ORIGINAL ARTICLE

Frequency of Polycystic Ovaries Syndrome in Reproductive Age Women

Shabnam Abbas, Amjad Sattar, Nauman AL-Qamari

ABSTRACT

Objective: To determine the frequency of polycystic ovarian syndrome (PCOs) amongst the reproductive age women by ultrasound.

Method: This retrospective cross-sectional study was conducted at Dow Institute of Radiology, Dow University of Health Sciences, Ojha campus, Karachi. The study period spanned from May - October, 2017. All women of reproductive age group (18 - 39 years) having complaints of infrequent or prolonged menstrual periods or excess male hormone (androgen) levels resulting in excess facial and body hair (hirsutism), severe acne or male-pattern baldness were included. A detailed history of past gynecological events along with demographic characteristics was also obtained.

Results: Of total 1500 women, mean age was 28.01 ±5.71 years. PCOs was found positive in 216 (14.4%) women. Multivariable analysis revealed that age (OR 2.88, 95% CI 1.97-4.19), nulliparity (AOR 5.03, 95% CI 2.84-8.91), primiparity (AOR 3.14, 95% CI 1.50-6.57), history of hormonal intake (AOR 1.18, 95% CI 0.72-1.92), and hirsutism (AOR 4.55, 95% CI 2.45-8.46) were significantly more likely while weight gain (OR 0.40, 95% CI 0.25-0.63) was significantly less likely to have PCOs.

Conclusion: The findings of our study have showed higher frequency of PCOs. Furthermore, increased age, nulliparity, primiparity, history of hormonal intake, and hirsutism were found to be significant associated factors.

Key words: Polycystic ovaries; women; past gynecological events.

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INTRODUCTION

Polycystic Ovary Syndrome (PCOs) is a female endocrinopathological disorder that comprises of hyperandrogenism, ovulatory dysfunction, and sonographic PCOs. The heterogeneity of the syndrome is dependent on the levels of androgens, gonadotrophins as well as the insulin resistance in each patient. Besides affecting the ovulatory cycles (resulting in oligomenorrhea), it may also afflict the female with infertility, acne and hirsutism.[1]

NIH proposed "NIH criteria" has gained worldwide acceptance.[2] The criteria included oligomenorrhea, hyperandrogenism in combination with the absence of phenocopies. As the presence of polycystic ovaries was not included in the original NIH Criteria, another meeting was held to include the size and morphology of the polycystic ovaries in the definition and the criteria were renamed "Rotterdam criteria".[3,4] According to the Rotterdam criteria , the ovaries would be labeled

Dow Institute of Radiology, Dow University of Health Sciences, Karachi, Pakistan.

Correspondence:
Dr. Shabnam Abbas
Dow Institute of Radiology, Dow University of Health Sciences, Ojha Campus, Suparco Road, Karachi, Pakistan
Email: brill_shabnam@yahoo.com

as polycystic morphologically if ≥12 follicles measuring 2–9 mm in diameter, or ovarian volume >10 ml are found in atleast one ovary. The ultrasound examination is very important as it has been reported that approximately 20-25% of females who have regular ovulating cycles, were found to PCOs.[4]

A trio of studies reported a frequency of 21-22% in patients, where ultrasonography was utilized to detect the polycystic ovaries.[5-7] A study reported a frequency of 9% and used oligomenorrhea and hyperandrogenism as the inclusion criteria.[8] The percentage of PCOs reported in South East Asia is considerably higher i.e. 52% as compared to the frequency was reported to be 20-25% in United Kingdom. The high frequency could be a result of a multitude of factors namely genetic, environmental as well as the consanguinity in marriages.[9]

Nonetheless, very little data was available in this regard which truly represents the disease frequency in Pakistan, Therefore, we conducted this study to determine the frequency of PCOs amongst the general Pakistani females. As every country has its own data relevant to heterogeneity in ethnicity, genetic and environmental factors, so our study will help the gynecologist, endocrinologist and physician in better management of the condition.

METHODS

This retrospective cross-sectional study conducted at Dow Institute of Radiology, Dow University of Health Sciences, Karachi. The study period spanned from May 1st 2017 to October 31st 2017. All women of reproductive age group (18 - 39 years) referred to our department having complaints of infrequent or prolonged menstrual periods or excess male hormone (androgen) levels resulting in excess facial and body hair (hirsutism), severe acne or male-pattern baldness were included. Patients who were suffering from any hepatic, renal or any other evident endocrinological disorders, had a positive history of immuno-suppressive therapy, had a positive history of smoking or currently on any treatment were excluded.

The purpose of the study was explained to each participants and voluntary informed consent was obtained. A detailed history of past gynecological events of each patient was also recorded. The participants were queried in detail regarding the presence of hypertension, diabetes mellitus, any menstrual irregularities and a positive history of weight gain. The menstrual history was emphasized on the most and a detailed questioning was done which included the age of menarche, time since last menstrual period, duration of cycles, any history of missed cycles or complete absence of cycles. Menstrual irregularities were defined as; oligomenorrhea as intermenstrual interval > 35 days. Regular menstruation was defined as 9–16 cycles of 21–35 days duration within a year and no more than a 4-days difference in duration between cycles. The participants were also examined for the presence of acne. They were also questioned about any excessive or out of ordinary hair growth that they may have noticed in their facial area or on the body.

The participants had pelvic ultrasound scan with full bladder. The ultrasound diagnosis of PCOS was made on the basis of Europeon Society for Human Reproduction (ESHRE) American Society of Human Reproduction (ASRM) criteria i.e. 10 or more cystic follicles per ovary, varying in size from 2-9 mm or ovarian volume of 10 cm^{10}. Women were interviewed as well as examined for the signs and symptoms of PCOs. The clinical diagnosis was based on history, general physical examination and ultrasound (US) assessment (trans-abdominal in young and unmarried girls and transvaginal US in the married women).

SPSS v. 22 was used for the purpose of statistical analysis. Mean and standard deviation was calculated for quantitative variables like age and age at the time of menarche while frequency and percentages were calculated for marital status, menstrual status, history of hormonal intake, hirsutism, acne, weight gain, parity and ovarian morphology. Chi-square test was applied to see the association of ovarian morphology with baseline characteristics. Binary logistic regression was also applied. All those variables found significant in univariable analysis were included for multivariable analysis. P-value <0.05 was taken as significant.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

RESULTS

Out of total 1500 woman, 834 (55.6%) women were presented with ≤28 years of age while 666 (44.4%) women with >28 years of age (mean age 28.01 ±5.71 years, range 18-39 years). The mean age at the menarche was 12.12 ±0.61 years (range 11-13 years). Majority of the women (n=1114, 74.3%) were presented with ≤12 years at the time of menarche while 386 (25.7%) women were presented with >12 years at the time of menarche. Married women were predominantly higher (n=1422, 94.8%) as compared to unmarried (n=78, 5.2%). Normal menstrual status was found in majority (n=1040, 69.3%) women, followed by oligomenorrhea (n=250, 16.7%), polymenorrhagia (n=185, 12.3%) while amenorrhea was found in only 25 (1.7%) women. History of hormonal intake was found 182 (12.1%), hirsutism in 102 (6.8%), acne in 294 (19.6%), while weight gain in 698 (46.5%) women.

PCOs was found positive in 216 (14.4%) women. (Figure 1) PCOs was found significantly associated with age (p-value <0.001), menstrual status (p-value <0.001), parity (p-value <0.001), history of hormonal intake (p-value <0.001), hirsutism (p-value <0.001), and weight gain (p-value <0.001) while insignificantly associated with marital status (p-value 0.683) and acne (p-value 0.217). (Table 1)

Univariable analysis showed that age (OR 2.81, 95% CI 2.02-3.90), nulliparity (OR 7.79, 95% CI 4.51-13.47), primiparity (OR 3.68, 95% CI 1.79-7.53), history of hormonal intake (OR 2.12, 95% CI 1.46-3.09), and hirsutism (OR 3.51, 95% CI 2.26-5.44) were significantly more likely while weight gain (OR 0.564, 95% CI 0.41-0.76) was significantly less likely to have PCOs. These associations were found similar on multivariable analysis as well. (Table 2).

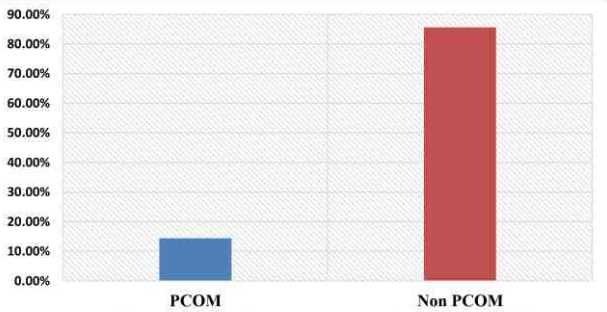

Figure 1: Ovarian morphology of women (n=1500)

Table 1: Comparison of polycystic ovarian syndrome with general characteristics of the women (n=1500)

	Total	PCOs	Non PCOs	
	n (%)	n (%)	n (%)	p-value
Age, years				
≤28	834	163 (19.5)	671 (80.5)	<0.001
>28	666	53 (8)	613 (92)	
Age at the time of menarche, in years				
≤12	1114	161 (14.5)	953 (85.5)	0.922
>12	386	55 (14.2)	331 (85.8)	
Marital Status				
Married	1422	206 (14.5)	1216 (8.5)	0.683
Unmarried	78	10 (12.8)	68 (87.2)	
Menstrual Status				
Amenorrhea	25	4 (16)	21 (84)	<0.001
Normal	1040	89 (8.6)	951 (91.4)	
Oligomenorrhea	250	99 (39.6)	151 (60.4)	
Polymenorrhagia	185	24 (13)	161 (87)	
Parity (n=1144)				
Nulliparity	635	156 (24.6)	479 (75.4)	<0.001
Primiparity	135	18 (13.3)	117 (86.7)	
Multiparity	337	15 (4.5)	322 (95.5)	
Grand Multiparity	37	0 (0)	37 (100)	
History of hormonal intake				
Yes	182	44 (24.2)	138 (75.8)	<0.001
No	1318	172 (13.1)	1146 (86.9)	
Hirsutism				
Yes	102	35 (34.3)	67 (65.7)	<0.001
No	1398	181 (12.9)	1217 (87.1)	
Acne				
Yes	294	49 (16.7)	245 (93.3)	0.217
No	1206	167 (13.8)	1039 (86.2)	
Weight Gain				
Yes	698	75 (10.7)	623 (89.3)	<0.001
No	802	141 (17.6)	661 (82.4)	
n: number, chi-square test applied, p-value <0.05 was taken as significant				

Table 2: Regression analysis of factors associated with PCOs (n=1500)

	OR (95% CI)	p-value	AOR (95% CI)	p-value
Age, years				
≤28	2.81 (2.02-3.90)	<0.001	2.88 (1.97-4.19)	<0.001
>28	1		1	
Parity				
Nulliparity	7.79 (4.51-13.47)	<0.001	5.03 (2.84-8.91)	<0.001
Primiparity	3.68 (1.79-7.53)	<0.001	3.14 (1.50-6.57)	0.002
Multiparity	1		1	
History of hormonal intake				
Yes	2.12 (1.46-3.09)	<0.001	1.18 (0.72-1.92)	0.508
No	1		1	
Hirsutism				
Yes	3.51 (2.26-5.44)	<0.001	4.55 (2.45-8.46)	<0.001
No	1		1	
Weight Gain				
Yes	0.564 (0.41-0.76)	<0.001	0.40 (0.25-0.63)	<0.001
No	1		1	
Note: Menstrual status was insignificant thus excluded from regression analysis, 37 cases of Non PCOs grand multiparity are merged in multiparity. OR: Odds Ratio, AOR: Adjusted Odds Ratio, CI: Confidence Interval.				

DISCUSSION

In our study the frequency of PCOS reported in 39.6% of patients who had oligomenorrhea followed by PCOS in 13 % patients with polymenorrhea. The reason for this wide range is because it depends on the nature of the group that is under observation. It is expected that if the group under study has been included based on the presence of the symptoms that are found to be associated with PCOS, then the frequency will be greater in comparison to the general population. [3]

In comparison, Adam et al. reported similar frequency of PCOS in amenorrhic patients which increased to much higher level in oligomenorrhic patients and in those who had complained of hirsutism but had regular cycles. Another study by Kelekci KH et al reported that lower frequency of PCOS in all women included in study but in the acne group, the frequency of PCOS was similar to our results.[11] These differences in frequency of PCOS are likely due to cultural and environ mental factors.

In our study, the frequency of hirsutism was found to be 34.3%. In comparison, a Greek study reported the co-presence of hirsutism and PCOS in lower percentage of population.[8] The difference in the reported percentages of hirsutism could be because of the alternate methodologies as well as different selection criterias.

In another study by Ogueh O et al, PCOs were present in less number of the women. On average women with PCO were younger (30.3 v 35.0 years) and more likely to present with amenorrhea (33.3 v 7.6) than women without PCO, but there was no other statistically significant differences between the two groups. This study suggests that Nigerian women have a low incidence of PCOs.[12]

In our study, the presence of polycystic ovaries was reported in 14.4% of the patients which is lower in comparison to a study by Jalilian et al. who reported very high frequency of polycystic ovaries in the Iranian women using ultrasound[13] while Farquhar also recorded slight higher frequency in a study population of 255 healthy women.[6]

In a study by Meyoshi A et al, Ultrasound identified PCOs in 11 patients (52.4%) and these patients also had higher levels of the androgen dehydroepiandrosterone sulfate (DHEA-S) than those without PCOs. Of the patients with PCOs, five presented menstrual irregularities (45.5%) and three met the Japanese criteria for PCOs (27.2%); whereas all patients without PCOs had a normal menstrual cycle .[14]

In a study by Orio F et al, showed that 141 patients agreed to participate in the study. Of the whole population studied, 32 women (23%) had multifollicular ovaries while 51 (36%) fulfilled the echographic criteria for the diagnosis of PCOs. The remaining number of subjects, 58 (41%), had a normal ovary morphology.[15] The difference in the reported percentages of polycystic ovaries could be because of ethnicity and environmental factors. Ultrasound of the pelvis plays an important role both for detection of polycystic ovaries as well as for the identifying androgens that give rise to the ovarian tumors and sexual development abnormalities.[16] It is recommended that even if a single follicle is identified that is >10mm in diameter, then ultrasound should be repeated again later for the calculation of ovarian volume and area. The classical ultrasound features of PCOS include peripheral distribution of follicles in “string of pearls” and hyperechogenicity of the stroma.[17] In our study, 82.4% of cases were found to have >10 follicles which were >2-9 mm in diameter in comparison to a Saudi study which reported that 12 or more 2–9 mm follicles were found in 97 (89.8%) cases.[18] This finding gives validity to the theory of follicular arrest that proposes the inability of the antral follicles to selected and then dominant follicle in PCOS.[19] Majority of authors have decided the threshold of 10 antral follicles[20] while fewer have kept it at 15.[21] This little difference could be due to operator dependent error.

In our study, the ovarian volume was measured by the 3D scan and found to be 8.83cm^3. In comparison a study by Kyei Mensah et al. included three groups: first group included 24 women with regular menstrual cycles and polycystic ovaries observed on ultrasound, second group included 26 women with diagnosed PCOS while third group comprised of 50 women with regular menstrual cycles and normal ovaries as observed on ultrasound. It was reported that the total ovarian volume was found to be 15.7-16.1 cm^3 in polycystic ovaries as compared to 11cm^3 in women with normal ovaries.[22]. Birdsall and Farquhar have reported a positive correlation between polycystic ovaries and ovarian volume.[6]

In the general population, the frequency of PCOs have been reported to be 20-33%.[7] Rodin et al.[23] has reported that the highest frequency of PCOs is

found amongst the South Asian immigrant women in United Kingdom, which was found to be 52%.

Few limitations need consideration. Our study was a single institution study. We did not evaluate the association of PCOs with the ethnicity. Recently studies are published which have also studied ethnicity as one of the detrimental factor.[24,25] Therefore, it is recommended that further multicenter studies focusing on ethnicity should be carried out in our population. Moreover, the high frequency reported in our region warrants the need for further research for the risk factors responsible for the disease as well as probable health consequences in the long run to help in the reduction of the morbidity and mortality that is associated with the disease.

CONCLUSION

The findings of our study showed higher frequency of PCOs. Furthermore, increased age, nulliparity, primiparity, history of hormonal intake, and hirsutism were found to be significant associated factors.

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