



Investigating the Correlation Between Adolescent Girls' Weight, Physical Activity Levels, and Menstrual Cycle

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ABSTRACT

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The menstrual cycle is the count of the first period and the next period, generally at intervals of 21-35 days. An irregular menstrual cycle signifies difficulties with ovulation. Body weight and physical activity are the most relevant factors in the development of menstrual cycle problems in teenage females attending Senior High School, according to preliminary research conducted on the subject. The objective of this research endeavor is to ascertain the correlation between physical activity level, body weight, and the menstrual cycle of adolescent females. This research is quantitative and uses analytical approaches combined with cross-sectional research. The research instrument consisted of observation sheets and IPAQ questionnaires, and the sample size had a total of 110 teenage females who were chosen through the process of purposive sampling-analysis of the data using the Chi-square statistics. The univariate analysis revealed that a significant proportion of adolescent females (64.5%) had a regular menstrual cycle, light physical activity, and body weight. According to the findings of a bivariate study, the incidence of irregular menstrual periods was higher among individuals with average weight (20%) and heavy exercise (35.5%). The findings of the Chi-square test indicated that there was a correlation between the menstrual cycle of adolescent females and their body weight as well as their level of physical activity ($p = 0.000$). A conclusion can be drawn that there is a connection between the menstrual cycle of adolescent females and their body weight, as well as their level of physical activity. As a suggestion, it is hoped that teenage girls will maintain control of their weight and make arrangements for physical exercise in order to prevent the emergence of menstrual cycle abnormalities

INTRODUCTION

Beginning at puberty and continuing into menopause, menstruation is a natural element of the reproductive process that takes place on a monthly basis. According to Ernawati et al. (2023), menstruation is referred to as the coming month or menstruation. This occurs when the human body undergoes regular physiological changes as a result of the effect of reproductive hormones, explicitly follicle-stimulating hormone (FSH) or luteinizing hormone (LH). As a result of fertilization, menstruation consists of hemorrhaging and the shedding of the uterine wall or endometrium (Sitoayu et al., 2017).

According to Handayani & Febrianti (2023), the menstrual cycle is defined as the period beginning with the first day of menstruation and ending with the arrival of menstruation during the subsequent period. The typical duration of a menstrual cycle is between 21 and 35 days. Menstrual cycle disorders or abnormalities are distinguished by the following: menstrual cycle duration of fewer than 21 days (polymenorrhea), menstrual cycle duration of more than 35 days (oligomenorrhea), or menstruation absence for three to six consecutive months (secondary amenorrhea). In extreme cases, the menstrual cycle may even cease entirely.

According to a publication by the World Health Organization (WHO), 45% of women globally encounter menstrual cycle disorders. Among these, 15.8% suffer from mixed disorders, 18.4% experience primary amenorrhea, 5.3% suffer from secondary amenorrhea, 50% experience oligomenorrhea, and 10.5% polymenorrhea. According to the menstrual cycle in Indonesia, 13.7% of women between the ages of 17 and 23 suffer menstruation symptoms that are not regular (D. P. Sari et al., 2021). From the data collected in the province of West Java, it has been shown that 14.4% of women between the ages of 10 and 59 years old experience irregular menstruation. The National Family Planning Coordinating Board (BKKBN) Tasikmalaya, in conjunction with Mitra Citra Remaja (MCR) Tasikmalaya, revealed that the prevalence of amenorrhea was 34%, and the prevalence of polymenorrhea was 21% (E. P. Sari, 2019). The impact of body weight can lead to the development of menstrual cycle disorders (Yastirin & Hardiyanti, 2018).

Through the use of the Body Mass Index (BMI) formula, it is possible to determine the standard weight of a woman. The BMI provides an indication of an individual's nutritional status, which significantly impacts the menstrual cycle. According to Kusmiran (2014), having a body mass index (BMI) that is either too high or too low can lead to menstrual diseases such as amenorrhea, absence of menstruation, irregular menstruation, and pain during menstruation. In a study investigating the correlation between body weight and the menstrual cycle, discovered that the majority of participants were underweight and did not report any menstrual cycle disorders. Based on the statistical test results, the p-value of 0.046 is less than the predetermined significance level of 0.05, indicating that there is a significant link between body weight and menstrual cycle regularity.

In addition, another factor that can affect the menstrual cycle is physical activity, where there is a correlation between the amount of physical exercise and the function of menstruation (Kusmiran, 2014). In accordance with the findings of studies that investigated the connection between the menstrual cycle and physical activity, it has been established that there is a connection between the two. The increased likelihood of experiencing menstrual cycle irregularities is directly proportional to the level of physical activity levels. Based on the context mentioned earlier, the investigator is intrigued by undertaking a study titled "Investigating the Correlation Between Adolescent Girls' Weight, Physical Activity Levels, and Menstrual Cycle".

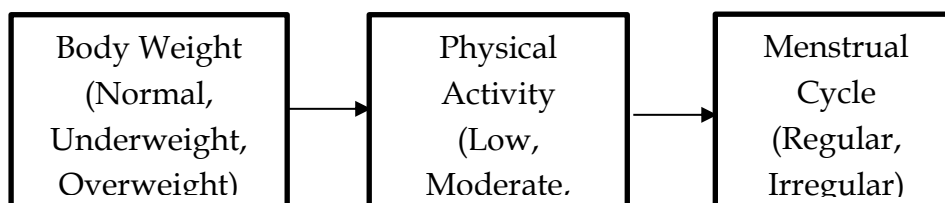
LITERATURE REVIEW

Menstruation, regulated by hormones like FSH and LH, is a vital part of reproduction, occurring from puberty to menopause (Ernawati et al., 2023 ; Sitoayu et al., 2017). A typical cycle lasts 21 to 35 days, with the uterine lining shedding if fertilization does not occur (Handayani & Febrianti 2023).

Menstrual disorders affect 45% of women globally, including conditions like polymenorrhea, oligomenorrhea, and amenorrhea. In Indonesia, 13.7% of women aged 17-23 and 14.4% of women in West Java report irregular menstruation (D. P. Sari et al., 2021 ; E. P. Sari, 2019).

Body Mass Index (BMI) affects the menstrual cycle, with both high and low BMI linked to disorders like amenorrhea and irregular cycles (Kusmiran, 2014). Studies show a strong correlation between BMI and menstrual health (Yastirin & Hardiyanti, 2018). Physical activity is also linked to menstrual irregularities, with higher activity levels associated with more irregular cycles (Kusmiran, 2014). So from the explanation of the studies above, the hypothesis that can be taken is that there are:

- H1: There is a significant relationship between Body Mass Index (BMI) and menstrual cycle regularity in adolescent girls.
- H2: There is a significant relationship between physical activity levels and menstrual cycle regularity in adolescent girls.



Picture 1. Conceptual Framework

METHODOLOGY

The present investigation is a quantitative study employing an analytic approach and a cross-sectional design; variable measurements are collected throughout the study, and each subject is examined exclusively once (Uyun & Yoseanto, 2022). For the purpose of this study, the population consisted of all of the adolescent females who attended SMA X in the year 2023. The researchers used the technique of purposive sampling to collect a sample of 110 respondents. Stepping scales and stadiometers were the research equipment that were utilized. These instruments were used to measure the Body Mass Index (BMI), and the results were recorded on an observation sheet—the instrument known as scientific researchers also utilized the International Physical Activity Questionnaire (IPAQ). The descriptive method was employed to ascertain the attributes of the respondent's menstrual cycle, body weight, and physical activity through univariate data analysis. In contrast, the Chi-square test was employed for the bivariate data analysis.

RESULTS

Table 1. Frequency Distribution of Respondent Characteristics

Variable	n=110	%
Body Weight		
Skinny	13	11,8
Normal	79	71,8
Fat	18	16,4
Physical Activity		
Light	47	42,7
Moderate	37	33,6
Heavy	26	23,6
Menstrual Cycle		
Normal	71	64,5
Not Normal	39	35,5

It is clear from looking at table 1 that the characteristics of the body weight of the respondents are dominated by average weight, meaning that 79 of the respondents, or 71.8 percent, had average weight. The characteristics of respondents who had engaged in light activity over the previous week were dominated by light activity, with 47 respondents accounting for 42.7% of the total. There were 71 respondents who had a regular menstrual cycle, which accounts for 35.5% of the total. This was the predominant characteristic of menstrual cycle respondents.

Table 2. The Relationship Between Body Weight and Menstrual Cycle of Adolescent Girls

Body Weight	Menstrual Cycle				Total		<i>p</i> *
	Normal		Not Normal		n	%	
	N	%	N	%			
Skinny	10	9,1	3	2,7	13	11,8	
Normal	57	51,8	22	20	79	71,8	0,001
Fat	4	3,6	14	12,7	18	16,4	
Total	71	64,5	39	35,5	110	100	

Table 2 presents the outcomes of statistical analyses employing the chi-square test, which indicates that among the thirteen participants who reported having a low body weight, ten individuals (9.1%) reported having a regular menstrual cycle. At the same time, among the respondents who had an average body weight, 57 individuals (51.8% of the total) experienced a regular menstrual cycle. On the other hand, among the respondents who had a fat body beat, 14 individuals (12.7%) experienced an abnormal menstrual cycle. This was statistically significant, with a *p*-value of 0.000 < 0.05, which is equivalent to 0.001. This indicates that there is a correlation between body weight and the menstrual cycle of adolescent girls attending X Senior High School in Tasikmalaya.

Table 3. Relationship Between Physical Activity and Menstrual Cycle of Girls

Physical Activity	Menstrual Cycle				Total		<i>p</i> *
	Normal		Not Normal		n	%	
	N	%	n	%			
Light	37	3,6	10	9,1	47	42,7	
Moderate	28	25,5	9	8,2	37	33,6	0,000
Heavy	6	5,5	20	18,2	26	23,6	
Total	71	64,5	39	35,5	110	100	

The results of statistical tests using the Chi-square test are presented in Table 3, which reveals that among the respondents who engaged in light physical activity, a total of 37 respondents, which accounts for 33.6% of the total, also experienced a regular menstrual cycle. In contrast, among those who engaged in moderate physical activity, 25.5% (n=28) reported a regular menstrual cycle. Conversely, among those who engaged in heavy physical activity, 18.2% (n=20) reported an abnormal menstrual cycle. This finding was statistically significant (*p* < 0.05, *n*=0.001), suggesting that a correlation exists between body weight and the menstrual cycle among adolescent girls attending X Senior High School in Tasikmalaya.

DISCUSSION

1. Characteristics of Weight, Physical Activity, and Menstrual Cycle

Body Weight

Characteristics of the weight of adolescent females attending SMA X demonstrated that while comparing the weight of thin teenage girls to the weight of ordinary adolescent girls, it was discovered that the average weight of adolescent females was higher than the weight of both thin and obese adolescent girls. According to Proverawati & Kusumawati (2014), a person's weight is frequently subject to fluctuation as a result of a variety of factors that influence it. A person who does not engage in physical activity or exercise will experience an increase in body weight if they consume more energy than their body requires. Because of this, the energy that is taken in by the body is not burned or utilized, and it is instead stored in the form of fat.

According to the findings of the study, individuals who are slender at the body level do so as a result of engaging in more strenuous activities than usual, which leads to a loss of appetite and occasional forgetfulness regarding meals. According to the responses of those who have a fat body weight, irregular eating patterns, and nighttime snacking, as well as frequent fast food consumption and infrequent exercise, are the causes, whereas those who have an average body weight claim that they can maintain a healthy and consistent diet despite their hectic schedules. This research is consistent with the findings of Hapsari (2018), who discovered that 20 respondents (54.1%) had the maximum IMT picture in the normal IMT category, while seven respondents (18.9%) had the lowest IMT picture in the over IMT category.

Physical Activity

Comparing the physical activity levels of adolescent girls at SMA X engaged in light, moderate, and heavy activities over the previous week reveals that the level of light physical activity is significantly higher than that of moderate and heavy activities. On the basis of the data and the outcomes of interviews with respondents, it is possible to conclude that the number of physical activities performed by respondents is moderate and that the activities performed do not significantly deplete the time and energy of adolescents. The findings of this study are consistent with the findings of Loa et al., (2022), who found that the majority of the adolescent girls who participated in this study and were responders at the research location engaged in light physical activity. According to the findings of the study, female adolescents attending Senior High School have more class schedules than male adolescents, which means that activities at school would conclude as early as the afternoon. On the other hand, students are expected to attend additional lessons for regular activities every week, in addition to additional classes for test preparation for class XII. Although not all students participate in extracurricular activities, students are forced to attend these sessions.

Because of this, just a small number of the female students who participated in this study and provided responses are engaged in strenuous physical exercise. Students who engage in strenuous physical exercise will experience an increase in their level of exhaustion, and they will have less time to relax as a result of this. Physical activity encompasses any bodily motion that induces increased effort, energy consumption, or calorie depletion. Nevertheless, this statement needs to be more consistent as the health benefits and effects of physical activity are contingent upon energy expenditure (e.g., running at a specific intensity). In contrast, stretching exercises do not require a great deal of energy expenditure and do not result in calorie expenditure (Subardja, 2014). The findings of this study are consistent with the findings of research conducted by Yani (2016), which demonstrated that the majority of athletes experience heavy levels of physical exercise (88.6%).

Menstrual Cycle

An analysis of the menstrual cycle characteristics of adolescent girls attending SMA X reveals that the proportion of adolescent girls with regular menstrual cycles is significantly higher than that of adolescent girls with abnormal menstrual cycles. As a result of these findings, the majority of the female students who participated in the study had a menstrual cycle that lasted between 21 and 35 days. This measurement was derived from the menstruation that occurred over the preceding month up until the time of the study. A normal menstrual cycle is characterized by a 21-35-day interval between the first day of menstrual blood discharge and the first day of the subsequent menstruation, with a duration of two to eight days. However, the mean duration of menstruation for women is four to five days, during which they produce an average of 60 to 80 ml of blood per cycle (Puspita et al., 2022).

2. Relationship Between Body Weight and Menstrual Cycle

The statistical analysis revealed a significant association between physical activity and the menstrual cycle, as indicated by a p-value of $0.001 < 0.05$. Consequently, the study conducted at SMA X Tasikmalaya established that a correlation existed between body weight and the menstrual cycle. The majority of respondents who report having a regular menstrual cycle also have a body weight that falls within the range of a normal BMI. Loa (2022) proposed that body weight may have an impact on the menstrual cycle due to the fact that adipose is a type of tissue within the body that converts androgen into estrogen in response to an individual's weight. Women who fall into the slim category have a low percentage of body fat, which leads to an estrogen shortage, which in turn produces oligomenorrhea and amenorrhea.

Through proper nutrition and sufficient physical activity, it is possible to acquire weight. Having a low body weight can prevent the release of gonadotropin-releasing hormone (GnRH), which in turn reduces levels of luteinizing hormone (LH). When LH levels are low, the luteal phase may be shortened, and shorter cycles may result from a shortened luteal phase. The production of estrogen, on the other hand, is increased in women who have extra fat deposits in their bodies. Granulosa cells and adipose tissue are the biological sites where the process of testosterone aromatization into estrogen takes place. A

rise in the amount of body fat leads to an increase in the production of estrogen, which also has the potential to upset the hormonal balance in the body. When this happens, estrogen levels stay high all the time, and FSH levels never hit their highest point. This leads to problems with the menstrual cycle. According to Kusmiran (2014), this prevents ovulation by halting follicular development.

The findings of this study are consistent with the findings of additional research carried out by Sari, which found that students who had a nutritional condition that was considered to be thin were more likely to suffer from oligomenorrhea by 55.5% (Arum et al., 2019). Additionally, this finding is corroborated by Lakesuma's study, which demonstrates a statistically significant correlation ($p=0.046$) between body weight and the menstrual cycle (Nurfadjrin, 2017). An additional investigation conducted by Loa et al. (2022) revealed that participants who did not encounter menstrual cycle disorders exhibited a healthy body weight, which fell within the normal BMI range. Moreover, a statistically significant correlation ($p=0.013$) was observed between body weight and menstrual cycle disorders.

3. Relationship Between Physical Activity and Menstrual Cycle

The statistical analysis yielded a p-value of 0.000, which was less than the predetermined significance level of 0.05. Consequently, the study conducted at SMA X Tasikmalaya established that a correlation existed between body weight and the menstrual cycle. In general, individuals who engage in mild to moderate physical activity report having regular menstrual cycles. Conversely, those who engage in strenuous physical activity report experiencing irregular menstrual cycles. Kusmiran (2014) says that exercise can change the timing of your periods. Through the stimulation of Gonadotropin Releasing Hormone (GnRH) inhibition and Gonadotropin activity, strenuous physical activity can bring about a reduction in the amount of estrogen that is present in the serum.

The potential impact of physical activity on the incidence of menstrual disorders is contingent upon the level of intensity exhibited during the activity. Christiana (2017) found that the risk of menstruation problems increased with both the frequency and intensity of physical activity. Delayed menarche is a condition that affects female athletes who have not yet had menstruation. Intense physical activity can potentially lead to amenorrhea in women as a result of various factors, including increased androgen hormone levels, impaired ovarian function, adipose loss, or the use of menstruation-delaying medications. A drop in follicle-stimulating hormone (FSH) and luteinizing hormone (LH) levels during intense physical exertion is another potential cause of menstrual irregularities (Loa et al., 2022).

Yani's (2016) research revealed that a significant proportion of athletes (27.3%) experienced oligomenorrhea during their menstrual cycles; their physical activity level was classified as heavy (88.6%). This finding was supported by a p-value of less than 0.05, which established the existence of a correlation between physical activity and the menstrual cycle. It is common for adolescents to engage in more straightforward physical activities, such as the activities and motions that they perform on a daily basis. Some teenage girls, according to the results of this study, have heavy periods because they are always on the go between school

and home, which causes them to get exhausted from polymenorrhea. Additionally, a proportion of female students engage in physical activity-related extracurricular activities, which increases their likelihood of developing menstrual cycle disorders.

In this millennial era, the convenient availability of transportation causes people to move less or expend little energy on their everyday activities. These factors contribute to the fact that not all adolescent females engage in intense physical activity. In addition, advanced technology has an effect, particularly on adolescents, who tend to favor activities that make use of technology, such as the usage of smartphones. These activities can range from learning activities to playing activities, and they can be done for a considerable amount of time. Due to this, a significant number of adolescents engage in light to moderate levels of physical activity.

Based on the findings of the interview, it was determined that the majority of the respondents' levels of physical activity fell into the categories of light and moderate. In addition, the findings of this study demonstrated that respondents who fell into the group of light activity were also reported to have experienced menstrual cycle abnormalities. Despite having sufficient hormones in plasma and a high-fat content, the body will still be unable to stimulate reproduction (Naibaho et al., 2014). This indicates that the reproductive system's requirements for oxidized energy reserves are not being satisfied and that reproductive function is being hindered if adequate and consistent physical activity is not being carried out.

There are a number of elements that influence the menstrual cycle, including aspects of physical activity (Wati et al., 2019). However, the menstrual cycle differs from woman to woman when other factors are taken into consideration. People who engage in strenuous activities and have disturbed menstrual cycles have an impact on the body's ability to burn fat. An irregular menstrual cycle can be observed when body fat percentages decline below 20% (Anindita et al., 2016). In the case of teenage girls who engage in strenuous physical activity, polymenorrhea may occur. Some possible reasons are higher amounts of androgen hormones and losing too much body fat (Wati et al., 2019). The results of this investigation corroborate prior research undertaken by Elza (2020), which posits a correlation between physical activity and the menstrual cycle with a p-value of 0.046 less than 0.05.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, it was determined that the menstrual cycle of teenage girls attending SMA X is related to both their body weight and their level of physical activity. It is hoped that adolescent girls can prevent the emergence of menstrual cycle problems by maintaining control of their body weight. This can be accomplished by paying attention to weight gain and loss in accordance with an average body mass index (BMI) and refraining from engaging in excessive physical activity.

FURTHER STUDY

This study has several limitations. Firstly, the cross-sectional design used prevents establishing causal relationships between the variables. Additionally, the sample was limited to students from SMA X in Tasikmalaya, which may reduce the generalizability of the findings to a broader population. The subjective measurement of physical activity could also introduce bias. Future research could benefit from a longitudinal design to track changes over time, a larger and more diverse sample to enhance generalizability, and consideration of other influencing factors like diet, stress, or contraceptive use for a more comprehensive understanding of menstrual cycle irregularities.

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