

Physical activity and anxiety with complaints of PMS in adolescents during the COVID-19 pandemic

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ABSTRACT

Premenstrual syndrome (PMS) is a menstrual cycle disorder that frequently appears in women. As a result of the coronavirus disease 2019 (COVID-19) virus pandemic, the school from home program was implemented, which could affect physical activity and anxiety and therefore increase the incidence of PMS. This cross-sectional research analyzed the relationship between physical activity and anxiety with PMS in adolescents. The population was 221 adolescent girls in Surabaya, Indonesia. A consecutive sampling technique was used to select the 143 respondents. The independent variables were physical activity and anxiety while the dependent variable was PMS. The data was collected using a questionnaire and analyzed by the Spearman Rho test with a level of significance $\alpha < 0.05$. The results showed no significant correlation between physical activity and PMS among adolescents, however there was a significant correlation between anxiety and PMS in adolescents ($p=0.000$; $r=0.463$). Adolescents with anxiety have higher risk of PMS. The higher level of anxiety will be the more severe the symptoms of PMS.

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1. INTRODUCTION

Lack of physical activity and increased anxiety during a pandemic will result in feelings of depression, which create more stress [1]. When a person experiences stress, the production of the hormone estrogen, progesterone, and other hormones becomes unstable. As a result, it can cause irregular menstrual cycles [2]. Menstruation is a sign of reproductive organ maturity in adolescent girls [3]. Premenstrual syndrome (PMS) is a collection of symptoms that mark someone in the ovulation and menstruation phases, the symptoms are psychological, emotional, and physical, PMS occurs 2-14 days before menstruation [4]. Most women experience one or more PMS symptoms at some point in the menstrual cycle, but the severity and frequency of symptoms experienced can also differ between periods [5]. PMS symptoms that often appear are irritability, dizziness, depression, sensitive feelings, fatigue, acne, breast pain, decreased or increased appetite [6]. Symptoms that arise in each woman are different, therefore the prevalence of sexually transmitted diseases (STDs) in each country is different [7].

The prevalence of PMS in Japan is 34%, in America 34% in women of childbearing age, and 44% in adult women in Australia. According to World Health Organization (WHO), the prevalence of PMS tends to be higher in some Asian countries than in European and American countries [8]. The results of the study show that in Indonesia the prevalence of women who experience PMS is 95% out of 260 adolescents, 33.75% have severe PMS and the rest have mild and moderate PMS. Meanwhile, the prevalence of PMS in

adolescent girls in East Java Province, especially in the city of Surabaya, who experienced severe PMS was 39.2%, and 60.8% was included in the mild category [9]. The factors that cause PMS are still not known for certain, but the biggest factor in PMS is because the hormone estrogen is not balanced and usually occurs in adolescents aged 13-14 years. In adolescence, physical activity plays an important role in the severity of PMS.

During the current COVID-19 pandemic, most governments around the world and Indonesia have implemented physical restrictions to stop the spread of the Coronavirus [10]. Implementation of the work from home (WFH) system, crowd restrictions in public places, and online learning activities or school from home to reduce physical activity [11]. There is a relationship between physical activity and the incidence of PMS by 50% of adolescents who do not do physical activity experience premenstrual syndrome with severe symptoms. Lack of physical activity will cause endorphin deficiency in the body, resulting in PMS [12]. In addition to reducing physical activity, the COVID-19 pandemic also increases stress.

The stress that arises during the COVID-19 pandemic can be in the form of fear and anxiety. Anxiety that arises can affect the incidence of the premenstrual syndrome because of neuroendocrine abnormalities in the menstrual cycle that often occur in the premenstrual phase [2]. The anxiety experienced by students is called academic anxiety. Anxiety in students does not only occur in Indonesia, another study concluded that Chinese students showed higher anxiety during the COVID-19 pandemic [11]. Changes in curriculum, changes in environmental conditions, new learning climates cause anxiety [2], [13]. Online learning due to the COVID-19 pandemic is a new learning climate felt by students. There is a strong and positive correlation between the level of anxiety and premenstrual syndrome, which is 26.25% by weight. Depression, anxiety, high stress, and the inability to adjust emotionally will increase the occurrence of PMS. Lack of physical activity as an external factor and anxiety as an internal factor can be a threat to women [7]. There has never been a study on the correlation between physical activity and anxiety on the occurrence of premenstrual syndrome in adolescents. Therefore, this study needs to be carried out to determine the relationship between physical activity and anxiety on premenstrual syndrome in adolescent girls during the COVID-19 pandemic.

2. RESEARCH METHOD

Survey was conducted from February to April, 2020 with 221 adolescent girls of eighth grade at Public Junior High School 17 (*Sekolah Menengah Pertama Negeri 17/SMP N 17*) Surabaya. This research is a quantitative study using a Cross-sectional design. One hundred forty-three adolescent girls were selected using consecutive sampling. The criteria in this study are aged 13-15 years, menstruation, 1-10 days before menstruation. Exclusion criteria from this study were students with disabilities, not living with biological mothers, suffering from diseases (cancer, tumors, broken bones, reproductive systems), and psychological disorders. The independent variables in this study are physical activity and anxiety. Physical activity was measured using the physical activity questionnaire for adolescents (PAQ-A) questionnaire [14]. Respondents were asked to fill out a PAQ-A questionnaire consisting of 8 questions about the types of physical activity, frequency (time per week), and duration (length of time) of physical activity carried out during the past seven days. Each question has a score of 1-5 so that the total score range is 8-40 and is categorized as: less= ≤ 19 , sufficient=19-28, good= ≥ 28 .

The anxiety variable is measured using the Zung self-rating anxiety score questionnaire (Z-SAS) [15]. The Z-SAS questionnaire consisted of 20 questions about anxiety characteristics, including five attitudes and 15 somatic symptoms. Each question was given a rating of 1-4, so the total score range was 20-80. The dependent variable of this study is a premenstrual syndrome or PMS using the shortened premenstrual assessment form (SPAF) questionnaire [16]. In the SPAF questionnaire, there are questions about the symptoms of premenstrual syndrome felt by respondents 1-10 days before menstruation; each question weighs 1-6, so the total score is 10-60. The score results are categorized as: there are no complaints symptoms=1-10, mild=11-19, moderate=20-29, severe= ≥ 30 . The collected data were then analyzed using the Spearman Rho test with $\alpha < 0.05$.

3. RESULTS AND DISCUSSION

In this section, it is explained the results of research and at the same time is given the comprehensive discussion. Results can be presented in figures, graphs, tables and others that make the reader understand easily. The discussion can be made in several sub-chapters.

3.1. Characteristics respondent

The respondents were 143 eighth-grade adolescent girls at Public Junior High School 17 Surabaya; they were mostly 14 years old. The respondents' age of first menstruation or menarche showed that the majority were aged less than 13 years. From all respondents, 106 students (74.1%) experienced regular

menstrual cycles. The 130 students, (90.9%) of respondents' menstrual periods were for 5-8 days. Adolescence is one of the factors of premenstrual syndrome occurrence. The majority of respondents in this study were adolescent girls aged 13-15 years classified as early adolescents. The participants of this study who met the criteria were 143 eighth-grade adolescent girls of Public Junior High School 17 Surabaya. Characteristics of the entire population can be seen in Table 1.

Table 1. Characteristics of respondent

No.	Respondents' characteristics	Criteria	f	%
1	Age (Years old)	13	19	13.3
		14	106	74.1
		15	18	12.6
2	Menarche age (Years old)	< 13	98	68.5
		≥ 13	45	31.5
3	Menstruation cycle	Regular	106	74.1
		Irregular	37	25.9
4	Menstruation	<5 days	8	5.6
		5-8 days	130	90.9
		>8 days	5	3.5

3.2. Relationship physical activity and anxiety with PMS in adolescent's pandemic era

The physical activity variable has a p-value of 0.921 ($p > 0.05$) which means that there is no significant relationship between physical activity and the occurrence of premenstrual syndrome. The anxiety variable has a p-value of 0.000 ($p < 0.05$) and a correlation r-value of (0.463). This shows a significant relationship between anxiety with the occurrence of premenstrual syndrome, so that the more severe the anxiety, the more severe premenstrual syndrome complaints will be felt. The adolescent girls engaged in less physical activity (66.4%), sufficient physical activity (39.2%), and (0.7%) for enjoyable physical activity. There is no relationship between physical activity and premenstrual syndrome ($p = 0.921$), which indicates that H_0 is accepted and H_1 is rejected. This study indicates that respondents with less physical activity (38 students, 40%) experienced mild premenstrual syndrome, while respondents with less physical activity (22 students, 15.4%) experienced severe premenstrual syndrome. This shows that most respondents with physical activity were less likely to experience mild premenstrual syndrome than respondents who did a less physical activity with less severe premenstrual syndrome Table 2.

Table 2. Bivariate analysis of physical activity and anxiety with PMS in adolescents

Variable	Category	Premenstrual syndrome (PMS)								p	r
		No symptoms		Mild		Moderate		Severe			
		n	%	n	%	n	%	n	%		
Physical activity	Less	5	3.5	38	40	30	15.4	22	15.4	0.921	0.008
	Sufficient	0	0	21	14.7	19	13.3	7	4.9		
	Good	0	0	0	0	1	0.7	0	0		
Anxiety	Mild	5	3.5	58	40.6	46	32.2	14	9.8	0.000	0.463
	Moderate	0	0	1	0.7	4	2.8	14	9.8		
	Severe	0	0	0	0	0	0	1	3.4		

One of the factors affecting physical activities was implementing the school from home program from Monday to Friday. Some respondents did the activities that did not require much energy expenditure, such as reading or writing while sitting. School closure also causes a lack of activities that require a long walk and no place to support physical activities. Reduced physical activity can also be influenced by the effect of technology, whereby adolescents play more on their smartphones than doing physical activities [7], [17].

Roy's theory states that physical stimulus is one of the external factors of a regulator coping mechanism [18]. It is expected that with coping mechanisms, someone can achieve four adaptive modes that aim to improve their adaptation to contribute to the health and quality of life and to provide adaptive responses [19], [20]. Regular and sustained physical (sporting) activities contribute to increasing the production and release of endorphins. Endorphins play a role in providing relaxed and calm feelings, distracting disturbing thoughts, promoting positive thinking, reducing short-term depressions, and improving mood [11], [12]. Regular exercise also functions to enhance comfort while restoring confidence [2], [21]. Adolescents with less physical activity experienced severe PMS symptoms. Individuals with less physical activity had more chance of experiencing severe PMS symptoms than the respondents with good physical activity [22].

Conversely, Habib and Ramadhini [23] has argued no significant relationship between physical activities and PMS ($p = 0.93$). They discovered that only seven of 26 students who were active in physical

activities did not experience PMS. Meanwhile, of 35 students who were not engaged in physical activities, 28 did not have PMS. These results indicated that respondents with insufficient activity also did not experience premenstrual syndrome. The study results indicated that most respondents doing moderate physical activity - 47 people - experienced PMS with no symptoms to mild symptoms.

Physical activity is not the only factor influencing the occurrence of PMS. The hormonal factor is the factor that most influences PMS [16]. Hormone imbalance is a factor that significantly affects premenstrual syndrome. Women who experience PMS due to imbalances in estrogen and progesterone will encounter a decrease in serotonin, which profoundly impacts changes in individual mood and behaviour [2], [7]. The symptoms felt by each individual differ depending on their sensitivity level to hormonal changes in the menstrual cycle [24], [25]. An individual's sensitivity to hormonal changes may vary, so individuals with light or vigorous activities might experience mild to severe PMS symptoms. Other factors can affect PMS, namely heredity and lifestyle factors. It shows that the factor causing PMS is physical activity and hormonal factors due to psychological disorders, lifestyle, sleep pattern, and genetic factors [26].

Previous studies have shown that several factors can cause different results due to different levels of physical activity [17], [22]. The respondents of this study exhibited daily physical activities, such as walking, running, and playing the chasing game. These activities could not be considered sports, while the respondents of the previous studies were active in sports, such as aerobics, instead of daily physical activities [27]. Activities included in aerobic exercise are gymnastics, brisk walking, jogging, swimming, running, cycling, and jumping rope.

One hundred twenty-three students experienced mild anxiety (86%), moderate anxiety (13.3%), and severe anxiety (0.7%). There was a significant relationship between anxiety and premenstrual syndrome (PMS) in adolescents ($p=0.000$), and the correlation coefficient $r=0.463$. These results indicate a relationship between anxiety with the occurrence of premenstrual syndrome with enough strength of the relationship and in a positive direction. This study indicates that the majority of students who experienced mild anxiety were 123 respondents (86%), while students who experienced PMS mild category were 59 respondents (41.3%). In this study, respondents with mild anxiety were 58 respondents (40.6%) who experienced mild PMS, and respondents with mild anxiety were 14 respondents (9.8%) who experienced severe PMS. The same as research from Andiarna and Kusumawati [28] the study show that online learning has an effect academic stress during the COVID-19 pandemic. Indicate that respondents experience moderate anxiety if they do not adapt, leading to premenstrual syndrome not experiencing improvement, and therefore moderate symptoms are still felt.

Roy's theory identifies that emotional ability is an incoming stimulus that is faced using one of the coping mechanisms, namely cognition. The adaptation that is realized could be seen in the four adaptive modes that aim to improve individual adaptation to contribute to individuals' health and quality of life and provide adaptive and maladaptive responses [19]. These results indicate that respondents experience moderate anxiety if they do not adapt, causing premenstrual syndrome not to improve and moderate symptoms are still felt.

The school from home program can be the anxiety trigger that affects PMS occurrence. The trigger can be in the form of academic factors, such as the high target of curriculum achievement, uncondusive learning climate, too many assignments given, short deadlines, and limited personal facilities and infrastructure [15]. These academic factors can affect the emergence of anxiety in adolescents. The anxiety will influence their psychological state, whereby it affects the work of the hypothalamus so that there is a hormonal unbalance [29]. The hormonal imbalance will result in decreased serotonin levels in the brain [30]. The experience of health adolence in dealing with COVID-19 has many effects on mental health stress, anxiety, and depression [31]. It is not only experienced in the short term but also has a long-term impact and the value of effective support [32]. The decrease in serotonin levels will lead to many complaints, such as being easily confused, passing out, sad, offended, irritable, and so on. In early adolescents, anxiety will increase along with hormonal changes that cause discomfort [29]. Thus, anxiety influences PMS. If the respondents with mild anxiety did not adapt to their condition, their PMS symptoms and health quality would not be improved. The more severe the anxiety level, the more severe the PMS symptoms.

4. CONCLUSION

Most adolescent experience mild PMS symptoms due to various factors. One of them is hormonal changes occured before menstruation. The results confirmed no significant correlation between physical activity and PMS among adolescents, however there was a significant correlation between anxiety and PMS. Adolescents with anxiety have higher risk of PMS. The higher level of anxiety will be the more severe the symptoms of PMS. For future researchers, it is necessary to identify events, causes, and interventions to prevent and manage PMS.

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