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Relation of obesity to Polycystic Ovarian Syndrome

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Original Research Article

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Abstract: Polycystic ovarian syndrome is the most common female endocrine disorder of reproductive age group with highly variable prevalence estimates ranging from 2.2 to 26 %. PCOS can be viewed as a heterogeneous androgen excess disorder with varying degrees of reproductive and metabolic abnormalities, whose diagnosis is based on anthropometric, biochemical and radiological abnormalities. Pcos is often linked to obesity. Obesity has been found to exacerebate the underlying insulin resistance. This is a prospective observational study done at St. Stephen's hospital Delhi over 2 year of period. 225 cases of age group 15-30 years who had attended the outpatient with menstrual symptoms were selected. Pcos was diagnosed by clinical hyperandrogenism (HA), irregular menstruation (IM), and polycystic ovary (PCO) using Rotterdam criteria.The Prevalence of PCOS was 33.3% according to Rotterdam criteria. More prevalent in obese patient (BMI 25.0-29.9Kg/$m^2$0) 42.7%. Lean patient prevalence was very low 4%. Oligomenorrhoea was present in 82.7% and polycystic ovaries in ultrasound were 28.88%. Polycystic ovarian syndrome is affecting the lives of young adolescent's girls. The disease is on its rise because of lifestyle and environmental changes occurring with modernization. The clinical manifestations are variable with obesity playing the key role.

Keywords: Polycystic ovarian syndrome, Obesity, Hirsutism, Oligomenorrhoea, Prevalence, Rotterdam criteria.

INTRODUCTION

Polycystic Ovarian Syndrome is the most common female endocrine disorder with a highly variable prevalence estimates ranging from 2.2% to 26% [1], which is attributed to lack of a universal definition.

PCOS is a major health concern- Patients with PCOS are at increased risk of infertility, pregnancy loss, obesity, cardiovascular disorders [2], diabetes mellitus, obstructive sleep apnea,depression, non-alcoholic fatty liver disease endometrial hyperplasia and endometrial carcinoma [3-6] etc. Infertility occurs in 75% due to anovulation [7]. Obesity and PCOS have often been linked, and obesity has been found to exacerbate the underlying insulin resistance in PCOS [8]. Women of different ethnicity presented with different clinical manifestation of PCOS.

In 1935 Irving F. Stein and Michael L. Leventhal described a symptom complex due to anovulation. Oligomenorrhea, hirsutism and obesity together with enlarged polycystic ovary were the diagnostic criteria of PCOS.

Since 1935, a myriad of other symptoms have also been correlated with PCOS such as acne, male pattern balding (alopecia), hirsutism (excessive hair growth), infertility, obesity, skin tags, and high androgen hormone levels. Most of the symptoms associated with PCOS appear to be linked with either high androgen or insulin hormone levels. Collectively, these symptoms were known as "Stein-Leventhal Syndrome" until the 1960s and 70s. Later the introduction of ultrasound allowed doctors to easily diagnose polycystic ovaries and the syndrome began to be referred as 'Polycystic Ovary Syndrome' or 'PCOS'.

PCOS is characterised by a heterogeneous presentation of hyperandrogenism and ovulatory dysfunction. The etiology is unknown but it has important long term health implication, having been associated with type 2 diabetes, risk factors for cardiovascular disease and endometrial carcinoma.

As such this disorder is a significant public health concern in society, which therefore indicates a need to accurately identify the proportion of women affected.

PCOS is not a specific endocrine disease but a syndrome represented by a collection of signs and symptoms. Diagnosis of PCOS is important because

affected women are at increased risk for a variety of problems (infertility, dysfunctional bleeding, endometrial cancer, obesity, type 2 diabetes mellitus, dyslipidemia, hypertension, and cardiovascular disease).

There have been three separate and distinct efforts to establish or define the diagnostic criteria for PCOS:-

NIH 1990 [9]

To include all of the following

- Clinical hyperandrogenism and /or hyperandrogenemia
- Oligo-anovulation
- Exclusion of related disorders

ROTTERDAM 2003 [10]

To include 2 of the following, in addition to exclusion of related disorders:-

- Hyperandrogenism and /or hyperandrogenemia
- Chronic anovulation
- Exclusion of related disorders

AES 2006 [11]

To include all of the following

- Hyperandrogenism (hirsutism and/ or hyperandrogenemia)
- Ovarian dysfunction (oligo anovulation and / or polycystic ovaries)
- Exclusion of related disordes

PCOS is a lifelong and multisystem disorder. Some researchers also pointed out that adolescents with PCOS scored lower on subscales measuring general health perception, physical functioning, general behaviour, and limitation in family activities.

MATERIALS AND METHODS

A prospective observational study was conducted over a period of 2 years (July 2014 to June 2016) at St. Stephen's Hospital, Delhi, India. The targeted population consisted entirely of women aged in reproductive age group 15 -30 years who had complaining of menstrual irregularity. 225 cases were participated in this study.

All young females between age group 15-30 years complaining of menstrual irregularities who gave consent for the study were asked to fill up a short PCOS symptoms check list that comprised of questions on the pattern of their menstrual cycle, any hirsutism, acne, alopecia, and acanthosis nigricans, and information regarding past diagnosis or treatment of PCOS or any other illness. Following which individual interviews were conducted to confirm statements in the check list. A physical examination was conducted to look for external features of PCOS and also to exclude other conditions that could mimic PCOS such as Cushing syndrome, adrenal hyperplasia or androgen producing neoplasm. Questions were asked about the use of oral contraceptive pills or any other hormones which affects the length of menstrual cycles.

All females with menstrual irregularity were asked to come for pelvic ultrasound and biochemical investigations which included estimation of serum testosterone, TSH, Prolactin, LH, FSH.

- Menstrual irregularities is assessed as presence of chronic amenorrhoea, or a usual cycle length of less than 21 days or more than 35 days, or greater than a 4–day variation between cycles. A participant will consider having oligomenorrhoea if she has less than 8 cycle per year and amenorrhoea if she has absence of menses for 6 months or more.
- Clinical hyperandrogenism is assessed as self reported degree of hirsutism using the modified Ferriman-Gallwey (mFG) scoring method, the women will compared the amount of body hair they had before hair removal with a chart displaying degree of hair growth in nine regions.

Polycystic ovaries are identified by ultrasound, conducted in follicular phase. A positive finding of polycystic ovaries required either 12 or more follicles measuring 2-9 mm in diameter, or increased ovarian volume (>10cm) in at least one of the ovaries.

OBSERVATIONS AND RESULTS

This was a prospective observational study carried out in patients attending department of Obstetrics and Gynaecology at St. Stephens Hospital, New Delhi, from July 2014 to 30th June 2016 including 225 patients of age group 15 to 30 years age group with menstrual complaints. On further evaluation of these patients, 75 were diagnosed with PCOS as per the Rotterdam criteria. Thus the prevalence of PCOS in this study was 33.3%.

Table 1: Frequency of PCOS according to body mass index (BMI)

BMI(Kg/M^2)	Subjects with PCOS	Frequency in %
<18.5	3	4.0%
18.6-24.9	30	40.0%
25.0-29.9	32	42.7%
30.0-34.9	7	9.3%
35.0-39.9	2	2.7%
>40.0	1	1.3%
Total subjects	75	100%

Above table suggests that in this study PCOS was more prevalent in 25-29.9 Kg/m^2 that was 42.7% while in lean women its prevalence was less that is only 4.0%. There was a statistically significant relationship between BMI and frequency of PCOS. p value 0.042.

Table-2: Phenotypic variation in menstrual irregularities

Menstrual complaint	Subjects with PCOS	Frequency
Oligomenorrhoea	62	82.7%
Hypomenorrhoea	19	25.3%
Polymenorrhoea	11	14.7%

Above table suggests that in this study Oligomenorrhoea was the most common menstrual complaint. Frequency of Oligomenorrhoea was 82.7%.

Phenotypic variations of PCOS observed in this study

- Menstrual irregularity and polycystic ovaries in ultrasound :- 86.7%
- Hirsutism and polycystic ovaries in ultrasound:- 17.3%
- Menstrual irregularity and hirsutism:- 30.2%
- All three features :- 17.3%

DISCUSSION

This was a prospective observational study on prevalence of polycystic ovarian syndrome in 15-30 years age group with menstrual irregularities attending to Obstetrics and Gynaecology Department of St. Stephen's hospital, New Delhi. 225 cases were evaluated. The patient entered the study after being duly explained about the study and giving informed consent. The period of study was from July 2014-June 2016.

PCOS among adolescents is an emerging problem that needs careful assessment, timely intervention and appropriate treatment. First study on PCOS done by Stein FI *et al*. in 1935 on seven patients who had symptoms associated with anovulation.

PCOS is the one of the most common reproductive endocrinological disorder with a broad spectrum of clinical manifestation affecting about 6-8% of reproductive years. However it is important to make an early diagnosis in order to prevent early and late sequel of this syndrome.

Globally, estimate prevalence is highly variable, ranging from 2.2 to as high as 26%.

Prevalence of PCOS in our study according to Rotterdam criteria is 33.3%. This prevalence is relatively higher than that reported by most studies, mainly due to use of different diagnostic criteria, study design and settings, hospital based study, recruitment process of the study population, heterogenous presentations of symptoms, logistic difficulty in carrying out blood or ultrasound, different age group, ethnic population that have been studied.

Michelmore *et al*. [12] also reported the similar prevalence of PCOS 33% in a adolescent girls. Joshi B *et al*. [13] found prevalence around 22.85%. Blasco FA *et al*. [14] reported prevalence of PCOS in overweight and obese 28.3%. Biradar KD *et al*. [15] reported prevalence of PCOS is 23.8% in a tertiary care centre Bangalore.

In an Iranian study conducted by Tehrani *et al*. [16] in 2008 among women aged 18-45 years. The reported prevalence was 14.6%. CP V [17] reported prevalence in Kerala, India was 15%. In one meta-analytic study conducted by Jaliliam A *et al*. [18] in Iran, reported prevalence of PCOS according to Rotterdam criteria was 19.5%.

In a German study reported prevalence was 14.8%. The prevalence of PCOS using Rotterdam criteria was reported to be 17.8% among 978 women who were recruited in a retrospective birth cohort study in South Australia.

Table-3: comparative prevalence of PCOS in different studies

Study	Prevalence In %
Present	33.3
Michelmore *et al.*	33.0
Blasco FA *et al.*	28.3
Biradar KD *et al.*	23.8
Joshi B *et al.*	22.8
Jaliliam A *et al.*	19.5
CP V *et al.*	15.0
Tehrani *et al.*	14.6
Present	10.7
Asuncion M *et al.*	12.3
Biradar KD *et al.*	16.6
Gabriellie L *et al.*	18.5

In our study mean BMI was 26.03±4.53 kg/m^2. P value 0.005 which shows statistically significant difference in prevalence of PCOS between obese and non obese. In this study PCOS in 25.0-29.9 kg/m^2 that is 42.7% and in lean women its prevalence is less that is 4%. Previous study conducted by Kalra *et al*. [19] in which the percentage of obese, overweight and normal BMI in Indian PCOS women based on ACOG criteria was 15.8%, 44.61% and 40%, respectively which is quite comparable to our study.

Ramananda SJ *et al*. [20] reported that prevalence of PCOS in BMI 25.0-29.9Kg/m^2 was 28.3%. Blasco FA *et al*. [14] reported that PCOS is more prevalent in obese women that are 28.3%. And prevalence in lean women was 5.5%. In an Iranian study reported prevalence was in overweight 21% and in obese 19%. In our study there is high prevalence of PCOS in obese patients as comparable to other studies might be due to in study settings, hospital based study, patient's selection and socioeconomic status. It is also a possibility that obese women, because of obesity become more health conscious, and/or have co-morbidities and seek medical advice as compared to non obese women.

Hence in overweight and obese cases, lifestyle and dietary changes along with exercises for weight reduction must be recommended, coupled with medical management to treat clinical symptoms and hyperinsulinemia.

Menstrual irregularity is the most common presenting feature in PCOS patients. In our study oligomenorrhoea was the most common menstrual problem that was present in 82.7% cases. Other menstrual complaints include hypomenorrhoea whose prevalence was 25.3% and polymenorrhoea 14.7%. Nazir F *et al*. [21] reported prevalence of oligomenorrhoea in their study was 88% that was comparable to our study. Ramananda SJ *et al*. [20] found that prevalence of oligomenorrhoea in their study was 65%.

Phenotypes of PCOS observed in our study were oligomenorrhoea and polycystic ovaries in USG was present in 86.7%, hirsutism and polycystic ovaries in USG was present in 17.3% cases, oligomenorrhoea and hirsutism was present in 30.7% cases and all three features were present in 17.3 % cases which is quite similar to CP V *et al*. [17] study which showed 70%, 13.3%, 3.3% and 13.3% respectively.

CONCLUSION

This prospective observational study was conducted to know the prevalence of polycystic ovarian Syndrome in females of age group 15-30 years, attending to department of obstetrics and gynaecology of St. Stephen's Hospital Delhi. Total 225 cases were studied. Overall prevalence of PCOS in this study was 33.3% according to Rotterdam criteria.

Most common presenting complaint was menstrual irregularity in form of oligomenorrhoea. This indicates the importance of proper evalution of young girls with irregular cycles or excessive hair growth before considering them as normal changes associated with pubertal development.

Proper evaluation and early diagnosis should be done in adolescents presenting with features.

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