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The Relationship of Stress Level to Stress Level And Menstrual Cycle Among Military Medical Cadets

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Abstract

Background: Menstrual cycle regularity is an important indicator of reproductive health. Stress may disrupt menstrual function through neuroendocrine pathways, and military medical cadets may be vulnerable to both academic demands and semi-military training. This study aimed to determine the relationship between stress level and menstrual cycle among female military medical cadets at the Republic of Indonesia Defense University.
Methods: This analytical observational study used a cross-sectional design. Ninety-five female medical cadets were recruited, and 92 respondents met the inclusion and exclusion criteria. Data were collected using Google Forms with the Perceived Stress Scale and a menstrual cycle questionnaire. The association between stress level and menstrual cycle was analyzed using the Chi-Square test, with statistical significance set at $p < 0.05$.
Results: Most respondents experienced moderate stress (61/92; 66.3%), while 31 respondents (33.7%) had mild stress. Normal menstrual cycles were reported by 71 respondents (77.2%), whereas 21 respondents (22.8%) had abnormal menstrual cycles. The Chi-Square test showed a significant association between stress level and menstrual cycle ($p = 0.008$).
Conclusion: Stress level was significantly associated with menstrual cycle patterns among military medical cadets. These findings highlight the importance of stress management and reproductive health monitoring in military medical education settings.
Keywords: *cross-sectional study, medical students, menstrual cycle, military cadets, stress level*

Background

Menstruation is a physiological process in women of reproductive age, characterized by periodic shedding of the endometrium and discharge of blood and mucosal tissue through the vagina. The menstrual cycle is regulated by coordinated hormonal activity within the hypothalamic-pituitary-ovarian axis. Although cycle length may vary among individuals, a regular menstrual pattern is an important marker of reproductive and general health.[1,2]

In Indonesia, national health data have shown that most women of reproductive age report regular menstrual cycles; however, a proportion still experience menstrual irregularities. Menstrual cycle disturbances may be influenced by several factors, including age, nutritional status, body mass index, physical activity, underlying reproductive disorders, and psychological stress. Among these factors, stress is clinically relevant because it is common in young adults and may affect endocrine regulation.[3-8]

Stress is a physiological, psychological, and behavioral response to internal or external stressors. Activation of the hypothalamic-pituitary-adrenal axis increases corticotropin-releasing hormone and cortisol secretion, which may suppress gonadotropin-releasing

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hormone and subsequently alter follicle-stimulating hormone, luteinizing hormone, estrogen, and progesterone activity. Medical students are known to be vulnerable to stress because of academic workload, intensive learning schedules, and frequent assessments. Military medical cadets may experience additional demands related to discipline, physical training, and non-academic responsibilities within a semi-military education system. Therefore, this study was conducted to determine the relationship between stress level and menstrual cycle among female medical cadets at the Republic of Indonesia Defense University.[9-12]

Methods

This study was an analytical observational study with a cross-sectional design. The study population consisted of female medical student cadets at the Republic of Indonesia Defense University. A total of 95 respondents were recruited, of whom 92 met the inclusion and exclusion criteria and were included in the final analysis.

Data were collected using questionnaires distributed through Google Forms. Stress level was assessed using the Perceived Stress Scale, while menstrual cycle characteristics were obtained using a menstrual cycle questionnaire. Stress level was categorized as mild, moderate, or severe. Menstrual cycle was categorized as normal or abnormal; abnormal cycles included oligomenorrhea and polymenorrhea based on the cycle pattern reported by respondents.

The inclusion criteria were female students of the Military Medical Faculty who were willing to participate as respondents, healthy unmarried individuals, and students with a history of regular menstrual cycles before entering medical education. The exclusion criteria were students with a history of irregular menstrual cycles before entering the medical education program and students with previous reproductive medical conditions.

Data were analyzed using the Chi-Square test to determine the association between stress level and menstrual cycle. A p-value of <0.05 was considered statistically significant. Statistical software used for analysis should be completed by the author. Informed consent was obtained from all respondents prior to participation in this study.

Results

This study included 92 respondents distributed across three cohorts. Cohort 1 consisted of 30 respondents (32.6%), Cohort 2 included 26 respondents (28.2%), and Cohort 3 comprised 36 respondents (39.2%). The largest age group was 20 years old, accounting for 34 respondents (37.0%). Respondents aged 19 and 21 years each accounted for 21 respondents (22.8%), while 9 respondents (9.8%) were 18 years old and 7 respondents (7.6%) were 22 years old.

Most respondents experienced menarche between the ages of 12 and 14 years (67 respondents; 72.8%). Seventeen respondents (18.5%) experienced menarche before the age of 12 years, and 8 respondents (8.7%) experienced menarche after the age of 14 years. Regarding menstrual cycle pattern, 71 respondents (77.2%) reported normal menstrual cycles, 13 respondents (14.1%) reported oligomenorrhea, and 8 respondents reported polymenorrhea. The original table listed polymenorrhea as 6.7%; however, based on 8 of 92 respondents, the calculated percentage is 8.7% [Data needs to be verified by author].

Regarding stress level, 61 respondents (66.3%) experienced moderate stress, 31 respondents (33.7%) experienced mild stress, and no respondent reported severe stress. The association analysis showed that among respondents with mild stress, 29 respondents (31.5%) had a normal menstrual cycle and 2 respondents (2.2%) had an abnormal menstrual cycle. Among respondents with moderate stress, 42 respondents (45.6%) had a normal menstrual cycle and 19 respondents (20.7%) had an abnormal menstrual cycle. The Chi-Square test showed a significant association between stress level and menstrual cycle ($p = 0.008$).

Table 1. Characteristics of respondents by cohort, age, age at menarche, menstrual cycle, and stress level

Characteristics	N	%
Cohort		
1	30	32.6
2	26	28.2
3	36	39.2
Age (years)		
18	9	9.8
19	21	22.8
20	34	37.0
21	21	22.8

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22	7	7.6
Age at menarche (years)		
<12	17	18.5
12-14	67	72.8
>14	8	8.7
Menstrual cycle		
Normal	71	77.2
Oligomenorrhea	13	14.1
Polymenorrhea	8	6.7
Stress level		
Mild	31	33.7
Moderate	61	66.3
Severe	0	0

Table 2. Association between stress level and menstrual cycle among military medical cadets

Stress level	Normal menstrual cycle, n (%)	Abnormal menstrual cycle, n (%)	p-value
Mild	29 (31.5)	2 (2.2)	0.008
Moderate	42 (45.6)	19 (20.7)	

Discussion

This study found a statistically significant association between stress level and menstrual cycle among female military medical cadets at the Republic of Indonesia Defense University. Most respondents experienced moderate stress, while the majority still reported normal menstrual cycles. Nevertheless, abnormal menstrual cycles were more frequently observed among respondents with moderate stress than among those with mild stress, supporting the hypothesis that higher stress levels are associated with menstrual cycle disturbances.[6-8]

The high proportion of moderate stress among respondents is consistent with previous reports showing that medical students commonly experience considerable psychological stress. Academic demands, intensive schedules, examinations, and the need to adapt to clinical and scientific learning environments may contribute to this burden. In the context of military medical education, cadets may face additional physical training, disciplinary routines, and non-academic responsibilities, creating a distinctive stress profile compared with non-military medical students.[11,12]

The biological plausibility of the association between stress and menstrual cycle disturbance is supported by neuroendocrine mechanisms. Psychological stress may activate the hypothalamic-pituitary-adrenal axis, resulting in increased corticotropin-releasing hormone and cortisol secretion. These changes may suppress hypothalamic gonadotropin-releasing hormone pulsatility and subsequently reduce follicle-stimulating hormone and luteinizing hormone secretion. Disruption of these pathways may alter estrogen and progesterone production, affecting ovulation and menstrual cycle regularity.[9,10]
The findings of this study are consistent with previous studies reporting significant relationships between stress and menstrual irregularities in medical student populations. The present study adds contextual relevance by focusing on female military medical cadets, a population exposed to both academic and semi-military stressors. These findings suggest the need for integrated stress management, reproductive health education, and early screening for menstrual disturbances within military medical education programs.[6-8,13,14]

This study has several limitations. The cross-sectional design limits causal interpretation because stress level and menstrual cycle pattern were measured at the same time. The use of self-reported questionnaires may introduce recall bias or reporting bias. The study was conducted in a specific institutional setting, which may limit generalizability to other medical student populations. Future studies with longitudinal designs, larger sample sizes, objective endocrine measurements, and assessment of additional confounding factors such as body mass index, sleep quality, diet, and physical activity are recommended.

Conclusion

There was a significant relationship between stress level and menstrual cycle among female military medical cadets at the Republic of Indonesia Defense University. Most respondents experienced moderate stress and had normal menstrual cycles; however, menstrual cycle abnormalities were more common among respondents with moderate stress. These findings emphasize the importance of stress management and reproductive health monitoring in military medical education settings.

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Author Contributions

All authors act as the guarantor of the manuscript. EF supervised the study and contributed to study conception, data interpretation, manuscript review, and final approval. SA, TMA, SPH, ARS, M, AS, and RH contributed to data acquisition, data organization, literature review, and drafting of the manuscript. SA, TMA, and SPH contributed to data analysis and statistical interpretation. All authors participated in manuscript preparation, reviewed the final version, approved the manuscript for submission, and agreed to be accountable for all aspects of the work.

Conflict of Interest

No conflict of interest.

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