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Abstract: Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in reproductive-aged women. This syndrome is a metabolic disorder causing a series of acute problems threatening health. Regarding the wide range of adolescent population on the state population pyramid as well as the high prevalence of this syndrome, the present study was conducted to investigate the menstrual period characteristics of adolescents afflicted with this syndrome in Shiraz city. This is a descriptive cross-sectional study conducted on 332 women with an age range of 15-20 years old (177 of whom were afflicted with PCOS and 155 were not) at Shiraz selected public centers and schools in 2015. The data collection instruments included individual information questionnaires such as the menarche age, menstrual disorders, and premenstrual syndrome (PMS). Data were analyzed through SPSS 16, using independent T-test, and Chi-Square test. The significant p-value was considered as less than 0.05. This study examined the relationship between PCOS and menstrual disorders, lower-abdominal pain in menstrual cycle interval, spotting between periods, and the amount of bleeding at the time of period (p<0.05). There was no significant relationship between PCOS and the menarche age, dysmenorrhea, and the menstrual period length (p>0.05). Among PMS physical and mental symptoms, there was only a statistically significant relationship in terms of the amount of edema between the patients afflicted with PCOS and the control group (p=0.003). The mean of all participants’ menarche age was 12.8. The findings of this study indicated that, like most of the individuals afflicted with PCOS, the menstrual disorder symptoms are present in adolescents, too. Furthermore, PMS is frequently observed in teenagers. Therefore, due to the sensitivity of this age associated with mental issues, the afflicted adolescents need to be paid more attention so that the manifestations of symptoms and the related mental problems would not affect them to a larger extent.

Keywords: Menstruation Characteristics, Polycystic Ovary Syndrome

INTRODUCTION
Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in reproductive-aged women, the most common cause of hyperandrogenism and hirsutism, and the most common cause of heterosexual maturity at the expected puberty age [1]. The prevalence of this syndrome in Iran has been reported 14.6 percent, based on Rotterdam criteria [2].

One of the most accepted recent diagnostic criteria in this regard is the existence of at least two criteria of the three clinical-biochemical Rotterdam criteria including hyperandrogenemic symptoms, oligomenorrhea or anovulation, and PCOS sonographic evidence [3]. Anovulation may be manifested as oligomenorrhea, primary amenorrhea or secondary amenorrhea [4]. Oligomenorrhea is defined as having 8 or less than 8 menstrual cycles per year or having menstrual cycles less than 26 days or more than 35 days [5]. The diagnostic criteria of PCOS are used for adolescents as well. In the past, it was believed that the irregular periods in the immediate years following the menarche age were due to the undeveloped hypothalamic-pituitary-ovarian axis; however, recent studies have indicated that the menstrual disorder in adolescents, especially if manifested as Oligomenorrhea, may be a sign of early PCOS [6]. There is a difference with respect to PCOS in
adolescents and other age groups such that it is more
difficult to diagnose this syndrome in adolescents. This
is due to the prevalence of menstrual disorders and
anovulation in adolescents, particularly in the first two
years following the first period [7].

Nowadays, it has been recognized that PCOS
is a metabolic disorder causing a series of acute
problems threatening health [8]. Moreover, there is a
relationship between physical manifestations of PCOS
and mental health reduction. This syndrome causes
various mental problems including depression, anxiety,
eating disorders, decreased sexual satisfaction, reduced
quality of life, and increased risk of committing suicide
[9]. Almost, 80 percent of the women afflicted with the
syndrome experience at least a certain mental disorder
during their life [10].

Premenstrual syndrome is one of the
psychosomatic issues which are related to reproductive
performance as well as affective disorders (mood
disorders) such as anger, anxiety, and irritability [11].
Premenstrual syndrome (PMS) refers to a set of
physical, psychological, emotional and behavioral
symptoms periodically occurring at the luteal phase and
considerably regressing in the remainder of the period
cycle. The diagnostic criteria of the American College
of Obstetricians and Gynecologists (ACOG) for PMS
include at least an emotional symptom and a physical
symptom which occur before menstruation and their
symptoms stop after the beginning of the period without
the help of medicine [12].
The aim of this study was to investigate the menstrual
cycle characteristics such as PMS and menarche age of
15-20-year-old women afflicted with PCOS in Shiraz.
Concerning the high prevalence of PCOS, the wide
range of adolescent population on the State population
pyramid, and the importance of adolescence health for
the health condition of the following years, the
significance of the present study becomes clear.

METHOD
This descriptive cross-sectional study was
conducted on 177 women with PCOS and 155 women
of the control group in Shiraz public clinics and two
public schools from each district of the 4 educational
districts in Shiraz, 2015. The participants were in the
age range of 15-20. The two schools were selected
based on stratified random sampling. The control group
participants were selected from the population of non-
PCOS patients in the aforementioned clinics as well as
the non-PCOS students in the schools having the
needed criteria to take part in the study. The students
were selected based on purposive sampling.

The criteria for participation in the study
included: 1) aged 15-20 years old; 2) written and oral
consent announcement; 3) having no background
diseases like malignancy and Thalassemias which affect
menstrual cycles; 4) not afflicted with primary
Amenorrhea, adrenal gland disorders, thyroid, and
hyperprolactinemia; 5) not afflicted with the known
endocrinopathies like Cushing’s syndrome; and 6) having
passed the menarche age at least for two years.
Sampling was done after receiving the participants’
written consent. Data collection instrument was a
questionnaire. Individual information, diseases,
individual’s drug use, some information about the
menstrual period and PCOS symptoms were collected
using a questionnaire as well as interview with the
participants. Disease diagnosis was carried out using
Rotterdam criterion. In the clinics, the individuals
whose diseases were diagnosed by the gynecologist
were considered as affected. In the schools, the students
were also examined based on the Rotterdam criterion
and then they took part in the study.

Similar studies have defined the regular
menstruation as the period intervals between 26 to 35
days and the interval between different cycles not more
than 4 days. PMS was investigated in this study based
on the symptoms mentioned in Novak’s book. The
participants were asked to consider three successive
periods and mark the symptoms they experience before
menstruation, starting to regress at the beginning of the
menstruation period without the help of medication.
Data were analyzed using descriptive and inferential
statistics (Chi-square test and T-test) in SPSS, version
16. The significant p-value was considered as less than
0.05 (p<0.05).

FINDINGS
332 participants took part in the study, divided
into two groups: 177 women with PCOS and 155 non-
PCOS women. The significance level was also
considered as 0.05.
Table 1: Comparison of the Menarche Age in the PCOS and Non-PCOS Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>+PCOS</th>
<th>-PCOS</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menarche age</td>
<td>Mean±SD</td>
<td>min</td>
<td>max</td>
</tr>
<tr>
<td></td>
<td>12/7 ± 1/3</td>
<td>10</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 2: Comparison of the Menstruation Period Qualitative Characteristics in the PCOS and Non-PCOS Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>+PCOS</th>
<th>-PCOS</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular interval of menstruation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>Number</td>
<td>Of%</td>
<td>Number</td>
</tr>
<tr>
<td>no</td>
<td>13</td>
<td>7/3</td>
<td>118</td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>104</td>
<td>58/1</td>
<td>99</td>
</tr>
<tr>
<td>no</td>
<td>75</td>
<td>41/9</td>
<td>49</td>
</tr>
<tr>
<td>Lower-abdominal pain between periods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>20</td>
<td>11/2</td>
<td>5</td>
</tr>
<tr>
<td>no</td>
<td>159</td>
<td>88/8</td>
<td>143</td>
</tr>
<tr>
<td>Spotting between periods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>25</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>no</td>
<td>154</td>
<td>86</td>
<td>145</td>
</tr>
</tbody>
</table>

Table 3: Comparison of the Menstruation Period Quantitative Characteristics in the PCOS and Non-PCOS Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>+PCOS</th>
<th>-PCOS</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menstrual period length</td>
<td>Mean±SD</td>
<td>min</td>
<td>max</td>
</tr>
<tr>
<td></td>
<td>6/24 ±1/93</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Amount of bleeding</td>
<td>4/11± 1/6</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 4: Comparison of the PMS Physical Symptoms in the PCOS and Non-PCOS Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>+PCOS</th>
<th>-PCOS</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>number</td>
<td>Of%</td>
<td>number</td>
</tr>
<tr>
<td>no</td>
<td>25</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>Muscle cramp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>38</td>
<td>21/2</td>
<td>22</td>
</tr>
<tr>
<td>no</td>
<td>141</td>
<td>78/8</td>
<td>126</td>
</tr>
<tr>
<td>Weakness and fatigue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>76</td>
<td>42/5</td>
<td>56</td>
</tr>
<tr>
<td>no</td>
<td>103</td>
<td>57/5</td>
<td>92</td>
</tr>
<tr>
<td>Edema</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>5</td>
<td>2/8</td>
<td>16</td>
</tr>
<tr>
<td>no</td>
<td>174</td>
<td>97/2</td>
<td>132</td>
</tr>
<tr>
<td>Painful breasts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>47</td>
<td>26/3</td>
<td>29</td>
</tr>
<tr>
<td>no</td>
<td>132</td>
<td>73/7</td>
<td>119</td>
</tr>
<tr>
<td>Cold sweat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>17</td>
<td>9/5</td>
<td>8</td>
</tr>
<tr>
<td>no</td>
<td>162</td>
<td>90/5</td>
<td>140</td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>22</td>
<td>12/3</td>
<td>12</td>
</tr>
<tr>
<td>no</td>
<td>157</td>
<td>87/7</td>
<td>136</td>
</tr>
<tr>
<td>Tingling in the limbs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>25</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>no</td>
<td>154</td>
<td>86</td>
<td>128</td>
</tr>
<tr>
<td>Blurred vision</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>18</td>
<td>8/9</td>
<td>9</td>
</tr>
<tr>
<td>no</td>
<td>161</td>
<td>91/1</td>
<td>139</td>
</tr>
</tbody>
</table>
The mean age of the individuals with PCOS was 17.61 and that of non-PCOS individuals was 16.08. The menarche age means of all participants (both PCOS and non-PCOS groups), individuals with PCOS, and non-PCOS individuals, were 12.8±1.2, 12.7, and 12.8, respectively; the independent T-test indicated that there was not a significant difference between the two groups (p=0.694). (Table 1)

There was a significant relationship between PCOS and irregular menstruation disorders (p<0.001), lower-abdominal pain during period intervals (p=0.008), and spotting between periods (p<0.001); however, there was no significant relationship between PCOS and dysmenorrhea (p=0.103) (Table 2). The amount of bleeding (in terms of the number of pads used during the days of a period) in the PCOS group was lower and had a significant difference (p=0.016) compared to non-PCOS group; yet, there was no statistically significant difference between PCOS group and non-PCOS group in terms of the menstrual period length (the mean of the number of bleeding days during menstrual period). (Table 3)

According to Chi-square test, the value of $\alpha=0.05$, and among the PMS physical symptoms, there was only a significant difference in terms of the amount of edema between patients afflicted with PCOS and the control group (p=0.003) so that it was higher in non-PCOS individuals. (Table 4) Besides, there was not a significant relationship between this syndrome and any of the premenstrual mental symptoms (P>0.05). (Table 5)

**DISCUSSION AND CONCLUSION**

In this study, the mean of menarche age in all participants (both patient and control groups) was 12.8. Among the domestic studies conducted on the menarche age, Amin Alroaya et al.; in 1997 [13], Razaqi et al.; in 2004 [14], and Haqian et al.; in 2002 [15] have reported the menarche age as 12.9, 12.6, and 12.5, respectively. The menarche age of the girls in other countries has also been reported as 12.5 [16], 12.4 [17], 12.8 [18], and 13 [19]. In the present study, the mean of menarche age was consistent with other studies conducted on Iranian girls as well as those with other nationalities.

The mean age of menarche in individuals with PCOS and the control group was 12.7 and 12.8, respectively, indicating no significant difference between the two groups (p=0.694). Sadrzadeh et al.; in 2003 conducted a study in an infertility clinic in Netherlands and reported that the age of onset of menarche in patients with PCOS was significantly higher compared to the control group [20]. Carroll et al.; in 2012 conducted a study on 18-45-year-old women regarding the hypothesis claiming the body mass index (BMI) and DNA variants are able to predict the menarche age in the girls afflicted with PCOS. They examined 522 women with PCOS and 472 in the control group in terms of the menarche age and observed that there was a strong inverse relationship between BMI and the menarche age in individuals with PCOS. Furthermore, there was a relationship between a kind of variant on chromosome 6 and the lower menarche age in women with PCOS. Generally, there was a relationship between the menarche age and the affliction status of PCOS, the reported weight at 10-14 years old, the present rate of BMI, and the patients’ genotype (LIN28B gene) [21].

Regarding the above-mentioned studies and contradictory results of different studies, one cannot conclude an agreement with respect to the relationship between the menarche age and PCOS. In this study, 92.7 percent of patients with PCOS and 20.3 percent of non-PCOS individuals had irregular periods. Lower-abdominal pain between period intervals was reported...
in 11.2 percent of patients with PCOS and 3.4 percent of non-PCOS individuals. 14 percent of patients with PCOS and 2 percent of non-PCOS individuals experienced spotting between periods; moreover, 58.1 percent of patients with PCOS and 66.9 percent of non-PCOS individuals were afflicted with dysmenorrhea.

There was a significant relationship between PCOS and menstruation disorders (p<0.001), lower-abdominal pain between period intervals (p=0.008), and spotting between periods (p<0.001), but it did not have a significant relationship with dysmenorrhea (p=0.103). Besides, there was no significant difference between the patients with PCOS (6.24±1.93) and non-PCOS individuals (6.26±1.42) with regard to the mean of the number of bleeding days during menstrual period (menstrual period length) (p=0.935). However, the amount of bleeding reported in terms of the number of pads used during the days of a period in the PCOS group (4.11±1.6) was lower and had a significant difference (p=0.016) compared to non-PCOS group (4.54±1.5).

Michelmore et al.; in 1999 conducted a study on 18-25-year-old girls and showed that 65 percent of the patients with PCOS and 45 percent of those in the control group had irregular periods [22]. Soltani et al.; in 2007 studied Hamadan high school girls, of whom 33.6 percent said to have irregular periods, 18.4 percent of whom experienced spotting between two menstruation periods, and 78.1 percent of whom were afflicted with dysmenorrhea [23]. In this study, the rate of menstrual irregularity has been higher compared to that of other studies (92.7% of the patients with PCOS and 20.3% of non-PCOS women). Its rate in non-PCOS women has been even higher than many of the aforementioned studies. This great difference may be due to the low age group in the study. Since the menstruation cycle evolution is a gradual process, the establishment of regular menstrual cycles may take 5 years after the menarche age. Bora in 2016 conducted a study on 172 18-45-year-old women afflicted with PCOS in India, of whom 59.8 percent were reported to have irregular periods [24]. Regarding the 60-percent prevalence of menstrual irregularity in Bora’s study and also regarding its 18-45-year-old age group, the high prevalence of menstrual irregularity in the present study can be justified.

Many studies have regarded PCOS as a major factor in menstrual irregularity occurrence in adolescence [19, 25-28]. The recent studies have indicated that the menstrual disorder in adolescents, especially if manifested as Oligomenorrhea, may be a sign of early PCOS [29-32]. Furthermore, the menstrual irregularity in the early years following the menarche age can be regarded as a disorder index for psychosocial adjustment of 13-19-year-old girls [33]. Jarvelaid et al.; in 2005 conducted a study on high school girls to investigate the prevalence of menstrual irregularity in the early years following the menarche age and the biopsychosocial factors associated with menstrual irregularity. 40 percent of the girls had irregular periods. The risk factors associated with menstrual irregularity included a BMI less than 17.5, poor relationship with parents, lack of desire and satisfaction for going to school, and a high level of depression. [26].

PMS was one of the other points investigated in the present study. The most common physical symptoms of PMS were weakness and fatigue (42.5% of the patients with PCOS and 37.8% of the control group), breast pain (26.3% of the patients with PCOS and 19.6% of the control group), muscle spasms (21.2% of the patients with PCOS and 14.9% of the control group), paresthesia (14% of the patients with PCOS and 13.5% of the control group), and headache (14% of the patients with PCOS and 12.9% of the control group), respectively. Among the PMS physical symptoms, there was only a significant difference in terms of the amount of edema between patients afflicted with PCOS and non-PCOS individuals (p=0.003) so that it was higher in non-PCOS individuals. The most common mental symptoms of PMS were nervousness and aggression (48.6% of the patients with PCOS and 56.1% of the control group), depression (17.3% of the patients with PCOS and 16.9% of the control group), difficulty concentrating, and mood irritability, respectively. There was no significant relationship between PCOS and any of the PMS mental symptoms including depression, difficulty concentrating, nervousness and aggression, and mood irritability (P>0.05).

Bakhshani et al.; in 2012 conducted a study on 14-18-year-old students and indicated that the most common mental symptoms were fatigue (51.4% of students) (fatigue and lethargy were categorized as mental symptoms in their study), anxiety and worry, appetite changes, sleep disorder, and decreased interest in work and social activities, respectively. Besides, the most common physical symptoms included breast pain (100% of students), gastric pain, backache, joint or muscle pain, and pain in hands and feet, respectively [34]. A study conducted on 18-40-year-old women in 6 big cities in Brazil indicated that the most common mental symptoms were anxiety, restlessness, irritability, anger, aggression, mood swings, and crying. Also, the most common physical symptoms were headache,
muscle spasms, and breast swelling or pain [12]. Furthermore, Silva et al.; in 2006 conducted a study and showed that the most common symptoms were breast pain, abdominal pain, fatigue, irritability, nervousness, and headache [35].

This phenomenon has been extensively studied on adults although the presence of which in adolescents has been diagnosed recently [12]. Some PMS symptoms may lead to negative serious consequences for adolescents, their families and social relationships such as low self-esteem, low stress tolerance, and feeling of insufficiency [34]. The results of the studies conducted by Wilson et al.; on high school students indicated that most female adolescents consider PMS as a problem significantly affecting their education and performance [36]. Previously, there was an accepted medical belief claiming that dysmenorrhea is prevalent in adolescents but PMS is not. Contrary to that belief, the results of the present study are consistent with other studies [34, 37, 38] indicating that PMS is a major problem among adolescents intervening family, educational, and social activities. Hence, it seems necessary to provide adolescents with an educational program in schools to increase their general information about physiology of menstruation and the relationship between hormonal changes and symptoms; moreover, it is recommended that prevention strategies should be used and efficient early treatments should be done to facilitate the adjustment and improvement of the quality of life as well as the health development of adolescent girls, an instance of which can be an improvement in adolescents’ dietary styles.

Therefore, according to the findings of the present study, like most of the individuals afflicted with PCOS, the menstrual disorder symptoms and PMS are also present in adolescents and there is no difference between adolescents and adults in this regard. Furthermore, PMS is frequently observed in teenagers. Thus, due to the sensitivity of this age and the mental issues associated with it, the afflicted adolescents need to be paid more attention so that the manifestations of symptoms and the mental problems related to PCOS would not affect them to a larger extent.

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