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MENSTRUAL DURATION AND ITS ASSOCIATION WITH PREMENSTRUAL SYNDROME (PMS): REPRODUCTIVE AND NUTRITIONAL FACTORS

Lama menstruasi sebagai faktor yang berhubungan dengan sindrom pramenstruasi (PMS): Analisis faktor reproduksi dan status gizi

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ABSTRACT

Premenstrual syndrome (PMS) is a common menstrual disorder among women of reproductive age and may adversely affect quality of life. PMS is multifactorial and is thought to be associated with reproductive characteristics and nutritional status. This study aimed to analyze the association between menstrual duration, age at menarche, and nutritional status with PMS. A cross-sectional study was conducted among 69 female subjects aged 18–20 years. Data were collected using a structured questionnaire administered via Google Forms with the assistance of enumerators. Data were analyzed using the chi-square test at a 95% confidence level. The results showed a statistically significant association between menstrual duration and PMS (p=0.032), with a higher proportion of PMS observed among subjects with menstrual duration longer than seven days. In contrast, age at menarche (p=0.495) and nutritional status (p=0.937) were not significantly associated with PMS. In conclusion, menstrual duration is a factor associated with PMS among women of reproductive age.

Keywords: Menstrual Duration, Menarche, Nutritional Status, Premenstrual Syndrome

ABSTRAK

Sindrom pra-menstruasi (PMS) merupakan gangguan menstruasi yang umum dialami oleh wanita usia reproduktif dan dapat berdampak pada kualitas hidup. PMS bersifat multifaktorial dan diduga berkaitan dengan karakteristik reproduksi serta status gizi. Penelitian ini bertujuan untuk menganalisis hubungan lama menstruasi, usia menarche, dan status gizi dengan kejadian PMS. Penelitian ini menggunakan desain cross-sectional dengan melibatkan 69 subjek perempuan berusia 18–20 tahun. Data dikumpulkan menggunakan kuesioner terstruktur melalui Google Form dengan pendampingan enumerator. Analisis data dilakukan menggunakan uji chi-square dengan tingkat kepercayaan 95%. Hasil penelitian menunjukkan bahwa lama menstruasi berhubungan signifikan dengan kejadian PMS (p=0,032), dengan proporsi PMS yang lebih tinggi pada subjek dengan lama menstruasi lebih dari tujuh hari. Sebaliknya, usia menarche (p=0,495) dan status gizi (p=0,937) tidak menunjukkan hubungan yang signifikan dengan kejadian PMS. Dapat disimpulkan bahwa lama menstruasi merupakan faktor yang berhubungan dengan kejadian PMS pada wanita usia reproduktif.

Kata Kunci: Lama Menstruasi, Menarche, Sindrom Pramenstruasi, Status Gizi

INTRODUCTION

Menstruation is a normal biological process experienced by women of reproductive age. However, a considerable proportion of women, including adolescents, experience menstrual disorders that may adversely affect their quality of life. One of the most common menstrual-related disorders is premenstrual syndrome (PMS), which encompasses a variety of physical, emotional, and behavioral symptoms occurring prior to menstruation. The prevalence of PMS remains high in many populations. In India, for example, the prevalence of PMS has been reported to reach 43% (Dutta & Sharma, 2021). Similarly, a study conducted by Mahardika (2020) found that approximately 70% of adolescent girls experienced symptoms of premenstrual syndrome.

PMS is a common condition experienced by women of reproductive age and is characterized by a range of physical, emotional, and behavioral symptoms that occur during the luteal phase of the menstrual cycle and resolve shortly after the onset of menstruation. Symptoms such as abdominal pain, breast tenderness, fatigue, mood disturbances, and changes in appetite may negatively affect daily activities, work productivity, and overall quality of life (Yoshimi et al., 2021). The prevalence of PMS varies widely across populations, reflecting differences in diagnostic criteria, lifestyle factors, and reproductive characteristics.

Premenstrual syndrome may occur with varying degrees of severity, ranging from mild to severe. Severe premenstrual syndrome is experienced by approximately 5–8% of women (Yonkers et al., 2008). Higher prevalence has been reported among adolescent populations in Egypt, where 20.8% experienced severe premenstrual syndrome and 27.9% experienced very severe symptoms (El-Banna et al., 2019). Among adolescents in the Jakarta region, the prevalence of severe premenstrual syndrome was reported to be 17.6% (Rahayu & Safitri, 2016).

The etiology of PMS is multifactorial and has not yet been fully elucidated. Hormonal fluctuations, particularly changes in estrogen and progesterone levels across the menstrual cycle, are considered central to the development of PMS symptoms. These hormonal changes may influence neurotransmitter activity, inflammatory responses, and metabolic regulation, thereby contributing to both psychological and somatic symptoms (Granda et al., 2021). In addition to hormonal mechanisms, reproductive factors such as menstrual characteristics and age at menarche have been suggested to play an important role in PMS occurrence.

Menstrual duration is one reproductive characteristic that may be associated with PMS (Eshetu et al., 2022). Variations in the length of menstruation may reflect underlying hormonal imbalance or altered endometrial function, which could influence the severity or presence of premenstrual symptoms. Women with longer menstrual duration may experience prolonged hormonal exposure or greater physiological stress, potentially increasing susceptibility to PMS (Jain et al., 2022). However, evidence regarding the association

between menstrual duration and PMS remains limited and inconsistent, particularly in comparison with more frequently studied factors such as menstrual cycle length.

Nutritional status is another factor that may be related to PMS. Both undernutrition and excess adiposity can affect endocrine function, including estrogen metabolism and insulin sensitivity, which are relevant to PMS pathophysiology. Body fat distribution and overall nutritional status have been linked to alterations in inflammatory markers and neurotransmitter pathways, which may exacerbate premenstrual symptoms (Yeung et al., 2013). Nevertheless, findings on the relationship between nutritional status and PMS are not uniform across studies.

Age at menarche has also been proposed as a reproductive factor associated with PMS. Early menarche is often associated with longer lifetime exposure to endogenous hormones and may influence reproductive health outcomes later in life (Lu et al., 2021; Yoshimi et al., 2021). However, the association between age at menarche and PMS has not been clearly established, with previous studies reporting mixed results.

Given the multifactorial nature of PMS and the limited evidence focusing on menstrual duration, further investigation is needed to clarify the role of reproductive factors and nutritional status in PMS occurrence. Therefore, this study aimed to analyze the association between menstrual duration and PMS, while also examining the roles of nutritional status and age at menarche among women of reproductive age.

METHODS

This study employed a cross-sectional design involving 69 female subjects who were active undergraduate students in the Nutrition Study Program at Universitas Muhammadiyah Prof. Dr. Hamka. Subjects were selected using purposive sampling based on the following inclusion criteria: 1) willingness to participate in the study; and 2) having experienced menstruation for at least two years.

Data were collected using a structured questionnaire administered via Google Forms. Subjects completed the questionnaire independently, with assistance from trained enumerators to ensure clarity and completeness of responses. Anthropometric measurements were conducted by enumerators following standardized measurement procedures.

The variables assessed in this study included premenstrual syndrome (PMS), menstrual duration, age at menarche, and nutritional status. Premenstrual syndrome was assessed using a self-reported question: “During the last three menstrual cycles, did you experience premenstrual syndrome within seven days prior to menstruation?” Subjects who answered “yes” were asked to describe the symptoms experienced. PMS status was categorized dichotomously as “yes” or “no.”

Menstrual duration was assessed by asking subjects: “During the last three menstrual cycles, how many days did your menstruation usually last?” Responses were categorized into <5 days, 5–7 days, and >7 days. Age at menarche was obtained by asking: “At what age did you experience your first

menstruation?" and was categorized into early (< 13 years) and normal (≥13 years) menarche.

Nutritional status was determined based on body mass index (BMI), calculated as weight in kilograms divided by height in meters squared (kg/m^2). Body weight and height were measured by trained enumerators using a digital scale and a microtoise. BMI values were classified into underweight, normal weight, and overweight.

Data analysis was performed using the chi-square test to examine the association between PMS and menstrual duration, nutritional status, and age at menarche. Statistical significance was set at a 95% confidence level, with a p-value <0.05 considered statistically significant.

This study had a limitation concerning the ethical clearance process, as an ethical clearance certificate was not obtained prior to data collection due to the limited data collection period and the technical constraints associated with the administrative review process. Nevertheless, the study was conducted in accordance with ethical research principles, including obtaining informed consent, maintaining participant confidentiality and anonymity, and ensuring the safety and rights of all subjects.

RESULTS

The subjects included in this study were aged 18–20 years, with 40.6% experiencing premenstrual syndrome (PMS). Table 1 presents the distribution of subjects according to menstrual duration, age at menarche, and nutritional status. Most subjects reported a menstrual duration of 5–7 days (68.1%), followed by those with menstrual duration longer than 7 days (27.5%). Only a small proportion of subjects experienced menstruation lasting less than 5 days (4.3%). Regarding age at menarche, slightly more than half of the subjects experienced menarche at the age of 13 years or older (52.2%), while 47.8% reported early menarche before the age of 13 years. Based on nutritional status assessed using body mass index (BMI), most subjects were classified as having normal nutritional status (51.1%). Underweight subjects accounted for 33.3% of the sample, whereas 11.6% were classified as overweight.

Table 1.
Distribution of subjects by menstrual duration, age at menarche, and nutritional status

Characteristics	n (%)
Menstrual duration (days)	
<5	3 (4,3)
5-7	47 (68,1)
>7	19 (27,5)
Age of menarche (years)	
<13	33 (47,8)
≥13	36 (52,2)
Nutritional status (BMI)	
<18,5 kg/m^2	23 (33,3)
≥18,5-<25 kg/m^2	38 (51,1)
≥25 kg/m^2	8 (11,6)

Table 2 shows the association between menstrual duration, age at menarche, nutritional status, and premenstrual syndrome (PMS). A statistically significant association was observed between menstrual duration and PMS (p = 0.032). The prevalence of PMS increased with longer menstrual duration. None of the subjects with menstrual duration of less than 5 days reported PMS, whereas 34.0% of subjects with a menstrual duration of 5–7 days experienced PMS. The highest proportion of PMS was observed among subjects with menstrual duration longer than 7 days (63.2%). No significant association was found between age at menarche and PMS (p = 0.495). PMS was reported by 36.4% of subjects who experienced menarche before the age of 13 years and by 44.4% of those who experienced menarche at the age of 13 years or older. Similarly, nutritional status was not significantly associated with PMS (p = 0.937). The proportion of PMS was comparable across BMI categories, with PMS reported by 43.5% of underweight subjects, 39.5% of subjects with normal nutritional status, and 37.5% of overweight subjects.

Table 2.
Association between menstrual duration, age at menarche, and nutritional status with premenstrual syndrome (PMS)

Risk Factors	PMS				Total		*p*
	Yes	%	No	%	n	%	
Menstrual duration (days)							
<5	0	0,0	3	100,0	3	100	
5-7	16	34,0	31	66,0	47	100	0,032*
>7	12	63,2	7	36,8	19	100	
Age of menarche (years)							
<13	12	36,4	21	63,6	33	100	0,495
≥13	16	44,4	20	55,6	36	100	
Nutritional status (BMI)							
<18,5 kg/m^2	10	43,5	13	56,5	23	100	
≥18,5-<25 kg/m^2	15	39,5	23	60,5	38	100	0,937
≥25 kg/m^2	3	37,5	5	62,5	8	100	

*Significant based on Chi-Square test

DISCUSSION

This study demonstrated a significant association between menstrual duration and premenstrual syndrome (PMS), with a higher proportion of PMS observed among subjects who experienced longer menstrual duration. Subjects with menstrual duration longer than seven days showed the highest prevalence of PMS compared to those with shorter durations. These findings indicate that menstrual duration may serve as an important reproductive characteristic associated with PMS among women of reproductive age.

The association between prolonged menstrual duration and PMS is biologically plausible and consistent with previous studies suggesting that longer bleeding duration may reflect hormonal dysregulation or altered endometrial responsiveness (Jain et al., 2022). Fluctuations in estrogen and

progesterone across the menstrual cycle play a central role in PMS pathophysiology, particularly through their interactions with neurotransmitter systems such as serotonin and gamma-aminobutyric acid (GABA) (Rapkin & Akopians, 2012). Prolonged menstrual duration may indicate extended exposure to fluctuating hormone levels or impaired hormonal withdrawal, potentially increasing vulnerability to premenstrual symptoms.

From a metabolic perspective, hormonal fluctuations across the menstrual cycle are closely linked to changes in glucose metabolism, insulin sensitivity, and inflammatory responses. Estrogen and progesterone have been shown to modulate insulin action and energy utilization, particularly during the luteal phase (De Paoli et al., 2021). Women with longer menstrual duration may experience more pronounced or prolonged metabolic and inflammatory stress during the menstrual cycle, which could contribute not only to PMS symptoms but also to broader metabolic dysregulation over time (Safitri et al., 2024). Although metabolic parameters were not assessed in this study, this linkage suggests a potential pathway connecting menstrual characteristics, PMS, and metabolic health.

In addition, menstruation is an inflammatory process involving endometrial shedding and local immune activation (Liu et al., 2018). Prolonged menstrual bleeding may amplify inflammatory signaling, which has been implicated in the development of somatic PMS symptoms such as pain, fatigue, and reduced physical functioning. Chronic low-grade inflammation is also a recognized contributor to insulin resistance and metabolic disorders (Albajy & Mihailescu, 2023), suggesting that menstrual characteristics associated with increased inflammatory burden may have implications beyond reproductive health.

In contrast, this study did not find a significant association between age at menarche and PMS. Although early menarche has been associated with increased lifetime exposure to endogenous hormones and has been linked to higher risk of metabolic disorders, including type 2 diabetes, the absence of an association with PMS in this study may be explained by the relatively homogeneous age range of subjects and limited variability in reproductive maturation.

Similarly, no significant association was observed between nutritional status as assessed by body mass index (BMI) and PMS. While BMI is commonly used as an indicator of nutritional status, it may not adequately capture metabolic health or body fat distribution, which are more directly related to hormonal regulation, insulin sensitivity, and inflammatory processes. Previous evidence suggests that metabolic factors such as central adiposity, dietary quality, and micronutrient intake may play a more critical role in PMS development than BMI alone (Thakur et al., 2022).

Several limitations should be considered when interpreting these findings. The cross-sectional design limits causal inference, and PMS assessment relied on self-reported symptoms rather than standardized diagnostic tools. In addition, metabolic

indicators such as glucose levels, insulin resistance, or inflammatory markers were not measured, which restricts the ability to directly examine metabolic pathways. Despite these limitations, this study contributes to the growing evidence that menstrual characteristics, particularly menstrual duration, may be linked to both reproductive and metabolic processes.

One limitation of this study is the relatively homogeneous characteristics and recruitment setting of the subjects. The study involved subjects from a specific university population, which may limit the representativeness and generalizability of the findings to the broader population of women of reproductive age with diverse ages, educational backgrounds, socioeconomic characteristics, and lifestyle patterns. Therefore, the observed association between menstrual duration and PMS should be interpreted primarily within the context of young adult female university students. Future studies should include women from more diverse age groups, educational and socioeconomic backgrounds, and geographic settings to improve the external validity and generalizability of the findings.

Another limitation concerns the assessment of PMS using a simple self-reported question regarding symptoms experienced during the previous three menstrual cycles, followed by a description of the symptoms. Although this approach was practical for data collection, it may not adequately establish PMS according to standardized diagnostic criteria and may result in misclassification of PMS status. Validated instruments, such as the Premenstrual Symptoms Screening Tool (PSST), Daily Record of Severity of Problems (DRSP), or American College of Obstetricians and Gynaecologists (ACOG) criteria, provide more comprehensive assessments of symptom characteristics, severity, timing, and functional impairment. Therefore, future studies should employ validated PMS assessment instruments or prospective daily symptom records to improve the accuracy and reliability of PMS classification.

CONCLUSSION

Menstrual duration was found to be significantly associated with PMS, whereas age at menarche and nutritional status based on BMI were not. These findings support the notion that menstrual characteristics may reflect underlying hormonal and metabolic dynamics. Future longitudinal studies incorporating metabolic biomarkers and dietary assessments are warranted to further elucidate the interplay between menstrual health, PMS, and metabolic risk among women of reproductive age.

CONFLICT OF INTEREST

Authors declare no conflict of interest to disclose.

DECLARATION USE AI

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to assist with language refinement, improving clarity and readability, restructuring selected paragraphs, and enhancing the overall flow of the manuscript. All scientific interpretations, data analyses,

conclusions, and final editorial decisions were made by the authors. The authors reviewed and edited all AI-assisted content and take full responsibility for the content of the published article.

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