ORIGINAL ARTICLE

The Correlation between Physical Activity and Fatigue Level during Menstrual Phase among Female Adolescents at Yadika Bangil Pasuruan Vocational High School, Surabaya, Indonesia

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ABSTRACT

Background & Objectives: The phenomenon of "remaja jompo", which has been known among Indonesian teenagers in recent years, describes the physical and mental exhaustion of teenagers. Fatigue is decreased efficiency, work performance, and physical strength or endurance, and is one of the most commonly reported complaints in primary health care services. Individuals, especially female adolescents, are more likely to experience severe fatigue if they engage in strenuous physical activities. Menstrual phases may worsen fatigue due to hormonal fluctuations and the depletion of iron stores. This study aims to determine the correlation between physical activity and fatigue level during the menstrual phase among female adolescents at Yadika Bangil Pasuruan Vocational High School, Surabaya. **Methods:** This study utilized an analytical observational method with a cross-sectional approach. A total of 60 female adolescents were enrolled. The instruments used in this research were the Baecke Questionnaire for physical activity and the Subjective Self Rating Scale for fatigue levels. The statistical analysis was conducted using SPSS, including the Kolmogorov-Smirnov test to assess data distribution and the Spearman's Rho correlation test to examine correlations among variables. **Results:** Most female adolescents at Yadika Bangil Pasuruan Vocational High School had moderate levels of physical activity (88.3%) and moderate fatigue during the menstrual phase (51.7%). The Spearman's Rho correlation test revealed a p-value of 0.173 ($p>0.05$). **Conclusion:** There is no significant correlation between physical activity and fatigue level on the menstrual phase among female adolescents at Yadika Bangil Pasuruan Vocational High School.

Keywords: Adolescent Girls; Fatigue; Menstruation; Physical Activity

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INTRODUCTION

As time progresses, fatigue has become a common experience for humans. Recently, the term "remaja jompo" has emerged among Indonesian teenagers and gone viral on social media. This term refers to adolescents who frequently experience fatigue, muscle soreness, back and waist pain, weakness, and headaches. It is a rather paradoxical term that combines two words that are actually contradictory: "remaja," which means 'teenager' and is associated with active, creative, and energetic growth phases, and "jompo," which connotes old age and physical frailty (Sujibto, 2022). This phenomenon illustrates the physical and mental exhaustion that today's youth face. Adolescents often complain about fatigue regardless of their level of physical activity. Even those with low levels of physical activity are not exempt from fatigue. However, fatigue is more commonly reported by female adolescents during their menstrual phase (Dayati et al. 2023).

In fact, fatigue is one of the most common complaints reported in primary healthcare services, accounting for 20% of all complaints (Basu et al. 2016). A study conducted in Morocco reported a prevalence of excessive fatigue symptoms among school-aged teenagers at 8.4%. Another study in the United States reported the lowest prevalence of chronic fatigue at 4.17%, while a study in the Netherlands reported the highest prevalence at 30.5% (Moustakbal & Maatoui, 2023).

Fatigue is the process of declining efficiency, work performance, and a decrease of physical strength or endurance to continue activities that must be

performed (Lady & Wiyanto, 2019). The primary factor causing fatigue is closely related to the level of physical activity an individual engages in. When physical activity is intense and prolonged, a person is likely to experience greater fatigue than someone who undertakes lower-level activities. This occurs because the energy required increases as the muscles contract against a load for an extended period (Naczenski et al. 2017).

Fatigue is one of the symptoms that occurs in women during the menstrual phase (Li, Lloyd, & Graham, 2020). Menstruation is a natural process in which the endometrial lining and unfertilized ovum are shed. Throughout each menstrual cycle, hormone levels fluctuate. Variations in sex hormone secretion during different menstrual cycles may affect both physical and psychological performance (Pallavi, Souza, & Shivaprakash, 2017). Additionally, during menstruation, women experience blood loss, which depletes iron reserves. Iron deficiency can lead to fatigue (Kemenkes RI, 2024).

Most people will use rest to address fatigue (Rahayu, 2017). However, there are cases in which fatigue persists even after rest (chronic fatigue) (Deumer et al. 2021). Therefore, it is essential to take measures to prevent fatigue by managing the risk factors that contribute to it, including during the menstrual phase and physical activity.

Research is needed to explore the relationship between physical activity and fatigue levels during the menstrual phase among female adolescents, to identify potential triggers or exacerbators of fatigue. This understanding can help in implementing prevention strategies for fatigue in female adolescents.

MATERIALS & METHODS

This research uses an analytical observational method with a cross-sectional approach. It was conducted among female adolescents at Yadika Bangil Pasuruan Vocational High School in Surabaya in June 2024. This study received ethical approval from the Universitas Airlangga Faculty of Dental Medicine Health Research Ethical Clearance Commission (Ref. No. 0534/HRECC.FODM/V/2024). The samples for this study consisted of 60 female subjects, with a total sampling technique used so that the entire population served as the sample.

The independent variable in this research is physical activity, and the dependent variable is fatigue level.

Inclusion and exclusion criteria:
The inclusion criteria of the sample consist of: 1) students of Yadika Bangil Pasuruan Vocational High School; 2) adolescents aged 15-19 years; 3) physically and mentally healthy; 4) had a regular menstrual cycle (21-35 days). Meanwhile, subjects with declined general health in the last month and subjects with a history of cardiovascular disease (i.e., coronary heart disorder, arrhythmia, deep vein thrombus, etc.) were excluded from this study.

The instruments used were the Baecke Questionnaire for physical activity and the Subjective Self Rating Test (SSRT) from the Industrial Fatigue Research Committee for fatigue levels.

Baecke Questionnaire: A validated instrument used to assess physical activity levels across three domains: occupational, leisure-time sport, and non-sport leisure activities. Each domain index is calculated by averaging its items to produce a score ranging from 1 to 5, with higher values indicating greater physical exertion. Specifically, the work domain score is derived by dividing the sum of its items by 8, while the sport and leisure domains are divided by 4. During calculation, items 2 and 13 are reverse-scored by subtracting the reported value from six.

The cumulative score from these three domains is used to categorize participants' physical activity status. A total score below 7.5 is classified as "light," reflecting a sedentary or inactive lifestyle. Conversely, a score exceeding 7.5 is categorized as "moderate," indicating a more active profile characterized by frequent occupational movement (such as standing or walking) and regular engagement in leisure-time sports.

SSRT: Subjective fatigue was assessed using the Subjective Self-Rating Test developed by the Industrial Fatigue Research Committee (IFRC). This 30-item instrument is organized into three subscales: weakened activity, loss of motivation, and physical fatigue symptoms, each with 10 items. Responses are evaluated on a 4-point Likert scale (0–3), with a cumulative score that classifies fatigue severity into four levels: low, moderate, high, and very high.

The clinical interpretation of these scores reflects the extent of functional impairment. Low scores indicate minimal fatigue resilient to stressors, whereas moderate scores suggest regular fatigue that remains manageable without significant performance deficits. Conversely, high scores are associated with diminished productivity, health complications, and emotional instability. The "very high" category signifies extreme exhaustion, encompassing severe physical, mental, and emotional fatigue that requires careful clinical consideration.

The statistical analysis was conducted using SPSS, with the Kolmogorov-Smirnov test to assess data distribution and the Spearman's Rho correlation test to examine correlations among variables, with a significance level of $p < 0.05$.

RESULTS

According to Table 1, the 60 subjects had an average weight of 50.05 kg, an average height of 156.05 cm (BMI of 20.54 kg/m²), and an average age of 17.17 years, with an age range of 16 to 19 years.

Table 1: Characteristics of the study participants (n=60)

	Min	Max	Average
Age (years)	16	19	17.17 ± 0.55
Weight (kg)	36	78	50.05 ± 8.59
Height (cm)	138	169	156.05 ± 4.68
BMI (kg/m²)	14.79	29.72	20.54 ± 3.24

Table 2: Physical activity level among the participants

Level	n	Percentage (%)
Low	7	11.7
Moderate	53	88.3
Total	**60**	**100**

Based on Table 2, the majority of participants engage in moderate physical activity, with 53 subjects (88.3%). Only 7 subjects (11.7%) had a low level of physical activity.

Table 3: Fatigue level results

Level	n	Percentage (%)
Low	22	36.7%
Moderate	31	51.7%
High	7	11.7%
Total	**60**	**100**

Table 4: Fatigue level by level of physical activity among the participants

		Fatigue Level								Total	
		Low		Moderate		High		Very High			
		N	%	*N*	%	*n*	%	*n*	%	*n*	%
Physical Activity	Low	4	6.7	3	5	0	0	0	0	7	11.7
	Moderate	18	30	28	46.6	7	11.7	0	0	53	93.3
Total		**22**	**36.7**	**31**	**51.6**	**7**	**11.7**	**0**	**0**	**60**	**100**

Based on Table 3, the majority of participants have a moderate level of fatigue, with 31 participants (51.7%). This is followed by low fatigue levels in 22 (36.7%) and high fatigue levels in 7 (11.7%).

Table 4 shows that the majority of participants have a moderate level of physical activity and fatigue, with 28 participants (46.6%). Participants with low physical activity reported lower fatigue, whereas those with high physical activity reported higher fatigue.

Table 5: Correlation between Physical activity and Fatigue Level

		Physical Activity	Fatigue Level
Physical Activity	*Correlation*	1000	0.178
	p-value	.	0.173
	N	60	60
Fatigue Level	*Correlation*	0.178	1000
	p-value	0.173	.
	N	60	60

The analysis, as shown in Table 5, found a correlation of 0.178 between physical activity and fatigue level during the menstrual phase, indicating a very weak relationship between the two variables. Additionally, the p-value with $\alpha = 0.05$ was obtained as 0.173. Since $p > \alpha$ (0.173 > 0.05), the research hypothesis is rejected, indicating that there is no relationship between physical activity and fatigue level during the menstrual phase among female adolescents at Yadika Bangil Pasuruan Vocational High School, Surabaya.

DISCUSSION

In this study, we found that female adolescents at Yadika Bangil Pasuruan Vocational High School had low to moderate levels of physical activity, as measured using the Baecke Questionnaire. This finding is not in line with the research conducted by Sari et al. (2018) on anemia and low physical activity affecting the incidence of dysmenorrhea in female adolescents at Kota Pekalongan, Indonesia, which found that the majority of the study participants had physical activity categorized as very low and low (Sari, Kartasurya, & Pangestuti, 2018).

These differences were likely due to the type of school the subjects attended. Vocational high schools focus on vocational education, emphasizing practical activities more than general senior high schools do. As a result, the physical activity of vocational high school students tends to be higher.

On the other hand, the majority of female adolescents at Yadika Bangil Pasuruan Vocational High School

show low to moderate fatigue during menstrual periods, with only 7 students reporting high fatigue. Yadika Bangil Pasuruan Vocational High School implements a full-day school system, which is one of the contributing factors to the general fatigue experienced by female adolescents there. Another factor is the internship activities outside of school that must be undertaken in the 11th grade. These activities also affect the students' fatigue.

Furthermore, based on the correlation analysis, there was no significant correlation between fatigue and students' physical activity levels during their menstrual period ($p = 0.173$). The absence of a relationship in this study can be attributed to several factors, including the phase of the menstrual cycle, which may feel more exhausting. Some research supports these findings, indicating that there is no relationship between physical activity and fatigue levels during menstruation. A study conducted by Ladan et al. (2024) found that hormonal phases of the menstrual cycle do not significantly affect recovery after high-intensity exercise. This study shows that women can train and recover from high-intensity workouts during any phase of their menstrual cycle. Similarly, regarding fatigue during exercise, no differences in fatigue levels were observed across the phases of the menstrual cycle.

The relationship between fatigue levels and phases of the menstrual cycle in literatures remains inconsistent. In a narrative review written by Carmichael et al. (2021), it was concluded that while many studies find that most female athletes report a perceived decline in performance during certain phases of the menstrual cycle, objective measurements do not show consistent and clear results regarding the impact of menstrual cycle phases on physical performance (Carmichael et al, 2021).

Furthermore, a literature review conducted by Pereira, Larson, and Bemben (2020) on 46 experimental studies examining motor output during the follicular and luteal phases of the menstrual cycle concluded that the effects of menstrual cycle phases on performance fatigue are varied (Pereira, Larson, & Bemben, 2020). While some studies do not show differences between the classical definitions of the luteal and follicular phases, others report greater fatigue during the luteal phase, and others during the follicular phase. The differences among studies may be attributed to variations in the body parts used (upper or lower) and in contraction type (dynamic or isometric), as well as inconsistencies in the definitions of menstrual cycle phases and in the relative concentrations of progesterone to estrogen.

The differences in the results between this research and previous research may be attributed to other factors influencing fatigue levels that were not accounted for in this research. Individual variability and differences in measurement and methodology could be reasons for these discrepancies.

In this study, subjects with a low body mass index tended to have higher fatigue levels than those with a high body mass index. A low body mass index is commonly associated with deficiencies in essential nutrients such as iron, vitamin B12, and protein (Hinga, 2019). Nutritional deficiencies, particularly iron deficiency, pose a risk factor for fatigue during menstruation.
A systematic review shows that iron deficiency and anemia are associated with adverse effects on physical, psychological, and cognitive health. Some studies have shown that iron deficiency without anemia disrupts athletic performance in women (Scholz, 1997). Meanwhile, other research indicates that iron deficiency can increase muscle fatigue (Brownlie, 2002; LaMan, 1993; Brutsaert, 2003). According to this systematic review, iron supplementation is proposed as a solution to address iron deficiency in women (Yow et al. 2016).

Differences in measurement and methodology also contribute to the differing results between this research and previous research. In this case, the research instrument was subjective, relying on subjects' honesty about their experiences. Moreover, fatigue during menstruation was measured at a single point in time across all subjects, meaning some subjects may not have been in the menstrual phase and may simply have been recalling what they typically experience during menstruation.

The limitation of this study is that the author did not include possible confounding factors in the inclusion criteria, thereby leaving the samples less homogeneous. This is because the population were limited to students at Yadika Bangil Pasuruan Vocational High School, Surabaya only. Future research is encouraged to include larger area in East Java by involving more Vocational High Schools.

CONCLUSION

In conclusion, there is no significant relationship between physical activity and fatigue level during the menstrual phase among female adolescents at Yadika Bangil Pasuruan Vocational High School, Surabaya. Fatigue is one of the syndromes that can occur during menstruation, suggesting that physical activity does not significantly affect fatigue. Further research that examines confounding factors and uses more objective measurement tools is warranted to better understand this topic.

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REFERENCES

Basu, N., Natarajan, A., van der Schouw, Y. T., Sharp, S. J., Luben, R., Khaw, K. T., Wareham, N. J., & Forouhi, N. G. (2016). Fatigue is associated with excess mortality in the general population: Results from the EPIC-Norfolk study. BMC Medicine, 14(1), 1–8.

Carmichael, M. A., Thomson, R. L., Moran, L. J., & Wycherley, T. P. (2021). The impact of menstrual cycle phase on athletes' performance: A narrative review. International Journal of Environmental Research and Public Health, 18(4), 1667.

Dayati. (2023). Yuk simak langkah-langkah untuk mencegah fenomena remaja jompo. RRI. https://www.rri.co.id/

Deumer, U. S., Varesi, A., Floris, V., Savioli, G., Mantovani, E., López-Carrasco, P., Rosati, G. M., Ricevuti, G., & Chirumbolo, S. (2021). Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS): An overview. Journal of Clinical Medicine, 10(20), 4786.

Hinga, E. K. (2019). Gambaran asupan energi dengan status gizi pada remaja putri underweight di Kota Kupang [Diploma thesis, Politeknik Kesehatan Kemenkes Kupang].

Kementerian Kesehatan Republik Indonesia. (2024, March 28). Lengkapi gizi dengan zat besi. Sehat Negeriku. https://sehatnegeriku.kemkes.go.id/baca/blog/20240328/5345190/lengkapi-gizi-with-zat-besi/

Ladan, A. N., Smith-Ryan, A., Blue, M., & Ryan, E.
(2024). The impact of the menstrual cycle on fatigue and recovery from acute high-intensity interval training. University of North Carolina at Chapel Hill. https://doi.org/10.17615/fdhn-ec67

Lady, L., & Wiyanto, A. S. (2019). Tingkat kelelahan kerja pada pekerja luar ruangan dan pengaruh lingkungan fisik terhadap peningkatan kelelahan. Journal Industrial Servicess, 5(1), 58–64.

Li, S. H., Lloyd, A. R., & Graham, B. M. (2020). Physical and mental fatigue across the menstrual cycle in women with and without generalised anxiety disorder. Hormones and Behavior, 118, 104667.

Low, M. S. Y., Speedy, J., Styles, C. E., De-Regil, L. M., & Pasricha, S. R. (2016). Daily iron supplementation for improving anaemia, iron status and health in menstruating women. Cochrane Database of Systematic Reviews, (4).

Moustakbal, M., & Maataoui, S. B. (2023). Prevalence and correlates of excessive fatigue among Moroccan school adolescents: A cross-sectional study. Journal of Public Health in Africa, 14(9).

Naczenski, L. M., de Vries, J. D., van Hooff, M. L. M., & Kompier, M. A. J. (2017). Systematic review of the association between physical activity and burnout. Journal of Occupational Health, 59(6), 477–494.

Pallavi, L. C., Souza, U. J. D., & Shivaprakash, G. (2017). Assessment of musculoskeletal strength and levels of fatigue during different phases of the menstrual cycle in young adults. Journal of Clinical and Diagnostic Research, 11(2), 11–13.

Pereira, H. M., Larson, R. D., & Bemben, D. A. (2020). Menstrual cycle effects on exercise-induced fatigability. Frontiers in Physiology, 11, 1–12.

Rahayu, T. (2017). Burnout dan koping stres pada guru pendamping (shadow teacher) anak berkebutuhan khusus yang sedang mengerjakan skripsi. Psikoborneo: Jurnal Ilmiah Psikologi, 5(2), 192–198.

Sari, S. E., Kartasurya, M. I., & Pangestuti, D. R. (2018). Anemia dan aktivitas fisik yang ringan mempengaruhi faktor risiko dismenore pada remaja putri. Jurnal Kesehatan Masyarakat, 6(5), 437–444. http://ejournal3.undip.ac.id/index.php/jkm

Sujibto, B. J. (2022). Remaja jompo: Diskursus dan praktik gaya hidup pandemi. Jurnal Studi Pemuda, 11(1), 67–82.