disturbances in the menstrual cycle [25].

Table 2. Cross-tabulation of Stress Levels with Respondents' Menstrual Cycles

Stress Level	Irregular menstrual cycle		Normal menstrual cycle		Total		P Value
	n (student)	Percentage (%)	n (student)	Percentage (%)	n (student)	Percentage (%)	
Light	3	1.1	14	5.3	265	100	0.000
In progress	64	24.2	157	59.2	265	100	
Weight	23	8.7	4	1.5	265	100	

Table 2 shows the pattern of this relationship, which was tested using the chi-square test and resulted in a significance value of 0.000 ($p < 0.05$). Thus, the hypothesis stating that there is a relationship between stress levels and the menstrual cycle can be accepted. This result is supported by several previous studies that showed a relationship between stress levels and menstrual cycle [6,25]. Stress, as a stimulator of the nervous system, is transmitted to the central nervous system through nerve transmission, and then through the autonomic nerves is relayed to the hormonal (endocrine) glands, causing them to secrete neurohormonal fluids toward the pituitary gland via the portal system to release gonadotropins in the form of FSH and LH. These hormones are influenced by GnRH, which is delivered from the hypothalamus to pituitary gland. The release of GnRH is strongly influenced by the estrogen feedback mechanism in the hypothalamus, which subsequently affects menstrual processes [26]. Women who suffer from severe psychological disorders such as extreme stress or depression usually experience hormonal disorders, resulting in irregular menstrual cycles and absence of ovulation [27].

The aim of this study was to detect the possibility of menstrual cycle disorders in female students who engage in heavy physical activity and experience high levels of stress. Disorders in the menstrual cycle, whether long or short cycles, indicate disturbances in the metabolic and hormonal systems that can affect fertility [10].

4 Conclusion

This study concludes that physical activity is not related to the menstrual cycle, but stress levels are related to the menstrual cycle.

5 Declarations

5.1. Author's Contributions

Hermawati Rahman was responsible for conceptualizing the study, developing the research instruments, collecting and curating the data, and preparing the initial draft of the manuscript. Endang Sawitri provided methodological supervision, validated the data analysis, assisted in interpreting the findings, oversaw the overall research process, and contributed to the substantive revision of the manuscript. Hadi Irawiraman conducted the statistical analysis, validated the dataset, prepared the tables and figures, and critically reviewed the results and discussion sections to ensure accuracy and coherence.

5.2. Ethics

This study received ethical approval from the Health Research Ethics Committee, Faculty of Medicine, Mulawarman University, with approval number 17/KEPK-FK/III/2021, dated March 10, 2021.

5.3. Conflict of Interest

Tidak ditemukan konflik kepentingan dalam penelitian ini.

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