

PREVALENCE OF POLYCYSTIC OVARIAN SYNDROME, ITS ASSOCIATED CONDITIONS AND COMPLICATIONS: AN EXPERIENCE FROM A LOW SOCIO-ECONOMIC POPULATION OF SIKANDRABAD, KARACHI, PAKISTAN

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ABSTRACT

OBJECTIVES

To study the prevalence of polycystic ovary syndrome, its associated conditions and complications in the low socio-economic population of Sikandrabad, Karachi.

METHODOLOGY

This cross-sectional study was conducted in a primary health care centre of Ziauddin University, Sikandrabad-Karachi, Pakistan, from January-June 2021. The ethical committee of the university approved this study. All female patients with gynaecological complaints having an age between 18 to 49 years were included. Females with a history of unilateral oophorectomy, uterine abnormality and abnormal karyotype or known malignancies were excluded from the study. A sample size of 118 was calculated using open-epi software. A performed questionnaire was used to collect data from females with gynaecological complaints. PCOS was diagnosed using Rotterdam criteria. Routine examination tests were done at the Primary Health Care Clinic (PHCC) of Ziauddin Hospital, and obesity was labelled through BMI calculation.

RESULTS

Of 118 females in the reproductive age group screened, 55.93% reported PCOS as a major gynaecological problem, followed by endometriosis at 16.94%, uterine fibroid at 14.46% and urinary tract infections at 9.32% respectively. Patients had infertility as a major complaint, with 54.54% cases followed by menstrual abnormalities at 21.21%, obesity at 16.66% and others at 7.57%. Most patients (38%) were obese, and 34% were overweight.

CONCLUSION

PCOS is a prevalent complicated endocrine disorder in women in the reproductive age group, and it presents with varying gynaecological complications like infertility, menstrual disturbances, hirsutism, and acne. Obesity, hormonal imbalance and poor dietary intake affect the disease outcomes further. More multi-centred studies are needed to know the exact prevalence and causal relations.

KEYWORDS: Polycystic Ovarian Syndrome, Infertility, Menstrual Disorder, Low Socio-Economic Area

INTRODUCTION

In Pakistan, 55.41% of premenopausal women are reported with the disease as the most prevalent gynaecological problem. The syndrome's pathophysiology is neither simple nor any single cause from which it is known to result yet recognized. Patient presentation is variable, ranging from asymptomatic to having multiple gynecologic, dermatologic or metabolic expositions.^{1,2,3,4} Further, it increases the risk for hypertension, type 2 diabetes mellitus, gestational diabetes, and various malignancies.⁵ It presents as more than a reproductive disease for its connotation with an extensive range of metabolic disorders, including glucose intolerance, diabetes, dyslipidemia and

hypertension. The syndrome's appearance can vary by race and is considered aggravated by obesity. Indication about its pathophysiology involving abnormal gonadotropin release from a reduced hypothalamic feedback response to circulating gonadal steroids is established. Moreover, an altered ovarian structure, functional alterations and disorderly insulin action in a variety of target tissues is seen in many cases.⁶ The polycystic ovarian syndrome is not a disease, which is considered exclusively associated with fertility and puberty age, but it also imparts variable effects on a person's life. The major abnormalities associated with PCOS are hirsutism, menstrual disturbances and obesity. The patient often complains of an infertility problem. The risk for diabetes gets increases once the

postmenopausal stage is established. Multiple metabolic disorders are also linked with PCOS, including impaired glucose metabolism, glucose intolerance, cardiovascular events and even breast cancer.⁷ Rotterdam criteria is trusted worldwide to diagnose PCOS, and this criterion is based on clinical and sub-clinical findings, i.e. ovulatory dysfunction, hyperandrogenism and polycystic ovaries.^{8,9,10,11} Hyperandrogenism and ovulatory dysfunction are mainly spotted based on the patient's history and examination.¹² Various tests, including serum hormone and ultrasound for any visible cyst in the ovaries, are done to complete the requirements to fulfil the diagnosis criteria. According to Rotterdam criteria, polycystic ovarian syndrome can be defined as a hormonal abnormality which is characterized by either two of three conditions from ovulatory dysfunction, enhanced androgens secretion and polycystic ovaries (having ≥ 12 follicles measuring 2–9mm in diameter, and an amplified ovarian volume (>10 mL) in at least one ovary).¹ limited data is available on the prevalence of PCOS, its associated conditions and complications in the low socio-economic population of Pakistan. Therefore, the study was conducted to understand disease prevalence in low socio-economic populations and disease relationships with lifestyle changes and socio-economic conditions.

METHODOLOGY

This cross-sectional observational study was conducted in the primary health care centre of Ziauddin University, Sikandrabad Karachi, Pakistan, from January-June 2021. The ethical committee of the university approved this study. A preformed questionnaire was used to record the data of the study participants. Non-probability convenience-based sampling was done based on respondents availability to collect the data. The sample size was calculated using an open-epi calculator, 118, at a 95% confidence level and 5% margin of error. The entire sample was taken from a low socio-economic population of Sikandrabad, Karachi. All female patients with gynaecological complaints attending the Primary Health Clinic (PHC) of Sikandrabad, Karachi, aged 18 to 49 years and willing to participate in the study, were included. Females with a history of unilateral oophorectomy, uterine abnormality and abnormal karyotype or known malignancies were excluded from the study. After taking informed written consent to participate in the survey, family physicians asked questions from subjects and filled out the pre-designed questionnaire. Routine examination tests (testosterone, prolactin, T3, T4, TSH and serum Insulin) were done at the Primary Health Care Clinic of Ziauddin Hospital to diagnose PCOS and

assess its associated conditions in study participants. No tests other than routine examination were advised because of the study nature. Data were analyzed using SPSS version 22.0. All numerical values like age and BMI were presented as mean and SD, whereas categorical variables were presented as frequency and percentages. A value of $p < 0.05$ was considered statistically significant.

RESULTS

118 female patients reporting to the primary health care clinic at Ziauddin University, Karachi, for gynaecological concerns, were enrolled in the study. The demographic data regarding their age, education, living area and marital status were recorded in a pre-designed questionnaire. The demographics of the patients are mentioned in Table 1.

Table 1: Demographic Characteristics of the Patients

Demographic Characters	N
Age Group (years)	N (%)
18-25	30(25.4)
26-33	39(33)
34-41	28(23.7)
> 41	21(17.8)
Education Level	N (%)
Primary/Middle	82(69.5)
Graduate	22(18.6)
Postgraduate	14(11.9)
Living Area	N (%)
Urban	41(34.7)
Rural	77(65.3)
Marital Status	N (%)
Single	24(20.3)
Married/Divorced	94(79.7)
Ethnicity	N=
Urdu Speaking	56
Baloch	20
Pashtoon	18
Punjabi	24
Religion	N=
Muslim	115
Non-Muslim	03

The results of the study showed that out of 118 females, 55.93% (n=66) were diagnosed with PCOS, reflecting it to be a major gynaecological problem followed by endometriosis 16.94% (n=20), uterine fibroid 14.46% (n=17) and UTI 9.32% (n=11) respectively in patients consulting for gynaecological concerns. A few patients were also diagnosed with cervical and breast carcinoma. (Figure 1)

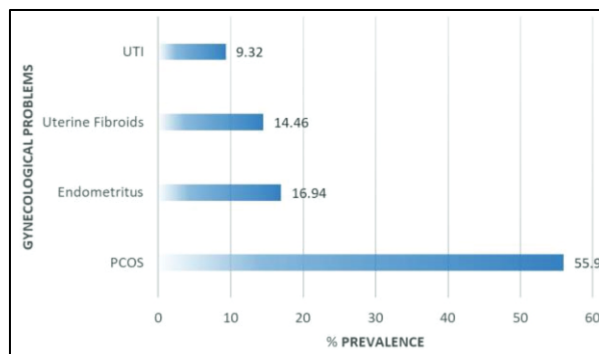


Figure 1: % Prevalence of Gynecological Problems among the Study Patients

The results also demonstrated the prevalence of major complaints among patients suffering from PCOS. The major complaint among these patients was infertility which was found to have existed in 54.54% (n=36) patients, followed by menstrual abnormality 21.29% (n=14), obesity 16.66% (n=11) and others (hirsutism) 7.54% (n=5) respectively. (Figure 2)

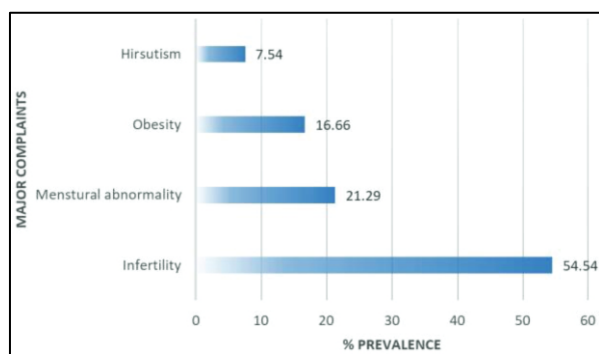


Figure 2: Prevalence of Major Complaints among PCOS Patients

Study results demonstrated that complications of PCOS vary differently among different age groups. The results showed a predominance of menstrual abnormality in the age group 18-25 years. In contrast, infertility was pre-dominant among patients aged 26-33, 34-41 years and > 42 years. Infertility, by and large, is the most predominant complication of disease. (Figure 3)

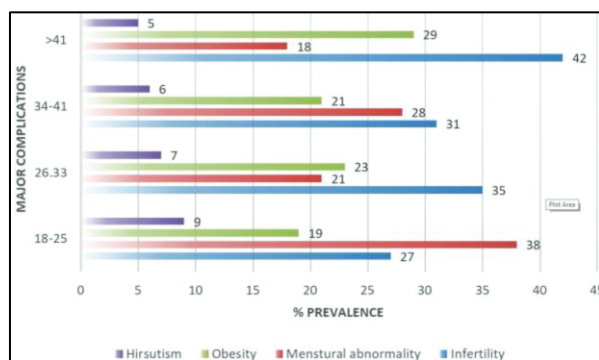


Figure 3: Major Complications among Various Age Groups

Based on BMI data according to WHO classification, most of the patients (38%) were obese with a BMI of 30 or more, and 34% were overweight with a BMI of > 25 (Figure 4).

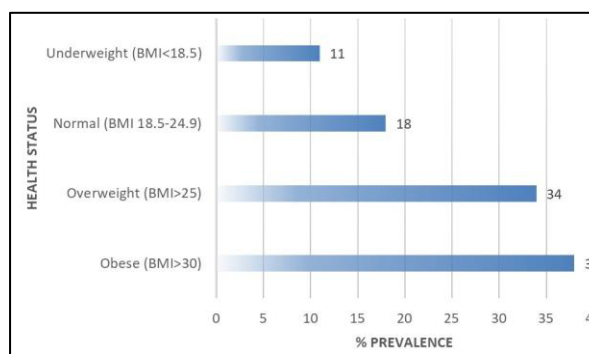


Figure 4: PCOs Patient's Health Status

The mean BMI among our study population was 25 ± 10.56 and was statistically significant in patients with PCOS. Higher Waist Circumference (WC) and Waist to Hip Circumference ratio (WHC) also had a statistical significance in patients with PCOS (<0.001 , table 2). Table 2 describes important dietary, biochemical and clinical characteristics to explore the associated conditions and complications with PCOS. The table is further helpful in nutrition-related or metabolic-related comorbidities parallel to PCOS. In our study, the average daily energy consumption through diet was 1788.4 ± 612 ; most women with PCOS consumed a diet that was focused on being low in micronutrients but rich in macronutrients than the recommended dietary allowances. Mean lower than recommended consumption of carbohydrates, fats and mean higher than recommended protein were statistically significant in PCOS patients. Most patients (61%) also consumed high-carbonated drinks with a low-fibre diet. Similarly, among routine investigations in the gynaecological clinic, a mean ovary volume of 14.44 ± 4.90 on ultrasound on the 2nd - 7th menstrual cycle day was found significant statistically. Further, mean prolactin levels of 22.10 ± 4.22 and TSH levels of 2.02 ± 1.00 were also substantial. At the same time, mean values for FSH, LH and LH/FSH were statistically insignificant in PCOS patients.

Table 2: Dietary, Biochemical and Clinical Characteristics of PCOS Patients

Characters	Mean Values \pm SD	P-Value
Energy (kcal/K)	1788.4 \pm 612	0.60
Carbohydrates (g/d)	224 \pm 19.11	<0.001
Fats (g/d)	76 \pm 12.21	0.03
Proteins (g/d)	78 \pm 06.22	<0.001
Fibres (g/d)	14 \pm 7.12	0.72
Mean BMI	25 \pm 10.56	<0.001
WC (cm)	90.22 \pm 09.39	<0.001
WHC	1.08 \pm 0.07	<0.001
TSH (mIU/L)	2.02 \pm 1.00	0.041
LH (IU/L)	14.40 \pm 2.80	0.080
FSH ((IU/L))	6.20 \pm 1.88	0.073
LH/FSH	1.88 \pm 0.90	0.77
Prolactin (ng/ml)	22.10 \pm 4.22	<0.001
Mean volume(ovaryml ³)	14.44 \pm 4.90	<0.001

Abbreviations: WC= Waist circumference, WHC= Waist-to-Hip Circumference ratio, BMI=Body Mass Index, TSH= Thyroid Stimulating Hormone, LH= Luteinizing Hormone, FSH= Follicle Stimulating Hormone

DISCUSSION

The childbearing age of a woman is a cause of multiple physiological, structural and psychological changes in her life. Due to our social and cultural confines, many women cannot discuss their menstrual health concerns. PCOS, also called "Stein Leventhal Syndrome", is the most common endocrine abnormality in females passing through their reproductive age.¹⁴ It is largely associated with multiple metabolic disorders, including obesity, thyroid imbalance, gonadal hormonal abnormalities, and insulin resistance. Increasing incidence of PCOS entire the globe has been reported due to lifestyle alterations, changing dietary habits and hormonal disturbances.¹⁵ The prevalence of PCOS depends on the enrollment process of the study population, standards used to define it, and the methods used for screening. In Pakistan, limited effort is made to its prevalence and associated complications in low socio-economic areas. In our study, the overall prevalence of PCOS was found to have existed at 55.93%, which is closely in agreement with the findings of Zandi et al., who showed a prevalence of PCOS in Iran of nearly 60.20%.¹⁶ However, the reported prevalence is highly variable. In another Iranian study, the prevalence of PCOS was reported to be 14.6%.¹⁷ Similarly, a Turkish study has shown a 19.9% prevalence of PCOS in females of childbearing age. Considering the increasing population of childbearing age women, this prevalence data is massive.¹⁸ Following PCOS, major complications that followed, as per our study, include endometriosis, uterine fibroids and urinary tract infections. According to an American study, endometriosis was the third leading cause of

hospitalization in women after Pelvic inflammatory diseases (PIDs) and benign cysts of the ovary.¹⁹ A small proportion of the population reported cervical and breast cancer. The low incidence of cervical and breast cancer might be because these are more common in postmenopausal women.^{20,21} Our study found that many women of childbearing age having an underlying PCOS disease visit a hospital because of infertility concerns, which was found to be present in 54.54% (n=36) patient population. The results are consistent with Urooj et al. 22. According to an analysis by Misso et al. 23's analysis; infertility was found to be 72% in patients with PCOS. Our findings showed that the prevalence of infertility among women having PCOS was age-dependent, as depicted in Figure 3. The higher infertility ratio was seen in an age group of > 42. Menstrual abnormality is another complication which was found to be associated with PCOS in women of childbearing age. The problem of menstrual abnormalities is exclusively related to adolescent females. Our study showed menstrual abnormalities in females aged 18-25. The results are consistent with the findings of Urooj et al. According to a report by Hsu, abnormal cycles and hyperandrogenism are associated with young aged females, whereas metabolic disorders and obesity are common with older age-group females.^{22,23} Obesity, a major concern in women with PCOS during childbearing age, significantly impacts their quality of life. The study by Haq et al. revealed about 39.7% prevalence of obesity in women (with PCOS) and an overall prevalence of overweight females of about 28.8%.²⁴ In our study, obesity was the third most prevalent complication of PCOS. Almost 80% of women with PCOS in the US suffer from obesity. In an Indian study conducted in 7 cities of the country, the prevalence of obesity was calculated to be 30% in an age group of 20-40.²⁵ The study indicated a higher risk of overweight and obesity among women with PCOS. In this study, BMI and waist parameters were positively and considerably associated with PCOS prevalence. Central obesity can be defined according to the WHO criteria as WC \geq 94 cm for men and \geq 80 cm for women or waist-to-hip ratio (WHR) \geq 0.90 in men and \geq 0.85 in women. In our study, the observed mean WC was 90.22 \pm 09.39, which was significant statistically (p=<0.001). Similarly, the observed mean WHC was 1.08 \pm 0.07 which is statistically significant (p=<0.001). The current evidence-based guidelines that evaluate and manage PCOS has accentuated the significance of diet in managing the signs and symptoms of PCOS and the metabolic complications associated with the syndrome.²⁶ It has been observed that poor diet has a strong connection with certain PCOS features, including polycystic ovary and hyperandrogenemia.²⁷ In our study, most women with

PCOS had shown consumption of a diet that was lower in micronutrients but rich in macronutrients. The findings of the study support the position of the current evidence-based guidelines for adopting a healthy lifestyle. A deficiency of micronutrients in the diet is consistent with previous studies of comparable energy and macronutrient intakes between women with and without PCOS.²⁸ Our results also validate evidence that women with PCOS meet suggested macronutrient quantities.²⁹ In our study, we also observed the low consumption of dietary fibres by the study group, which is consistent with the findings of other researchers.³⁰ The results of our study about FSH, LH levels and ratios, prolactin, and mean ovary volume showed consistency with the findings of other researchers.^{26,27,28}

LIMITATIONS

As the study was a single centred conducted in a low socio-economic area of Sikandrabad, Karachi, the results cannot be generalized for the whole country. Multi-centred research in other cities of the country with more participants is needed to present the actual picture of the condition.

CONCLUSIONS

PCOS is a prevalent complicated endocrine disorder in women in the reproductive age group, and it presents with varying gynaecological complications like infertility, menstrual disturbances, hirsutism, acne, etc. Obesity, hormonal imbalance and poor dietary intake affect the disease outcomes further. More multi-centred studies are needed to know the exact prevalence and causal relations.

CONFLICT OF INTEREST: None

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