

Awareness of Polycystic Ovary Syndrome among Schoolgirls and Their Mothers: A Cross-Sectional Study

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Abstract

Background: One of the most common endocrine disorders of reproductive age women is polycystic ovary syndrome (PCOS). Women with PCOS are at risk for infertility, endometrial cancer, metabolic disorders, and cardiovascular disease. Awareness of the signs and symptoms of PCOS can be effective in diagnosing early stage PCOS and promoting quality of life (QoL). This study assesses the awareness of PCOS in schoolgirls and their mothers.

Materials and Methods: This cross-sectional study was carried out on 1580 high school girls and 480 of their mothers in Tehran (capital of Iran) in 2017 and 2018. We used the stratified sampling method and divided Tehran into five geographic regions: north, south, east, west, and central. Schools were randomly selected from each of these regions. Students and their mothers separately answered a self-administered questionnaire that pertained to their knowledge of PCOS. Statistical analyses were carried out with SPSS, version 22 (Inc. Chicago, IL, USA) and R version 3.2.1.

Results: Students had an average age of 16.97 ± 0.84 years and their mothers' average age was 45.19 ± 5.03 years. The average body mass index (BMI) of the students was 22.01 ± 5.54 kg/m². The results of this study showed that only 48 students (3.2%) and 148 mothers (27%) had acceptable knowledge about PCOS. The knowledge of students about PCOS was positively related to their mothers' knowledge about PCOS ($P < 0.001$).

Conclusion: The level of PCOS awareness in Iranian women is insufficient and this may affect their QoL. Therefore, the health authorities should implement educational programs to challenge women's incorrect beliefs about PCOS and increase their awareness of this disease.

Keywords: Polycystic Ovary Syndrome, Knowledge, Schoolgirls

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Introduction

Polycystic ovary syndrome (PCOS) is one of the most common and complex endocrine disorders that affects 5-10% of reproductive-aged women (1). The range of PCOS prevalence is 8 to 13% and depends on the type of diagnostic criteria, race, and ethnicity of the studied population (2). For instance, the prevalence of PCOS in the United States ranges from 5 to 7% (3); however, it is at least 2.2% in China (4) and as high as 14.1% in Iran (5). The results of a study conducted in the United Kingdom indicated that women in South Asia were significantly more

likely to hyperandrogenic symptoms in comparison with Caucasian women (6). These differences in phenotypes have been mentioned in other populations, including African Americans and Hispanics (7, 8). Differences in the reported prevalence of PCOS are probably be due to differences in diagnostic criteria (9). For instance, Tehrani et al. (10) have reported a prevalence of PCOS in women ages 18-45 years of 7.1% according to National Institutes of Health (NIH) criteria, 11.7% by Androgen Excess Society (AES) criteria, and 14.6% according to Rotterdam criteria. Sayehmiri et al. (11) reported a prevalence of

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PCOS among 10-54 years old females of 6.8% (NIH), 19.5% (Rotterdam), and 41.4% (ultrasound) criteria. In addition, the prevalence of PCOS may vary according to age. Koivunen et al. (12) reported a higher prevalence of PCOS in young women compared to women over 35 years of age. PCOS seems to have a genetic source that is affected by environmental factors of eating habits, lifestyle, and social status. It is characterised by a wide range of signs and symptoms that are associated with dysfunction in the reproductive organs, endocrine functions, and metabolic systems (13, 14). The signs and symptoms of PCOS in women are painful and uncomfortable. Barnard et al. (13) have reported that women with PCOS had poor quality of life (QoL), high levels of depression, emotional disturbance, obesity, infertility, acne, menstrual symptoms, and hirsutism. Also, PCOS is a leading cause of anovulatory infertility, a risk factor for endometrial dysfunction and uterine cancer, which is a serious lifelong health concern (15, 16). Therefore, awareness of the signs, symptoms, and complications of early stage PCOS could be of tremendous importance in improving QoL in these women (1).

Sunanda and Nayak (17) reported that, in recent years, the number of PCOS patients increased by 30% in India. Lack of knowledge and lifestyle changes among the women appeared to be two important factors that led to increased numbers of PCOS patients. Hajivandi et al. (18) reported decreased consumption of healthy foods (e.g., fibre, meat, beans, fish, seafood, and dairy products) among adolescent girls with PCOS. The results of studies indicate that weight loss and lifestyle modification are two, initially important steps for treatment of PCOS (19-21). The actual cause of PCOS is unclear and symptoms vary from case to case (22). PCOS is caused by an imbalance of female sex hormones, which may lead to changes in the menstrual cycle, multiple cysts in the ovaries, failure to conceive, and other health issues (17). Symptoms of PCOS begin after onset of the menstrual cycle in women. The most common symptom is irregularity in the menstrual cycle along with symptoms of obesity, menstrual abnormalities (amenorrhoea, oligomenorrhoea, and other menstrual irregularities), hirsutism, acne, sleep apnoea, depression, and infertility (23).

Diagnosis of the early symptoms of PCOS is possible in individuals with late puberty and early adolescence, both of which are commonly correlated with lifestyle and environmental changes. Early diagnosis of PCOS is necessary for timely intervention in order to reduce both the initial and chronic complications of PCOS (24).

Obesity and insulin resistance are important risk factors of metabolic syndrome in PCOS patients. The high risks associated with such metabolic disorders call for rapid and timely identification of PCOS. In this regard, the first step is to increase women's awareness of PCOS (25) because an accurate diagnosis can improve QoL in these women (26). Awareness of PCOS symptoms is of great importance for both treatment and prevention of complications (27).

Haq et al. (28) have reported that although the prevalence of signs and symptoms of PCOS is increasing, there is still a substantial lack of awareness of the symptoms among females. According to Rahmanpour et al. (25), awareness of women with PCOS in terms of symptoms, complications (obesity, insulin resistance, infertility, etc.) and ways to prevent PCOS progression that include lifestyle changes and decreased consumption of fast foods can play an important role in the future.

To the best of our knowledge, this is the first study to evaluate the level of awareness towards PCOS among high school girls and their mothers in Iran. The results of this study can help to change the approach of the education system in Iran. Therefore, educating high school girls about the symptoms, risk factors, and prevention of diseases (such as PCOS) can be a significant help in improving women's community health in the future.

Materials and Methods

This was a cross-sectional study performed on 1580 schoolgirls who attended randomly chosen schools from 19 school districts in Tehran (capital of Iran) and 480 of their mothers. The study was conducted in 2017 and 2018. Of note, the school principals of these schools invited all mothers to participate in a meeting, but only 480 of them attended.

The Ethical Committee of Royan Institute, Tehran Iran (IR.ACECR.ROYAN.REC.1396.45) approved this study. The study aim and data confidentiality were clearly explained for all participants along with ethical issues, which were written above the questionnaires. Each schoolgirl and her mother who wished to participate were included in this study. Each completed questionnaire was considered to be that participant's written informed consent.

A review of available sources and texts was conducted by researchers on different sites and no similar questionnaire was located. Therefore, in order to achieve the main goal of the study, we designed this questionnaire. Initially, similar articles about PCOS were extracted by searching various databases and locating the available sources and texts. This was a knowledge-based questionnaire; therefore, content validity was confirmed via thorough review and revision by 15 experts and specialists (obstetricians and gynaecologists, midwives and nurses). Face validity was also used for the spoken items in the questionnaire. The designed questionnaire included ten positive and negative questions about PCOS. Participants who answered more than half of these questions were considered to "have knowledge". Demographic and general information questions that included region of school and grade, age, weight, height, birth order, type of delivery (vaginal or caesarean section), nutrition in infancy (breast milk, powdered milk, or both) were included. The mother's questionnaire included demographic information that pertained to

age, birth order, type of delivery, nutrition in infancy, occupation, and education, etc... A yes/no general question about self-perception of PCOS awareness was also included.

Any clinical or laboratory diagnostic methods were not included in this study.

We used a stratified sampling method to divide Tehran into five geographic regions: north, south, east, west, and central, from which the schools were randomly selected. In the next step, with the coordination of the school principals, we conducted a conference entitled "Awareness of PCOS for Girls and Their Mothers". Students and their mothers answered a self-administered questionnaire of their knowledge about PCOS prior to the conference.

Based on this method, estimating the sample size, 95% confidence level, 0.025 (two-way) confidence interval, and proportional probabilities of the three-stage clustering method were used. In the first stage, with equal probability, regions and schools were randomly selected with an equal probability within the clusters. Finally, we selected 40 students from each school. Due to the structure of the data collection and the random number of participants in the third stage of the surveys, we selected the minimum sample size available to decrease the possibility of insufficiency of the sample at this stage (Table S1, See supplementary Online Information at www.ijfs.ir).

Statistical analysis

The descriptive characteristics of the students and their mothers are reported as mean ± standard deviation or frequency (percentage). The McNemar test was performed to estimate the relation between mothers and daughters' knowledge about PCOS. The Chi-square test of independence or Fisher's exact test was used to assess the association of the PCOS categorical variables. Type I error was considered to be 0.05. Statistical analyses were conducted using SPSS, version 22 (Inc. Chicago, IL, USA) and R version 3.2.1.

Results

School girls had a mean age and body mass index (BMI) of 16.97 ± 0.84 years and 22.01 ± 5.54 kg/m², respectively. Most students were from the east region (29.4%) and most were the first child in their family (52.4%). A total of 71% were born by caesarean section and 63.8% were completely breastfed during their childhood. Table 1 lists the demographic characteristics of the students.

Table 2 lists the demographic characteristics of the mothers. The mothers had an average age of 45.19 ± 5.03 years, 62.7% of them were born by vaginal delivery, and 71.9% were completely breastfed. The majority of mothers who were housewives with a diploma degree had more information about PCOS compared to the other mothers.

Table 1: Demographic characteristics of the schoolgirls

Variables	Mean ± SD or frequency (%)
Age (Y)	16.97 ± 0.84
BMI (Kg/m ²)	22.01 ± 5.54
Region	
South	192 (11.5)
East	492 (29.4)
North	219 (13.1)
West	426 (25.5)
Center	251 (15)
Birth order	
1	779 (52.4)
2	502 (33.7)
3	160 (10.8)
4	40 (2.7)
5	6 (0.4)
7	1 (0.1)
Type of delivery	
Vaginal	575 (29)
Caesarian	898 (71)
Nutrition in infancy	
Breast	927 (63.8)
Powder	108 (7.4)
Both	418 (28.8)

BMI; Body mass index.

Table 2: Demographic characteristics of the mothers

Variables	Mean ± SD or frequency (%)
Age (Y)	45.19 ± 5.03
Number of daughters	1.53 ± 0.78
Number of sons	0.67 ± 0.71
Number of family members	2.21 ± 0.99
Occupation	
Housewife	421 (88.8)
Employee	53 (11.2)
Education	
High school	85 (18)
Diploma	288 (61)
Graduated	99 (21)
Nutrition in infancy	
Breast	339 (71.9)
Powder	54 (11.3)
Both	85 (17.8)
Type of delivery	
Vaginal	301 (62.7)
Caesarian	179 (37.3)

The awareness rate of PCOS in schoolgirls was 3.2% (n=48), and 22.91% (n=11) had PCOS. There was a history of PCOS in their mothers (n=5, 10.41%) and sisters (n=6, 12.5%). The awareness rate of PCOS among mothers was 27% (n=128).

In terms of self-perception of awareness, 6.45% (n=102) of the students considered themselves to have knowledge of PCOS compared to 44.58% (n=214) of the mothers.

Sources of information about PCOS for schoolgirls included their mothers (31.25%), the Internet (25%), health educators and radio /television (each one 18.75%), their friends and study about PCOS (each one 14.58%).

Table 3 shows a significant positive relation between awareness of the schoolgirls about PCOS and their mothers' knowledge about PCOS (P<0.001).

Table 3: The relationship between schoolgirls' awareness of PCOS and their mothers' knowledge

Awareness of PCOS	Mothers		McNemar test P value
	Yes	No	
Schoolgirls			<0.001
Yes	9 (2.3)	12 (3.1)	
No	97 (24.9)	271 (69.7)	
Total	106 (27.2)	283 (72.8)	

Data are presented as n (%). PCOS; Polycystic ovary syndrome.

The result of our study showed that awareness of PCOS in mothers and their daughters was significantly related to the level of mothers' education (P=0.002). In addition, PCOS awareness among mothers was significantly related to their educational level (P<0.001, Table 4).

We observed a significant correlation between mothers' occupations and their awareness of PCOS (P=0.01). However, there was no correlation between mothers' occupations and their daughters' awareness of PCOS (P=0.06, Table 5).

Table 4: The relationship between mothers' education with awareness of PCOS for themselves and their daughters

Awareness of PCOS in	Mothers' education			Total	P value
	Under diploma	Diploma	Uper diploma		
Schoolgirls					0.002
Yes	9 (2.3)	12 (3.1)	0 (0)	21 (5.4)	
No	59 (15.2)	233 (60.2)	74 (19.1)	366 (94.6)	
Total	68 (17.6)	245 (63.3)	74 (19.1)	387 (100)	
Mothers					<0.001
Yes	6 (1.3)	82 (17.6)	40 (8.6)	128 (27.4)	
No	79 (16.9)	203 (43.5)	57 (12.2)	339 (72.6)	
Total	85 (18.2)	285 (61)	97 (20.8)	467 (100)	

Data are presented as n (%). PCOS; Polycystic ovary syndrome.

Table 5: The relationship between mothers' occupation to awareness of their PCOS and their daughters

Awareness of PCOS in	Mothers' education		Total	P value
	Housewife	Employee		
Schoolgirls				0.06
Yes	21 (5.4)	0 (0)	21 (5.4)	
No	321 (82.7)	46 (11.9)	367 (94.6)	
Total	342 (88.1)	46 (11.9)	388 (100)	
Mothers				0.01
Yes	103 (22)	21 (4.5)	124 (26.4)	
No	313 (66.7)	32 (6.8)	345 (73.6)	
Total	416 (88.7)	53 (11.3)	469 (100)	

Data are presented as n (%). PCOS; Polycystic ovary syndrome.

Table 6: The association between awareness of PCOS and demographic variables of the participants

Demographic variables	Mothers' awareness			Students' awareness		
	Yes	No	P value	Yes	No	P value
Birth order ^a	1.00	54 (24.7)	<0.001*	1.00	25 (3.2)	0.24
	2.00	46 (37.1)		2.00	15 (3)	
	3.00	6 (15.4)		3.00	8 (5)	
	≥4	0 (0)		≥4	0 (0)	
		7 (100)			47 (100)	
Nutrition in infancy ^b	Breast	86 (25.5)	0.01*	Breast	26 (2.8)	0.71
	Powder	9 (16.7)		Powder	3 (2.8)	
	Both	31 (37.8)		Both	10 (2.4)	
Type of delivery ^b	Vaginal	80 (26.6)	0.81	Vaginal	26 (4.5)	0.02*
	Caesarian	48 (27.6)		Caesarian	21 (2.3)	
Age ^b (Y)	<42	28 (18.9)	<0.001*	≤15	0 (0)	0.23
	42-45	41 (46.6)		16	10 (2.8)	
	45-48	18 (18.2)		17	22 (3.1)	
	>48	32 (29.6)		18	16 (4)	
Region ^b	South	15 (20.8)	0.01*	South	2 (1.1)	0.01*
	East	35 (21.9)		East	23 (5.2)	
	North	12 (30.8)		North	8 (3.7)	
	West	24 (31.6)		West	6 (1.5)	
	Center	42 (32.8)		Center	9 (3.6)	

Data presented as frequency (%). ^a; Fisher Exact test, ^b; Chi Square test, *; Significant, and PCOS; Polycystic ovary syndrome.

Our results showed that the level of awareness towards PCOS among students was significantly related to two variables: maternal delivery type ($P=0.02$) and district of residence ($P=0.01$). In this regard, students who were delivered by caesarean section and lived in the east region had more information of PCOS compared to other students. Table 6 shows that mothers who had higher awareness of PCOS compared to the other participants had the following characteristics: first child ($P<0.001$), age range: 42–45 years ($P=0.01$), nutrition in infancy ($P<0.001$), and residence in the central region of the capital ($P=0.01$).

Discussion

The first step in managing PCOS is awareness and accurate diagnosis, which can both improve QoL in a patient (1). This study was conducted to assess the knowledge of PCOS among schoolgirls and their mothers. The results of our study showed that awareness of PCOS in schoolgirls and their mothers was 3.2% ($n=48$) and 27% ($n=148$), respectively. Among them, 22.91% ($n=11$) of girls and 10.41 % ($n=5$) of mothers were diagnosed with PCOS.

Gul et al. (29) reported that only 20 out of 177 (11.3%) Pakistani women who participated in their study had inadequate information about PCOS, and 11 participants had degrees in the Medical Sciences. In another study in Pakistan, Haq et al. (28) reported that 72.5% of the women were unaware of PCOS. Awareness of PCOS in Saudi women was 56.7% of which 15.3% of these women had PCOS (27). Additionally, Shammi (26) showed that 66.94% of female students had the least knowledge and 2.20% had high awareness of PCOS, 30.85% had no knowledge of PCOS, and 22.25% were diagnosed with PCOS. Upadhye and Shembekar (1) conducted a study in India and reported that 72% of girls (medical students) had knowledge of PCOS, and 6% had PCOS. The high level of awareness of girls in their study might be due to their medical school education.

In a study conducted by Alessa et al. (27), 72.9% of females were university graduates and 1.2% had only primary school education. They found that a significantly greater level of awareness of PCOS among women with higher education levels; most of the women with knowledge of PCOS had a history of medical and health education. Aminrad et al. (30) reported that an increase in age and level of education resulted in an increase in awareness and attitude of individuals towards environmental issues. In our study, the average age of high school girls was 16.97 ± 0.84 years. Upadhye and Shembekar (1) reported that 62.5% of participants were young adults (20–24 years) and 37.5% were adolescents (18–19 years); only 28% were unaware of PCOS. Sills et al. (31) found that participants in the age group of 26–34 years had significantly higher information about PCOS than others. Alessa et al. (27) reported a relatively high awareness level (56.7%) towards PCOS among Saudi women (18–50 years). Due to less experience and study

levels among younger age groups, they might receive less information about PCOS than older age groups; however, Strong (32) believes that people who live longer will have a better chance of learning. In other words, as young girls become older, their level of awareness and curiosity increase with respect to female-related illnesses, which could be due to the exposure of students, friends, and relatives to relative illnesses and symptoms.

In the present study, the most common source of information for girls was from their mothers (31.25%), followed by the Internet (25%), health educators and radio/television (each one 18.75%), and their friends and study about PCOS (each one 14.58%). Alessa and colleagues (27) reported that among women who had knowledge of PCOS, 15.3% had PCOS and they received information about their disease from the Internet (21.3%), other patients (10.4%), doctors (10.8%), and books (3.1%). In another study, 82.02% of the students with PCOS had access to information via doctors (17.98%), media (11.24%), the Internet, and physiotherapists (1.1%) (26). Sills et al. (31) reported that women with PCOS, regardless of age, received more information on PCOS from their doctors. Upadhye and Shembekar (1) indicated that 33% of young girls and teenagers received their information about PCOS from teachers, friends (19%), physicians (11.5%), newspapers (3.5%), and the Internet (5%).

The results of our study showed that schoolgirls who attended high schools in east Tehran had the highest knowledge about PCOS and students in the south had the least awareness of PCOS. The east parts of Tehran appear to be some of the older, original regions, and had less migration than the other regions. Also, the quality of education in this area is higher than the south of Tehran, with a more native and marginal tissue. Shokouhi (33) believes that one of the consequences of uncontrolled migration to large cities, such as Tehran, is marginalization that has expanded over the past few decades.

Mothers' knowledge about PCOS significantly affects the awareness of their daughters. In addition, mothers who are the first-born in a family have more awareness of PCOS. It seems that mothers are more sensitive and spend more time to train and educate their first-born children. Mothers usually obtain their information through consultation with friends, doctors, radio and television, reading books, and the Internet. If a mother has PCOS, she can inform her daughter of its symptoms and side effects. Therefore, this awareness can lead to a faster diagnosis and prevention of complications.

Abdel Azim Mohamed (34) concluded that educating woman about PCOS could play a significant role in increasing their awareness. They reported that prior to the establishment of educational sessions, most students (84.4%) had poor knowledge about PCOS. After the educational sessions, there was an increase in the knowledge score of PCOS. Nivetha and Suganya (24) reported that educating women about all aspects of PCOS would increase community knowledge about the impact

of PCOS on women and their loved ones. Jakhar et al. (35) believes that screening of PCOS in schools/colleges/universities is extremely important and awareness of PCOS could enhance a woman's lifestyle and her future reproductive life.

The limitations of our study include the lack of suitable cooperation by schools, students, and their mothers with researchers. The allotted time for students and mothers to complete the questionnaires was 8 am to 2 pm that majority of mothers were housewives. The exclusion of diagnostic analysis; and the criterion for PCOS was self-reported (mother or student).

Conclusion

The level of PCOS awareness in Iranian women is insufficient and this affects their QoL. Adolescent girls should receive knowledge about PCOS because it can affect their health and future pregnancies since PCOS is associated with foetal and maternal complications. A mother's awareness about PCOS can be a tremendous assistance to her daughter's knowledge of PCOS.

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Authors' Contributions

A.M., R.O.S.; Study design and conception, responsible for the overall supervision, and editing of the manuscript. F.M.; Study design contributed to the interpretation of the data and writing manuscript. B.N., M.M.; Data collection and manuscript writing. M.M.; Data analysis and interpretation and manuscript writing. All authors approved the final version of the manuscript for submission.

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