Original Research Article

Waist hip ratio: an anatomical predictive marker of risk of PCOS

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ABSTRACT

Background: Polycystic ovarian syndrome (PCOS) is one of the most common endocrine disorders seen in infertility clinic of Gynae OPD. It is basically is disease of metabolic disorder and requires ultrasound and hormonal assay for its diagnosis.
Methods: The study was carried out in the GOPD of MGM medical College and M.Y. Hospital Indore (M.P.) India. It included 200 women in the age group 18-40 years diagnosed as PCOS and who were compared with 200 women of same age group without PCOS. The height, weight BMI and waist hip ratio were measured and analyzed statistically.
Results: The present study shows that women with PCOS had higher incidence of acne hirsutism and irregular menses (p<0.0001), women with PCOS had higher mean ovarian volume measurement (11±1.4cc) compared to female controls who had lower volume of ovary with a range of (7.94±2.34cc. (p<0.0001) as calculated by USG by sonologist.
Conclusions: The presence of central obesity, (waist hip ratio >0.87) is an indication for presence of PCOS. Thus, these patients may undergo further hormone evaluation and this simple measurement can help to screen out PCOS from general population. This prevents financial burden on low resource settings.

Keywords: BMI, Metabolic disorder, PCOS

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is one of the most common endocrine disorder affecting approximately 5% - 8% of premenopausal women.[1] PCOS also called Hyperandrogenic Anovulation or Stein Leventhal syndrome has diverse range of causes and it peruse etiology is unknown but there is a strong evidence that it is a genetic disease.[2,3]

It produces symptoms in approximately 5-10% of women of reproductive age. and is thought to be the leading cause of female sub fertility.[4] Excess androgen is attributed to be one of the causes. There are varied data of prevalence of PCOS, in different population. The tests to detect PCOS are generally quite expensive such as hormone assays and ultrasonography. Since PCOS is related to obesity, women with PCOS particularly those with central obesity are at higher risk of development of metabolic syndrome and insulin resistance worsens insulin related metabolic and reproductive features of PCOS including dyslipidemia, anovulation, hyperandrogenemia.

Authors decided to conduct a study to determine if PCOS could he predicted by waist hip ratio (W:H).

METHODS

The present prospective study was conducted in Gynaecological OPD of MY hospital and M.G.M. Medical College Indore (M.P.) India.

Inclusion criteria

- It included 200 women in each group (case and control) of age group 18-40 years which were diagnosed cases of PCOS either by a reproductive endocrinologist or gynecologist on the basis of clinical history to determine menstrual irregularities or duration of infertility.
- Ultrasonography to detect the presence or absence of Polycystic ovaries.
- These cases were compared with 200 regular cycling women of the same age group without PCOS.

Exclusion criteria

- Subject below 18 years and above 40 years.
- Subjects with other aetiologies of androgen excess and anovulatory infertility such as hyperprolactinemia thyroid dysfunction and congenital adrenal hyperplasia.
- Subject with pathological causes of oedema, hypertension and patients on drugs like diuretics, steroids which can affect vascular and extra vascular volume were also excluded.

RESULTS

Anthropometic measurements included a waist circumference in centimeters measured at the narrowed circumference midway between the upper border of iliac crest and the lower rib margin where the hip circumference was taken as the widest measurement at the level of the greater trochanters.

Table 1: Distribution of acne hirsutism and irregular menses in case and controls.

Group	Cases		Controls	
	N=200	%	N=200	%
Acne (A)	64	64	22	22
Hirsutism (H)	62	62	08	08
Irregular Menses (I)	84	84	03	03
	200		200	

Height was recorded in cms and weight in kilogram. Body mass index BMI was calculated as weight in kilogram divided by square of height in meters (Kg/m^2). Table 1 highlights that majority of the cases (84%) presented with irregular menses followed by hirsutism in 62 % and acne in 64% of the cases as the chief complaint.

Table 2: Distribution according to anthropometric parameters.

T Test cases/controls	Weight (kg) cases	Weight (kg) control	Height (m) cases	Height (m) control	BMI cases	BMI controls
Minimum	45	43	1.50	1.52	17.15	17.24
Maximum	82	76	1.72	1.72	32.05	30.44
Mean	65.54	60.31	1.59	1.59	25.79	23.86
SD	8.32	6.65	0.038	0.030	3.09	2.53
SE	0.832	0.665	0.003	0.003	0.309	0.253
t Value	4.90		0.90		4.82	
P Value	p<0.0001		p<0.367		p<0.0001	
Significance	*** Highly Significant		Not Significant		***Highly Significant	

Table 3: Distribution according to age.

t Test cases/controls age	Age cases	Age control
Minimum	19	19
Maximum	35	36
Mean	23.26	24.35
SD	3.56	3.69
SE	0.356	0.369
t Value	2.13	
P Value	p<0.0347	
Significance	*Significant	

Table 2 shows that PCOS is significantly associated with weight and BMI in comparison to height which was found to be non-significant. Table 3 shows that PCOS is significantly associated with age. As p-value is <0.0347 so this is found to be a significant association. Table 4 shows the mean age of 23.26±3.56 years and 24.35±3.69 years respectively in the group of cases and controls.

Table 4: Observation and results distribution according to age.

	Cases	Controls	p Value
Age and years	23.26±3.56	24.35±3.69	< 0.0347

Table 5: Waist hip ratio.

	Cases	Controls	p value
Waist hip ratio (WHR)	0.87±0.05	0.82±0.05	<0.0001

Table 5 shows WHR > 0.8 is significantly associated with the PCOS and thereby reflecting its effect on the patient's clinical features, metabolic disturbances and endocrine profile.

DISCUSSION

Androgen excess in utero may support the presence of unfavorable metabolic state leading to dyslipidemia and contract distribution of fat (android patters) which in turn leads to PCOS.[6] The present study shows that women with PCOS had higher incidence of acne, hirsutism and irregular menses with p-value<0.0001. Women with PCOS had higher mean ovarian volume measurement (11±1.4cc) compared to female controls who had literally equal volume of ovary with a range of (7.94 ± 2.34cc) with p-value <0.0001 as calculated by USG by sonologist.[7]

In a study on Brazilian women with PCOS the prevalence of metabolic syndrome was found to increase with BMI : 3.2%, 19.2%, and 52.3% for normal over weight and Obese women respectively.[8] In present study we find that height of the women does not correlate well with the prediction of PCOS with p-value <0.367 which was not significant while if you take only weight, it is predictive of PCOS with p-value <0.0001 which was found to be highly significant. Thereby proving that obesity has a correlation with PCOS. When you compare BMI for these women again in the case studies comparing it with controls, BMI prediction was highly significant for PCOS (p value < 0.0001)

A Dutch study reported that a waist circumference >83.5 cm along with biochemical evidence of hyperandrogenism was a powerful prediction of the presence of metabolic syndrome and insulin résistance.[9] Waist Hip ratio was a better predictor of metabolic syndrome in women with PCOS compared to other predictors including BMI. In present study, parameter of obesity, being a good predictor of PCOS, in the control group is in agreement with Janssen et al.

Janssen et al concluded that waist circumference is closely related to obesity related risk factor as compared with BMI.[10] This is also in agreement with all WHR > 0.8 are correlated significantly with the PCOS and reflecting its effect on the patients clinical features, metabolic disturbances and endocrine profile.[11]

Screening for all infertility women with PCOS would be ideal, but in our country with low resources, it seems far-fetched so if authors can identify women and then screen them it would be saving lot of resources. Present study has some limitations as authors could not co-related present findings with hormone assays as they were not available in present settings.

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