Infertility in PCOD

Dhanesh Kumar

Abstract: <u>*Background:*</u> *Polycystic ovarian disease/ syndrome (PCOD/PCOS) is a common health condition which mainly affects females in their reproductive age. It is a complex disorder, for which numerous genetic and environmental factors have been implicated. It is the most common cause of abnormal uterine bleeding in the pubertal age group. It has been estimated that about 20% of Indian women suffer from PCOD. The present study was undertaken to study the hormonal imbalance in the females suffering from PCOD.* <u>*Methods:*</u> *A cross- sectional study was carried out among the women suffering from PCOD. A total of 100 samples were studied and data was collected using a standard questionnaire. Data was analysed by using.* <u>*Results:*</u> *Study showed that Out of 100 women studied who were suffering from PCOD, 72% were having problem in conceiving while 10% had no issues with infertility. However, 18% of the women, among the sample were not married yet.* <u>*Conclusion:*</u> *Therefore, our study concludes that there is a corelation between PCOD and infertility.*

1. Introduction

Polycystic ovarian disease/syndrome also called as Stein leventhal syndrome, is an ovarian dysfunction disorder and is diagnosed using a criteria called as **Rotterdam criteria**. This has three components, out of which two must be present to make a provisional diagnosis of PCOD i.e.

1) Hyperandrogenism (presence of symptoms of excessive androgenic hormones) or Hyperandrogenemia (presence of excessive levels of androgens in blood with/ without symptoms).
2) Menstural irregularities, particularly the oligomennorhea and secondary amenorrhea.
3) Polycystic ovary on USG:
   Ovarian size >/= 10 cc
   >/= 12 follicles
   Size of follicles = 2-9 mm (< 10 mm).

However for the definitive diagnosis, the conditions which have the same features as of PCOS have to be excluded:

Late onset congenital adrenal hyperplasia
Hyperprolactinoma
Idiopathic hirsutism
Hypothyroidism
Elevated cortisol levels

The various features seen in PCOS include:

- **Hormonal imbalance :**

PCOD is characterised by excessive production of androgen, mainly from the ovaries and partly from adrenals (seen in 50% females).The main hormone produced is testosterone which is formed from DHEA .Also, the levels of androstenedione are raised which is derived from the precursor, DHEA-S.

The reason for the increased production is in turn the elevated levels of LH (leutinising hormone) and insulin resistance.

The elevated level of the androgens is responsible for many of the clinical manifestations of PCOD which include:

Hirsutism: Growth of excess terminal hair (in male pattern)
Acne: It doesn't respond to usual treatment and is scarring in nature.

Androgenic alopecia
Dyslipidemia

The (excessive) androgens are converted further into estrogen in adipose tissue, the conversion being more prominent in obese females. There is also a change in the pattern of estrogen formed with the ratio of $E_1:E_2$ in PCOD being 2:1 while in normal females, it is 1:2.

The estrogen formed, has a negative feedback on FSH leading to its decreased value.

The estrogen also has a positive feedback on LH, increasing its levels. This elevated level of LH stimulates theca cells of ovary to release excessive androgens.

The ratio of LH: FSH becomes 2:1 or 3:1.

The decrease in the FSH levels leads to impaired follicle development as a result, the follicles in the ovary remain small and are multiple; these small follicles in turn secreate inhibin B.

Therefore, the levels of Inhibin B increase.

The levels of progesterone also decrease

- **Menstural irregulaties**

As the levels of LH are constantly high, there will be no "LH surge" which is important for ovulation to occur, therefore, the cycles in PCOS become anovulatory.

As there is a anovulation, there is no formation of corpus luteum due to which progesterone levels are decreased too. This in turn leads to oligomennorhea (defined as less than 8 cycles / year) or secondary amenorrhea. Also, in cases where the estrogen levels are excessively high, the females may suffer from metrorrhagia (irregular and excessive periods).

- **Infertility:**

The cause of infertility in PCOD is the an ovulation. It is the most treatable cause of infertility. The most common cause of medically treatable infertility is polycystic ovary syndrome (PCOS). This syndrome is common among young women and is cause of an ovulatory infertility in 70%[1]Polycystic ovary syndrome accounts for more than 75%of cases of an ovulatory infertility[2].

- **Insulin resistance:**

(50-70)% cases of PCOD have insulin resistance.It is more predominant in the obese patients .It leads increased glucose which produces an inflammatory response leading to an increase in CRP. The patient will have an abnormal oral glucose tolerance test .It will lead to the formation of Acanthosis nigiricans which is a darkly pigmented patch on skin mostly seen on the nape of neck. Due to this, it is also called as HIAR-AN syndrome i.e.

- Hyperandrogenism
- Insulin resistance
- Acanthosis nigiricans.

Recent data suggest a divergence in post receptor signaling pathways for insulin in its target tissues, where the metabolic pathway of insulin activity is defective[4.]

- **Ultrasound features:**

The unruptured follicles arrange themselves around the periphery of the ovary giving an appearance called as **necklace pattern.** In a study conducted, 29% of patients had normal ovarian volume. A normal ovarian volume doesn't exclude diagnosis of PCOD in proper clinical settings; the remaining 71% patients with PCOD had bilaterally enlarged ovaries in three distinct patterns[3.]

PCOD leads to a variety of complications in the long run which include:

- Coronary artery disease
- Dyslipidemia (metabolic x syndrome)
- Endometrial hyperplasia (increasing the risk of Endometrial Ca ,Ovarian Ca)
- Obesity can lead to Sleep apnea, NASH, Depression.
- Diabetes mellitus due to insulin resistance.

The diagnosis of PCOD is based on the clinical features along with characteristic hormonal profile and an ultrasound.

The mainstay of treatment is considered to be life style modification and maintaining a healthy weight is advocated is all patients.

The other mode of treatment (if required) is purely symptomatic.

2. Literature Review

Polycystic ovary syndrome is the most common cause of an ovulatory infertility. An ovulation is characterized by arrest of a trail follicle growth in the final stages of maturation. There is evidence that abnormal endocrine environment in PCOS (specifically elevation of serum levels of luteinizing hormone and/or insulin) plays an important role in arrest of natural follicles but, as a result study of recent studies, abnormalities in the early follicle development have also been shown to be present [5].

Lifestyle change alone is considered first-line treatment for the management of infertile anovulatory PCOS women who are overweight or obese. First-line medical ovulation induction therapy to improve fertility outcomes is clomiphene citrate, whilst gonadotropins, laparoscopic ovarian surgery or possibly meteor in are second line in clomiphene citrate-resistant PCOS women[6].

PCOD is the most common hormonal disturbance in women- around one fifth of women in United Kingdom are affected. It is also the most common reason for women not to ovulate , and the combination of being overweight and having polycystic ovary syndrome have a profound effect on reproductive Heath[7].

Aims and Objectives:
To determine the prevalence of infertility in the women suffering from PCOD.

Operational Definitions

PCOD (polycystic ovary disorder):

It is a complex disorder in which the patient suffers from hyperandrogenemia, menstural irregularities and typical ultrasound appearance and out of these three, two must be present to make a provisional diagonosis.

Infertility: The failure of a couple to conceive even after a year of unprotected sexual intercourse.

3. Methods and Materials

Study design: Cross sectional study

Setting: Patients attending Gynaecology OPD

Study population: Patients suffering from Polycystic Ovarian Syndrome who attended the OPD from 01/02/22 to 28/02/22.

Sample technique: Non-Random

Data Collection Tool: Questionnaire

Sample Collection:

Inclusion Criteria:
Patients documented as cases of PCOD, attending Gynaecology OPD.

Exclusion Criteria:

Patients who were still not confirmed as cases of PCOD. Uncooperative patients.

Data Collection Procedure

A structured questionnaire was developed which included the questions pertaining to the topic. The questionnaire was pre- tested twice before adapting a final version. The questionnaires were filled by the patients who met the inclusion criteria. Informed consent was taken from all the subjects under study.

Data Analysis:

1) The completed questionnaires were entered into computer using SPSS version 16.0.
2) Data was described in terms of percentages.

4. Results

Fertility Status	Total No. of Participants	Results
Infertile	100	72
Fertile	100	10
Unmarried	100	18

5. Discussion

Our research on infertility in PCOD was conducted on about 100 patients in Gynaecology OPD.

The study included the females who belonged to reproductive age group and had alreay documented PCOD. A questionnaire which contained the relievant questions regarding the topic was used to collect the information from these patients.

Out of 100 patients who suffered from PCOD, it was found that 72 (72%) had not conceived while 10. (10%) had conceived and were attending OPD for the other unrelated issues. It was also seen that out of these women, 18. (18%) were unmarried and consequently their fertility status couldn't be established.

6. Recommendations

Based on our research, we conclude that PCOD is among the leading causes of infertility and at the same time, it is the most easily treatable cause of infertility. Lifestyle modifications , which can improve not only the fertility status in PCOD but also has a tremendous effect on the other symptoms should be widely encouraged. Moreover, since the basic cause of infertility is usually the anovulution, therefore, in the patients who don't conceive despite of lifestyle modifications, ovulation inducing drugs can be used. It is also important to spread the word about this condition so that it can be managed at early stages by simple changes in the lifestyle before it leads to any complications.

References

[1] Brassard M, AinMelk Y, Bailargeon JP. Basic infertility including polycystic ovary syndrome. Medical Clinical of North America. 2008 Sep1;92(5):1163-92

[2] Gorry A,White DM, Franks S. Infertility in polycystic ovary syndrome. Endocrine.2006 Aug;30(1):27-33.

[3] Hann LE, Hall DA, McArdle CR, Seidel M. Polycystic ovarian disease: sonographic spectrum. Radiology. 1984 Feb;150(2):531-4.

[4] Diamante-Kandarakis E, Papavassilliou AG. Molecular mechanisms of insulin resistance in polycystic ovary syndrome. Trends in molecular medicine. 2006 Jul 1;12(7):324-32

[5] Franks S. Anovulation in polycystic ovary syndrome. InInsulin Resistance and Polycystic ovary syndrome 2007 (pp.297-302).Humana Press.

[6] Costello MF, Misso ML, Wong J, Hart R, Rombauts L, Melder A, Norman RJ, Teede HJ. The treatment of infert in polycystic ovary syndrome: a brief update. Australia and New Zealand Journal of Obstetrics and Gynaecology. 2012 Aug; 52(4):400-3.

[7] Bales AH, Rutherford AJ. Managing anovulatory infertility and polycystic ovary syndrome. Bmj.2007 Sep 27;335(7621):663-6