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Original Research Article

Effect of polycystic ovary syndrome on dysmenorrhea: a case-control study

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is a common endocrine disorder that has an important impact on women of reproductive age and is diagnosed with various hormonal disorders. Menstrual pain is a common and often problematic problem for women during their reproductive age. Although these two problems may appear to be presented separately, they often overlap and lead to complex and multiple challenges in health care for women. This study was conducted with the aim of the effect of PCOS on dysmenorrhea.

Methods: This case-control study was done on 92 women who visited Alavi hospital in Ardabil during 2022-2023. Data collected included age, body mass index, length of the menstrual cycle (in days), menstrual bleeding volume (number of pad changes during the menstrual cycle), duration of menstrual bleeding (in days), and the presence of menstrual pain. Additionally, the severity of menstrual pain was assessed using the visual analog scale (VAS). Data were analyzed using SPSS version 25.

Results: Mann-Whitney test showed a significant difference between subjects with PCOS and non-PCOS in terms of the frequency of pain scores ($p=0.03$). There was no significant difference between the two groups in the variable of pain intensity ($p=0.70$).

Conclusions: The results of this study showed that the frequency of dysmenorrhea increases in people with PCOS, but the intensity of menstrual pain does not increase.

Keywords: Menstrual pain, PCOS, Menstruation

INTRODUCTION

Polycystic ovary syndrome (PCOS) is a common, multifactorial and complex endocrine disorder.¹ The global prevalence of polycystic ovary is estimated between 2.2 and 22.5% and its prevalence in Iran is based on the NIH criteria of 6.8%, based on the Rotterdam criteria of 19.5% and based on ultrasound methods 41.0% is estimated.²⁻³ PCOS is associated with increased risk of infertility, ovarian disorders, endometrial cancer, early menopause, and increased risk of a group of metabolic

disorders including insulin resistance, hypertension, and cardiovascular diseases.⁴ Amenorrhea, oligomenorrhea, hirsutism, infertility and acne are among the important symptoms of this syndrome. In a review study, the prevalence of menstrual disorders was estimated at 28%, acne at 26%, hirsutism at 13%, androgenic alopecia at 9%, and infertility at 8%.³ Another common symptom in patients with PCOS, which has received less attention from researchers than other symptoms, is menstrual pain.⁵ Menstrual pain or dysmenorrhea is the most common gynecological problem among women of reproductive age, and its prevalence is reported in the range of 15-

85%.⁶⁻⁷ Menstrual pain usually lasts 24 to 48 hours from the onset of menstruation and can have a negative impact on many aspects of an individual's life, including family relationships, work performance, recreational activities, and social life.⁸⁻⁹ Considering its significant impact on productivity and the fact that it affects the population of working-age women, dysmenorrhea has even been shown to be associated with significant economic consequences.¹⁰ The studies conducted in the field of dysmenorrhea are mainly limited to the age group of teenagers, while as mentioned, considering that dysmenorrhea affects all women of reproductive age, research on it is needed in all age groups. Paying attention to this issue among women with PCOS is even more important because there are reports that menstrual pain is more common in these patients than in the general population of women.¹¹ A pathophysiological mechanism for dysmenorrhea that is most accepted is the overproduction of prostaglandins, and interestingly, prostaglandin levels have been shown to be significantly higher in women with PCOS than in women of the same age.¹² However, the relationship between PCOS and menstrual pain has not been sufficiently investigated and there are even reports that this problem is neglected in them.⁵ Meanwhile, investigating this relationship is important because it can help doctors to understand the dimensions of this problem in women with PCOS and adopt strategies to reduce it. Menstrual pains are a common disease and often debilitating condition experienced by many women during their childbearing years. PCOS, on the other hand, is a common endocrine disorder that affects women of reproductive age and is characterized by a range of hormonal imbalances. While these two conditions may seem distinct, they often intersect, but leading to a complex and multifaceted health care challenge for women, so present study was conducted with the aim of impact of PCOS on dysmenorrhea.

METHODS

This case-control study was conducted after obtaining the code of ethics from Ardabil branch of Azad university on 92 women referred to Alavi hospital in Ardabil from April 2021 to April 2022. The study was conducted after obtaining the consent of women of reproductive age (18-45 years old) participating in the study, who were divided into two groups with PCOS and without it. The diagnosis of PCOS was made based on the diagnostic criteria of Rotterdam under the supervision of a gynecologist.

According to the presence of two of the three criteria; 1) oligo-ovulation leading to oligomenorrhea or anovulation leading to amenorrhea (number of monthly cycles less than 2 cycles in 12 months), 2) clinical hyperandrogenism (hirsutism, male pattern alopecia, acne or biochemical hyperandrogenism) and 3) polycystic ovary morphology (PCOSM) in ultrasound (presence of 12 or more follicles in each ovary with a diameter of 12 mm or an increase in ovarian volume greater than 310 cm) a person with PCOS is classified became. In this study, 47 people were selected as the case group and 45 women without a history of PCOS were selected as the control group. Exclusion criteria were pregnancy during the study, suffering from other causes of hyperandrogenism such as hereditary adrenal hyperplasia, hyperprolactinemia, and hypothyroidism. Information related to age, body mass index, length of menstrual cycle (days), amount of menstrual bleeding (number of pad changes in the entire menstrual period), duration of menstrual bleeding (days), having pain, menstruation, the amount of menstrual pain (VAS score), and the use of contraceptives pain during menstrual pain (always/sometimes/never) was collected through a questionnaire. Amount of menstrual pain was determined through the visual pain rating scale (VAS), which grades the intensity of pain from 0 (no pain) to 10 (expressing the most severe pain). Quantitative variables were reported as mean and standard deviation, and qualitative variables were reported as frequency and percentage in the form of tables and graphs. Chi-square test and t-test were used to compare the studied parameters between two groups. The significance level in all analyzes was considered less than 0.05. The collected data were subjected to statistical analysis with SPSS version 25 software.

RESULTS

Among all the studied women, 45 (48.9%) were healthy and 47 (51.1%) had PCOS. The results of the t-test showed that there was a significant difference in terms of age between women with PCO and healthy women ($p=0.013$), but no significant difference was seen in terms of height, weight, and BMI.

In comparing the mean of menstrual pain in patients with PCOS compared to patients without PCOS, based on the results of the Mann-Whitney U test, there is a significant difference between subjects with PCO and non-PCO in terms of mean of pain ($p=0.037$) was observed (Table 2).

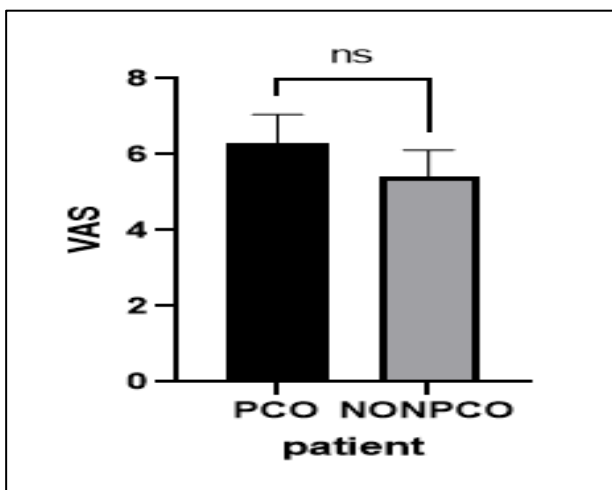
Table 1: Demographic information of the women of the two studied groups.

Variables	PCOS	N	Min	Max	Mean	SD	P value
Age (in years)	-	45	18	44	29.64	6.492	0.013
	+	47	22	39	26.57	4.999	
Height	-	45	150	174	162.31	4.8	0.156
	+	47	160	173	163.77	4.948	
Weight	-	45	50	100	65.49	8.487	0.685
	+	47	44	91	66.3	10.421	
BMI (kg/m ²)	-	45	19.7	39	24.82	3.366	0.704
	+	47	16.6	35.5	24.53	3.987	

Table 2: Comparison of the mean of menstrual pain and intensity of menstrual pain in two groups.

Variables	PCO	N	Mean of rank	Sum of ranks	P value
Menstrual pain	-	45	41.53	1869	0.037
	+	47	51.26	2409	
Intensity of menstrual pain	-	45	5.4	2.3	0.7
	+	47	6.2	2.5	

According to Table 2, regarding the effect of PCOS on the intensity of menstrual pain based on the result of the independent T test, there was no significant difference ($p>0.05$) between the intensity of pain between subjects with PCO and non-PCO in terms of pain score (Figure 1).

**Figure 1: Comparison of pain intensity between PCO and non-PCO patients.**

A significant relationship was observed between the frequency of dysmenorrhea and PCO disease, and affected people had more frequent pain, but there was no significant relationship between pain intensity and PCOS.

DISCUSSION

In the present study, a significant relationship was observed between the frequency of dysmenorrhea among polycystic and non-polycystic people, and the frequency of dysmenorrhea was higher among people with PCO than among people without it. According to the findings of the present study, Kumar et al also showed that the frequency of dysmenorrhea among people with PCO was higher than healthy people.¹³ Brito et al also showed that PCOS was the most common cause of pelvic change observed in the studied population. Other changes, such as uterine fibroids and endometriosis, which are also common in the studied population, may increase the symptoms of dysmenorrhea.¹⁴ Bigambo et al also showed that in China, the frequency of menstrual pain has a significant relationship with the incidence of PCOS.¹⁵ Suhaid et al found that most of the people who experienced menstrual pain had PCOS.¹⁶ Also, evidence has shown that although dysmenorrhea in adolescents and adults is usually early and associated with normal ovulatory cycles, there is

evidence that pelvic or uterine abnormalities may be found in approximately 10% of individuals with severe dysmenorrhea.¹⁷ Similarly, many women with PCOS experience irregular menstrual cycles, including oligomenorrhea (infrequent menstruation) or amenorrhea (absence of menstruation).¹⁸ These irregularities can lead to the accumulation of endometrial tissue in the uterus over time. When the uterine wall sheds during menstruation, it can lead to heavier and more painful periods. On the other hand, anovulation or anovulation is common in PCOS.¹⁹ When ovulation does not occur, the normal hormonal fluctuations that regulate the menstrual cycle are disrupted.²⁰ This can lead to a buildup of the lining of the uterus, resulting in heavier periods and increased menstrual pain. Also, PCOS is associated with chronic low-grade inflammation, and inflammation can contribute to increased pain sensitivity. This inflammatory response can make menstrual cramps and pain worse.²¹ PCOS is a reflection of a heterogeneous endocrine disorder that appears in 5 to 10% of women of reproductive age and is associated with reproductive, metabolic, and psychological disorders.²² The results obtained from the study did not show a significant relationship between pain intensity and PCOS. Contrary to our findings, Superior et al also showed that severe menstrual pain can be a common complication among people with PCOS.¹⁴ Also, Corleta et al showed that during PCO, in cases of uterine fibroids, dysmenorrhea and bleeding occur more when the location of these fibroids is inside the uterus.²³ Jeong et al found that severe menstrual pain can be associated with PCO.²⁴ Based on the findings of Creatsas et al it is thought that severe menstrual pain may be due to an increase in the level of prostaglandin, which increases the contractions of blood vessels of the myometrium and uterus, thereby creating a relative ischemic state of the uterus.²⁵ A possible explanation for the association between PCO and severe pain may be uterine endothelial dysfunction. Also, an increase in the serum level of asymmetric dimethylarginine (ADMA), which is a strong marker of endothelial dysfunction in atherosclerosis, has been reported in patients with severe menstrual pain.²⁶ In various studies on pain, it has been hypothesized that arginine metabolism is one of the key mechanisms causing pain in patients with sickle cell disease, a hemoglobinopathy with pain as a symptom. Arginine is thought to play a key role in numerous metabolic processes, particularly by contributing to endothelial dysfunction and vascular occlusion in sickle cell disease.²⁶ The same ADMA study group later showed a positive correlation between serum ADMA and serum anti-Müllerian hormone (AMH) in young women with primary dysmenorrhea. They suggested that ADMA, like AMH,

may be used as a marker of ovarian reserve.²⁷ However, it is not clear how serum ADMA and AMH are connected in the larger context of PCO, except that they share the same bone morphogenetic protein pathway for signal transduction. The association between PCOM and serum AMH is well known, even though patients in a number of studies only had PCOM but not PCOS.²⁸ On the other hand, Sanchez-Garrido et al showed that PCOS is characterized by hormonal imbalance, especially increased levels of androgens (male hormones such as testosterone) and insulin resistance.²⁹ This hormonal imbalance can affect the normal hormonal regulation of the menstrual cycle. Elevated androgen levels can lead to abnormal menstrual bleeding, which can contribute to more severe menstrual pain.³⁰ This study has no limitation.

CONCLUSION

The results of this study showed that PCOS increases the frequency of dysmenorrhea, but has no effect on the intensity of menstrual pain. Considering the effectiveness of various factors on PCOS and dysmenorrhea, further studies are suggested.

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