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Original Research

The Relationship between Physical Activity and Body Mass Index (BMI) with Menstrual Cycle among Adolescent Girls in Balangtaroang Village, Bulukumba Regency

Suriani Bahrun[1*], Yuliana Yusfira[2]

[1]Nurse Professional Study Program, Stikes Tanawali Takalar, Indonesia
[2]Bachelor of Nursing Study Program, STIK GIA Makassar, Indonesia

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*Corresponding Author:
Suriani Bahrun, Nurse Professional Study Program, Stikes Tanawali
Email:
Suriani.bahrun@stikestanawali.ac.id

Abstract

Background: Menstrual cycle irregularities are common among adolescent girls and may lead to reproductive health problems if not addressed properly. Two major contributing factors are physical activity and body mass index (BMI), which influence hormonal balance and ovulatory function.
Objective: This study aimed to determine the relationship between physical activity and BMI with menstrual cycle regularity among adolescent girls.
Methods: An analytical observational study with a cross-sectional design was conducted involving 25 adolescent girls living in Balangtaroang Village, Bulukumba Regency. Physical activity data were obtained using a structured questionnaire, while BMI was calculated using height and weight measurements. Data were analyzed using the Somers'd test with a significance level of 0.05.
Results: The results showed a significant relationship between physical activity and menstrual cycle ($p = 0.044 < 0.05$), while no significant relationship was found between BMI and menstrual cycle ($p = 0.133 > 0.05$).
Conclusion: Physical activity is significantly associated with menstrual cycle regularity, while BMI is not. Balanced physical activity is recommended for adolescent girls to maintain reproductive health.

Keywords: Adolescent girls; body mass index; menstrual cycle; physical activity

Introduction

Adolescence is a stage of human development marked by significant physical, psychological, and hormonal changes. The most observable physical change in adolescents is related to the development of primary sexual characteristics. In males, this is characterized by nocturnal emissions, whereas in females it is marked by the onset of menstruation (Esther, 2019). The menstrual cycle varies among individuals, and only about 10% of women have a regular 28-day cycle. Irregular menstruation can be an early indicator of fertility problems (Prawihardjo, 2011).

Globally, menstrual disorders are relatively common. Research by Bieniasz et al. (2017) estimated that the prevalence of menstrual disorders worldwide includes 10.5% polymenorrhea, 50% oligomenorrhea, and 23.7% amenorrhea (Wulandari, 2017). In Indonesia, 76.7% of women aged 20-24 years experience regular menstrual cycles, while 14.4% have irregular cycles (Purwanisari, 2019). More specifically, 11.7% of adolescents aged 15-19 years have irregular menstruation, and 14.9% of women in urban areas also experience irregular cycles (Supratiknyo, 2016). In South Sulawesi, 14.5% of women aged 10-59 years report irregular menstruation (Supratiknyo, 2016). Another study conducted in March 2018 on 15 female students of the Midwifery Study Program at Andalas University found that 40% of the respondents experienced menstrual cycle disorders (Krishna, 2019).

Menstrual irregularities that are not managed promptly and properly can result in health complications. According to Sari (2016), untreated menstrual disturbances may lead to infertility, excessive blood loss, and anemia. Common symptoms of anemia include shortness of breath, fatigue, pallor, and reduced concentration.

A preliminary survey conducted on May 9, 2020, in Balangtaroang Village, Bulukumba Regency, involving 25 adolescent girls, showed that 13 (52%) had normal menstrual cycles, while 12 (48%) experienced menstrual cycle disorders. One of the possible factors affecting menstrual regularity is physical activity. According to Naihabo (2017),

normal physical activity levels are associated with more regular menstrual cycles, while excessive activity may lead to disruptions. Women who engage in light or moderate physical activity tend to experience regular menstrual cycles compared to those with strenuous or high-intensity activities.

Another influencing factor is body mass index (BMI). Sibagariang (2013) explained that adequate nutrition supports a healthy reproductive system, while nutritional deficiencies or imbalances can cause disruptions. Hupitoyo (2011) noted that estrogen, a hormone essential for menstruation, is synthesized not only in the ovaries but also in the adrenal glands, placenta, fatty tissue, and central nervous system. Therefore, both underweight and overweight conditions can affect estrogen levels and lead to menstrual irregularities. Harahap (2013) reported that menstrual disturbances are not limited to women with high BMI; those who are excessively thin or experience rapid weight loss can also develop oligomenorrhea or amenorrhea due to estrogen deficiency. According to Mahitala (2017), excessive physical activity can also cause hypothalamic dysfunction, leading to disruptions in gonadotropin-releasing hormone (GnRH) secretion.

Based on these findings and previous research, menstrual cycle regularity in adolescent girls may be influenced by both physical activity and body mass index. Therefore, this study aims to determine the relationship between physical activity and body mass index (BMI) with menstrual cycle regularity among adolescent girls in Balangtaroang Village, Bulukumba Regency.

Methods

Study Design

This study used an analytical observational method with a cross-sectional approach.

Samples/Participants

The population included all 25 adolescent girls aged 12-21 years residing in Balangtaroang Village, Bulukumba Regency. A total sampling technique was used.

Instruments

Physical activity was measured using a structured questionnaire assessing frequency and intensity of daily activities. Body weight and height were measured using a digital scale and stadiometer, and BMI was calculated as weight (kg)/height (m^2) according to WHO standards.

Data Collection

Data collection was carried out directly through interviews and anthropometric measurements. Respondents provided information on their physical activity and menstrual cycle patterns.

Data Analysis

Data were analyzed using the Somers'd correlation test to examine the relationship between physical activity, BMI, and menstrual cycle regularity, with a significance level of $\alpha = 0.05$.

Ethical Considerations

Clearly explain the name of the ethics committee institution for research approval. You will also need to state the informed consent process.

Results

Table 1 presents the distribution of respondents by age in Balangtaroang Village, Bulukumba Regency. The majority of respondents were aged 19-21 years (60%), indicating that most participants were in late adolescence. Meanwhile, 28% were aged 15-18 years, and only 12% were 12-13 years old. This suggests that the sample was dominated by older adolescents who are more likely to have established menstrual patterns.

Table 1 Distribution of Respondents by Age in Balangtaroang Village Bulukumba Regency

Age (Years)	n	%
12-13	3	12
15-18	7	28
19-21	15	60
Total	25	100

Source: SPSS Processed Data, 2024

Table 2 shows the distribution of respondents based on physical activity. Most adolescents (40%) engaged in heavy physical activity, while 32% reported moderate activity and 28% light activity. This indicates that a considerable proportion of participants were physically active, likely influenced by daily household chores, school activities, or community participation.

Table 2 Distribution of Respondents Based on Physical Activity in Balangtaroang Village Bulukumba Regency

Physical Activity	n	%

Light	7	28
Moderate	8	32
Heavy	10	40
Total	25	100

Source: SPSS Processed Data, 2024

Table 3 displays the distribution of respondents by body mass index (BMI). A majority (60%) had normal BMI, while 40% were categorized as abnormal (either underweight or overweight). These findings suggest that most adolescents in the study maintained a healthy weight range.

Table 3. Distribution of Respondents Based on Body Mass Index in Balangtaroang Village Bulukumba Regency

Body Mass Index	n	%
Normal	15	60
Abnormal	10	40
Total	25	100

Source: SPSS Processed Data, 2024

Table 4 presents the mean BMI values based on menstrual cycle categories. The mean BMI among respondents with normal menstrual cycles was 19.18, whereas those with abnormal menstrual cycles had a mean BMI of 21.03. Although the difference is observable, both values fall within the normal BMI range, suggesting that BMI variations among participants were relatively small.

Table 4 Mean Body Mass Index by Menstrual Cycle Category in Balangtaroang Village Bulukumba Regency

Menstrual Cycle Category	Mean	n	Std. Deviation
Normal	19.18	13	2.31
Abnormal	21.03	12	3.05
Total	20.07	25	2.80

Source: SPSS Processed Data, 2024

Table 5 shows the distribution of respondents according to their menstrual cycle regularity. A total of 52% had normal menstrual cycles, while 48% reported irregular cycles. This proportion indicates that menstrual irregularities were relatively common among adolescent girls in Balangtaroang Village, with nearly half of respondents experiencing some form of irregularity.

Table 5. Distribution of Respondents Based on Menstrual Cycle in Balangtaroang Village Bulukumba Regency

Menstrual Cycle	n	%
Normal	13	52
Abnormal	12	48
Total	25	100

Source: SPSS Processed Data, 2024

Bivariate Analysis

Table 6 shows the relationship between physical activity and menstrual cycle. Results of the Somers'd test revealed a significant relationship between physical activity and menstrual cycle ($r = 0.790$; $p = 0.044 < 0.05$). This finding indicates that menstrual cycle regularity is influenced by the level of physical activity. Adolescents who engaged in light or moderate activity were more likely to have normal menstrual cycles, while those performing heavy activity tended to experience irregular cycles.

Table 6. Relationship between Physical Activity and Menstrual Cycle in Balangtaroang Village Bulukumba Regency

Physical Activity	Normal n (%)	Abnormal n (%)	Total n (%)
Light	4 (30.8)	3 (25.0)	7 (28.0)
Moderate	4 (30.8)	4 (33.3)	8 (32.0)
Heavy	5 (38.4)	5 (41.7)	10 (40.0)
Total	13 (100)	12 (100)	25 (100)

Somers'd test: $r = 0.790$, $p = 0.044$

Source: SPSS Processed Data, 2024

Table 7 shows the relationship between BMI and menstrual cycle. The statistical analysis found no significant relationship between BMI and menstrual cycle ($p = 0.133 > 0.05$). Although a slightly higher proportion of normal BMI respondents had regular cycles (7 of 13), the difference was not statistically meaningful. This suggests that BMI alone does not determine menstrual cycle regularity among the adolescents studied.

Table 7. Relationship between BMI and Menstrual Cycle in Balangtaroang Village Bulukumba Regency

Body Mass Index	Normal n	Abnormal n	Total n (%)
Normal	7	8	13 (52)
Abnormal	6	4	12 (48)
Total	13	12	25 (100)

Somers'd test: p = 0.133
Source: SPSS Processed Data, 2025

Discussion

The Relationship of Physical Activity with the Menstrual Cycle

Based on table 6, it can be seen that from 25 respondents, the results of 13 respondents who have normal menstrual cycles are obtained. Meanwhile, of the 13 respondents who had normal menstrual cycles, 4 respondents were lightly active.

According to (Naihabo, 2017), this is because normal physical activity experiences more normal menstrual cycles as well. Women who have light physical activity have a normal menstrual cycle compared to women who have strenuous activity. On the other hand, out of 25 respondents, 5 respondents were heavily active and had abnormal menstrual cycles.

This is in line with the results of Sianipar's (2017) research, namely that the higher the intensity and frequency of physical activity performed, the greater the likelihood of menstrual cycle disruption. Respondents who are strenuous and have abnormal menstrual cycles are normal. Strenuous physical activity increases the risk of menstrual disorders because women who exercise too often or too strenuously can affect fat burning in the body when the fat level in the body drops to below 20% so that the menstrual cycle becomes irregular. Researchers argue that light physical activity done by adolescents will have a normal menstrual cycle, and vice versa, strenuous physical activity performed by adolescents will have an impact on abnormal menstrual cycles. Based on the results of the bivariate analysis in table 6 using the *Somersd* shows the result p-value = 0.044 <(0.05). This shows a significant relationship between Physical Activity and the Menstrual Cycle. (Mahitala, 2017), that there is a relationship between physical activity and the menstrual cycle. Fatigue due to excessive activity can cause hypothalamus dysfunction which causes disruption in GnRH secretion.

The Relationship between Body Mass Index and Menstrual Cycle

Based on table 7, it can be seen that from 25 respondents, the results of 13 respondents who have normal menstrual cycles are obtained. Meanwhile, of the 13 respondents who had a normal menstrual cycle, 7 respondents had a normal BMI. According to (Sibagariang, 2013), if a woman's nutrition is good, then there will be no obstacles in her reproductive system. On the other hand, out of 25 respondents, 4 respondents were found with abnormal BMI and abnormal menstrual cycles. According to (Hupitoyo, 2011), one of the hormones that plays a role in menstruation is estrogen. This estrogen is synthesized in the ovaries, adrenals, placenta, testicles, fatty tissues and central nervous systems. According to the analysis, the causes of longer menstrual cycles are caused by an increased amount of estrogen in the blood due to an increase in the amount of body fat. Women who are overweight and have menstrual cycle disorders can do a weight loss program ±10% indicates an improvement in hormone profile that can reduce the risk of menstrual cycle disorders.

Meanwhile, other research conducted by (Harahap, 2013), stating that it is not only women with high BMI who experience menstrual cycle disorders. Women who exercise excessively and become thin or have little body fat can cause oligomenorrhea or amenorrhea resulting from estrogen deficiency. Low body weight or sudden weight loss can inhibit the release of GnRH, thereby reducing the levels of LH and FSH responsible for egg development in the ovaries.

Based on table 7, it can be seen that from 25 respondents, 8 respondents had normal BMI and abnormal menstrual cycles. According to (Sibagariang, 2013), it should be noted that in a woman's reproductive system, in addition to needing good nutrition, there are also psychological factors that influence. If a woman has a psychological disorder, even though her nutrition is good, her reproductive system can be disrupted. Nutrition and food are not only needed for growth, physical, mental, and health development but are also necessary for fertility or fertility for a person to have offspring. The researchers assumed that respondents who had normal BMI should have a normal menstrual cycle. Respondents who have a normal BMI but have an abnormal menstrual cycle can be affected by other factors such as physical activity, stress or thyroid disorders. Based on the results of bivariate analysis in table 7 using the *Somersd* shows the result p-value = 0.133 >(0.05). This shows the absence of a significant relationship between body mass index and menstrual cycle. The researcher argued that there was no relationship between body mass index and menstrual cycle because in this study the average BMI in the normal

menstrual cycle was 19.18 while the BMI in the abnormal menstrual cycle was 21.03, meaning that the respondents' BMI was in the normal category. Meanwhile, several studies showed that there was a relationship between BMI and menstrual cycles more in respondents with the obesity category.

Conclusion

There is a significant relationship between physical activity and menstrual cycle regularity among adolescent girls, while no significant association exists between BMI and menstrual cycle. Health education programs that encourage balanced physical activity should be implemented to support menstrual health and reproductive well-being in adolescents.

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