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Premenstrual Syndrome (PMS) and The Role Of Physical Activity Among Adolescents

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ABSTRACT

Background: Premenstrual Syndrome (PMS) is a heterogeneous symptom that occurs in the luteal phase of the menstrual cycle. PMS affects women's quality of life various factors related to menstrual biology, hormones, and lifestyle are associated with PMS.

Objective: To explore the incidence and severity of PMS in high school students and its relationship with physical activity, Body Mass Index, menstrual cycle, age at menarche.

Method: Cross sectional study was conducted in July-August 2024 on 68 high school students selected by purposive sampling technique in the age group of 16-18 years in Palangka Raya City. Bivariate analysis with chi square. Data collection uses Questionnaire The Premenstrual Symptoms Screening Tool for Adolescents (PSST-A) used for identification and classification of PMS. The International Physical Activity Questionnaires 1 for measures to estimate habitual practice of physical activities. Anthropometric indices measured include height, weight, body mass index.

Results: Of the 68 participants, 64.7% were reported to have experienced PMS. Mild PMS 43.2%, Moderate 34.1%, Severe PMS 18.2%. Normal body mass index experiencing PMS 45.5%.

Conclusion: PMS is not significantly correlated with physical activity, age of menarche, menstrual cycle, duration of menstruation, BMI

1. Introduction

Premenstrual Syndrome (PMS) is one of the problems that arise during the menstrual period, namely a collection of somatic, emotional and behavioral symptoms that occur in the luteal phase of the menstrual cycle. The etiology of PMS is still unknown but related to various psychological conditions, socio-demographic factors (age, region of residence, marital status) and lifestyle factors. Lifestyle factors may contribute to this syndrome, including smoking, alcohol consumption, caffeinated beverages, physical activity such as exercise and diet. Other factors include a long menstrual cycle, and age at menarche (1), (2). The prevalence of PMS is found to differ in various countries, in China it is found to be 34%, 71% in Turkey, 80% in Pakistan and 92% in Jordan (3). In India, the range is 14.3%-74.4% (4). According to strict diagnostic criteria, an estimated 2.5-5% of adolescent girls and adult women experience PMS. However, some researchers argue that PMS symptoms occur in 40-80% of adolescent and adult women (5).

PMS symptoms occur in the luteal phase of the menstrual cycle and include physical and emotional symptoms (6). All these symptoms will disappear after menstruation and these symptoms are common in young urban women where 97.2% of students have at least one PMS symptom (86.3% mild PMS; 9.6% moderate-severe PMS) (7). Another study found that 71.3% of women reported having experienced at least one symptom of PMS. Mild PMS 46.9, Moderate PMS 31.5% Severe PMS 8.3% and no symptoms 13.3% (8). Another study found the prevalence of PMS was 23.3%. Of these, 11.2% experienced moderate PMS and 12.5% were classified as severe to very severe, defined as having Premenstrual Dysphoric Disorder (PMDD) (9).

Around 70-80% of women do not experience any disturbance in carrying out normal daily activities during or a few days before menstruation, while 20-30% experience PMS (10),(11). Research in India showed that the most common symptoms were anger/irritability (mild 46.3%, moderate to severe 41.4%). Physical symptoms, including headaches, joint/muscle pain, breast tenderness, weight gain and bloating (mild 42.1%, moderate 25.6%). Other symptoms included fatigue/lack of energy (mild 42.1%, no symptoms 22.6%), insomnia symptoms (mild 18.9%), A total of 41.5% had mild symptoms of low mood/hopelessness (mild 41.5%, moderate 25.6%). Respondents also experienced symptoms of decreased interest in activities at home, work, and society. Of all these symptoms, decreased interest in activities at home was the most common symptom found at 70.2% (12). Other symptoms such as mood swings (84.62%), appetite (73.72%), breast pain (39.74%) (13).

Premenstrual Syndrome(PMS) is also associated with a variety of problems such as educational activities, including lack of concentration and motivation, decreased individual work performance, collaborative work performance and low grades. Despite the prevalence and significant impact of PMS, many professionals are still unaware of it (14),(15). Previous studies have shown that premenstrual syndrome symptoms are associated with poor academic performance, work efficiency, and quality of life (16,17,18). There are 1 in 7 girls during their last menstruation absent from their school because of pain and malaise. As many as 25% stated that the pain felt was very disturbing or severe. Pain is a common reason for not participating in class and also contributes to reduced concentration. Dizziness, fatigue, and lethargy are also common complaints during menstruation (19). There are various treatment options such as antidepressants and serotonin reuptake inhibitors for premenstrual syndrome, but the use of drugs and chemicals has its own side effects. A study conducted at Qazvin University of Medical Sciences, Iran has documented that lifestyle changes can help reduce the severity and occurrence of PMS (20).

The National Institute for Health and Care Excellence and the Royal College of Obstetricians and Gynaecologists (RCOG) recommend physical exercise as an intervention for PMS (21). Exercise is recognized for its ability to increase endorphin levels, regulate progesterone and estrogen synthesis, and stimulate the natural production of anti-inflammatory substances. In addition, exercise offers a variety of other benefits, including increased overall fitness, opportunities for social interaction, and the potential to reduce feelings of depression. These combined benefits may contribute to moderating the many symptoms experienced in PMS.

Health efforts that have been made by the government related to menstrual health include facilitating Clean and Healthy Living Behavior (PHBS) related to menstruation in schools through the School Health Effort program which focuses on efforts to facilitate students so that they can experience their menstrual period comfortably at school, including by providing accurate and correct information related to the implementation or Management of Menstrual Hygiene (MHM) (22). There has been no specific intervention related to the handling/management of symptoms felt by adolescents before premenstrual syndrome. The results of this study are expected to contribute in providing information to help women make evidence-based decisions regarding premenstrual health. The information collected from this study can be used to develop effective intervention strategies to improve the reproductive health status of adolescents related to menstrual problems.

2. Method

This cross sectional study was conducted on adolescents aged 16-18 years. Adolescents with regular menstrual cycles in the last 3 months, not undergoing treatment, not smoking and drinking alcohol were set as inclusion criteria in this study. The study was conducted in June-August 2024 on 68 high school students selected by purposive sampling technique in the age group of 16-18 years in Palangka Raya City. Interview using The Premenstrual Symptoms Screening Tool for Adolescents (PSST-A) (23). The collection of symptoms measured are periodic changes in behavior, emotions and physical conditions that occur several days before menstruation (luteal phase). Physical activity was measured using the International Physical Activity Questionnaire (1). Energy expended during physical activity is calculated quantitatively with Metabolic Equivalent Task (MET) which is a unit

that estimates the amount of energy used by the body during physical activity based on the intensity of the physical activity performed, namely low, moderate and heavy intensity. The accumulated MET results (shown in MET-hours or MET-minutes) performed each day are the most frequently used quantitative calculations. This unit has been standardized so that it can be used on people with varying body weights (24). Anthropometric indices measured include height, weight, body mass index. Interview conducted for menstrual cycle and duration data on the first day and last day of menstruation in the last 3 months. Statistical Analysis Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) v. 29.0 software for MS Windows. STROBE guidelines were followed to report the analysis. Descriptive statistics were applied to present the data in the form of mean, standard deviation, number of counts, and percentage, as required. Chi Square is used to assess the linear relationship between variables.

3. Result

The average age of respondents in this study was 17 years old, who were students in high schools and vocational schools in Palangka Raya City. From the total respondents of the study (n=68), the average PMS score 84 ± 25.85 (46-176) and the average physical activity score was 2414 ± 4123.76 (52-24056). For details of the characteristics of the research subjects are presented in Table 1.

Table 1. Characteristics of Research Subjects

Variables	X ± SD (min - max)
Respondent Age (years)	17 ± 1.14 (16-18)
Height (cm)	154 ± 5.18 (140-167)
Body Weight (kg)	48 ± 11.04 (32-95)
Premenstrual Syndrome (score)	84 ± 25.85 (46-176)
Age of Menarche (years)	12 ± 0.96 (10-14)
Menstrual Cycle (days)	30 ± 5.07 (18-44)
Menstrual Period (days)	6 ± 1.45 (2-9)
Body Mass Index25(kg/m2)	20.14 ± 4.13 (15.0-37.1)
Physical Activity (score)	2414 ± 4123.76 (52-24056)

Table 2. Analysis of the relationship between age of menarche, menstrual cycle, duration of menstruation, BMI, physical activity with Premenstrual Syndrome (PMS)

Variables	PMS		$\chi 2$	p-value
	Yes	*No*		
	n (%)	*n (%)*		
Age of Menarche	29 (65.9)	13 (54.2)		
≤ 13 years	15 (34.1)	11 (45.8)	0.907	0.489
> 13 years				
Menstrual Cycle	3 (6.8)	3 (12.5)		
< 21 days	37 (84.1)	18 (75)	0.902	0.637
21-35 days	4 (9.1)	3 (12.5)		
> 35 Days				
Menstrual Period	31 (70.5)	16 (66.7)		
> 5 days	13 (29.5)	8 (33.3)	0.104	0.961
≤ 5 days				
Body Mass Index	4 (9.1)	2 (8.3)		
Obesity	20 (45.4)	15 (62.5)	1,924	0.382
Normal	20 (45.5)	7 (29.2)		
Underweight				
Physical Activity				
High	15 (34.1)	9 (37.5)	0.494	0.781
Moderete	7 (15.9)	5 (20.8)		
Low	22 (50)	10 (41.7)		

Premenstrual Syndrome (PMS) is also experienced by adolescents with menarche age ≤ 12 years (65.9%), menstrual cycle < 21 days (6.8%), > 35 days (9.1), menstrual duration < 5 days (29.5%), Body Mass Index classified as Underweight (45.5%), Overweight/Obesity (9.1%), light activity

(50%), heavy activity (34.1%). The results of the analysis found that there was no statistically significant relationship between the variables of menarche age, menstrual cycle, menstrual duration, BMI and physical activity with PMS.

Table 3. Frequency of PMS Symptoms and Severity (n=68)

Symptom	PMS	
	Yes	No
	n (%)	n (%)
Anger/irritability		
Mild	19 (57.6)	14 (42.4)
Moderete	15 (75)	5 (25)
Severe	8 (100)	0 (0)
Crying/increased sensitivity to rejection		
Mild	15 (65.2)	8 (34.8)
Moderete	12 (85.7)	2 (14.3)
Severe	6 (75)	2 (25)
Depressed/desperate mood		
Mild		
Moderete	20 (76.9)	6 (23.1)
Severe	1(100)	0 (0)
Decreased interest in work activities		
Mild	17 (63)	10 (37)
Moderete	15 (88.2)	2 (11.8)
Severe	5 (83.3)	1 (16.7)
Decreased interest in activities/in activities at home		
Mild	15 (53.6)	13 (46.4)
Moderete	13 (81.3)	3 (18.8)
Severe	6 (100)	0 (0)
Difficulty concentrating		
Mild	16 (69.6)	7 (30.4)
Moderete	15 (83.3)	3 (16.7)
Severe	4 (80)	1 (20)
Fatigue/lack of energy		
Mild	13 (59.1)	9 (40.9)
Moderete	22 (71)	9 (29)
Severe	7 (77.8)	2 (22.2)
Hypersomnia (needing more time to sleep)		
Mild	12 (57.1)	9 (42.9)
Moderete	13 (76.5)	4 (23.5)
Severe	5 (71.4)	2 (28.6)
Feeling overwhelmed/out of control		
Mild	15 (60)	10 (40)
Moderete	12 (80)	3 (20)
Severe	4 (100)	0 (0)
Physical symptoms (including breast tenderness, headaches, joint/muscle pain, bloating and weight gain)		
Mild	22 (73.3)	8 (26.7)
Moderete	11 (64.7)	6 (35.3)
Severe	4 (100)	0 (0)

Table 3 shows the distribution of the frequency of symptoms and severity of PMS felt by the research respondents ranging from mild to severe. These symptoms were not only felt by subjects who experienced PMS but also by subjects who did not experience PMS.

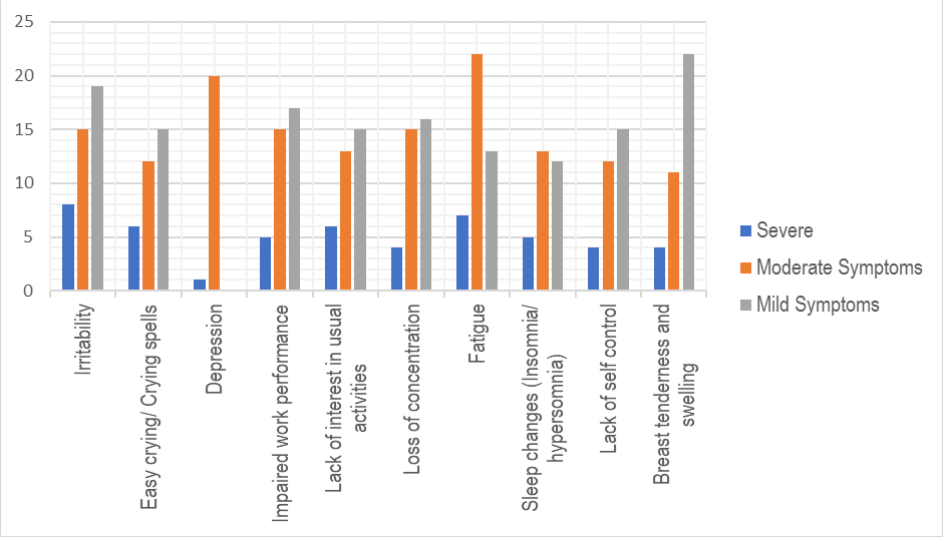

Figure 1. PMS Symptoms and Severity (n=44)

Figure 1 shows the percentage of Symptoms of PMS experienced by respondents were based on mild, moderate and severe symptom categories

4. Discussion

Irritability, mood swings, decreased interest, difficulty concentrating, fatigue, headaches, breast/joint/muscle pain were the symptoms reported by respondents in this study. These findings are consistent with a study conducted on 330 Indian women aged 18-23 years. In this case, PMS is not only experienced by adolescents aged 16-18 but also in the higher age group (26). Another study found that the most common symptoms were anger/irritability (mild 46.3%, moderate to severe 41.4%). Physical symptoms, including headaches, joint/muscle pain, breast tenderness, weight gain and bloating (mild 42.1%, moderate 25.6%). Other symptoms included fatigue/lack of energy (mild 42.1%, no symptoms 22.6%), insomnia symptoms (mild 18.9%), A total of 41.5% had mild symptoms of low mood/hopelessness (mild 41.5%, moderate 25.6%). Respondents also experienced symptoms of decreased interest in activities at home, work, and in society. Of all these symptoms, decreased interest in activities at home was the most common symptom found at 70.2% (12). Other symptoms frequently experienced are mood swings (84.62%), appetite (73.72%), breast pain (39.74%) (13).

In this study, PMS symptoms were more prevalent among adolescents with low activity levels. Those with ≥ 3000 MET-minutes/week of physical activity had lower PMS total symptom scores (p< 0.01), scores physical symptom (p= 0.01), and scores psychological symptom (p= 0.01) compared to those with < 3000 MET-minutes/week of total physical activity. These results suggest that young women with high physical activity (≥ 3000 MET-minutes/week) have milder PMS symptoms (27). National Institute for Health and Care Excellence dan Royal College of Obstetricians and Gynecologists (RCOG) menganjurkan latihan fisik seperti olahraga sebagai intervensi utama untuk PMS· (29). Latihan fisik dapat menjadi salah satu terapi non-farmakologi untuk membantu mengatasi gejala PMS (30).

Age of menarche is inversely related to premenstrual complaints. Late menarche (> 13 years) is significantly associated with PMS complaints and increased risk of Premenstrual Disorder (PMD) later in life (10). Meanwhile, in this study, 65.9% of PMS were experienced by the menarche age group ≤ 12 years. Early age of menarche was not statistically significantly associated with premenstrual complaints. This may be associated with lifestyle during childhood, such as sports/physical activity, which can affect puberty and hormonal function that affects the risk of PMS (31). PMS is experienced by 70.5% of adolescents with menstrual duration > 5 days (70.5%). Other studies also found the same thing, namelyLong menstrual duration was found to be a predictor of

premenstrual syndrome. Long menstrual duration (≥7 days) had a 3.56 [95% CI: (1.53, 8.37)] times greater risk of experiencing PMS than those with a menstrual duration of 1-3 days (15).

In this study, PMS was found equally in adolescents with normal BMI (45.4%) and underweight BMI (45.5%). This is different from other studies that found that the prevalence of PMS was higher in underweight and obese women (32,33) But another study is relevant to the study that found that PMS severity was significantly correlated with body fat percentage and BMI. Although the average body mass index of the participants was within the normal range (21.76 ± 4.81 kg/m^2) (8).

Researchers use questionnaires to assess physical activity due to its low cost and ease of administration. However, there are limitations such as participant memory bias in recalling details of physical activities performed which may lead to over- or under-rating. In addition, the population in this study was limited so that the results cannot describe the overall results of the population. Further detailed studies are needed in the future to obtain better results.

5. Conclusion

This study has attempted to explore PMS and its risk factors among adolescents, so that it can reduce the prevalence of PMS. The results of anthropometric measurements showed that even though BMI was normal, there was a risk of experiencing PMS. The prevalence of PMS in this studied was 64.7% so that interventions were needed to reduce it. Prospective studies on adolescents in a wider scope are needed to add to the existing information. These findings can be used as initial data for exploring other variables with a wider population.Irritability, mood swings, decreased interest, difficulty concentrating, fatigue, headache, breast/joint/muscle painare symptoms felt ranging from mild to severe which were reported in this study.

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