Clinical, endocrinal and radiological profile of cases with polycystic ovary syndrome in tertiary care centre

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Abstract:

Background: Polycystic ovary syndrome (PCOS) is a chain of pathological, biochemical and endocrinal events which usually present with complaints like infertility, features of hyperandrogenemia (HA), amenorrhea and signs of metabolic disturbances like impaired glucose tolerance. **Aim:** To assess clinical, endocrinal and radiological profile of cases with polycystic ovary syndrome in tertiary care centre. **Methodology:** Descriptive cross-sectional study conducted in gynaecological OPD on 100 women having PCOS diagnosed by Rotterdam criteria. **Results:** Most of cases were belongs to age group of 20 to 24 years (47%) with mean age of patients was 23.69 ± 4.48 years. Half were obese (48%). Almost 50% women showed features of hyperandrogenism and 86% had oligomenorrhea. Serum testosterone levels were found to be increased among 54% women. Out of three Rotterdam criteria for diagnosis of PCOS, most cases had chronic anovulation (irregular cycles) followed by 83% had USG suggestive of PCOS and 46% had hyperandrogenism. Association between hyperandrogenism, acanthosis nigricans and obesity were statistically significant ($p<0.05$). Out of 100 cases, 83% cases had feature suggestive of PCOS on USG. **Conclusion:** Complaint of any feature of PCOS should not be neglected because timely therapeutic intervention can halt the process of development of PCOS. PCOS is symptoms complex which is not clearly defined, so it needs proper monitoring. Awareness regarding various symptoms and role of weight reduction in treatment of PCOS should be spread.

Keywords: Infertility, hirsutism, acanthosis nigricans, oligomenorrhea.

Polycystic ovary syndrome (PCOS) is one of the most commonly occurring hormonal disorders among reproductive age group women [1]. In women presenting with infertility, PCOS is leading diagnosis. As features of PCOS syndrome is not defined precisely, the exact prevalence is not known [2]. Prevalence of PCOS is highly variable ranging from 2.2% to 26% globally [3]. Studies done in Maharashtra and South India, prevalence of PCOS using Rotterdam criteria were reported as 9.13% and 22.5% respectively [4, 5].

PCOS first described by Valisnere (in 1721) followed by Stein and Leventhal (in 1935) [6]. At the ESHER conference in Rotterdam, Netherland (May 2003) the definition of PCOS was revised which put emphasis on fulfilment of at least two out of three criteria for diagnosis of PCOS [7]. Three criteria were oligo-ovulation or anovulation; clinical and/or biochemical signs of hyperandrogenism and presence of polycystic ovaries on ultrasonography. PCOS is a chain of pathological, biochemical and endocrinal events which usually present with complaints like infertility, features of hyperandrogenemia (HA), amenorrhea and signs of metabolic disturbances like impaired glucose tolerance. Features of hyperandrogenism like hirsutism, acne and baldness affect mental health and quality of life of

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females [5]. As the PCOS is complex, heterogeneous and multifactorial disease, this study was planned to assess clinical, endocrinal and radiological profile of cases with polycystic ovary syndrome in tertiary care centre.

Material and methods

An observational descriptive cross-sectional study was conducted in obstetrics and gynaecology (OBGY) outpatient department (OPD) of SMBT Institute of Medical Sciences and Research Centre, from October 2020 to September 2021. Institutional ethics committee (IEC) consent was taken before data collection. Females of reproductive age group attending gynaecology OPD fulfilling any 2 out of 3 Rotterdam criteria [7] and ready to give consent for participation were included in study. For this operational definition given by joint consensus meeting between ASRM (American society for reproductive medicine) and ESHRE (European society for human reproductive embryology) was used which diagnose PCOS by the presence of 2 out of 3 criteria - 1. Oligo and / or an ovulation; 2. Clinical or biochemical features of hyperandrogenism; 3. Polycystic ovarian morphology on USG. Cases with pregnancy, congenital adrenal hyperplasia (CAH), Cushing's syndrome and androgen secreting tumours were excluded. Total 100 PCOS cases fulfilling inclusion and exclusion criteria were enrolled for study.

Written informed consent was taken from each female before data collection. Information about demographic characteristics like age; marital status; menstrual cycle history like duration, amount of bleeding, pain etc; past history; family history; age of onset of puberty; infertility and complaint about illness was collected through interview. After that thorough general and systemic clinical examination was conducted for detection of signs of PCOS. Signs of hyperandrogenism were checked. Anthropometric measurements were taken to calculate body mass index. All cases were subjected to ultrasonography (6.5 MHz endo vaginal probe) for polycystic ovarian morphology and ovarian volume. On USG, criteria was presence of 12 or more follicles in each ovary (with one ovary being sufficient for diagnosis) measuring 2-9 mm in diameter or increase ovarian volume >10ml [8]. A trans-vaginal pelvic ultrasound was performed. Features of hyperandrogenism was clinical (if the FG score was 8 or greater or the patient had moderate to severe acne, defined by the presence of inflammatory lesions and their extension) or biochemical (T or FTC or androstenedione were above the 95% confidence interval for the 97.5 percentile) [9]. Thyroid function tests and glucose tolerance tests also done in all cases. Standard operating definitions and protocols were formulated and stated before start of study and followed till the end.

Data was entered in Microsoft Excel 2007 and analysed with SPSS v.16. Data was summarized with descriptive statistics like frequency, percentages, mean and standard deviation. Inferential statistics like chi-square test used to find significant association at $p<0.05$. Data was presented with the help of tables and graphs.

Results

Table 1: Signs and symptoms among study participants (N=100)

Characteristics		**Frequency (%)**
Irregularities of menstrual cycle	Irregular cycles	96
	Dysmenorrhea	29
	Oligomenorrhea	86
	Amenorrhea	1
	Menorrhagia	4
Hirsutism	Present	41
	Absent	59
Infertility (in 68 married women)	Present	32(48%)
	Absent	36 (52%)
Acne	Present	24
	Absent	76
Baldness	Present	4
	Absent	96
Acanthosis nigricans	Present	34
	Absent	66

Demographic details of hundred polycystic ovarian syndrome cases (PCOS) are shown in figure 1. Most of cases were belongs to age group of 20 to 24 years (47%) followed by 25 to 29 years (34%). Mean age of patients was 23.69 ± 4.48 years. Very few cases were more than of age 32 years. Out of 100 women reported in outpatient department (OPD), 68% were married and 32% were unmarried. Most of cases were obese (48%) and pre-obese (35%).

As indicated in table 1 which highlights clinical profile of study participants, 96% women had irregular menstrual cycle, 86% had oligomenorrhea and 29% had dysmenorrhea. Mild to severe male pattern of hair growth was seen among 41% females. Out of 68 married women, 48% were facing problem of infertility. Almost 50% women showed features of hyperandrogenism. Complaints of acne were reported by one forth women while baldness (mild) was present in only 4% women. Acanthosis nigricans was present in 34% cases.

Table 2: Hormonal and biochemical profile of study participants (N=100)		
Parameters		**Frequency**
Total testosterone	Normal or low	46
	Increased	54
Glucose tolerance test	Normal	91
	Impaired glucose tolerance	9

As shown in table 2, serum testosterone levels were found to be increased among 54% women while 46% had either low or normal levels. Only 9% women had impaired glucose tolerance test. Thyroid dysfunction was present in 11% women. Table 3 highlights ultrasonographic (USG) findings among study participants. Out of 100 cases, 83% cases had feature suggestive of PCOS on USG. Out of these 83 cases, 5 (6.02%) had only polycystic ovarian morphology while 1 (14.46%) had only increased ovarian volume and 66 (79.52%) had both (increased ovarian volume and polycystic ovarian morphology). Among these 78 cases of increased ovarian volume, 36 cases had hirsutism. Hirsutism showed statistically significant association with ovarian volume ($p<0.05$).

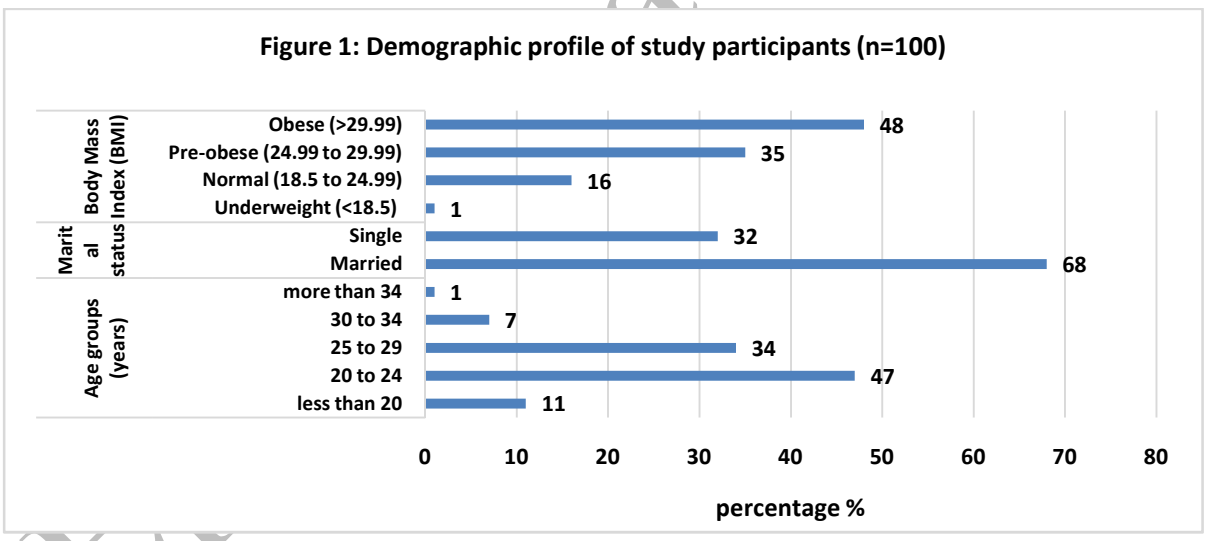

Figure1: Demographic profile of study participants (N=100)

Details of diagnostic criteria for PCOS are shown in table 4. Out of three Rotterdam criteria for diagnosis of PCOS, most cases had chronic anovulation (irregular cycles) followed by 83% had USG suggestive of PCOS and 46% had hyperandrogenism. Chronic anovulation and positive USG for PCOS found in 54% cases. Chronic anovulation and hyperandrogenism found in 17% cases. Hyperandrogenism and positive USG for PCOS found in 13%. All three features found in 16% cases. Among 46 cases of hyperandrogenism, 34 cases were obese and association between them was statistically significant ($p<0.05$). Association between acanthosis nigricans and obesity was also found to be statistically significant ($p<0.05$).

Table 3: Ultrasonographic findings of study participants		
Findings	**Frequency**	**%**
Both increased ovarian volume and polycystic ovarian morphology	66	79.52
Only increased ovarian volume	12	14.46
Only polycystic ovarian morphology	5	6.02
Total	83	100.00

Table 4: Diagnostic criteria for polycystic ovarian syndrome (PCOS)		
Characteristics		**Frequency**
Rotterdam criteria	Chronic anovulation(irregular cycles)	87
	Hyperandrogenism	46
	USG* suggestive of PCO#	83
Criteria for PCOS	All three criteria	16
	Chronic anovulation + USG of PCO	54
	Chronic anovulation + Hyperandrogenism	17
	Hyperandrogenism + USG of PCO	13
	Total	100
* Polycystic ovary; # Ultra-sonography		

Discussion

In pubertal development phase, transition occurs in adolescent girls from pre-pubertal phase characteristically having cystic ovaries, anovulatory cycles, relative androgenemia and insulin resistance to pubertal phase with estrogenic stage. If this transition does not happen properly, it may result into PCOS [10].

In present study, mean age was 23.69 years and almost 50% participants were belonged to 20 to 24 years of age. Himabindu et al reported about 40% participants were from same age group [9]. Average age of cases noted by previous studies done by Joshi et al and Christos populous et al were 24 years and 24.9 years, respectively [5,11]. Concurrent findings were reported by Ramanand et al and Sharma et al [4,12]. Higher percentage of obese/pre-obese was 83% in present study than that of in Ramanand et al (75%) and Sharma et al (53%) [4, 12] less than 50% participants were obese in studies done by Balen et al and Kalra et al [8,12].

PCOS characterized by anovulation resulting in irregular menstrual cycles. In this study, 96% cases had irregular menses and 86% had oligomenorrhea. Previous studies done by Himabindu et al, Sharma et al and Mandrella et al recorded oligomenorrhea in 84% to 89% case [9,12,14]. But studies done by Ramanand et al (65%) and Balen et al (47%) reported oligomenorrhea in less number of cases [4,8]. Other signs noted in present study were, 41% cases had complaints of hirsutism, 24% had acne, 4% had baldness, 48% had infertility and 34% had acanthosis nigricans. These findings were slightly different from study done by Ramanand et al reported comparable findings with present study with hirsutism in 44% cases, acne in 20% cases, baldness in 6.66% cases and acanthosis nigricans in 44% cases [4]. Sharma et al [12] (54%) and Alakananda et al [15] (56%) reported higher levels of infertility in their studies while Joshi et al [5] (46%) reported comparable findings. Infertility as one of the long-term sequel of PCOS was reported by Pfeifer et al [16].

Present study reported higher number of cases with raised S. Testosterone levels (54%) and lesser number of cases with (9%) impaired glucose tolerance test as compared to study done by Himabindu et al [9]. Ramanand et al reported in their study that in 22% cases level of DHEA (Dihydroepiandrosterone) was increased while in 58% cases serum testosterone levels were increased [4]. Himabindu et al reported increased serum testosterone levels in 27% cases and impaired glucose tolerance test or symptoms suggestive of Diabetes in 16% cases [9]. Hyperandrogenism commonly manifests itself as hirsutism (60-83%), acne (11-43%) [17]. In present study, thyroid dysfunction was present in 11% cases. Ramanand et al and Ozdemir et al reported thyroid dysfunction in 15% and 15.9% cases, respectively [4,18]. Study done by Himabindu et al reported increased ovarian volume and PCOS morphology in 71.1% cases, only increased ovarian volume in 12% and only PCOS morphology in 16.5% cases [9]. Present study finding reported increased ovarian volume and PCOS morphology in 79.52% cases, only increased ovarian volume in 14.46% and only PCOS morphology in 6.02% cases.

Sujata Kar et al reported, all three criteria (hyperandrogenism, USG of PCO and chronic anovulation) in 65.6% followed by USG of PCO & chronic anovulation in 22.22% and hyperandrogenism & chronic anovulation in 11.2% cases[19]. Moghetti et al reported Rotterdam criteria found oligomenorrhea in 84.7%, PCO morphology in 89% and hyperandrogenism in 84.7% [20]. Sharma et al reported, all three criteria of PCOS in 12% followed by USG of PCO & chronic anovulation in 60% and hyperandrogenism & chronic anovulation in 15% cases[12]. Present study reported quite similar results. Himabindu et al reported chronic anovulation as most common Rotterdam criteria in 94% cases followed by hyperandrogenism in 52% cases and USG of PCO in 96% cases [9]. In present study, association between hyperandrogenism and obesity was statistically significant ($p<0.05$) also association between acanthosis nigricans and obesity was also found to be statistically significant ($p<0.05$). Study done by Ramanand et al reported, significant association between acanthosis nigricans and obesity while association between hyperandrogenism and obesity was not significant [4]. Mujumdar et al have reported prevalence of menstrual irregularities as 79.2% vs. 44% in obese vs non-obese women [21]. Blank et al reported that, obesity exacerbates the PCOS phenotype in previously asymptomatic individuals [22]. Kiddy et al mentioned in their study that weight reduction in adult women has been shown to improve free androgen levels, insulin sensitivity and ovulatory function [23].

Conclusion

In present study, oligomenorrhea, features of hyperandrogenism like hirsutism, baldness, acne, obesity, insulin resistance, infertility and acanthosis nigricans were common features in cases with PCOS. Occurrence of single or couple of symptoms or signs in cases with PCOS was less common when compared with occurrence of multiple symptoms/signs which is indicative of chain of pathological, biochemical and hormonal reactions. So complaint of any feature should not be neglected because timely therapeutic intervention can halt this process of development of PCOS. PCOS is symptoms complex which is not clearly defined, so it needs proper monitoring. Awareness regarding various symptoms and role of weight reduction in treatment of PCOS should be spread.

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