Original Article

Differences in Prostaglandin f2α Level in Adolescent Girls Experienced and Not Experienced Premenstrual Syndrome: A Cross-Sectional Study

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ABSTRACT

This study aims to determine the differences in Prostaglandin f2α concentration in female adolescents who experienced and did not experience Pre-Menstrual Syndrome (PMS). Cross-sectional study conducted at a single institution. The sample for this study was female adolescents at the Darul Arqam Islamic Boarding School in Makassar, consisting of 50 adolescents who experienced PMS and those who did not experience PMS in a ratio of 1:1. Prostaglandin f2α levels were measured using an ELISA kit. The sample used was 5 cc blood from the median cubital vein by laboratory staff 5 days before menstruation. Data were analyzed descriptively and statistically. The results showed that the average Prostaglandin f2α in the group that experienced PMS (379.07) was higher compared to the group that did not experience PMS (101.23) with a p-value < 0.05, significantly. Furthermore, the group that experienced mild PMS had an average Prostaglandin f2α value of 283.32, while the group that experienced severe PMS had an average Prostaglandin f2α value of 454.31. The average Prostaglandin f2α level in the group who did not experience PMS, mild PMS, and severe PMS had a p-value < 0.05. This study concludes that there is a significant difference in the Prostaglandin f2α Level in adolescents who experience PMS and those who do not experience it and there are differences based on the severity of PMS.

Keywords*: Premenstrual Syndrome (PMS), Prostaglandin f2α, Female Adolescents.*

INTRODUCTION

Premenstrual syndrome (PMS) is a group of symptoms that usually appear one to three days before the start of the menstrual cycle, disappear once the menstrual cycle begins, or persist until the menstrual cycle is finished [1]. Based on the WHO (World Health Organization) report, PMS has a higher prevalence in Asian countries compared to Western countries [2]. Research shows that around 90% of women of childbearing age are affected by mild to acute premenstrual symptoms. Among them, about 20% to 40% experience PMS[1]. The prevalence of premenstrual syndrome in Ethiopia was found to be 53% [3]. In Palestine, of the 398 participants (100%) suffered from some kind of PMS symptoms, 398 (100%) had physical symptoms, 397 (99.7%) had psychological symptoms, and 339 (85.2%) had behavioral PMS symptoms [4]. In Indonesia, Four hundred and sixty women aged between 20 and 49 years with regular menstrual cycles, as many as 95% of these women were found to have at least premenstrual symptoms. Severe to moderate premenstrual symptoms and premenstrual dysphoric disorder were suffered by 5% of women and mostly

affected 20-29 year old women [5].

Premenstrual syndrome can cause depression which can lead to suicidal feelings, even the desire to commit violence against oneself or others [6]. Apart from that, other illnesses that are often experienced are feelings of anger, anxiety, and sadness [7]. This is in line with research by Surbhi and team which explains that more than half (53.8%) of female participants said that PMS made it difficult for them to focus, work well, create results, and engage in social activities [8]. As age increases, there is a statistically significant increase in the likelihood of forgetfulness, low libido, sleep problems, gastrointestinal symptoms, weight gain, headaches, sweating or hot flashes, fatigue, hair changes, rashes, and swelling [9]. PMS is also associated with the risk of postpartum depression [10].

According to a study, prostaglandin hormone levels may have an impact on premenstrual symptoms [11]. Prostaglandins are hormone-like substances that mediate several physiological reactions, including inflammation, muscle contraction, blood vessel dilation, and platelet aggregation [12]. Ni Made et al (2021) researched endometrial preparations in women suffering from menstrual pain who were not undergoing treatment. On the first day of menstruation, PGF2 levels were four times higher than women who did not experience menstrual pain [13].

Understanding the differences in Prostaglandin f2α levels can help manage premenstrual syndrome, especially in mild, moderate, or severe cases. Based on previous research, not many studies have discussed the differences in prostaglandin f2α levels in adolescent girls who experience and do not experience premenstrual syndrome and the differences regarding the severity. Therefore, this study aims to determine the differences in Prostaglandin f2α concentration in female adolescents who experienced and did not experience premenstrual syndrome.

METHOD

This research was conducted at the Darul Arqam Makassar Islamic Boarding School from March to May 2017 after obtaining the Ethical approval recommendation issued by the Postgraduate Faculty of Hasanuddin University Makassar number: 255/ H4.8.4.5.31/ PP36-KOMETIK/ 2017. Before conducting the research, respondents were given information about the research being conducted and then signed informed consent. Researchers keep research data confidential by not using respondents' identities in reporting data.

This study used a cross-sectional study. The population in this study were all female students at the Darul Arqam Makassar Islamic Boarding School. The population in this study was all 50 young women who were studying at school. The sample used in this research was all students, 25 people who experienced PMS and 25 people who did not experience PMS.

The inclusion criteria for this study were middle-class students aged 15 to 17 years, who have had regular menstrual cycles (28 to 32-day cycle) for the previous three months, and who were willing to refrain from using drugs, including pharmacological treatments like anti-pain medications and non-pharmacological treatments like herbs and other herbal medicines throughout the study, and who were willing to be respondents. While the exclusion criteria were female students who suffered from gynecological diseases, such as polimenerhoea, vaginitis, oligomenorhea, hypomenorrhoea, leukorrhea, endometritis, dysmenorrhea, pelvic inflammation, uterine cysts, and who experienced mental disorders. Exclusion criteria are proven by examination results from hospitals or health facilities.

The instrument used in this research is a diary sheet (LCH), namely a data collection questionnaire that contains the identity and symptoms or complaints of premenstrual syndrome. The unit of analysis is prostaglandin F2 levels. Prostaglandin Enzyme Linked Immuno Sorbent Assay (ELISA) kit was used for prostaglandin analysis. The unit of prostaglandin examination results is pg/ml. The sample used was a 5 cc blood sample from the median cubital vein by laboratory staff 5 days before menstruation.

The collected data was then processed using a computer and the Excel and SPSS version 21 programs. The data was analyzed descriptively and statistically. The t-test was used to analyze differences in prostaglandin levels in adolescents suffering from PMS and those not suffering from PMS. If the data is not normally distributed, the data is analyzed using the Mann-Whitney Test. The difference is concluded to be significant if the p-value <0.05.

RESULTS

A summary of the respondent's data was provided in the study's results. Based on Table 1, respondents who experienced PMS and did not experience PMS were dominated by the 17-year age group and the lowest were in the 15-year age group. More than half of the total respondents had menarche at the age of 11 years in the PMS group Among respondents who did not experience PMS, more than half of the total respondents had menarche at the age of 13 years. Based on body mass index, more than half of the total respondents experiencing PMS were overweight and 1 person (4%) had an obesity. There were no respondents who were obese in the group of respondents who did not experience PMS.

The length of the menstrual cycle varies. Almost half of the total respondents who experience PMS have a menstrual cycle of 28 days. 2 people experienced a 31-day menstrual cycle. Nearly half of the total respondents who do not experience PMS have a menstrual cycle of 29 days. 2 people also experience a 31-day menstrual cycle. In the group of respondents who experienced PMS, more than half of the total respondents had menstrual periods of 3-7 days. In the group of respondents who did not experience PMS, more than half of the respondents had menstrual periods of 3-7 days. Almost all of the total respondents who experienced PMS had menstrual blood from 3-5 pads, as did the group who did not experience PMS. The results of the respondent characteristics are in Table 1.

Table 1. Distribution of Respondents

Respondents Characteristics	Group				Total	
	PMS		Non-PMS			
	n	%	n	%	n	%
Age						
15 years old	1	4.0	1	4.0	2	4.0
16 years old	5	20.0	1	4.0	6	12.0
17 years old	19	76.0	23	92.0	42	84.0
Menarche Age						
12 years old	2	8.0	2	8.0	4	8.0
13 years old	15	600.0	14	56.0	29	58.0
14 years old	3	12.0	7	28.0	10	20.0
15 years old	5	20.0	2	8.0	7	14.0
IMT						
Thin	1	4.0	1	4.0	2	4.0
Normal	9	36.0	14	56.0	23	46.0
Overweight	14	56.0	10	40.0	24	48.0
Obesity	1	4.0	0	0	1	2.0
Menstrual cycle length						
28 days	8	32.0	4	16.0	12	24.0
29 days	5	20.0	7	28.0	12	24.0
30 days	5	20.0	6	24.0	11	22.0
31 days	2	8.0	2	8.0	4	8.0
32 days	5	20.0	6	24.0	11	22.0
Menstruation duration						
3 – 7 days	14	56.0	10	40.0	24	48.0
> 7 days	11	44.0	15	60.0	26	52.0
Menstrual blood pads						
<3 x / days	0	0	0	0	0	0
3-5 x / days	23	92.0	23	92.0	46	92.0
> 5 x / days	2	8.0	2	8.0	4	8.0
Total	25	100.0	25	100.0	50	100.0

Table 2, the complaints experienced by respondents varied. More than half of the respondents experienced waist pain, wasting time, and difficulty concentrating. The most common complaint is difficulty concentrating.

Table 2. Distribution of Respondents Based on PMS Symptoms

Symptoms	No		Yes		Total	
	n	%	n	%	n	%
Headache	22	88.0	3	12.0	25	100.0
Pimple	15	60.0	10	40.0	25	100.0
Painful or Swollen Breasts	14	56.0	11	44.0	25	100.0
Waist Pain	11	44.0	14	56,0	25	100.0
Bloated	23	92.0	2	8.0	25	100.0
Joint and Muscle Pain	21	84.0	4	16.0	25	100.0
Eat a lot	24	96.0	1	4.0	25	100.0
Weight Gain	24	96.0	1	4.0	25	100.0
Increased appetite	20	80.0	5	20.0	25	100.0
Decreased appetite	25	100.0	0	0.0	25	100.0
Feeling useless	23	92.0	2	8.0	25	100.0
Sad and Desperate	22	88.0	3	12.0	25	100.0
Anxious and Tense	19	76.0	6	24.0	25	100.0
Feeling Restless	21	84.0	4	16.0	25	100.0
Sad and Crying	18	72.0	7	28.0	25	100.0
Easily offended	11	44.0	14	56.0	25	100.0
Lots of Anger and Annoyance	14	56.0	11	44.0	25	100.0
Lazy	13	52.0	12	48.0	25	100.0
Difficult to Concentrate	8	32.0	17	68.0	25	100.0
Easily Tired	16	64.0	9	36.0	25	100.0
Sleep a lot	23	92.0	2	8.0	25	100.0
Feels like Shouting	24	96.0	1	4.0	25	100.0
Want to Slam Things around	22	88.0	3	12.0	25	100.0

Table 3, the average Prostaglandin f2α in the group that experienced PMS (379.07) was higher compared to the group that did not experience PMS (101.23) with p-value < 0.05. This means that there was a significant difference in the increase in Pgf2α for respondents who experienced PMS and those who did not experience PMS.

Table 3. Analysis of Differences in Average Levels of Prostaglandin F2α Hormone

Adolescents Group	Prostaglandin F2α Hormone Concentration		p-value (uji t)
	Mean	Std.Deviation	
PMS	379.07	138.73	0,000
Non-PMS	101.23	17,84	

Table 4 shows the group that experienced mild PMS had an average Prostaglandin f2α value of 283.32, while the group that experienced severe PMS had an average Prostaglandin f2α value of 454.31. The average Prostaglandin f2α level in the group who did not experience PMS, mild PMS, and severe PMS had a p-value < 0.05.

Table 4. Analysis of Differences in Average Levels of Prostaglandin F2α Hormone

Adolescents Group	Prostaglandin Concentration	F2α Hormone	p-value (uji t)
	Mean	Std.Deviation	
Non-PMS	101.23	17.84	0,00
Mild PMS	283.32	106.52	
Severe PMS	454.31	113.78	

DISCUSSION

This research emphasizes that there is a significant difference in the Prostaglandin f2α Level in adolescents who experience PMS and those who do not experience it and there are differences based on the severity of PMS. According to a study, different prostaglandin levels in the female reproductive system have an impact on the endometrial sloughing and regression of the corpus luteum. LH's ovulation-related effects are similarly impacted by prostaglandins [14]. It was discovered that there was an association between complaints of menstrual pain and the uterine smooth muscle contraction-stimulating properties of menstrual blood, as well as the generation of prostaglandins. PGF2 and PGE2 are present in these substances, and females who have primary menstrual pain have greater PGF2/PGE2 ratios in their endometrium and menstrual blood [15].

The definition of severe PMS varies among RCTs, but in recent studies, standardized criteria have been used to diagnose one variant of severe PMS-premenstrual dysphoric disorder (PMDD). The criteria are based on at least five symptoms, including one of four core psychological symptoms (from a list of 17 physical and psychological symptoms) and being severe before menstruation starts and mild or absent after menstruation. The 17 symptoms are depression, feeling hopeless or guilty, anxiety/tension, mood swings, irritability/persistent anger, decreased interest, poor concentration, fatigue, food craving or increased appetite, sleep disturbance, feeling out of control or overwhelmed, poor coordination, headache, aches, swelling/bloating/weight gain, cramps, and breast tenderness [16].

Due to the misconception that premenstrual discomfort is normal and would go away on its own, premenstrual syndrome is a symptom that affects adolescents whose management is still insufficient. Even though PMS does not cause death, PMS is a disorder that, if not handled properly, can disrupt learning, achievement, productivity, and social relationships.

The results of this study illustrate that the respondent dominated with adolescents aged 17 years. This indicates that the age of 17 years is a childbearing age that is prone to PMS. It will affect their reproductive health in obtaining offspring in the future. Senja et al (2021) estimated that the prevalence of PMS was 20-40% of all females of reproductive age. The demographic range was between 14-51 years [17]. Wahyu et al. (2021) stated that the age of adolescents who experience PMS in Indonesia was between 25-35 years, with a tendency to increase the incidence in older age groups [18]. Herwandha & Prastuti, (2020) stated that in adulthood emotional development has been mature[19]. Emotional development will greatly influence a person's responses and actions towards health status [19]. Several adolescents claim to have PMS symptoms early, and research shows that some adolescents have PMS symptoms that are just as severe as those reported by older women.

Based on the results of research on menarche age characteristics, the average number of respondents who experienced PMS was 11 years old. Menarche is a period of hormonal and physical development that is mature enough to start the menstrual cycle. In studies of growth and development, the age at menarche, or the age at which young females experience their first menstrual period, is a measurement used to gauge the rate of reproductive maturity in individuals. Currently, female adolescents get menstruation faster, namely menarche at the age of 10-12 years [20]. This is in line with research which showed that PMS was more common in the group of female students with menarche age <12 years (rapid), namely 47.17% compared to those with menarche age ≥12 years, namely 19.82% [21].

According to the findings of the study on BMI characteristics, more than half of the respondents who had PMS had an excessive BMI. This supports the theory that PMS is caused by an imbalance in the hormones estrogen and progesterone, which is caused by obesity because PMS is also caused by excess fat [22]. According to research, obese female adolescents at Islamic Senior High School 1 East Lampung Metro experienced PMS at a rate of 55.6% as opposed to female adolescents who were not obese and experienced PMS, who had a rate of 27.4% [23]. The results of this study were in line with the results of research on Midwifery Academy Students in the Kudus Regency Government, which showed that there was a significant relationship between obesity in young females and PMS [24].

The results of the study were obtained, difficulty concentrating is the main problem.

This was in line with the theory that the common symptoms found in PMS, such as cognitive impairment, can be concentration imbalances and confusion. Mastalgia (breast discomfort), bloating, migraines, exhaustion, and sleeplessness are examples of somatic illnesses. Social behavior disorders include carbohydrate abuse [25].

CONCLUSION

There was an increase in prostaglandin f2α levels in adolescent girls who experienced PMS. Apart from that, there are significant differences in prostaglandin f2α levels in adolescents who experience PMS and those who do not experience PMS and there are differences based on the severity of PMS. It is important to understand premenstrual syndrome in female adolescents, especially the impact of the Prostaglandin f2α hormone so that they can manage and understand their condition to avoid depression or psychological disorders. Health workers, especially midwives at the community health center level, as midwives in the community, are expected to be able to provide education regarding premenstrual syndrome in adolescents.

CONFLICTS OF INTEREST
There is no conflict of interest.

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