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Frequency of Polycystic Ovarian Syndrome in Women Presenting with Infertility

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ABSTRACT

Objective: To determine the frequency of polycystic ovarian syndrome (PCOS) among women presenting with infertility in. Sandeman Provincial Hospital, Quetta, **Methodology:** This six-month cross-sectional study was carried out in the obstetrics and gynecology department of Sandeman Provincial Hospital in Quetta. Through successive sampling, 186 women between the ages of 18 and 49 who were presenting with infertility were included. Age, place of residence, education, BMI, length of marriage, and type of infertility were among the baseline clinical and demographic data recorded. Using conventional operating criteria, PCOS was diagnosed. SPSS version 24 was used to examine the data, stratifying the data for any effect modifiers. Following stratification, either Fisher's exact test or chi-square test was used, with $p < 0.05$ being significant. **Results:** Among women who were infertile, 49.5% had PCOS. Age ($p = 1.000$), residency ($p = 0.234$), BMI ($p = 0.557$), length of marriage ($p = 0.468$), and type of infertility ($p = 0.771$) did not significantly correlate with any of these factors. There was a marginal correlation between education and $p = 0.054$. **Conclusion:** PCOS was found to be a major cause of infertility in our study, affecting over half of the infertile women. Most clinical and demographic characteristics did not significantly correlate, but there seems to be a correlation between higher prevalence and lower educational attainment. To lessen the burden of infertility caused by PCOS, these findings emphasize the necessity of early screening, lifestyle changes, and patient education.

INTRODUCTION

A prevalent disorder in women, polycystic ovarian syndrome (PCOS) is typified by hyperandrogenism, or the presence of extra male hormone or androgen effect; for instance, ovulatory dysfunction (including menstrual dysfunction), polycystic ovarian morphology (PCOM; an excessive number of preantral follicles in the ovaries), and clinically, such as hirsutism, as well as biochemically, such as hyperandrogen aemia or excess levels of androgen. (1) Depending on whether certain characteristics are present or absent, the clinical presentation is diverse and can be divided into multiple phenotypes.

Most afflicted patients exhibit metabolic abnormalities, primarily insulin resistance and compensatory hyperinsulinemia1, particularly in women who also exhibit hyperandrogenism (2). Worldwide, the condition affects 1 in 6 to 1 in 20 women of reproductive age (5–20%). Even without accounting for the higher risk of obstetrical problems, type 2 diabetes mellitus (T2DM), and other conditions, the economic effect of PCOS in the US alone in 2004 was over US$4 billion. (3)

Polycystic ovary syndrome (PCOS) is common cause of infertility and endocrine disorder affecting women both physically and psychologically which may also disturb the quality of health life. Various studies have reported a prevalence of 5-10%, of all females and 4-6% of adolescent girls and young women. (4) for the first time in 1935, the classic form of PCOS was described by Ashtyn and Leventhal.(5) A chronic anovulation syndrome associated with excess of hydrogen is termed as polycystic ovarian syndrome and can be referred as hyper-androgenic anovulation. There are generally three criteria for the diagnosis of PCOS ie., ovulatory dysfunction, hyperandrogenism, polycystic ovarian morphology on ultrasound.(6) The estimated prevalence of PCOS in women of reproductive age is about 8-13% which can vary.

Anovulation is a major problem that most of the women with PCOS have problems like dysfunctional bleeding and infertility comes along with this.(7)

One of the most common causes of infertility is PCOS. Several studies show that certain menstrual abnormalities such as amenorrhea, oligomenorrhoea or obesity can result in infertility.(8,9) With this some dermatological

features such as acne, hirsutism, seborrhea, alopecia are present. All these symptoms not only have an impact on quality of life but also come up with heterogeneous phenotype of PCOS. Ultrasound is, indeed, the most effective instrument of initial imaging; it is a profoundly administrator subordinate and requires patient coordination. (4,10)

Although Pakistan is among the currently most populous countries of the world, and has a population growth rate of around 2%, it also has high rate of infertility (21.9%); 3.5% primary and 18.4% secondary the prevalence of infertility in Pakistan is 21.9%. (11) Infertility in women has many possible causes. The most common cause of treatable infertility is polycystic ovarian

syndrome, common in young women and cause of an ovulatory infertility in 70% cases. (12) World Health Organization classification offers a useful frame for diagnosis and treatment. Polycystic ovary syndrome is the most common cause of oligo ovulation and anovulation. (13)

Polycystic ovary syndrome is the most common cause of oligo ovulation and anovulation. Poly cystic ovarian syndrome (PCOS) is a common endocrine disorder which causes anovulatory infertility. (14) In PCOS Increased ovarian androgen production leads to premature adrenarche, menstrual irregularity, acne, hirsutism, and infertility by means of elevated luteinizing hormone to follicle stimulating hormone production and hyperinsulinemia. (15)

Study by Afzal et al (16) reported the frequency of PCOS among infertile women However, PCOS was higher among women with secondary infertility as compare (86.51% vs 8.16%). Another study conducted in Mirpurkhas reported the frequency of PCOS in infertile women was 38.3%. (17)

PCOS has been identified as a chronic metabolic syndrome throughout the world having long-term effects on health besides being a reproductive disease. The overall prevalence of PCOS in women of reproductive age is approximately 9.2% (95 % CI: 6.812.5%), as shown by a recent meta-analysis; but prevalence rates differ widely, with reported rates ranging between 4 and 20% based on the population and diagnostic criteria applied. (18,19). Moreover, PCOS has become a widespread condition worldwide, and it is expected that by 2021, 65 million women with the disease will be nearly three times as many as in 1990. (20)

Pakistani epidemiological estimates of the PCOS in the general female population differ. A survey in a hospital based in Pakistan revealed that 20.7 of female patients who attend gynecological clinics have PCOS. (21)

According to some research, the rates are much higher, particularly in younger or select minorities. Indicatively, in one study, the prevalence of PCOS in Pakistani women was 52% as opposed to 20% to 25% in the Caucasians, which may be a result of selection pressures or referral bias. According to a study done in south Punjab (22) the rate among women who were not especially infertile stood at 23.3%.

There are many factors that affect variations in reported prevalence at the local and global levels. First, variations in the diagnostic criteria: the Androgen Excess Society, NIH, and Rotterdam criteria have varying definitions of features and varying levels of stringency, and hence case definitions and by extension prevalence estimates. (19)

Second, the population of the study groups (age group, BMI, urban/rural residence, fertility clinic population, not fertility clinic population) are different. Third, in regions that are economically disadvantaged, underdiagnosis can be caused by inequalities in awareness, screening processes and access to diagnostic tools (like reliable ultrasound and hormone tests) (24)

Our research question is to find the prevalence of PCOS in infertile women. Literature is found on this topic internationally, but the results of those studies cannot be applied in our local population. The onset of PCOS is also increasing primarily due to their poor lifestyles such as sedentary lifestyles, junk foods, etc, and other unexplained factors. Majority of the clinical manifestations excluding abnormal menstrual periods are not known to be a symptom of concern and they are not treated. Thus, there is need to shed more light on this crucial issue to determine the local burden of this problem. Also, our study outcome will assist gynecologist in conducting adequate counselling of such women and formulate preventive strategies to overcome the burden of infertility and PCOS.

LITERATURE REVIEW

The association between PCOS and infertility has been extensively studied in the Pakistani populations and has offered an understanding on prevalence, phenotypic variation, and clinical correlates of PCOS across geographical settings and hospital settings.

It was conducted as a cross-sectional descriptive study conducted on a sample of 88 women who are of primary infertility (18-35 years old) at Jinnah Postgraduate Medical Centre, Karachi. The study further reports that polycystic ovaries existed in 43 per cent of these infertile women. (25).

At the Rehman Medical Institute, Peshawar, a large cross-sectional study with 662 women with sub-fertility was carried out. The prevalence of PCOS was 59.76 using Rotterdam criteria. The women were also categorized into phenotypes: Phenotype A (oligo-anovulation + hyperandrogenism + polycystic ovaries) was the dominant one (58.2%), then phenotype D and C and Phenotype B was the least common. This was an important study because it reported prevalence and gave us some understanding of clinical and hormonal differences indicating complete phenotype A is most closely linked to infertility. (26)

Another study carried in South Punjab focused on analyzing 120 women of reproductive age in the general population as opposed to those samples based on infertility. PCOS prevalence was 23.33, which is significantly lower than that of the cohorts of infertility centers. In the study, the risk factors were identified as family history of diabetes, irregular menstruation, as well as obesity. This means that whereas PCOS occurs widely in general, it is especially significant in clinic-based communities about its effects on infertility. (23)

A study conducted in Pakistan among women attending hospitals showed that 38.5 percent of infertile

women were affected by polycystic ovarian syndrome (PCOS), which indicated that polycystic ovarian syndrome is a leading cause of anovulatory infertility in the country (21). This finding is commensurate with international statistics that PCOS is relatively the leading cause of treatable infertility.

A study was conducted in Karachi to analyze the frequency of insulin resistance among infertile women with PCOS and mild hypothyroidism. The researchers found that 63.3 percent of women with PCOS and subclinical hypothyroidism were insulin resistant. Moreover, thyroid stimulating hormone (TSH) concentrations were found to reduce significantly after three months of metformin therapy, which suggests that the drug can be used to treat metabolic and endocrine diseases in this patient group. This is an illustration of how thyroid and endocrine disorders, such as PCOS, can co-exist in Pakistani women and how this can influence infertility (27).

A prospective study by Ghulam Muhammad Mahar Medical College in Sukkur evaluated 124 women with PCOS between the ages of 18 and 35. The researchers found that infertility among PCOS women was 62.9%. The risk factors that were observed to deteriorate the rates of infertility were higher age at the reproductive age, higher body mass index, and the use of chewing tobacco. The findings point to the importance of lifestyle modifications and timely medical treatments, as well as the immense prevalence of infertility among the PCOS patients in interior Sindh. (28)

The association between resilience and mental health problems among 200 Pakistani women with PCOS were studied using a descriptive cross-sectional study. The occurrence of anxiety, despair, and reduced quality of life has been observed to be much higher in women with PCOS which was mediated by resilience. Interestingly, the resilience score of working and non-working women differed, and it could be that social support networks and employment can alleviate psychological inconvenience in PCOS patients. It was found that PCOS has both serious psychological and social consequences on Pakistani women along with its impact on the metabolic and reproductive health. (29)

The sum of all studies above indicates that consistently, in Pakistani PCOS data, infertility in women is a major cause, which is often complicated by metabolic problems, endocrine comorbidity, and psychological stress. In as much as the frequency varies across regions and age groups, it causes significant impact on women reproductive and overall health. These data demonstrate that to reduce the impact of PCOS-related infertility among our population, early diagnosis, lifestyle changes, and combined care strategies are required.

Objective of Study

To determine the frequency of polycystic ovarian syndrome (PCOS) among women presenting with infertility in a tertiary care hospital.

METHODOLOGY

This cross-sectional study was conducted in the Department of Obstetrics and Gynecology, Sandaman Provincial Hospital, Quetta, over a period of six months after approval of the synopsis by the College of Physicians and Surgeons Pakistan (CPSP) and the Institutional Ethical Review Committee. The sample size of 186 was calculated using the WHO sample size calculator, taking the frequency of polycystic ovarian syndrome (PCOS) among infertile women as 38.3%, a margin of error of 7%, and a 95% confidence level. A consecutive sampling technique was applied to recruit participants.

Regardless of parity or gravida, women between the ages of 18 and 49 who presented with infertility were included. Women who were taking contraceptives, did not live with their husbands, had thyroid disorders, were receiving therapy for infertility, or refused to give informed permission were not allowed to participate.

Written informed permission was obtained before enrolling eligible women who were in the outpatient department. Age, residence, family monthly income, education, height, weight, body mass index (BMI), length of marriage, and type of infertility were among the baseline demographic and clinical history items that were documented. All women with an infertility diagnosis had their PCOS levels checked, and infertility was determined using the operational criteria. A predetermined proforma was used to record the data.

All data were entered and analyzed using SPSS version 24. Quantitative variables (age, height, weight, BMI, family monthly income, and duration of marriage) were presented as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on data distribution. Qualitative variables (residence, education, type of infertility, and presence of PCOS) were presented as frequency and percentage. Potential effect modifiers such as age, residence, family monthly income, education, BMI, duration of marriage, and type of infertility were controlled through stratification. Post-stratification, chi-square test or Fisher's exact test was applied, considering a p-value ≤ 0.05 as statistically significant.

RESULTS

Table 1

Descriptive Statistics

	N	Mean	Std. Deviation
Age	186	1.5000	.50135
Height	186	166.7849	13.19201
Weight	186	1.9301	.80569
BMI	186	1.52688	.500624
Marriage_duration	186	12.4516	7.34408
Monthly_income	186	2.5591	1.15279
Valid N (listwise)	186		

Frequency Tables

Table 2

Residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Urban	85	45.7	45.7	45.7
	Rural	101	54.3	54.3	100.0
	Total	186	100.0	100.0	

Table 3

Infertility_type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	87	46.8	46.8	46.8
	Secondary	99	53.2	53.2	100.0
	Total	186	100.0	100.0	

Table 4

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Illiterate	29	15.6	15.6	15.6
	Primary	39	21.0	21.0	36.6
	Secondary	28	15.1	15.1	51.6
	Matric	37	19.9	19.9	71.5
	Intermediate	26	14.0	14.0	85.5
	Graduate	27	14.5	14.5	100.0
	Total	186	100.0	100.0	

Table 5

PCOS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	92	49.5	49.5	49.5
	No	94	50.5	50.5	100.0
	Total	186	100.0	100.0	

Stratification

PCOS Vs. Age

Table 6

PCOS * Age Crosstabulation

			Age		Total
			less than or equal to 30	greater than 30	
PCOS	yes	% within PCOS	50.0%	50.0%	100.0%
		% within Age	49.5%	49.5%	49.5%
	No	% within PCOS	50.0%	50.0%	100.0%
		% within Age	50.5%	50.5%	50.5%
Total		% within PCOS	50.0%	50.0%	100.0%
		% within Age	100.0%	100.0%	100.0%

Table 7

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.000[a]	1	1.000		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.000	1	1.000		
Fisher's Exact Test				1.000	.558
Linear-by-Linear Association	.000	1	1.000		
N of Valid Cases	186				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 46.00.
b. Computed only for a 2x2 table

PCOS Vs. Residency

Table 8

PCOS * Residence Crosstabulation

			Residence		Total
			Urban	Rural	
PCOS	yes	% within PCOS	41.3%	58.7%	100.0%
		% within Residence	44.7%	53.5%	49.5%
	No	% within PCOS	50.0%	50.0%	100.0%
		% within Residence	55.3%	46.5%	50.5%
Total		% within PCOS	45.7%	54.3%	100.0%
		% within Residence	100.0%	100.0%	100.0%

Table 9

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.417[a]	1	.234		
Continuity Correction[b]	1.088	1	.297		
Likelihood Ratio	1.419	1	.234		
Fisher's Exact Test				.243	.148
Linear-by-Linear Association	1.409	1	.235		
N of Valid Cases	186				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 42.04.
b. Computed only for a 2x2 table

PCOS Vs. Education

Table 10

PCOS * Education Crosstabulation

			Education						Total
			Illiterate	Primary	Secondary	Matric	Intermediate	Graduate	
PCOS	yes	% within PCOS	9.8%	29.3%	15.2%	19.6%	14.1%	12.0%	100.0%
		% within Education	31.0%	69.2%	50.0%	48.6%	50.0%	40.7%	49.5%
	No	% within PCOS	21.3%	12.8%	14.9%	20.2%	13.8%	17.0%	100.0%
		% within Education	69.0%	30.8%	50.0%	51.4%	50.0%	59.3%	50.5%
Total		% within PCOS	15.6%	21.0%	15.1%	19.9%	14.0%	14.5%	100.0%
		% within Education	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 11

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.874[a]	5	.054
Likelihood Ratio	11.136	5	.049
Linear-by-Linear Association	.132	1	.717
N of Valid Cases	186		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.86.

PCOS Vs. BMI

Table 12

PCOS * BMI Crosstabulation

			BMI		Total
			Less than 30	Greater than 30	
PCOS	yes	% within PCOS	50.0%	50.0%	100.0%
		% within BMI	52.3%	46.9%	49.5%
	No	% within PCOS	44.7%	55.3%	100.0%
		% within BMI	47.7%	53.1%	50.5%
Total		% within PCOS	47.3%	52.7%	100.0%

% within BMI	100.0%	100.0%	100.0%

Table 13

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.528[a]	1	.468		
Continuity Correction[b]	.336	1	.562		
Likelihood Ratio	.528	1	.467		
Fisher's Exact Test				.557	.281
Linear-by-Linear Association	.525	1	.469		
N of Valid Cases	186				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 43.53.
b. Computed only for a 2x2 table

PCOS Vs. Duration of Marriage

Table 14

Marriage duration Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.528[a]	1	.468		
Continuity Correction[b]	.336	1	.562		
Likelihood Ratio	.528	1	.467		
Fisher's Exact Test				.557	.281
Linear-by-Linear Association	.525	1	.469		
N of Valid Cases	186				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 43.53.
b. Computed only for a 2x2 table

PCOS Vs. Type of infertility

Table 15

PCOS * Infertility_type Crosstabulation

			Infertility_type		
			Primary	secondary	Total
PCOS	yes	% within PCOS	45.7%	54.3%	100.0%
		% within Infertility_type	48.3%	50.5%	49.5%
	No	% within PCOS	47.9%	52.1%	100.0%
		% within Infertility_type	51.7%	49.5%	50.5%
Total		% within PCOS	46.8%	53.2%	100.0%
		% within Infertility_type	100.0 %	100.0%	100.0%

Table 16

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.092[a]	1	.762		
Continuity Correction[b]	.024	1	.876		
Likelihood Ratio	.092	1	.762		
Fisher's Exact Test				.771	.438
Linear-by-Linear Association	.092	1	.762		
N of Valid Cases	186				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 43.03.
b. Computed only for a 2x2 table

Post Stratification Results

Age and PCOS: When stratified by age (≤30 years vs >30 years), no statistically significant association was observed between age and PCOS (p = 1.000).

Residence and PCOS: On stratification by place of residence (urban vs rural), there was no significant association between residence and PCOS (p = 0.234).

Education and PCOS: Stratification by education level (illiterate, primary, secondary, matric, intermediate, graduate) showed a borderline association with PCOS (p = 0.054).

BMI and PCOS: On stratification by BMI (<30 vs ≥30), no statistically significant association was observed with PCOS (p = 0.557).

Marriage Duration and PCOS: Stratification by marriage duration also did not show any significant association with PCOS (p = 0.523).

Infertility Type and PCOS: When stratified by type of infertility (primary vs secondary), no significant association was found between infertility type and PCOS (p = 0.771).

DISCUSSION

According to the current study, 49.5% of women who presented with infertility had polycystic ovarian syndrome (PCOS), highlighting PCOS as a significant cause of female infertility in our society. This result is in line with earlier research from Pakistan and other South Asian nations, which found that between 38% and 60% of infertile women had PCOS (16,17,26). Our study's frequency is within this reported range, which supports the idea that PCOS is a major contributor to anovulatory infertility.

For most variables, no statistically significant correlations were found when stratified by possible effect modifiers. The distribution of PCOS was not significantly impacted by age (p = 1.000), suggesting that the syndrome has a similar impact on younger and older infertile women. Although clinical symptoms may differ among reproductive age groups, this is consistent with earlier research indicating that PCOS is not strictly age dependent.

In a similar vein, living in an urban or rural area had no discernible impact on the prevalence of PCOS (p = 0.234). Our findings did not reveal a significant urban–rural difference, despite some research reporting a higher frequency in urban areas due to lifestyle factors such food choices and sedentary activity.

It's interesting to note that there was a weak correlation between education and PCOS (p = 0.054). Compared to women with greater education, those with lower education levels tended to have higher prevalence of PCOS, which may be a result of disparities in awareness, health-seeking behavior, and lifestyle modification techniques. However, this conclusion should be viewed with caution because the link was not statistically significant.

Our study found no significant correlation between PCOS and BMI (p = 0.557). In contrast, obesity has been closely associated with PCOS in several worldwide studies

because of insulin resistance and metabolic abnormalities (2,15). Our data's lack of significance could be attributed to either underreporting of lifestyle factors linked to obesity or the very small sample size. Likewise, there was no significant correlation between PCOS and the length of marriage (p = 0.523). According to this, the period of infertility or marital life does not directly increase the incidence of PCOS, but it may have an impact on the likelihood that a couple would visit a medical facility.

Lastly, **infertility** (primary vs. secondary) showed no significant association with PCOS (p = 0.771). This contrasts with findings by Afzal et al. (16), who reported higher prevalence of PCOS in women with secondary infertility. Differences in sample size, inclusion criteria, and regional variations may explain this discrepancy.

CONCLUSION

Polycystic ovarian syndrome (PCOS) was identified as a prominent cause of female infertility in Quetta by this study, which indicated that over half (49.5%) of infertile women had the condition. The high prevalence found supports PCOS as a serious reproductive health issue and is in line with both national and international research. According to post-stratification analysis, there was no significant correlation between PCOS and age, place of residence, BMI, length of marriage, or type of infertility. Education, on the other hand, displayed a shaky correlation, indicating that lower literacy levels might indirectly be involved through a lack of preventive lifestyle behaviors, limited health-seeking behavior, and inadequate awareness.

PCOS may afflict women from all socioeconomic and reproductive origins, as evidenced by the lack of a substantial correlation with most demographic characteristics. To lessen the burden of PCOS-related infertility in our community, these data highlight the significance of early diagnosis, awareness campaigns, and focused therapies, including lifestyle modification counseling.

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