



Impact of Occupational Stress and Fatigue on Menstrual Cycle Characteristics among Female Biddokkes Workers

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ARTICLE INFO

Article History:

Submitted: 11-10-2025

Revised: 22-12-2025

Accepted: 12-02-2026

Published: 28-02-2026

 doi.org/10.58545/jkmi.v5i2.752

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ABSTRACT

Background: Menstrual cycle irregularity is a reproductive health problem that may be influenced by occupational stress and work fatigue. **Objective:** This study examined the relationship between stress level and work fatigue with menstrual cycle regularity among female formal workers at Biddokkes Polda Jawa Timur. **Methods:** An analytical observational study with a cross-sectional design was conducted among 88 female former workers selected from a population of 100 workers. Stress, work fatigue, and menstrual cycle data were collected using structured questionnaires, including the Unimma Work Fatigue Instrument for fatigue assessment and PSS-10 for occupational stress. Data were analyzed using Spearman correlation. **Results:** Most respondents reported very severe stress (39.8%), severe work fatigue (44.3%), and irregular menstrual cycles (65.9%). Spearman's correlation analysis revealed strong, significant negative correlations between stress level ($p < 0.001$; $r = -0.850$) and work fatigue ($p < 0.001$; $r = -0.870$) and the menstrual cycle. **Conclusion:** Higher stress levels and work fatigue were significantly associated with menstrual cycle irregularity among female formal workers. Workplace stress management, fatigue control, and reproductive health monitoring are needed to protect female workers' health.

Keywords: Stress, Work Fatigue, Menstrual Cycle, Female Workers, Occupational Health

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How to cite:

Prafitasari, I., Prasty, A., & Al Afgani, M. C. (2026). Impact of Occupational Stress and Fatigue on Menstrual Cycle Characteristics among Female Biddokkes Workers. *Jurnal Kegawatdaruratan Medis Indonesia*, 5(2), 143-152. <https://doi.org/10.58545/jkmi.v5i2.752>

1. INTRODUCTION

Menstrual health is an important component of reproductive health because menstrual patterns reflect physical, psychological, and social well-being across the reproductive life course (Hennegan et al., 2021; WHO, 2022). The menstrual cycle

is also used as a vital sign in women's health assessment because abnormalities in frequency, duration, volume, or regularity may indicate reproductive or systemic health problems (American College of Obstetricians and Gynecologists, 2015; Jain et al., 2023). Irregular menstrual cycles can

include polymenorrhea, oligomenorrhea, and amenorrhea. These disorders may interfere with quality of life, fertility awareness, and early recognition of reproductive health risks.

Female workers are exposed to occupational factors that may affect menstrual health. Working conditions, sleep patterns, shift schedules, heavy physical workloads, and psychosocial stressors can interact with individual physiological factors and influence menstrual regularity (Song et al., 2022; Shim et al., 2024). A meta-analysis also reported that shift work is associated with higher odds of menstrual disorders, dysmenorrhea, and early menopause (Hu et al., 2023). These findings indicate that menstrual cycle assessment should not be separated from workplace health surveillance.

Work stress is one of the occupational risks that may affect female workers. Stress occurs when job demands exceed an individual's perceived capacity to cope with workload, time pressure, work environment, or organizational expectations. In policing and police-related health services, occupational stress can arise from high job demands, responsibility, emergency conditions, long working hours, and limited recovery time. Previous studies among police officers have

shown that job stress and burnout are associated with workload, organizational stress, sleep problems, and coping capacity (Queirós et al., 2020; Bezie et al., 2024).

Physiologically, stress can influence menstrual function through neuroendocrine pathways. Chronic stress may activate the hypothalamic-pituitary-adrenal axis and disrupt the hypothalamic-pituitary-gonadal axis, thereby affecting gonadotropin-releasing hormone secretion, ovulation, and ovarian steroid production (Sasaki et al., 2022; Vigil et al., 2022). This mechanism supports the assumption that higher occupational stress may increase the likelihood of menstrual cycle irregularity.

Work fatigue may also contribute to menstrual cycle disturbances. Fatigue reflects reduced physical or mental capacity after work demands, insufficient recovery, sleep disturbance, and continuous workload. Evidence from female formal workers in Magelang showed a significant association between work fatigue and menstrual cycle disturbance (Rahmawati et al., 2021).

Biddokkes (Bidang Kedokteran dan Kesehatan) is the element responsible for directing and implementing core health functions within the Indonesian National Police. A work culture that upholds cleanliness, punctuality, and adherence to

medical and official standard operating procedures (SOPs). In the present setting, female formal workers at Biddokkes Polda Jawa Timur carry administrative, health-service, and police-support responsibilities that may lead to stress and fatigue. This study aimed to determine the relationship between stress level and work fatigue with menstrual cycle regularity among female formal workers at Biddokkes Polda Jawa Timur.

2. METHODS

This study used an analytical observational design with a cross-sectional approach. The design was selected because stress levels, work fatigue, and menstrual cycle status were measured simultaneously in the study population. The study was conducted at Biddokkes Polda Jawa Timur, Surabaya, Indonesia, in March 2025.

The population consisted of 100 female formal workers at Biddokkes Polda Jawa Timur. The sample size was calculated using the Slovin formula at a 5% significance level, yielding 80 respondents. To anticipate potential drop-out, 10% was added, producing a final target of 88 respondents. The respondents were selected from eligible female workers who completed the research questionnaire and met the inclusion criteria.

The inclusion criteria were female formal workers aged 48 years or younger who were still menstruating. The exclusion criteria were current hormonal contraception use and pregnancy. These criteria were applied to reduce factors that could directly alter menstrual cycle patterns independently of occupational stress and fatigue.

Data were collected using a structured online questionnaire. Stress level was measured using a PSS-10. Validity testing conducted on a similar population yielded a Cronbach's alpha of 0.93, indicating it is sufficiently suitable for use (Hakim et al., 2024). Work fatigue was measured using the Unimma Work Fatigue Instrument (UWFI), which comprises 19 statements assessing mood changes, difficulty thinking, sleep problems, physical changes, and work-related effects. Menstrual cycle status was measured using a menstrual cycle questionnaire and was categorized as normal or abnormal. Normal cycles were defined as cycles ranging from 21 to 35 days, while abnormal cycles included polymenorrhea, oligomenorrhea, or amenorrhea.

Data processing included editing, coding, entry, and data checking. The data were analyzed using IBM SPSS Statistics version 19. Univariate analysis was used to describe respondent characteristics, stress

level, work fatigue, and menstrual cycle status. Bivariate analysis used the Spearman correlation test to examine the relationships between stress level and menstrual cycle, and between work fatigue and menstrual cycle. The significance level was set at $\alpha = 0.05$.

3. RESULTS

This study included 88 female formal workers at Biddokkes Polda Jawa Timur. The results are presented as respondent characteristics, the distribution of stress levels, work fatigue, and menstrual cycle status, and the results of a Spearman correlation analysis.

Table 1. Respondent Characteristics

Variable	Category	Frequency (n)	Percentage (%)
Age	17-25 years	22	25.0
	26-35 years	31	35.2
	36-45 years	26	29.5
	46-48 years	9	10.2
Education	Secondary education	24	27.3
	Higher education	64	72.7
Work tenure	1-3 years	22	25.0
	4-6 years	31	35.2
	> 7 years	35	39.8

Table 1 shows that most respondents were aged 26-35 years (35.2%), had higher

education backgrounds (72.7%), and had worked for more than seven years (39.8%).

Table 2. Distribution of Stress Level, Work Fatigue, and Menstrual Cycle

Variable	Category	Frequency (n)	Percentage (%)
Stress level	Normal	7	8.0
	Mild	9	10.2
	Moderate	13	14.8
	Severe	24	27.3
	Very severe	35	39.8
Menstrual cycle	Mild	22	25.0
	Moderate	27	30.7
	Severe	39	44.3
Menstrual cycle	Normal	30	34.1
	Irregular	58	65.9

Table 2 shows that the highest proportion of respondents experienced very severe stress (39.8%). Severe work

fatigue was found in 39 respondents (44.3%). Menstrual cycle irregularity was reported by 58 respondents (65.9%).

Table 3. Spearman Correlation between Occupational Factors and Menstrual Cycle

Relationship	r	p-value	Interpretation
Stress level and menstrual cycle	-0.850	< 0.001	Strong significant correlation
Work fatigue and menstrual cycle	-0.870	< 0.001	Strong significant correlation

Table 3 shows that the Spearman correlation analysis indicated that stress level had a significant, strong relationship with menstrual cycle status ($p < 0.001$; $r = -0.850$). Work fatigue was also strongly and significantly related to menstrual cycle status ($p < 0.001$; $r = -0.870$). These results indicate that occupational stress and fatigue were statistically associated with menstrual cycle irregularity among respondents.

4. DISCUSSION

Stress Level and Menstrual Cycle

The findings showed a statistically significant strong correlation between stress level and menstrual cycle status ($p < 0.001$; $r = -0.850$). In practical terms, respondents with higher occupational stress tended to report abnormal menstrual cycles more frequently. This result supports previous evidence that workplace psychosocial factors may influence menstruation-related symptoms and menstrual abnormalities among female workers (Sasaki et al., 2022; Sasaki et al., 2025).

Stress may disturb menstrual regularity through endocrine pathways. Psychological and occupational stress can activate the hypothalamic-pituitary-adrenal axis and increase cortisol activity. This process may interfere with

hypothalamic-pituitary-gonadal regulation and alter gonadotropin-releasing hormone secretion, thereby affecting ovulation and menstrual cycle stability (Vigil et al., 2022). The finding is therefore biologically plausible and consistent with the observed high proportion of respondents experiencing very severe stress.

This study showed a strong correlation between stress level and menstrual cycle status ($r = -0.850$). The findings of this study are consistent with previous studies that have reported significant relationships between stress and the menstrual cycle among female military medical cadets at the Republic of Indonesia Defense University (Azka et al., 2025). 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. A work culture that upholds cleanliness, punctuality, and adherence to medical and official standard operating procedures (SOPs) presents physical stress. The biological stress is associated with psychological stress. Psychological stress may activate the hypothalamic-pituitary-adrenal axis, resulting in increased

secretion of corticotropin-releasing hormone and cortisol. These changes may suppress hypothalamic gonadotropin-releasing hormone pulsatility, thereby reducing follicle-stimulating hormone and luteinizing hormone secretion. Disruption of these pathways may alter estrogen and progesterone production, affecting ovulation and menstrual cycle regularity.

Work Fatigue and Menstrual Cycle

The study also found a statistically significant strong correlation between work fatigue and menstrual cycle status ($p < 0.001$; $r = -0.870$). Severe work fatigue was the most common fatigue category among respondents. This finding is consistent with Rahmawati et al. (2021), who reported a significant relationship between work fatigue and the menstrual cycle among female formal-sector workers in Magelang.

Work fatigue can reflect prolonged workload, limited recovery, sleep disturbance, and reduced physical endurance. These conditions may influence reproductive health both directly and indirectly through stress response, sleep disruption, and reduced physiological resilience. Studies among female workers and nurses indicate that perceived stress, physical or mental fatigue, sleep problems, long-standing hours, and heavy lifting are

associated with irregular cycles or menstrual distress (Song et al., 2022; Shim et al., 2024).

In this study, a strong relationship was also found between work fatigue and the menstrual cycle, with an R value of -0.870 . The results of this study are consistent with research by Sukmawati (2024), which finds that women with mild work fatigue are 5.3 times more likely to have regular menstrual cycles than those with heavy work fatigue. However, full-time workers or residents who work 35 hours or more per week are more susceptible to burnout than part-time workers. Fatigue is a condition in which the body experiences a decrease in work capacity and energy to carry out an activity.

Practical Implications

The results indicate the need for workplace-based reproductive health monitoring for female workers. Biddokkes Polda Jawa Timur can integrate stress screening, fatigue assessment, workload review, and menstrual health education into occupational health programs. Practical interventions may include policies that ensure optimal rest periods for those on the first day of their period. Those entering the first day of their menstrual period are granted time off work or assigned duties with a reduced workload.

Other policies regarding periodic reproductive health screening and service programs are also important in maintaining work productivity.

Limitations

This study used a cross-sectional design; therefore, causal relationships cannot be concluded. Menstrual cycle status, stress, and fatigue were measured through self-reported questionnaires, which may introduce recall bias. The study did not control for body mass index, nutritional status, sleep quality, physical activity, gynecological history, or other hormonal factors that may influence menstrual cycles. Future studies should use longitudinal designs and include biological, occupational, and lifestyle variables. Another limitation of this study is that the menstrual cycle was characterized solely by its duration; consequently, the term "menstrual cycle regularity" requires a more scientific definition.

5. CONCLUSION

This study found strong, significant correlations between stress level and menstrual cycle status, and between work fatigue and menstrual cycle status, among female formal workers at Biddokkes Poldo Jawa Timur. Most respondents

experienced very severe stress, severe work fatigue, and abnormal menstrual cycles. These findings indicate that occupational stress and fatigue should be considered important factors in workplace reproductive health programs. Biddokkes Poldo Jawa Timur should strengthen stress management, fatigue control, adequate rest arrangements, and periodic monitoring of menstrual health for female workers.

ACKNOWLEDGEMENT

The authors thank Sekolah Tinggi Ilmu Kesehatan Majapahit Mojokerto, Biddokkes Poldo Jawa Timur, and all respondents who participated in this study. The authors also appreciate the support provided during data collection and manuscript preparation.

AUTHOR CONTRIBUTIONS

IP contributed to conceptualization, methodology, data curation, and original draft preparation. AP contributed to supervision, validation, formal analysis, and manuscript review. MCA contributed to data processing, visualization, reference management, and manuscript editing.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the publication of this article.

DATA AVAILABILITY STATEMENT

The data supporting this study's findings are available from the corresponding author upon reasonable request.

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