

A Study on the Clinical and Biochemical Profile of Polycystic Ovary Syndrome Patients Attending a Tertiary Care Hospital in Bihar

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ABSTRACT

Background: Polycystic ovarian syndrome (PCOS) is one of the most common reproductive endocrinological disorders with a broad spectrum of clinical manifestations affecting women of reproductive years. It is a common diagnosis in women presenting with infertility. All the dimensions of PCOS have not been completely explored. Many studies have tried to characterize the exact presentation of the disease. The main objective of this study was to find out the clinical and biochemical profile of patients with polycystic ovary syndrome (PCOS) in patient population attending the tertiary care hospital in Gaya, Bihar. **Methods:** A cross sectional study was done among 300 PCOS patients in a span of one year. Pregnant patients, patients with symptomatic disease and those of age less than 15 years and more than 35 years were excluded. PCOS patients were diagnosed using Rotterdam's criteria. A detailed history and examination was obtained. Transvaginal USG was undertaken to detect PCOS. Anthropometric measurements were also done. Biochemical and hormonal test were done by standard methods. **Results:** The mean age group of patients was 28.11 ± 4.9 SD with mean BMI 26.12 ± 5.12 . Maximum (42.7%) number of patients was in the age group 26-30 years. Out of 245 fertile patients, 68.6% were nulliparous. Among them, 82.7% had primary infertility. According to duration of infertility, maximum (45.2%) were of 6-10 years duration. About 93.7% were detected to have PCOS in ultrasonography. Androgenic features like acne was present in 22.3% of the patients, acanthosis nigricans in 18% of the patients and androgenic alopecia was present in 7.7%. The prevalence of metabolic syndrome was 21.7% while 20.3% had hypothyroidism. Elevated total testosterone was elevated in 41.3% of the patients. **Conclusion:** Early diagnosis and intervention will reduce the long term health complications associated with PCOS. A complete clinical, biochemical and radiological workup is necessary for appropriate management.

Keywords: Polycystic ovary syndrome, Body mass index, Hirsutism, Obese, Metabolic syndrome.

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in the women of reproductive age group. Its prevalence ranges from 7-10% worldwide. PCOS causes increased ovarian and adrenal androgen secretion. This leads to hyperandrogenic metabolic syndrome which causes symptoms such as hirsutism, acne and/or alopecia, menstrual irregularity and polycystic ovaries. PCOS is not only a reproductive endocrinopathy but also a metabolic disorder. The development of PCOS has been linked to hereditary and environmental factors including genetics, insulin resistance, obesity and birth weight. The presence of PCOS is associated with an increased prevalence of adverse health

conditions such as the metabolic syndrome, cardiovascular disease and type II diabetes mellitus.^[1-3]

PCOS is characterized by chronic anovulation. Till recently, there was no universally accepted clinical definition for PCOS. The 2003 Rotterdam ESHRE/ASRM-sponsored PCOS consensus workshop group concluded that no single diagnostic criterion was sufficient for a clinical diagnosis of PCOS. Two out of three criteria have to be met to fit the definition: chronic anovulation, clinical and/or biochemical hyperandrogenism, and polycystic ovaries.^[4]

Diagnosis of PCOS continues to be controversial primarily because of the heterogenous nature of the condition which may change during the lifetime of the woman. PCOS receives a considerable attention because it has high prevalence. Also, the metabolic, reproductive and cardiovascular complications are high too. Indians are known to have high prevalence of insulin resistance, so the prevalence of PCOS may be high in our population.^[5]

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The objective of this study was to find out the clinical and biochemical profile of patients with polycystic ovary syndrome (PCOS) in patient population attending the tertiary care hospital in Gaya, Bihar.

MATERIALS AND METHODS

A cross sectional study was done in ANMMCH, a tertiary care hospital in Gaya, Bihar. The study was approved by the institutional ethics committee. Based on the expected prevalence of PCOS to be 20% and confidence level 95%, the sample size for this study was calculated to be 243, using Rao's software.^[6] We selected 300 patients of PCOS in the age 15-35 years attending gynecology out-patient department. The study was carried between July, 2018 to June, 2019. Women presenting with oligo/amenorrhea, hyperandrogenic (clinical or biochemical) and diagnosed as PCOS by ultrasound were included in the study population. The pregnant women, patients with symptomatic disease (liver, kidney, heart or other symptomatic diseases) were excluded.

PCOS patients were diagnosed using Rotterdam's criteria.^[4] After selecting the patients, all women were counselled and written informed consent was taken from them. A detailed history was obtained including past history, gynaecological history and history of any drug intake. Menstrual history was also taken. An absence of menstrual cycles for more than 6 months was defined as a case of secondary amenorrhoea. Oligomenorrhoea was defined as a delay in menstruation for >35 days to 6 months.^[7] Family history was also taken regarding diabetes mellitus and hypertension in the first and second degree relatives. Patients were screened for clinical signs of hyperandrogenism. The dermatological signs of hyperandrogenism like acne, oily skin and hirsutism were also observed. Clinical hyperandrogenism was defined using a modified Ferriman-Gallaway (FG) score for evaluating and quantifying hirsutism in women using nine body areas (upper lip, chin, chest, upper and lower abdomen, thighs, upper and lower back and upper arm).^[8] Hair growth was rated from 0 (no growth of terminal hair) to 4 (extensive hair growth) in each of the nine locations. A score ≥ 8 was indicative of androgen excess. Transvaginal USG was undertaken to detect PCO's. Anthropometric measurements were also done by standard methods. Diabetes and hypertension was diagnosed by standard methods. BMI was calculated as per recent International Obesity Task Force values for defining overweight and obesity among Asian population.^[9]

Early follicular phase samples were taken on day 2 of menstruation of all women in the fasting state. Hormonal assay was done accordingly. The normal cut off for FSH and LH was taken as <12.55mIU/ml. A prolactin level <25ng/ml was taken as normal, a

total testosterone of <70ng/dl was taken as normal. LH: FSH ratio >2:1 was taken significant. TSH was done irrespective of menstrual cycle, a TSH >4.5 was considered as hypothyroid. Fasting lipid profile (FLP) was done in PCOS patients to diagnose dyslipidemia and metabolic syndrome, normal values taken were TC<200, HDL >50, LDL <130, TG <150 and VLDL <50. Metabolic syndrome diagnosis was made according to NCEP ATP 3 criteria.^[10]

Data were analyzed using SPSS version 16.0 which is freely available online. Data were presented as mean and standard deviation and range and categorical data were presented as frequency and percentage.

RESULTS

Table 1: Demographic profile of the study population

Age in years	N (%)
15-20	40 (13.3)
21-25	58 (19.3)
26-30	128 (42.7)
31-35	74 (24.7)
Religion	
Hindu	201 (67)
Muslim	81 (27)
Christian	18 (6)
Education	
Literate	222 (74)
Illiterate	78 (26)
Socio economic status	
Lower	87 (29)
Middle	178 (59.3)
Upper	35 (11.7)
Body mass index (in Kg/m ²)	
<18.5 (underweight)	19 (6.3)
18.5- 22.9 (Normal)	115 (38.3)
23-24.9 (Overweight)	101 (33.7)
>25 (Obese)	65 (21.7)

Table 2: Marital and infertility status of PCOS patients

Characteristics	N (%)
Marital history (n=300)	
Married	245 (81.7)
Unmarried	55 (18.3)
Fertility status (n=245)	
Parous	77 (31.4)
Nulliparous	168 (68.6)
Type of infertility (n=168)	
Primary infertility	139 (82.7)
Secondary infertility	29 (17.3)
Duration of infertility (n=168)	
1-5 years	67 (39.9)
6-10 years	76 (45.2)
11-15 years	25 (14.9)

The study population included 300 diagnosed PCOS patients. A total of 3258 patients visited Gynecology out-patient between January, 2018 to December, 2018. The prevalence of PCOS was found to be 9.2%. [Table 1] shows the demographic profile of PCOS patients. The mean age group of patients was 28.11± 4.9 SD. The mean BMI was 26.12± 5.12. When age distribution of PCOS patients were

analysed, maximum number of patients was in the age group 26-30 years (42.7%) followed by 31-35 years (24.7%) whereas minimum patients were in age group of 15-20 years (13.3%).

Table 3: Clinical profile of PCOS patients (n=300)

Signs of hyperandrogenism	N (%)
Hirsutism	218 (72.7)
Acne	67 (22.3)
Acanthosis nigricans	54 (18)
Androgenic alopecia	23 (7.7)
Waist circumference (WC)	
≤88 cm	176 (58.7)
>88 cm	124 (41.3)
Waist hip ratio (WHR)	
<0.8	181 (60.3)
≥0.8	119 (39.7)
Ovarian dysfunction	
Oligomenorrhoea	178 (59.3)
Secondary Amenorrhoea	13 (4.3)
Ultrasound polycystic ovaries	281 (93.7)
Hypertension	
Yes	35 (11.7)
No	265 (88.3)
Dyslipidemia	
Total cholesterol ≥/= 200mg/dl	39 (13)
HDL <50 mg/dl	41 (13.7)
TG> 150 mg/dl	57 (19)
Metabolic syndrome	65 (21.7)
Diabetes mellitus	
Yes	38 (12.7)
No	262 (87.3)

Table 4: Biochemical profile of PCOS patients (n=300)

Investigations	Values	N(%)	Mean± SD
TSH	<0.27	8 (2.7)	3.45 ± 3.12
	0.27- 4.2	231 (77)	
	>4.2	61 (20.3)	
LH	>12	84 (28)	8.23 ± 5.11
Prolactin	<25 ng/ml	268 (89.3)	14.12 ± 14.15
	>25 ng/ml	32 (10.7)	
LH/FSH	<2:1	211 (70.3)	1.59 ± 1.14
	>2:1	89 (29.7)	
Testosterone	<0.8	176 (58.7)	0.93 ± 0.72
	≥0.8	124 (41.3)	

[Table 2] shows the marital and parity status of patients in our study. The mean age of menarche was 12.13 ± 1.23 years. The mean duration of Infertility was 6.98 ± 3.11 years. Out of 245 fertile patients, 68.6% were nulliparous. Among them, 82.7% had primary infertility. According to duration of infertility, maximum (45.2%) were of 6-10 years duration.

[Table 3] shows clinical profile of 300 PCOS patients. About 93.7% were detected to have PCOS in ultrasonography. Androgenic features like acne was present in 22.3% of the patients, acanthosis nigricans in 18% of the patients and androgenic alopecia was present in 7.7%. Waist circumference was >88cm in 41.3% of the patients and WHR >0.85 was seen in 39.7% of the patients. Hypertension was seen in 11.7% patients while diabetes was present in 12.7% of patients. Metabolic syndrome diagnosis was made according to NCEP ATP 3 criteria. The

prevalence of metabolic syndrome was calculated and it is found to be 21.7%. Table 4 shows the biochemical profile of PCOS patients. Every patient was evaluated for altered sugars and lipid abnormalities our study showed, 20.3% had hypothyroidism. Elevated total testosterone was elevated in 41.3% of the patients.

DISCUSSION

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders in women of reproductive age, affecting about 6.5–6.7% of all premenopausal women.^[11] The present study was therefore done to study the clinical and biochemical profile of PCOS patients in a tertiary care hospital in Gaya, Bihar. The prevalence of PCOS using Rotterdam criteria in our study was among gynaecological out-patient visits. Spandana JC et al in 2017 found that prevalence of PCOS was 6.3% while Nidhi et al in 2011 found it to be 9.13% in Andhra Pradesh, South India.^[12,13] Other studies on Asian population have reported lower prevalence rates: 6.3% in Sri Lankan population and 2.4% in Chinese population. Higher prevalence in India as compared to other Asian countries could be expected because strong etiological link between PCOS and diabetes, and India has the higher prevalence of diabetes.^[14,15]

PCOS is reported to be more prevalent in younger ages (<35) than among older women, proposing that due to a physiological decline of the follicular cohort leading to a normalized ovarian ultrasonographic appearance with advancing age. In our study mean age of the patients was 28.11± 4.9 SD and majority of the patients belonged to the age group between 26-30 years (42.7%). In a study done by Muralidhara et al in KMC Mangalore in 2012 mean age among PCOS patients was 27+/-7.1 which is comparable to our study.^[16]

In our study 59.3% had oligomenorrhoea and 4.3% had secondary amenorrhoea. In a study done by Sunitha J Ramanand et al at Kohlapur, Maharashtra found that Oligomenorrhoea was present in 65% patients. They showed that hypoadiponectinemia was present in a subset of PCOS patients. In Indian women with PCOS, serum adiponectin is inversely correlated with age, indicating a trend of change in adipocyte homeostasis as the age advances. Low levels of adiponectin possibly facilitates development of dermal manifestation of insulin resistance in PCOS patients.^[17]

PCOS patients show abnormality of the hypothalamic-pituitary ovarian or adrenal axis. Disturbance in the pulsatility of gonadotrophin releasing hormone (GnRH) results in the relative increase in LH to FSH release. An abnormal feedback mechanism by ovarian estrogen is blamed to play role in this discriminated increase in LH release. Many researchers consider elevated LH:

FSH (>2) diagnostic for PCOS. In this study, day 2 hormonal profile the results showed that 28% had elevated LH and LH: FSH (>2) was elevated in 29.7% of patients and prolactin was high in 10.7% of the patients. Elevated total testosterone was elevated in 41.3% of the patients. Nizem FI et al in Benghazi-Libya showed that 16% had elevated LH/FSH ratio, 31% had hyperprolactinemia, 26.4% had elevated testosterone.^[18]

The prevalence of metabolic syndrome in this study was calculated to be 21.7%. In a study done by Soo Jin Chae et al in Seoul, South Korea in 2008 showed that all PCOS subgroups were more associated with metabolic syndrome than the control group ($p < 0.05$).^[19]

In this study, 20.3% had hypothyroidism It has been hypothesized in various studies that there exists an association of autoimmunity with PCOS and thyroid dysfunctions. It has been observed that the immunoglobulin produced against the thyroid is polyclonal multiple combination of various antibodies lead to the clinical spectrum of autoimmune thyroid disease that affects reproductive functions also. It has also been observed that hypothyroidism produces ovarian cyst and polycystic appearance of ovaries which surprisingly disappeared in all patients after thyroxine treatment.^[20]

CONCLUSION

Most of the PCOS patients were hirsute with central obesity and overweight or obese. The most common presentation was oligomenorrhoea. Obese women with PCOS had more severe ovulatory dysfunction and so they need more attention and appropriate management should be done after thorough clinical and biochemical evaluation.

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