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RESEARCH ARTICLE

Sociodemographic Characteristics and Clinical Presentation of Infertile Women with Polycystic Ovary Syndrome in a Tertiary Care Hospital

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ABSTRACT

Background: Infertility has been an issue of concern especially for women for decades, and one of the identified etiological factors is polycystic ovary syndrome (PCOS) that impact on ovulation and conception.

Aim: This study aims to study the sociodemographic characteristics and clinical presentationof infertile women with (POS).

Materials and methods : In this prospective case-control study, out of 150 infertile patients 75 women served as PCOS group. The demographic details such as age, socioeconomic class, employment status residential area, Body mass index, menstrual patterns, clinical presentation, and infertility related lab values were noted.The collected data were statistically analyzed using the Chi-square test.

Results: The prevalence of PCOS was high in the age group 24 to 27 years (37.33%), from middle socioeconomic class (45%), residing in urban areas (62.67%) and housewives (65.33%). Most of the PCOS patients were overweight (32%) and obese (21.33%) and showed statistical significance p = 0.021 and p = 0.021 respectively. Oligomenorrhea (54.67%) and amenorrhea (40%) were the commonly found clinical presentations. Weight gain (p = 0.000) and acne (p = 0.049) were found to be significant. Also, a significant relationship was seen for Luteinizing Hormone (LH) (p = 0.003) and Prolactin (p = 0.001) in both groups.

Conclusion: In this study, the prevalence of PCOS was high in patients from a middle socio-economic class, residing in urban areas and obese patients. Oligomenorrhea was found to be the most common clinical presentation in PCOS patients. Furthermore, evidence of high LH and Prolactin levels were found that is known to be associated with hyperandrogenism in PCOS patients.

Keywords: PCOS, Prevalence, Oligomenorrhea, Weight gain, Acne, LH, Prolactin

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INTRODUCTION

The polycystic ovary syndrome (PCOS) is a complex, multifactorial, endocrine and metabolic disorder characterized by hyperandrogenism and a myriad of symptoms with varied clinical presentations such as oligomenorrhea, amenorrhea, hirsutism, acne, alopecia and obesity.[1]

Globally, the estimates of PCOS prevalence are highly variable, ranging from 2.2 to 26%.[2] PCOS has a prevalence of 5–10% in women of childbearing age with variance among races, ethnicities and geographical areas.[3,4] The highest reported incidence 52% has been among the South Asian immigrants in Britain.[5]

In today's society, infertility due to PCOS is becoming more common mainly because of their unhealthy lifestyle like sedentary habits, junk food, etc. and other unknown reasons. Most of the clinical features other than irregular menstrual cycles are not recognized as a symptom of concern and are left untreated. This study aimed at determining the sociodemographic characteristicsand common clinical features of PCOS in women with infertility. Very few studies are available in India regarding the socioeconomic characteristics and clinical features in infertile PCOS women, and hence, it is hoped that the results of this study will provide awareness in our locality since there is a lack of knowledge in the provision of such care in our environment.

MATERIALS AND METHODS

This prospective case-control observational study was conducted in Bharati Hospital and Research Centre, Pune, over a period of 9 months from August 2016 to April 2017. Women of reproductive age (20–39 years) who are attending or admitted with complaints and symptoms suggesting polycystic ovary syndrome and clinically

diagnosed using Rotterdam criteria[6] were included in the study while patients less than 20 years and above 40 years of age were excluded from the study. A total of 320 patients attended the ertility clinic, out of which 150 patients showed symptoms according to Rotterdam criteria (oligomenorrhea or amenorrhea and hirsutism, acne or alopecia) suggesting PCOS on physical examination.Before initiating the study, the patient consent was taken by providing them with a patient written consent form.

Further, all the 150 patients suggesting symptoms of PCOS randomly underwent transabdominal and transvaginal ultrasound along with basic lab parameters pertaining to PCOS such as FSH, LH, prolactin, and TSH for confirmation of PCOS. Serum testosterone, androstenedione, 17OH-progesterone, dehydroepiandrosterone-sulfate (DHEAS), and sex hormone–binding globulin (SHBG), serum anti-Müllerian hormone (AMH) tests were not done as these were expensive and most of the patients in this tertiary care hospital were from middle socioeconomic class. Out of 150 infertile women who underwent all the investigations possible for PCOS, 75 women were confirmed with PCOS.

Data Collection Procedure

The 150 infertile women were classified into two group based on the diagnosis; the PCOS group (75 patients diagnosed with PCOS) and non-PCOS group (75 patients without PCOS). The details like age, employment status, socioeconomic status, area of residence, height, weight, menstrual history, duration of infertility, clinical presentation, infertility related lab values (LH, follicular stimulating hormone (FSH), thyroid stimulating hormone (TSH) and prolactin) and past medical history were noted from the pertility OPD case paper sheets for both the groups in the self-pre-designed patient profile form. Socioeconomic class and employment status were determined based onthe patient's education, her husband's occupatio, and monthly income. The BMI was calculated based on the height and weight revealed in the fertility OPD case sheets.

Statistical Analysis

The collected data of the PCOS study group was analyzedd for prevalence, clinical feature, and lab values and were also compared with collected data of the non-PCOS control group to determine significant differences. The BMI was calculated using the formula:

Weight in kilograms/height in meters^2

The data were statistically represented in terms of range,mean, and standard deviation for age, frequency tables for other sociodemographic characteristics, menstrual patterns and bar diagrams for BMI and common clinical features. To estimate the significant differences in characteristics between the PCOS and control groups, the statistical method Chi-square test was applied to find out p value (statistically significant level < 0.05) wherever applicable.

Table 1: Prevalence rate in infertile women with polycystic ovary syndrome (PCOS)

Total number of infertility patients in year 2016-2017	*Total number of PCOS patients*	*Prevalence rate (%)*
320	75	23.43

RESULTS

Prevalence and Sociodemographic Characteristics

Out of 320 infertility patients who attended the fertility OPD from August 2016-April 2017, 75 patients were found to have polycystic ovary syndrome with a prevalence rate of 23.43% (Table 1).

Out of 150 infertility patients studied, 75 were PCOS and 75 were non-PCOS. Most women in the PCOS group were aged 24–27 years (37.33%), while in the control group most of them were aged 20–23 years (30.67%). The mean ages of the PCOS and non-PCOS were 25.91 ± 3.60 years and 26.16 ± 3.90 years respectively. Majority of the PCOS group were from a middle socioeconomic class (45%) whereas most of the control group were from low socioeconomic class (40%). Total 62.67% of the PCOS group were found to be residing in urban areas while 37.33% were found to be residing in rural areas (Table 2).

Menstrual Patterns, Duration of Infertility and Types of Infertility in Study Participants

Table 3 shows that most of the PCOS and control groups were having an average duration of infertility less than or equal to 2 years, (77.33%) and (92%) respectively. Primary infertility wasthe most common type of infertility seen in both PCOS (68%) and non-PCOS women (60%). A significant difference was found in menstrual pattern (p = 0.020) and duration of infertility p = 0.012) in both the groups.

Body Mass Index of Participants in the Study

Graph 1 demonstrates that most of the control group had normal weight (64%) when compared to PCOS group (34%) with statistical significance p = 0.000. A majority of the PCOS group were overweight (32%) as compared to the control group (16%). Statistically significant difference was observed for overweight (p = 0.021) and obese (p = 0.021).

Common Clinical Features Observed in Study Participants

The most commonly found clinical features in PCOS group were oligomenorrhea (54.67%) followed by weight gain (53.33%), amenorrhea (40%), hirsutism (20%), alopecia (18.67%), and acne (10.67%) whereas in control group

Table 2: Sociodemographic characteristics in infertile women with and without polycystic ovary syndrome

Characteristics	PCOS group (N = 75)	Control group (N = 75)	p value
Age (years)			
20–23	22 (29.33)	23 (30.67)	
24–27	28 (37.33)	22 (29.33)	
28–31	19 (25.33)	22 (29.33)	0.741
32–35	6 (8)	8 (10.67)	
36–39	0	0	
Socioeconomic class			
Middle	34 (45)	30 (40)	
Low	31 (41.33)	34 (45)	0.804
High	10 (13.33)	11 (14.67)	
Employment status			
Housewife	49 (65.33)	48 (64)	0.864
Employed	26 (34.67)	27 (36)	
Area of residence			
Urban	47 (62.67)	54 (72)	0.222
Rural	28 (37.33)	21 (28)	

Table 3: Menstrual pattern, duration of infertility and types of infertility in women with and without polycystic ovary syndrome

Parameters	PCOS group (N = 75)	Control group (N = 75)	p value
Menstrual cycle			
Irregular	71 (94.67)	62 (82.67)	*0.020
Regular	4 (53.33)	13 (17.33)	
Duration of infertility			
≤2 years	58 (77.33)	69 (92)	*0.012
≥2 years	17 (22.67)	6 (8)	
Types of infertility			
Primary	51(68)	45(60)	1.041
Secondary	24(32)	30(40)	

*Statistically significant

most of the women were found to have oligomenorrhea (48.00%) followed by amenorrhea (34.67%) and weight gain (30.67%). A significantt difference was seen for weight gain ($p = 0.000$) and acne (0.049) between PCOS and control groups (Graph 2).

Hormonal Profile of Participants in the Study

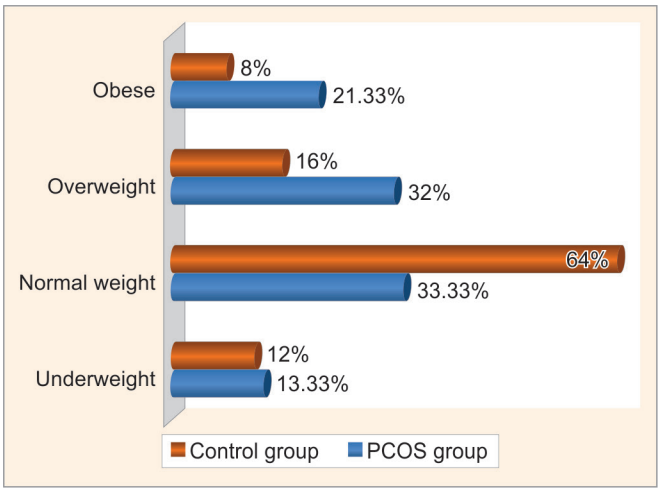
The LH levels were found to be higher in PCOS group (53.33%) as compared to control group (37.33%). Majority of the PCOS group was found to have high prolactin value (28.42%) as compared tothe control group (24%). Significant differencesweres seen for LH ($p = 0.003$) and prolactin (0.001) levels in both the groups (Table 4).

DISCUSSION

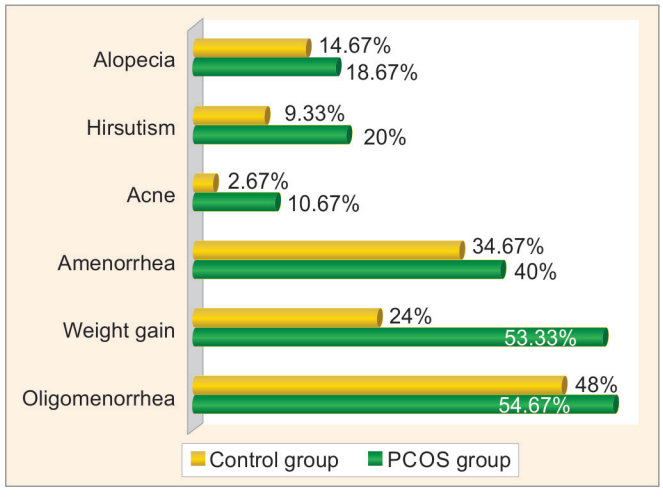
In this study, the prevalence rate of PCOS in infertility was estimated to be 23.43% which is comparatively lesser than that reported by Lakshmi et al.[7] who reported 32% prevalence of PCOS in a tertiary care hospital, Karnataka. Various studies have reported a prevalence of PCOS in women of reproductive age to be 5–10%.[3,4] The prevalence of PCOS in infertile patients varies according to the geographic regions of the world and ranges from 12.2% in Nigeria[8] to 3.7% in India.[9] The variations in prevalence rates can be attributed to racial differences, socioeconomic status and other factors such as genetic and environmental determinants of PCOS. Another reason for the variation may be the recruitment process of the study population and the screening methods used.

Most women in the PCOS study group were aged 24 to 27 years (29.33%) with a mean age of 25 years while in the non-PCOS control group most of them were aged 20–23 years (30.67%) with a mean age of 26 years. However, this is not surprising as in India most of the women get married in their early or mid-twenties and hence show an early need for conception. The result of the PCOS study group is similar when compared to Dhagat et al.[10] who reported that most of the infertile PCOS women were aged 21–25 years (58%) with a mean age of 25 years.

Researchers have shown that lower and middle socioeconomic classes have increased PCOS rates due to stress related to financial hardships and treatment, poor nutritional diet, lack of knowledge, lack of understanding between couples and family members regarding fertility



Graph 1: Body mass index of infertile women with and without polycystic ovary syndrome



Graph 2: Comparative data of various clinical features in infertile women with and without polycystic ovary syndrome

Table 4: Hormonal profile of infertile women with and without Polycystic ovary syndrome

	Number of patients (%)		
Hormone levels	*PCOS group (N=75)*	*Control group (N=75)*	*p value*
FSH			
Normal	28 (37.33)	39 (52)	
High	30 (40)	30 (40)	0.859
LH			
Normal	14 (18.67)	39 (52)	
High	40 (53.33)	28 (37.33)	*0.003
TSH			
High	12 (16)	14 (18.67)	0.294
Low	12 (16)	8 (10.67)	
Prolactin			
Normal	19 (25.33)	46 (61.33)	
High	27(28.42)	18 (24)	*0.001

*Statistically significant

issues, poor quality of life and impaired health due to unhealthy lifestyle habits.[10-12] In this study, the majority of the PCOS group were from a middle socioeconomic class (45%) as compared to non-PCOS control group (40%). The result of the study group is higher as compared to that reported by Dasgupta et al., in Hyderabad, India[13] wherein most of the PCOS women were from middle socioeconomic class (38.4%). However, there was no statistically significant relationship between socioeconomic status and both the PCOS and control groups $p = 0.804$).

In this study, the prevalence of PCOS in urban population was found to be higher (62.67%) than their rural counterparts (37.33%). The reason behind this may be a sedentary lifestyle and unhealthy dietary habits mainly including junk foods. The study result is consistent with that reported by Sarkar et al.[14] in 2006 who revealed that lifestyle changes including lack of exercise and low physical activity play a role in the prevalence of PCOS to be more in urban than rural areas.

The incidence of primary infertility in this study was higher (68%) *vs.* (60%) than secondary infertility (32%) *vs.* (40%) respectively for both the PCOS and control groups. Similarly, a study conducted by Dhagat et al.[10] also concluded that 70% of women are having primary infertility while 30% of women are having secondary infertility. Also, the duration of infertility was mostly found less than or equal to 2 years in both PCOS (77.33%) and non-PCOS control group (92%). A statistically significant relationship was found between the menstrual patterns p = 0.020) and duration of infertility $p = 0.012$) in both the groups. The apparent underlying reasons for infertility can be multifactorial like persistent anovulation over a prolonged period, delay in seeking medical help, expensive treatments, etc.

Obese women are more prone to have irregularity in their menstrual cycles and anovulatory infertility than women with normal BMI. This study reports that 53.33% of PCOS patients had high BMI wherein 32% were overweight $p = 0.021$) and 21.33% were obese $p = 0.021$) as compared to control group with high BMI (24%). The reason behind this can be the deranged metabolism, lack of exercise, sedentary lifestyle, dietary habits especially junk foods, impaired glucose tolerance and a greater degree of insulin resistance in women with PCOS. This result is in good agreement with the study conducted in New Delhi[15] which showed that 58% of the patients had a high BMI wherein 38% were overweight and 20% obese. Normal weight was found to be significantly $p = 0.000$) higher in the control group (64%) than PCOS group (34%).

Menstrual irregularities were found to be higher in the PCOS group (94.67%) as compared to non-PCOSS control group (82.67%). Oligomenorrhea (54.67%) was most commonly founda menstrual irregularity in the PCOS group as compared to control group (48%) followed by amenorrhea 40% and 34.67% in PCOS group and control group respectively. This is consistent with the study conducted by Balen et al.[16] who reported that menstrual disturbances were seen in 72% of the PCOS women. Among the,m oligomenorrhoea (60%) was the commonest followed by amenorrhoea (11%). The cause of oligomenorrhea and amenorrhea in PCOS women may be due to anovulation and hyperandrogenism. Other clinical features like weight gain (53.33%), Hirsutism (20%), Alopecia (18.67%) and Acne (10.67%) were found to be higher in the PCOS group than the control group. This result is consistent with the study conducted by Hussein et al. in Iraq[17] who reported a higher prevalence of weight gain (79%), hirsutism (78.3%), alopecia (56.6%) and acne (22.6%) in PCOS patients. Statistically, significant difference was observed between both the groups for weight gain ($p = 0.000$) and acne ($p = 0.049$).

PCOS usually happens when LH or levels of insulin are too high, which then causes the ovaries to make extra amounts of testosterone. In this study, the LH levels were found to be higher in PCOS group (53.33%) as compared to control group (37.33%). This study isinconsistentt with the result reported by Kanwar et al., in Rajasthan,[18] India and also by Janssen et al., in Munich, Germany.[19] Majority of the PCOS group in this study was found to have high prolactin value (28.42%) as compared to the control group (24%). The study result is inconsistent with the result of the study conducted by Bracero et al., in USA.[20] and Carmina et al. in Italy.[21] Increased Prolactin levels are known to cause hyperandrogenism which is associated with infertility. FSH ($p = 0.859$) and TSH ($p = 0.294$) levels were also found to be high in some PCOS patients but were not significant.

Limitations of our study include small sample size and short duration of the study (9 months). A short duration of study leads to a lack of precise and accurate data. Further, this study was conducted in a tertiary care hospital thus only focusing on a small population and lacking generalizability of other IVF centers, fertility clinics or hospitals

in our area, hence a lack of involvement of other possible infertile population was another limitation.

CONCLUSION

To conclude, PCOS was highly prevalent in this tertiary care hospital and was commonly found in infertile women aged 24–27 years with a mean age of 25 years, from a middle socioeconomic class and mostly residing in urban areas and housewives. Oligomenorrhea, weight gain, hirsutis, and acne were found to be the major clinical features ofinfertile PCOS women with duration of infertility less than 2 years. Hormonal changes, especially increased FSH and LH play a major role in causing hyperandrogenism in PCOS.

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