

Original Article

# A study to assess the co-morbidities and complications of polycystic ovarian syndrome



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## ABSTRACT

The purpose of the study was to evaluate the prevalence, co-morbidities, pharmacological therapy, and effectiveness of common lifestyle changes for metabolic dysfunction in women with the polycystic ovarian syndrome (PCOS) and related comorbidities in the gynaecology division. This 6-month prospective observational study of 120 PCOS patients who were gynaecology patients at a tertiary care hospital was conducted from September 2021 to February 2022. An interview with the patient was done using an assessment form. This study highlighted the supportive evidence among PCOS patients for the advantages of changing one's lifestyle. This study involved 90 PCOS individuals out of a total of 120 participants, many of them were in the 20–30 age group. This research analyses the high prevalence of cardiovascular disease comorbidities and demonstrates that a high BMI is the most common risk factor for PCOS. The findings of our study indicate the necessity of evaluating the complications seen in individuals who are at risk, such as infertility. This line of research demonstrates the critical impact that medication and lifestyle modifications play in managing PCOS. Patients with the polycystic ovarian syndrome should get advice regarding lifestyle modifications from a clinical pharmacist.

## 1. Introduction

The polycystic ovarian syndrome is a metabolic and endocrine disorder that commonly affects women of reproductive age. In the period 377–460 BC, Hippocrates first noted this phenomenon, saying that "women whose menstruation is less than three days are strong, with a healthy complexion and a masculine appearance; neither they are concerned about delivering children nor do they become pregnant [1]." Three significant characteristics—irregular menstruation, hyperandrogenism, and polycystic ovarian morphology (PCOM)—were identified, along with their existence and severity [2]. A hormonal imbalance was identified in women

with PCOS, including androgens, luteinizing hormones, sex hormone-binding globulin, and prolactin [3]. As a consequence, the phenotype of the disease, the patient's age, and their lifestyle can all affect how these manifests in a patient. [4].

Hirsutism, androgenic alopecia, and acne are the clinical manifestations of hyperandrogenism in PCOS. According to a recent study, PCOS is identified in more than 80% of females with hyperandrogenic symptoms [5, 6]. Oligomenorrhea, secondary amenorrhea, and dysfunctional uterine bleeding are among the symptoms that PCOS patients may experience [7]. PCOS affects 30%–40% of women with amenorrhea and

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85%–90% of women with oligomenorrhea [4]. In addition to infertility, it can cause significant problems such as metabolic syndrome, diabetes mellitus, dyslipidaemias, endometrial cancer, and cardiovascular disease [2]. PCOS is classified as a metabolic, and reproductive condition [8] as a result of these issues.

Although the exact cause of PCOS is still unknown, research points to a combination of environmental factors and genetic predisposition. The absence of follicle-stimulating hormone (FSH), which is necessary for converting androgens into oestrogens, and elevated levels of luteinizing hormone (LH), which stimulates theca cells to make androgens, are two essential pathologic indicators [9]. Several hypotheses explain this high LH/FSH ratio, such as increased insulin resistance, high levels of insulin in the blood, and continuous pulses of the gonadotropin-releasing hormone (GnRH). Pharmacological interventions include ovulation inducers, antiandrogens, oral hypoglycaemics, insulin sensitizers, and oral hypoglycaemics [10].

Combination treatment with oral contraceptives includes ethinylestradiol and cyproterone acetate, ethinylestradiol and desogestrel, and ethinylestradiol and drospirenone, which were effective in lowering testosterone levels and controlling menstruation [11, 12]. Continued use of these medicines alters metabolic parameters and increases the risk of venous thrombosis [13]. Metformin use may enhance lipid and glucose metabolism and lessen these harmful effects [14]. Furthermore, there is no evidence from previous meta-analyses to help choose the most efficient intervention.

We, therefore, initiated this prospective observational study to compare the clinical and biochemical results for short- and long-term follow-ups, and to assess the risk factors, co-morbidities, and complications in overweight PCOS patients.

## 2. Materials and methods

### 2.1. Study design

The study is prospective and observational.

### 2.2. Sources of data and materials

- ✓ Patient consent form
- ✓ Patient data collection form.
- ✓ Patient case note/prescription.

### 2.3. Inclusion criteria

- ✓ Gynaecology department patients at SVS Hospital & Medical College, including inpatients and outpatients.
- ✓ Patients who are female and of childbearing age.
- ✓ The patients who are willing to consent.

### 2.4. Exclusion criteria

- ✓ Patients underwent major surgeries.
- ✓ All individuals with concomitant diseases, including TB and immune-deficient illnesses like HIV
- ✓ Pregnant and lactating women

### 2.5. Method of Data collection

- ✓ By collecting case reports and assessing biochemical results.
- ✓ Patient questionnaire/interview.

### 2.6. Study procedure

After obtaining consent, eligible patients were included in this prospective observational study. The form for collecting information will be created and used. The patient's demographic details and a list of medications are primarily included in this form.

The study was conducted at SVS Medical College and Hospital. From admission until discharge, the relevant data for the study was collected, and the data was assessed using the proper statistical techniques.

### 2.7. Does the study require any investigation or intervention to be conducted on patients?

No

## 2.8. Has ethical clearance been obtained from your institution in the above case?

The ethical committee clearance was obtained from the Institutional Ethical Committee of SVS Medical College Hospital before initiating the study.

## 2.9. Duration of the study

The study duration was for 6 months.

### 2.9.1. Place of study

The study was conducted at SVS Medical College & Hospital.

## 2.10. Plan of work

- ✓ All patients presenting to the gynaecology department are screened.
- ✓ Patients are added to studies if they meet the criteria and give their permission to do so.
- ✓ The patient data collection form will be used to record demographic information and other information.
- ✓ The patient will be questioned about any co-morbidities or disease-related issues.
- ✓ Drugs from different classes that have been used in the past and are currently being used are examined for the assessment and treatment regimen.
- ✓ Patients were interviewed in order to achieve the goals of this study.
- ✓ After the data collection, statistical analysis was carried out.
- ✓ After data analysis, the results will be interpreted.
- ✓ Finally, the result was concluded, and the impression was highlighted.

## 3. Results

### 3.1. Prevalence of PCOS according to age

At SVS Medical College and Hospital, a prospective observational study was carried out. In total, 90 patients took part. A larger proportion of patients—51 patients, or 55.5%—are between the ages of 18 and 30

years, and 8 patients, or 8.8%—are between the ages of 41 and 50 years.

### 3.2. Prevalence of PCOS based on body mass index

Based on the data, PCOS is most common in people with a high BMI, which is 62 patients (68.8%), then in people with a normal BMI, which is 19 patients (21.1%), and in people with a low BMI, which is 9 patients (10%). (Table 1)

**Table 1.** Table showing the prevalence of PCOS based on BMI

BMI	No. of Patients	Percentage
Low BMI	9	10
Normal BMI	19	21.1
High BMI	62	68.8

### 3.3. Co-morbidities in PCOS patients

In this study, we found that patients with cardiovascular disease co-morbidities had the greatest risk of developing PCOS, at 37.7%, followed by patients with diabetes and insulin resistance at 23.3% and those with metabolic syndrome at 21.1%, and subsequently patients with psychiatric problems. While psychiatric conditions including sleep apnea, depression, and anxiety were least prevalent in 16 patients (17.7%), (Table 2).

**Table 2.** Co-Morbidities in PCOS Patients

Co-Morbidities	No. of Patients	Percentage
Cardiovascular disease	34	37.7
Diabetes and Insulin resistance	21	23.3
Metabolic syndrome	19	21.1
Psychological problems	16	17.7

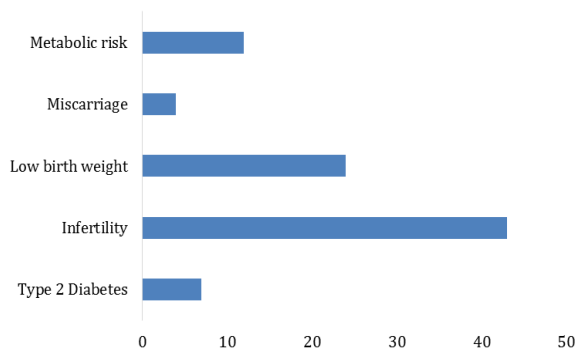
### 3.4. Complications observed in PCOS

Infertility was the most frequent complication primarily seen in PCOS during our study, followed by obstetric or pregnancy complications such as low birth weight. The following issues were metabolic risk and gestational diabetes. Miscarriage was the finding with the fewest complications (Figure 1).

### 3.5. Commonly Prescribed Drugs in PCOS

A folic acid supplement, the insulin sensitizer metformin, which helps to regulate metabolic disorders and obesity, and combined oral contraceptive pills are the

treatment options for PCOS, according to the data obtained. More patients—68 (75.5%)—are provided oral contraceptive pills like ethinylestradiol and desogestrel with metformin and folic acid, whereas only 22 (24.4%) are prescribed ethinylestradiol and drospirenone with metformin and folic acid. (Table 3).



**Fig. 1.** Distribution of complications observed in PCOS

**Table 3.** Commonly Prescribed Drugs in PCOS

Drug Name	No. of Patients	Percentage
Ethinylestradiol + Desogestrel	68	75.5
Ethinylestradiol + Drospirenone	22	24.4
Metformin	90	100
Folic Acid	90	100

### 3.6. Lifestyle modifications in PCOS

PCOS patients were divided into two groups: 45 patients received monotherapy with diets consisting of low-saturated foods (30%), limited carbohydrates (55%) and protein foods (30%), or only with physical activities such as aerobics, gym, yoga, exercise, and walking; 45 patients received combination therapy for 6 months, combining diet and physical activity. In this approach, we found that patients who received combined therapy of diet and physical activity had better reproductive results by lowering their risk of metabolic disorders and cardiovascular disease, as well as better patient health by normalising their menstrual cycle.

## 4. Discussion

Based on data collected from a review of 90 PCOS patients' medical records, interviews, and 6-month risk assessments. It was shown that women between the ages of 18 and 25 are more prevalent. It was determined

through reviews of related papers that PCOS prevalence is highest in people between the ages of 18 and 25 [15].

The outcomes of one more study led the authors to conclude that obesity and PCOS are closely related. Numerous processes play a role in how obesity and weight gain affect the onset of PCOS. The metabolic effects of insulin resistance and the steroidogenic and reproductive effects of hyperinsulinemia are significant pathways. Obese women are more likely than normal-weight women to have irregular menstruation and anovulatory infertility. The relative risk of anovulatory infertility increases in women of reproductive age with a BMI of 24 kg/m<sup>2</sup> and continues to go up as BMI grows [16].

Cardiovascular disease, diabetes, insulin resistance, metabolic syndrome, and psychiatric problems are common comorbidities in PCOS patients. And although similar results were observed in a review article by Emily W. Gilbert et al., the authors concluded that, regardless of age or race, PCOS is associated with a higher prevalence of cardiovascular comorbidities and metabolic syndrome. Furthermore, they concluded that women with PCOS have lower insulin sensitivity and glucose tolerance than women without these problems [17].

According to review research, several factors, such as PCOS characteristics, multiple pregnancies, infertility treatments, obesity, IR and metabolic malfunctions, inflammation, and placental abnormalities, may raise the likelihood of pregnancy difficulties in PCOS sufferers [18]. According to a different meta-analysis of research, PCOS-positive women are more likely to experience unfavourable pregnancies and new born problems. These results [19] were extremely similar to our results.

An earlier study found that the most effective interventions were appropriate dietary modifications, increased physical activity and exercise, and adherence-maintaining techniques. By successfully increasing the conception rates in PCOS patients, dietary changes and medication appear to enhance ovulation function and the menstrual cycle. Additionally, lifestyle

changes could reduce stress and anxiety and improve the quality of life, particularly in PCOS patients who are obese females [20]. In addition, we discovered that improving reproductive, metabolic, and quality of life factors had a positive effect on PCOS when combined with drug therapy in the current study.

#### 4.1. Limitations and recommendations will be as follow

- ✓ This study's period was limited, so we could not enrol more cases.
- ✓ Additionally, this may be investigated in relation to various gynaecological and obstetrical illnesses and treatment outcomes.
- ✓ A patient's adverse medication reactions and interactions with the recommended treatment can also be examined.
- ✓ Follow your medication use day by day and keep an eye out for any changes in your symptoms.
- ✓ All of the study's participants are of the same ethnicity. The inclusion of various sources might have an effect on the findings at hand.

#### 5. Conclusion

In this study, we assessed the risk variables for each age group, including BMI, comorbidities, complications, and lifestyle modification. We have reached the following conclusion: Modifying one's lifestyle is vital with PCOS. The study included 90 people with PCOS between the ages of 18 and 30. In this study, BMI is the main risk factor for PCOS. In this study, we discovered that individuals with cardiovascular co-morbidities had a significant chance of developing PCOS and that PCOS was more common in those with psychiatric issues.

Infertility was the most frequent complication primarily seen in PCOS during our study, followed by obstetric or pregnancy issues such as low birth weight. A miscarriage, however, was the least common problem. This study demonstrates that lowering metabolic

risk and cardiovascular disease in PCOS patients has improved reproductive results when combined with drug therapy.

#### Abbreviation

PCOS: Poly Cystic Ovarian Syndrome

BMI: Body Mass Index

#### Conflict of Interest

The authors, at this moment, declare that they have no conflict of interest.

#### Author's contributions

All authors equally participated in designing experiment analysis and interpretation of data. All authors read and approved the final manuscript.

#### Consent for publications

All authors have read and approved the final manuscript for publication.

#### Availability of data and material

The authors have embedded all data in the manuscript.

#### Ethics approval and consent to participate

The authors did not use humans or animals in the research

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#### References

1. Azziz R, Carmina E, Chen Z, Dunaif A, Laven JS, Legro RS, Lizneva D, Natterson-Horowitz B, Teede HJ, Yildiz BO (2016) Polycystic ovary syndrome. *Nature reviews Disease primers* 2 (1): 1-18. doi: <https://doi.org/10.1038/nrdp.2016.57>
2. Nandi A, Chen Z, Patel R, Poretsky L (2014) Polycystic ovary syndrome. *Endocrinology and Metabolism Clinics* 43 (1): 123-147. doi: <https://doi.org/10.1016/j.ecl.2013.10.003>
3. Parsamanesh N, Moossavi M, Bahrami A, Butler AE, Sahebkar A (2018) Therapeutic potential of curcumin in diabetic complications. *Pharmacological Research*

- 136): 181-193. doi: <https://doi.org/10.1016/j.phrs.2018.09.012>
4. Meier RK (2018) Polycystic ovary syndrome. *Nursing Clinics* 53 (3): 407-420. doi: <https://doi.org/10.1016/j.cnur.2018.04.008>
  5. Azziz R, Sanchez L, Knochenhauer E, Moran C, Lazenby J, Stephens K, Taylor K, Boots L (2004) Androgen excess in women: experience with over 1000 consecutive patients. *The Journal of Clinical Endocrinology & Metabolism* 89 (2): 453-462. doi: <https://doi.org/10.1210/jc.2003-031122>
  6. Sirmans SM, Parish RC, Blake S, Wang X (2014) Epidemiology and comorbidities of polycystic ovary syndrome in an indigent population. *Journal of Investigative Medicine* 62 (6): 868-874. doi: <https://doi.org/10.1097/01.JIM.0000446834.90599.5d>
  7. Foster C, Al-Zubeidi H (2018) Menstrual irregularities. *Pediatric annals* 47 (1): e23-e28. doi: <https://doi.org/10.3928/19382359-20171219-01>
  8. Dunaif A, Fauser BC (2013) Renaming PCOS—a two-state solution. *The Journal of Clinical Endocrinology & Metabolism* 98 (11): 4325-4328. doi: <https://doi.org/10.1210/jc.2013-2040>
  9. Wang Z, Tang X, Yang S, Yin T, Zhao Y, Zheng A, Zhang R, Gu Y, Wang L (2019) A gradual change of chromosome mosaicism from placenta to fetus leading to T18 false negative result by NIPS. *Clinica Chimica Acta* 495: 263-268. doi: <https://doi.org/10.1016/j.cca.2019.04.064>
  10. Legro RS, Arslanian SA, Ehrmann DA, Hoeger KM, Murad MH, Pasquali R, Welt CK (2013) Diagnosis and treatment of polycystic ovary syndrome: an Endocrine Society clinical practice guideline. *The Journal of Clinical Endocrinology & Metabolism* 98 (12): 4565-4592. doi: <https://doi.org/10.1210/jc.2013-2350>
  11. Teede H, Tassone EC, Piltonen T, Malhotra J, Mol BW, Peña A, Witchel SF, Joham A, McAllister V, Romualdi D (2019) Effect of the combined oral contraceptive pill and/or metformin in the management of polycystic ovary syndrome: A systematic review with meta-analyses. *Clinical endocrinology* 91 (4): 479-489. doi: <https://doi.org/10.1111/cen.14013>
  12. Menshawy A, Ismail A, Abdel-Maboud M, El-Din AA, Elgebaly A, Gadelkarim M, Bahbah EI, Abdelghany MF, Samy A, Abbas AM (2019) Effect of chlormadinone acetate versus drospirenone-containing oral contraceptives on the endocrinal features of women with polycystic ovary syndrome: Systematic review and meta-analysis of randomized clinical trials. *Journal of Gynecology Obstetrics and Human Reproduction* 48 (9): 763-770. doi: <https://doi.org/10.1016/j.jogoh.2019.03.025>
  13. Stegeman BH, de Bastos M, Rosendaal FR, van Hylckama Vlieg A, Helmerhorst FM, Stijnen T, Dekkers OM (2013) Different combined oral contraceptives and the risk of venous thrombosis: systematic review and network meta-analysis. *Bmj* 347: f5298. doi: <https://doi.org/10.1136/bmj.f5298>
  14. Johnson NP (2014) Metformin use in women with polycystic ovary syndrome. *Annals of translational medicine* 2 (6): 56. doi: <https://doi.org/10.3978%2Fj.issn.2305-5839.2014.04.15>
  15. Gill H, Tiwari P, Dabadghao P (2012) Prevalence of polycystic ovary syndrome in young women from North India: A Community-based study. *Indian journal of endocrinology and metabolism* 16 (Suppl 2): S389-S392. doi: <https://doi.org/10.4103%2F2230-8210.104104>
  16. Barber TM, Hanson P, Weickert MO, Franks S (2019) Obesity and polycystic ovary syndrome: implications for pathogenesis and novel management strategies. *Clinical Medicine Insights: Reproductive Health* 13): 1-9. doi: <https://doi.org/10.1177/117955811987404>
  17. Gilbert EW, Tay CT, Hiam DS, Teede HJ, Moran LJ (2018) Comorbidities and complications of polycystic ovary syndrome: an overview of systematic reviews. *Clinical endocrinology* 89 (6): 683-699. doi: <https://doi.org/10.1111/cen.13828>

18. Palomba S, De Wilde MA, Falbo A, Koster MP, La Sala GB, Fauser BC (2015) Pregnancy complications in women with polycystic ovary syndrome. *Human reproduction update* 21 (5): 575-592. doi: <https://doi.org/10.1093/humupd/dmv029>
19. Qin JZ, Pang LH, Li MJ, Fan XJ, Huang RD, Chen HY (2013) Obstetric complications in women with polycystic ovary syndrome: a systematic review and meta-analysis. *Reproductive Biology and Endocrinology* 11 (1): 1-14. doi: <https://doi.org/10.1186/1477-7827-11-56>
20. Lim SS, Hutchison SK, Van Ryswyk E, Norman RJ, Teede HJ, Moran LJ (2019) Lifestyle changes in women with polycystic ovary syndrome. *Cochrane Database of Systematic Reviews* 2019 (3): Art. No. CD007506. doi: <https://doi.org/10.1002/2F14651858.CD007506.pub4>



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