

POLYCYSTIC OVARY SYNDROME (PCO) WOMEN WITH PREVALENCE  
IN LARKANA PAKISTANMajida Ali<sup>1</sup>, Autif Hussain Mangi<sup>\*2</sup>, Marvi Arijo<sup>3</sup>, Sumaiya Shaikh<sup>4</sup>, Firdous Brohi<sup>5</sup>,  
Fozia Shaikh<sup>6</sup>, Paris Abassi<sup>7</sup><sup>1, 3, 4, 5, 6, 7</sup>Obstetrics and Gynaecology SMBBMU, CMC, Larkana<sup>\*2</sup>Biochemistry Institute Sind University Jamshoro<sup>\*2</sup>autif@usindh.edu.pkDOI: <https://doi.org/10.5281/zenodo.18357819>**Keywords**Hyperandrogenism (HA),  
Hirsutism, Menstrual Irregularities  
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**Abstract****Introduction:** Obesity hirsutism infertility menstrual dysfunction and acne are symptoms of Polycystic Ovary Syndrome (PCOS) a common but little-studied hormonal disorder that affects 6–13% of women of reproductive age but is particularly high in Pakistan at 52%. In 15 studies 10% of participants had PCOS.**Objective:** - The aim to assess the prevalence of PCOS among women in Larkana, Pakistan.**Methodology:** 6105 women with PCOS ages 15 to 35 who visited an outpatient gynecology clinic in Larkana between January 2019 and December 2024 participated in the prospective cross-sectional study. Data was gathered through structured interviews regarding PCOS symptoms such as irregular menstruation or hyperandrogenism (Rotterdam diagnostic criteria 2003). In Larkana the prevalence was examined between 2010 and 2024.**Results:** From 2019 to 2024, 43,805 women aged 30.8 to 36.34 years were studied, with 6,105 diagnosed with Polycystic Ovary Syndrome (PCOS), indicating a prevalence of 13.9%. The average age of diagnosed women was 29.29 years. Common complaints among PCOS patients included obesity (23.67% were overweight or obese), infertility (99% of cases), irregular menstruation (22.17%), hirsutism (13.38%), and acanthosis (6.75%).**Conclusion:** PCOS, prevalent among reproductive-aged women in Larkana, presents with symptoms such as menstrual irregularity, oligomenorrhea, excess androgen, obesity, and infertility. Complications associated with the disorder can affect metabolism, heart health, reproduction, and mental health. There is a need for further research involving larger populations and enhanced diagnostic techniques, along with comprehensive management strategies.**INTRODUCTION**

One of the most common but little researched hormonal disorders affecting women of reproductive age is polycystic ovarian syndrome (PCOS) which was first described by Stein and Leventhal in 1935. Five to six million women in the US are thought to have PCOS. With

estimates ranging from 5 to 21 percent of women of reproductive age or more than 69 million cases in 2021 PCOS is a serious and expanding condition that affects millions of people worldwide (1). To determine prevalence use the following formula: Prevalence Rate = Total

number of women in the study population  $\times$  100% = number of confirmed PCOS cases. Polycystic ovarian morphology (PCOM) hyperandrogenism and irregular menstruation are the hallmarks of polycystic ovarian syndrome (PCOS) (2). In addition to its effects on reproductive health PCOS is associated with a number of metabolic comorbidities including obesity metabolic syndrome insulin resistance dysglycemia and nonalcoholic fatty liver disease (NAFLD). As a result treatment options for PCOS must focus on symptoms or dominant pathologic mechanisms. Different criteria are used to diagnose PCOS due to a variety of clinical features. The range of prevalence is two to thirty-five percent (3). Globally the prevalence of PCOS varies from 4 to 21 percent in Pakistan it is 52 percent (18-44 percent) in India it is 3. 7-22 percent in Bangladesh it is 39 percent in Africa it is 16-32 percent in Europe it is 5-18 percent in the United Arab Emirates it is 25 percent in Austria it is 26 percent in Saudi Arabia it is 16 percent in the United Kingdom it is 10 percent in America it is 5 point2 percent in Asia it is 6-9 percent in China it is 1 point in South Asia it is 1 point and in Turkey it is 0 percent. With updated data for 2025. China had 7. 8-8. 6 percent America had 6-12 percent the UK had 2-3. 5 percent and India had 10-20 percent (7). PCOS prevalence varies due to a number of factors including diagnostic criteria geographic location population ethnicity and variations in androgen menstrual and infertility history and ultrasonography-based assessments (8. 9). Nevertheless adequate sample sizes and well-designed population-based studies are still lacking making it difficult to ascertain the actual prevalence of PCOS. This study sought to determine the prevalence of PCOS throughout Larkana and estimate related comorbidities due to the significant impact of PCOS on fertility the absence of communicable diseases and possible generational effects of Tran.

## Material and Methods

This retrospective observational descriptive cross-sectional study was carried out by Shakhzyad Womens Hospital in Larkana using hospital

records and OPD registers from January 2019 to December 2024. Ethical approval was given in September 2024 by the Institute of Biochemistry University of Sindh Jamshoro and the Ethics Committee of Shakhzyad Womens Hospital. All women who visited the OPD during the study period were included patients with thyroid conditions hyperprolactinemia virilizing or androgen-secreting tumors non-classical congenital adrenal hyperplasia Cushings syndrome or drug-induced androgen excess were not. The inclusion criteria included signs of androgen excess such as hirsutism irregular menstruation oligo-anovulation obesity and clinical or biochemical hyperandrogenism. 215 women between the ages of 17 and 43 who satisfied the inclusion criteria were selected from 438110 OPD patients of whom 6105 received a PCOS diagnosis over a six-year period. A complete clinical history including details about infertility menstrual patterns acne hirsutism obesity metabolic and endocrine disorders and relevant family history was recorded following informed consent. Rotterdam criteria were used to make the diagnosis. Fasting venous blood samples (3-4 cc) were taken on days 3-5 of the menstrual cycle and tested for hormonal and metabolic parameters including FSH LH LH/FSH ratio random blood glucose serum insulin and lipid profile (TC TG HDL) with LDL calculated using the Friedewald formula. Samples were maintained at -80 °C and analyzed using standard enzymatic colorimetric methods. SPSS version 25 and Microsoft Excel were utilized for data analysis. While quantitative variables were expressed as mean  $\pm$  standard deviation qualitative variables were expressed as frequencies and percentages. The independent t-test chi-square test odds ratio and one-way ANOVA with significance set at p 0 were among the statistical tests used. Confidence intervals of 5 and 95 percent.

## Results:

In 6 years total 6105 pcos women presented with different symptoms including infertility, menstrual irregularity, obesity, acne, hirsutism, lean pcos, and thin hairs are shown in table 1.

**Table.1.Total pcos symptoms (6105) from (2019-2024)**

| symptoms               | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | n    | %      |
|------------------------|------|------|------|------|------|------|------|--------|
| obesity                | 167  | 249  | 208  | 253  | 310  | 264  | 1451 | 23.67% |
| infertility            | 200  | 234  | 179  | 247  | 315  | 234  | 1405 | 22.99% |
| Menstrual irregularity | 176  | 208  | 173  | 248  | 317  | 245  | 1359 | 22.17% |
| hirsutism              | 63   | 92   | 85   | 163  | 241  | 176  | 820  | 13.38% |
| Acne/oily skin         | 64   | 72   | 73   | 125  | 195  | 124  | 583  | 9.51%  |
| Acanthosis             | 37   | 66   | 40   | 77   | 98   | 96   | 414  | 6.75%  |

Pcos pts women showed frequencies, percentage, p value of all symptoms including obesity, infertility, menstrual irregularity, hirsutism, acne, and acanthosis Nigeria.

**Table 2. The frequency/percentage /p value of symptoms of pcos p**

| symptoms               | N (frequency | % percentage | p-value |
|------------------------|--------------|--------------|---------|
| obesity                | 1451         | 23.67%       | <0.001  |
| infertility            | 1405         | 22.99%       | 0.1062  |
| Menstrual irregularity | 1359         | 22.17%       | 0.1063  |
| hirsutism              | 820          | 13.38%       | 0.063   |
| Acne/oily skin         | 583          | 9.51%        | <0.001  |
| Acanthosis             | 414          | 6.75%        | <0.001  |

**TABLE 3. 6 YEARS PCOS PTS AGE Showed in this table. TATISTICS**

| YEARS/ | PCOS WOMEN | MEAN | STD DEVIATION | P- VALUE |
|--------|------------|------|---------------|----------|
| 2019   | 579        | 21.4 | ± 6.3         | >0.05    |
| 2020   | 848        | 23.8 | ± 6.1         | <0.001   |
| 2021   | 692        | 29.9 | ± 6.5         | 0.001    |
| 2022   | 1105       | 25.7 | ± 5.2         | 0.001    |
| 2023   | 1464       | 24.6 | ± 5.2         | 0.001    |
| 2024   | 1418       | 23.7 | ± 6.5         | 0.001    |

Prevalence of pcos in 6 years (2019-2024) from month wise which Indicated pcos women 6105 from total OPD in gyne unit 43811 WIT PREVALENCE 13.9%IN LARKANA.

**Table 4. PCOS PATIENTS MONTH WISE TOTAL 6105 (2019-2024) (13.9% PREVELANCE)**

| MONTHS (2019-2024) | PCOS | TOTAL |
|--------------------|------|-------|
| JANUARY            | 461  |       |
| FEBUARY            | 464  |       |
| MARCH              | 492  |       |
| APRIL              | 507  |       |

|                       |        |       |
|-----------------------|--------|-------|
| MAY                   | 509    |       |
| JUNE                  | 505    |       |
| JULY                  | 571    |       |
| AUGUST                | 602    |       |
| SEPTEMBER             | 617    |       |
| OCTOBER               | 599    |       |
| NOVEMBER              | 362    |       |
| DECEMBER              | 389    |       |
| TOTAL PCOS IN 6 YEARS | 6105   | 6105  |
| TOTAL OPD IN 6 YEARS  | 438110 |       |
| PERCENTAGE %          |        | 13.9% |

In this table it presented year wise with total opd and pcos women in 6 years.

**Table 5. 6 years prevalence of PCOS (6105) 2019-2024.**

| years                     | Total OPD PATIENTS PER YEAR | TOTAL PCOS PTS PER YEAR        | PREVELANCE |
|---------------------------|-----------------------------|--------------------------------|------------|
| 2019                      | 68438                       | 579                            |            |
| 2020                      | 59438                       | 847                            |            |
| 2021                      | 67475                       | 692                            |            |
| 2022                      | 73897                       | 1105                           |            |
| 2023                      | 97566                       | 1464                           |            |
| 2024                      | 71296                       | 1418                           |            |
| TOTAL PATIENTS IN 6 YEARS | 438110                      | TOTAL PCOS PTS IN 6 YEARS 6105 | 13.93%     |

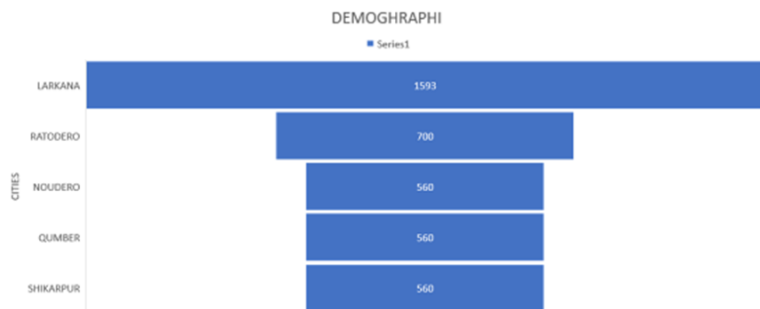
Demographic distribution of pcos women in different cities in 6 years (2019-2024).

Most of pcos women from Larkana were 1593 with 26.09 %, Ratodero 25.50%, Noudero were 25.43%, and rest of cities with 6.35%, 4.07%, 4.99% respectively.

**Table 6. Demographic distribution of pcos women in different cities in 6 years (2019-2024).**

| YEARS | LARKANA | RATODERO | NOUDERO | DOKERI | QUMBER/SHAH DAD QUT | NASIRABAD | SHIKARPUR | BANGOLDERO |
|-------|---------|----------|---------|--------|---------------------|-----------|-----------|------------|
| 2019  | 202     | 201      | 176     | 55     | 21                  | 22        | 32        | 35         |
| 2020  | 213     | 211      | 189     | 56     | 24                  | 28        | 36        | 40         |
| 2021  | 219     | 200      | 190     | 60     | 32                  | 30        | 40        | 33         |
| 2022  | 301     | 302      | 302     | 66     | 33                  | 39        | 44        | 41         |
| 2023  | 313     | 321      | 305     | 73     | 38                  | 44        | 48        | 72         |
| 2024  | 345     | 323      | 321     | 78     | 39                  | 43        | 49        | 84         |
| N     | 1593    | 1558     | 1583    | 388    | 220                 | 206       | 249       | 305        |
| (%)   | 26.09%  | 25.50%   | 25.43%  | 6.35%  | 3.60%               | 3.37%     | 4.07%     | 4.99%      |

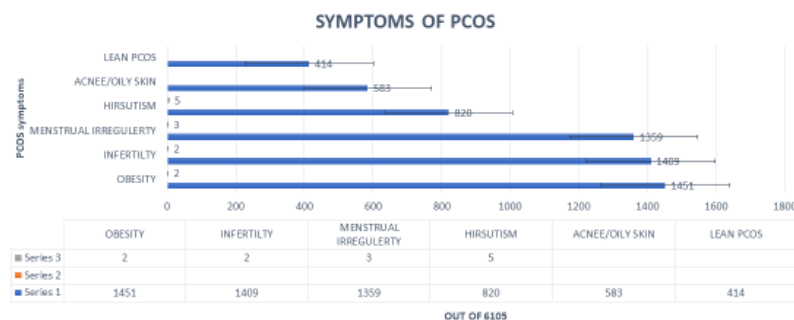
## DEMOGRAPHIC



81

Figure 1. Demographic distribution of pcos pts in different cities

## TOTAL PCOS OF SYMPTOMS (6105) FROM 2019 TO 2024



99

Figure 2. Symptoms of pcos women with frequency and percentage

Complications in pcos women for 6 years (2019-2024) including Type 2 DM, insulin resistance, CVD, hypertension, hyperlipidemia, carcinoma of endometrium, obesity, infertility and depression. The frequency and percentage is Illustrated in table 7.

Table.7. Long term complications of pcos 2019-2024 (6105).

| Complications Of pcos 2019-2024 | Type 2 DM/insulin resistance | CVD/ Hypertension/ hyperlipidemia | Carcinoma of endometrium | obesity | Infertility (treatment failure) | depression |
|---------------------------------|------------------------------|-----------------------------------|--------------------------|---------|---------------------------------|------------|
| 2019-(598)                      | 6                            | 2/4/80                            | 0                        | 30      | 10                              | 101        |
| 2020-(847)                      | 9                            | 3/8/110                           | 1                        | 32      | 15                              | 136        |
| 2021-(696)                      | 11                           | 4/10/106                          | 0                        | 35      | 17                              | 117        |
| 2022-(1105)                     | 12                           | 3/12/88                           | 1                        | 36      | 21                              | 102        |

|             |            |                                     |           |                |                |                 |
|-------------|------------|-------------------------------------|-----------|----------------|----------------|-----------------|
| 2023-(1464) | 16         | 4/20/109                            | 2         | 37             | 28             | 121             |
| 2024-(1418) | 17         | 6/21/132                            | 1         | 40             | 31             | 128             |
| N(%) 6105   | 71 (1.15%) | 22/56/625<br>0.35%/1.06%/10.23<br>% | 6 (0.09%) | 210<br>(3.42%) | 152<br>(2.48%) | 705<br>(11.54%) |

COMPLICATIONS OF PCOS

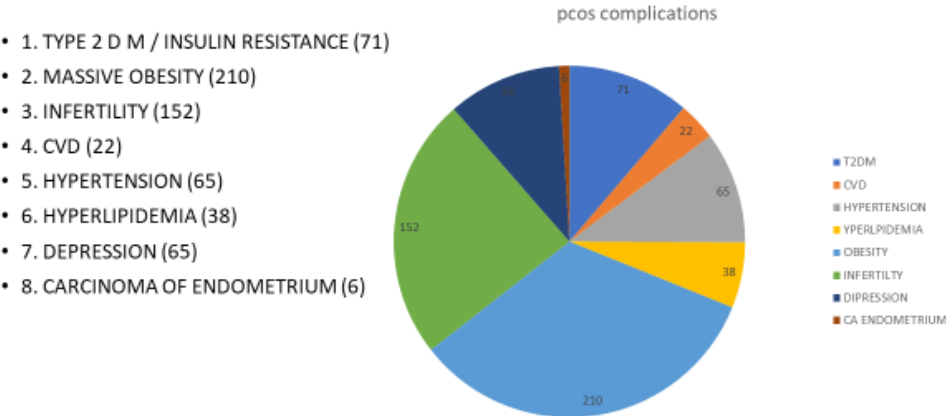


Figure 3. Complication of pcos

DISCUSSION

PCOS is associated with a number of severe medical reproductive emotional and psychological problems. PCOS has a significant and high socioeconomic impact on medical facilities (9). In the middle of the nineteenth century Stein and Leventhal made important advances in their knowledge of PCOS. Among the health issues that Pcos causes are infertility dyslipidemia heart attacks oligo-hypo menorrhea and endometrial and ovarian cancers. Over 116 million women worldwide are estimated to be affected by PCOS (3). (10) 4 percent. Our study found that between 2019 and 2024 the six-year OPD bases at our medical center had a 13 percent incidence of PCOS. 438058 female OPD patients or 9%. It is no longer exclusively recognized as an ovarian condition. Increased BMI and IR are linked to this prevalent metabolic syndrome and endocrine condition (11). We used retrospective OPD PCOS patients

for this study. Consequently PCOS prevalence varies by country. Three percent was reported as the prevalence 2. 2 and 4 percent. 7 percent in China Iran and the US respectively. It was discovered that prevalence rates ranged from five to ten percent in Brazil Beijing Sri Lanka Palestine Greece the UK and Spain. Denmark Turkey and Australia reported higher prevalence ranges (15–20 percent) (121314). Wolf et al. (2018). demonstrated the prevalence of PCOS in Mexico. 2019 witnessed Ganie et al. determined that PCOS prevalence ranged from 3. 7 to 22 percent. 5% depending on the study population and the diagnostic standards used. In the Indian state of Haryana 71% of women with PCOS resided in cities while 29% lived in rural areas according to a report from this laboratory (15). PCOS patients were significantly more likely to be obese (23). 67 percent) whereas the most prevalent lipid profile characteristic was reduced HDL (49). thirty percent of those with PCOS).

The TG/HDL ratios were higher in women with PCOS (6). 671) and rose with BMI which could raise the risk of cardiovascular illnesses. Research on dyslipidemia and PCOS has mostly focused on triglyceride (TG) and cholesterol levels. Women with PCOS have a lipid profile that includes lower HDL and higher TG levels (16). These alterations are consistent with the normal lipid profile that is frequently associated with insulin resistance. The liver secretes more VLDL particles which raises plasma triglyceride (TG) levels. The exchange of TGs for CE is subsequently made easier by the activity of the cholesterol ester (CE) transfer protein. Triglyceride-enriched HDL particles decay more quickly due to this mechanism whereas CE-enriched VLDL particles change into small dense LDL particles (17). Diabetes was more common in PCOS patients with poor glucose metabolism. In our six-year study the prevalence of infertility among women with PCOS was 22%. 67% of which 30% were primary infertility and 70% were secondary infertility. There were 22 cases of oligo-hypomenorrhea amenorrhea and menorrhagia three patterns of irregular menstrual cycles. 67% of women with PCOS. Among PCOS patients oligo-hypomenorrhea is the most common symptom. Hirsutism rose in PCOS-affected women (13). 17%) oily or acne-prone skin (9. 5%) and acanthosis (6%). 75 percent. Additionally a number of studies discovered that lipid abnormalities and T2DM frequently coexisted and that patients with diabetes were more likely to develop atherosclerotic arterial disease as a result of abnormalities in lipid metabolism (18). By phagocytosing excess plasma LDL and invading the sub-endothelium for instance macrophages can contribute to the atherosclerosis cascade (19). However due to the small total number of patients (n=160 and n=44) the elevated LDL level was not significant in the dysglycemia or diabetes subgroups in our study. Furthermore more research is required to better understand the precise mechanism of lipid abnormalities causing hyperinsulinemia insulin resistance dysglycemia and type 2 diabetes in PCOS as well as to develop more effective treatments for dysmetabolism (2021). Abdominal

obesity and glucose metabolism issues can arise in PCOS patients. Their conditions are often pre-diabetic. Ensuring that the course of treatment does not exacerbate pre-existing issues is crucial. Further problems must be avoided in order to stop metabolic syndrome from developing (23). According to the study's findings increasing physical activity can progressively lower the incidence of PCOS. These protective benefits can be multiplied twelve times by increasing daily physical exercise intensity (24). Our study's strength is its large sample size which improves the generalizability of the results. By including a significant number of participants we were able to lower the possibility of sampling bias and boost the statistical power of the study. The small sample size of this study is a limitation. It was difficult to find healthy controls who were matched for BMI and age. Confounding factors like insulin resistance dietary fat intake and androgen levels were not considered and the absence of a total cholesterol assessment restricts how the results can be interpreted. Future research should employ a larger sample size and measure total cholesterol levels. Some of the limitations of this study are as follows: (1) fewer states and union territories were included (2) the COVID-19 pandemic increased dropout rates (3) androstenedione and sex hormone-binding globulin were not estimated (4) transabdominal ultrasonography was used instead of a transvaginal approach to estimate ovarian volume and (5) electrochemiluminescence immunoassay was used instead of liquid chromatography-mass spectrometry for androgen estimation. It's also crucial to remember that recall bias in menstrual history reporting cannot be completely ruled out as a potential source of error in our study.

## Conclusions

PCOS was prevalent in this descriptive cross-sectional study of women of reproductive age who were recruited throughout Larkana. Most of these PCOS-affected women had hirsutism acne obesity irregular menstruation and infertility. Some women with oligomenorrhea hyperandrogenism and severe metabolic abnormalities were diagnosed with pre-PCOS.

Complications from PCOS include massive obesity type 2 diabetes hypertension hypercholestermia CVS CA endometrium long-term infertility with unsuccessful treatments and depression. For efficient management a multidisciplinary strategy ought to be suggested. The development of preventive and diagnostic/therapeutic strategies as well as the possible integration of PCOS diagnosis and treatment into national health protocols depend on these findings. Future research will use more sensitive assays or modern markers and participants will be drawn from different cities.

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