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The Relationship Between Body Fat Percentage And Menstrual Disorders Among Female Medical Students At The Faculty Of Medicine, Universitas Muhammadiyah Sumatera Utara

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Abstract

Menstrual disorders are a major public health issue frequently experienced by women. Several predisposing factors contribute to menstrual irregularities, including body fat percentage, nutritional intake, reproductive hormone levels, physical activity, and stress. Fat intake is closely linked to body fat percentage—showing a direct correlation—such that abnormalities in these factors can induce physiological changes in the reproductive system, specifically menstrual disorders. This study employed a descriptive-analytic design with a cross-sectional approach. The sample consisted of 128 female students selected via non-probability sampling. Body fat percentage was determined using the RFM method, while data on menstrual disorders were collected via questionnaire. Data analysis was performed using the chi-square test. Bivariate analysis revealed that 70 respondents (84.3%) with abnormal body fat percentages experienced menstrual disorders, whereas the group without menstrual disorders was dominated by respondents with normal body fat percentages (44 respondents, or 97.8%). The study concludes that body fat percentage is significantly associated with menstrual disorders, a finding statistically confirmed by the chi-square test (p-value = 0.001).

Keywords: Menstrual Disorders, Body Fat Percentage, Menstrual Cycle

INTRODUCTION

Menstrual disorders are significant social issues and common reproductive health problems among women. These disorders encompass abnormal or prolonged bleeding, irregular menstrual cycles, and variations in menstrual blood volume. Observed disorders include secondary amenorrhea (18.4%), primary amenorrhea (5.3%), oligomenorrhea (10.7%), polymenorrhea (10.5%), and mixed disorders (23.1%). Menstrual disorders serve as a crucial initial indicator for assessing potential reproductive system abnormalities, such as uterine cancer, breast cancer, and infertility. Several predisposing factors contribute to menstrual disturbances, including body fat percentage, nutritional intake, reproductive hormone levels, physical activity, and stress. Fat intake is closely linked to body fat percentage; the two are directly proportional. Lower fat intake results in a lower body fat percentage, which can trigger physiological changes in the reproductive system, manifesting as menstrual disorders. Body fat percentage—representing fat weight or mass (including both visceral and subcutaneous fat) relative to an individual's total body mass—can be measured using various methods, such as Relative Fat Mass (RFM), Body Mass Index (BMI), Bioelectrical Impedance Analysis (BIA), skinfold tests, and Dual-Energy X-Ray Absorptiometry (DEXA). This study measures body fat percentage using the RFM method, applying the formula: 64 – (20 x Height / Waist Circumference (cm)) + 12. Fat is a vital component of the body; it acts as a solvent for vitamins A, E, K, and D, protects the body against cold temperatures, and aids in the synthesis of hormones and vitamins. Fat also plays a role in the production and storage of reproductive hormones. Reproductive hormones

require fat to assist the hypothalamus in secreting GnRH, which triggers the pituitary gland to release FSH and LH during the menstrual cycle.

RESEARCH METHODS

Menstrual disorders are significant social issues and common reproductive health problems among women. These disorders encompass abnormal or prolonged bleeding, irregular menstrual cycles, and variations in menstrual blood volume. Observed disorders include secondary amenorrhea (18.4%), primary amenorrhea (5.3%), oligomenorrhea (10.7%), polymenorrhea (10.5%), and mixed disorders (23.1%). Menstrual disorders serve as a crucial initial indicator for assessing potential reproductive system abnormalities, such as uterine cancer, breast cancer, and infertility. Several predisposing factors contribute to menstrual disturbances, including body fat percentage, nutritional intake, reproductive hormone levels, physical activity, and stress. Fat intake is closely linked to body fat percentage; the two are directly proportional. Lower fat intake results in a lower body fat percentage, which can trigger physiological changes in the reproductive system, manifesting as menstrual disorders. Body fat percentage—representing fat weight or mass (including both visceral and subcutaneous fat) relative to an individual's total body mass—can be measured using various methods, such as Relative Fat Mass (RFM), Body Mass Index (BMI), Bioelectrical Impedance Analysis (BIA), skinfold tests, and Dual-Energy X-Ray Absorptiometry (DEXA). This study measures body fat percentage using the RFM method, applying the formula: 64 – (20 x Height / Waist Circumference (cm)) + 12. Fat is a vital component of the body; it acts as a solvent for vitamins A, E, K, and D, protects the body against cold temperatures, and aids in the synthesis of hormones and vitamins. Fat also plays a role in the production and storage of reproductive hormones. Reproductive hormones require fat to assist the hypothalamus in secreting GnRH, which triggers the pituitary gland to release FSH and LH during the menstrual cycle.

RESULTS AND DISCUSSION

Based on the information in Table 1, the total number of respondents is 128. The largest age group is the 20-year-old group, comprising 101 respondents (78.9%), while the most common age at menarche is 12 years, reported by 58 respondents (45.3%).

Table 1. Distribution of Respondent Characteristics

Characteristic	Frequency	Percentage
Age		
19	8	6,3%
20	101	78,9%
21	17	13,3%
22	2	1,6%
Age at Menarche		
9	3	2,3%
10	6	4,7%
11	19	14,8%
12	58	45,3%
13	21	16,4%
14	16	12,5%
15	3	2,3%
16	1	0,8%
17	1	0,8%
Total	128	100%

Table 2. Characteristics of respondents based on menstrual disorders

Kategori	Jumlah	Persentase
Ya (memiliki gangguan haid)	71	55,5%
Tidak (tidak memiliki gangguan haid)	57	44,5%
Total	128	100%

Based on the results in Table 2, it can be seen that out of 128 respondents, 71 (55.5%) have menstrual disorders, while 57 (44.5%) do not have menstrual disorders.

Table 3. Characteristics of respondents based on fat percentage

Category	Quantity	Percentage
Normal	45	35,2%
Abnormal		
Underfat	27	21,1%
Overfat	56	43,8%
Total	128	100%

Based on the results in Table 3, which shows the frequency distribution of respondents' body fat percentage, it can be observed that out of 128 respondents, 45 (35.2%) have a normal body fat percentage, while 83 (64.8%) have an abnormal body fat percentage—consisting of 27 respondents (21.2%) classified as "underfat" and 56 respondents (43.8%) classified as "overfat."

The results of the bivariate analysis using the chi-square test indicate a significant association between body fat percentage and menstrual disorders. This is statistically supported, as the p-value obtained is 0.001; since this value is less than 0.05, the hypothesis (Ha) is accepted and the null hypothesis (H0) is rejected.

Table 4. Results of bivariate analysis on the relationship between body fat percentage and menstrual disorders

Fat percentage	Menstrual disorders						*P Value*
	YA		TIDAK		TOTAL		
	n	%	n	%	n	%	
Normal	1	2,2%	44	97,8%	45	100%	0,001
Not normal	70	84,3%	13	15,7%	83	100%	
total	71	55,5%	57	44,5%	128	100%	

Discussion

This study involved 128 respondents. Based on a univariate analysis of demographic data, the majority of respondents were 20 years old (78.9%), followed by those aged 21 (13.3%), 19 (6.3%), and 22 (1.6%). The age range in this study falls into the category of young adulthood—a stage characterized by physical and psychological growth and development. The results indicate that 71 out of the 128 respondents (55.5%) experienced menstrual disorders. This finding aligns with research by De Liyis et al., which reported that 140 respondents (66.3%) in the young adult age group also experienced menstrual disorders. This consistency suggests that young adulthood, being a period of active reproductive life, is a phase particularly vulnerable to menstrual irregularities.

Regarding the age at menarche, the largest group consisted of those who reached menarche at age 12 (58 respondents, or 45.3%). This is consistent with research by Kholifah, which found that the age at menarche in Indonesia decreased from 13 years in 2013 to 12.8 years in 2018.

The analysis conducted to determine whether a relationship exists between body fat percentage and menstrual disorders among female students at the Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, revealed that body fat percentage can influence menstrual disorders, specifically affecting menstrual cycles and menstrual blood volume. This aligns with a study by De Liyis et al. involving 211 respondents, which concluded that body fat percentage is significantly associated with the length of the menstrual cycle and the duration of menstrual bleeding. Similar findings were also reported in a study by Nurdi et al. involving 78 respondents, which identified a significant relationship between body fat percentage and menstrual disorders. This study shares a common focus: the relationship between body fat percentage and menstrual disorders, with body fat percentage serving as the independent variable and menstrual disorders as the dependent variable. The research centers on how body fat levels influence the balance of reproductive hormones—such as estrogen and progesterone—which, in turn, affects the menstrual cycle. The study participants are young adult female university students who are in an active reproductive phase and are susceptible to hormonal imbalances resulting from their lifestyles, dietary habits, and physical activity levels. The methodology employed is also consistent, utilizing a cross-sectional study design.

Insulin and leptin levels can be influenced by body fat; both hormones play a role in regulating the secretion of GnRH (Gonadotropin-Releasing Hormone). GnRH, in turn, stimulates the release of FSH and LH, which trigger the ovaries to undergo folliculogenesis and steroidogenesis (the production of estrogen and progesterone)15. Consequently, any disruption in the hypothalamus can lead to menstrual irregularities. Furthermore, imbalances in estrogen levels or ovarian abnormalities can also result in such issues. Body fat serves as a fundamental substrate for estrogen production16,20. Excess body fat can elevate estrogen levels by accelerating the conversion of androgens into estrogen within granulosa cells and adipose tissue. This increase in estrogen can lead to a prolongation of the menstrual cycle13,17. These findings align with a study by Ummah and Utami, which demonstrated that high fat reserves accelerate the conversion of androgens into estrogen in granulosa cells and adipose tissue. This enhanced process raises estrogen levels in the body, which can ultimately affect and extend the menstrual cycle10.

The percentage of body fat is influenced by various factors, one of which is dietary fat intake. Inadequate fat intake can deplete body fat reserves, thereby affecting the production of androstenedione—a precursor to reproductive hormones. This condition can impair female reproductive function2,3. These findings are consistent with research by Nahdah and Safitri, who observed that consuming either too much or too little fat can disrupt the release of hormones involved in reproduction11. This occurs because body fat influences the levels of gonadotropins in serum and urine, leading to a decline in gonadotropin concentrations and alterations in their secretion patterns. This state is linked to hypothalamic dysfunction. A reduction in gonadotropin levels subsequently impacts the production of FSH and LH, as well as the hormones estrogen and progesterone. A decline in the production of these hormones can hinder the maturation of egg cells, which may ultimately lead to menstrual cycle irregularities, such as a cycle duration that is longer than normal2,3. Consistent with this, a study by Lestari involving 75 respondents at SMK Bina Putera indicated a significant association between fat intake and menstrual irregularities6. Consuming higher amounts of fat alters reproductive hormones, potentially increasing body fat levels and leading to an increased release of estrogen. This can result in menstrual cycles that are either excessively long or short. Similarly, research by Nuriannisa and Namira found that a higher percentage of body fat is associated with a shorter menstrual cycle12.

This study cannot definitively determine whether other additional factors might influence menstrual characteristics. However, it does support the idea that body fat

percentage is a risk factor for menstrual disorders. Furthermore, the direct measurement of body fat percentage provides added value in understanding the relationship between body composition and reproductive health. It is hoped that the more accurate data obtained through this method can be used to formulate specific clinical recommendations, particularly regarding the prevention and management of menstrual disorders. Future research should consider other variables—such as physical activity, stress levels, and nutritional intake—to gain a more comprehensive understanding of the factors that influence menstrual disorders.

CONCLUSION

This study indicates a relationship between body fat percentage and menstrual disorders among female students at the Faculty of Medicine, University of Muhammadiyah North Sumatra. Body fat percentage plays a role in maintaining reproductive function by regulating reproductive hormones, which in turn influence the characteristics of the menstrual cycle. Therefore, keeping body fat percentage within a normal range is one way to support reproductive health and reduce the risk of menstrual disorders. Future research should consider additional factors—such as nutritional intake, physical activity, stress levels, and sleep patterns—to gain a more comprehensive understanding of the elements that influence menstrual disorders.

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