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Original Research Article

An anthropometry study in polycystic ovary syndrome patients

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) a symptom complex, which is also known as hyperandrogenism anovulation, was first proposed by Stein and Leventhal in 1935.
Methods: This observational cross-sectional study was conducted in the obstetrics and gynaecology department of SPS Hospital, Ludhiana, Punjab and included 60 women with PCOS and 30 non PCOS women of age group 18-40 who met the inclusion criteria.
Results: The Mean BMI of study population was 26.39±4.17 in group A (PCOS) and 26.37±3.79 in group B (non PCOS). The calculated mean waist hip ratio of subjects was 0.73±0.08 in both groups. The mean waist height ratio of study population was 0.48±0.05 in group A and 0.49±0.04 in group B.
Conclusions: Anthropometric parameters are recommended as a screening tool in women with PCOS so as to improve endocrinological and metabolic disturbances not only to treat PCOS but also to reduce long term health risks. An early treatment for obesity should be a priority to prevent cardiometabolic complications in future.

Keywords: Polycystic ovaries, Anthropometry, Waist hip ratio, Waist height ratio, Body mass index

INTRODUCTION

PCOS, a symptom complex, which is also known as hyperandrogenism anovulation, was first proposed by Stein and Leventhal in 1935.[1] The prevalence of PCOS across the globe in highly variable, ranging from 2.2% to as high as 26%.[2]

Obesity is another higher risk factor for developing cardiovascular disease than PCOS alone. The incidence of PCOS in obese females is 40-80%, while in lean thin women is 6-22% cases.[3,4] Obese women with PCOS have 10-fold increase and overweight women have 7-fold increase in risk of abnormal glucose tolerance as compared with normal weight women with PCOS.[3]

So, this study was taken to establish an anthropometry determined by BMI (body mass index), waist hip ratio (WHR), waist height ratio (WHtR) in PCOS patients.[5]

METHODS

It was a cross sectional study. The study was conducted at Satguru Pratap Singh Hospitals, Ludhiana. The study was conducted from September 2018 to February 2020.

Study population

The study was conducted on 60 women with PCOS (Rotterdam criteria 2003) and 30 non PCOS women, attended out-patient department of obstetrics and gynaecology, SPS Hospitals, Ludhiana.

Inclusion criteria

All female participants of age group 18-40 years who meet the Rotterdam criteria, 2003 were included. Rotterdam criteria, 2003 included oligomenorrhea/anovulation, clinical and/or biochemical signs of hyperandrogenism and polycystic ovaries.

Exclusion criteria

Any participants with diabetes mellitus type-1 and type-2, stage 2 hypertension, congenital adrenal hyperplasia, hyperprolactinemia, hypothyroidism, Cushing syndrome were excluded.

Sample size and sample technique

The following formula (Daniel, 1999) was used,

$$n=\frac{Z^2P\ (1-P)}{d^2},$$

where,

n=sample size, Z=Z statistic for a level of confidence of 95% which was conventional (Z=1.96), P=expected prevalence of PCOS was 4% (in proportion was 0.04), d=precision (in proportion was 0.05),

therefore,

$$n=\frac{1.96\times1.96\times0.04\ (1-0.04)}{0.05\times0.05}=59.$$

The sample size for one year was 59. We took 60 cases to round off the figure.

Procedure

This observational cross-sectional study was conducted in the obstetrics and gynaecology department of SPS Hospital, Ludhiana, Punjab and included 60 women with PCOS and 30 non PCOS women of age group 18-40 who met the inclusion criteria. Informed written consent was obtained from all the participants and institutional ethics review committee approval was obtained before commencing the study. A detailed history of woman including chief complaints, history of presenting illness, demographic entity, menstrual history, obstetric, past medical and surgical history, personal history were documented. General physical examination was done, specially looking for features of hirsutism, acne, acanthosis nigricans. Anthropometric measurements were taken.

Vitals

Pulse, blood pressure, respiratory rate, temperature was recorded. Blood pressure (BP) was measured after a 10 minutes rest period using digital automatic blood pressure monitor in sitting position placing the patient's right or left arm at the level of mid sternum (the approximation of right atrial level).

Anthropometry parameters

Weight (in kg)-weighed (in kg) to within 100 g in light clothing without shoes using digital weighing scale. Height (in cm)-measured to the 0.1 cm using a wall mounted stadiometer. Height (in cm)-measured to the 0.1 cm using a wall mounted stadiometer.

BMI (quetelet index)=$\frac{weight\ (in\ kg)}{height\ (meter)^2}$.

Waist circumference (WC) (cm)-measured at the level midway between the lower rib margin and iliac crest. Hip circumference (HC) (cm)-at widest point between the iliac crest and buttock.

WHR (cm)-WC/HC,

WHtR (cm)-WC/ height (cm).

Systemic examination included, cardiovascular, respiratory and per abdomen examination. Pelvic examination included per speculum, bimanual examination and per rectal examination wherever required has been done.

Ultrasound examination

Ultrasound machine E Saote was used to perform USG of lower abdomen in 2-dimensions in all participants. Transvaginal sonography where ever was required had been done. Complete ultrasonography of lower abdomen was done to look uterus, bilateral fallopian tubes, and bilateral ovaries for any pathology. Ovarian measurements size, volume, no of follicles in both ovaries had been recorded.

Statistical analysis

Statistical analysis was performed using the statistical package for the social sciences trial version 18.0 software (SPSS) and MS excel 2007 spread sheet. Pearson's co relation correlation co-efficient was calculated to see co relation between anthropometric parameters and lipid profile in PCOS female patients. For all statistical analysis p value, 0.05 had been considered statistically significant.

RESULTS

Participants

This observational cross-sectional study was conducted in the obstetrics and gynaecology department of SPS Hospital, Ludhiana, Punjab and included 60 women with PCOS and 30 non PCOS women of age group 18-40 who meet the inclusion criteria.

Table 1: BMI.

BMI (kg/m^2) group	Group				Total	Chi square value	P value
	Group A		Group B				
	No.	% age	No.	% age			
<18.5	1	2	0	0	1		
18.5-24.99	22	37	6	20	28		
25-29.99	23	38	14	47	37	3.374	0.338
>30	14	23	10	33	24		
Total	60	100	30	100	90		

Table 2: WHR.

WHR	Group				Total	Chi square value	P value
	Group A		Group B				
	No.	% age	No.	% age			
<0.85	54	90	28	93	82		
>0.85	6	10	2	7	8	0.274	0.714
Total	60	100	30	100	90		

Table 3: WHtR.

WHtR	Group				Total	Chi square value	P value
	Group A		Group B				
	No.	% age	No.	% age			
<0.55	54	90	28	93	82		
>0.55	6	10	2	7	8	0.274	0.714
Total	60	100	30	100	90		

Table 4: Mean and differences (group A and group B).

Parameters	Group A		Group B		t	P value	Difference	
	Mean	SD	Mean	SD			Mean	SD
BMI (kg/m^2)	26.39	4.17	26.37	3.79	0.023	0.982	-1.779	1.820
WHR	0.73	0.08	0.73	0.08	0.233	0.817	-0.031	0.040
WHtR	0.48	0.05	0.49	0.04	-0.152	0.880	-0.021	0.018

Table 5: BMI (comparison with previous studies).

Study	Year	Place	Subjects		Mean BMI (cases)	Mean BMI (controls)
			Cases	Controls		
Pirwany et al[6]	2001	Glasgow UK	52	14	29.4±14.8	28.5±5.2
Valkenburg et al[7]	2007	Nether-lands	557	295	26.6 (22.5-32)	24.4 (22.0-27.1)
Berneis et al[8]	2007	Italy	30	24	28.4±5.8	28±4.4
Macut et al[9]	2008	Serbia	75	51	24.9±4.7	23.7±4.0
Rocha et al[10]	2011	Brazil	142	31	29.10±6.17	27.42±6.91
Saghafi-Asl et al[11]	2013	Iran	23	40	32.27±3.46	30.91±3.88
Donthu et al[12]	2017	India	86	-	27.93±4.64	-
Present study	2020	India	60	30	26.39±4.17	26.37±3.79

Table 6: Mean WHR (comparison with previous studies).

Study	Year	Place	Cases	Controls	Mean WHR cases	Mean WHR controls
Pirwany et al[6]	2001	Glasgow UK	52	14	0.82±0.07	0.78±0.05
Macut et al[9]	2008	Serbia	75	51	0.79±0.06	0.77±0.05

Continued.

Study	Year	Place	Cases	Controls	Mean WHR cases	Mean WHR controls
Saghafi-Asl et al[11]	2013	Iran	23	40	0.88±0.03	0.89±0.04
Donthu et al[12]	2017	India	86	-	0.89±0.05	
Present study	2020	India	60	30	0.73±0.08	0.73±0.08

Table 7: Mean WHtR (comparison with previous studies).

Study	Year	Place	Subjects	Controls	Mean WHtR (cases)	Mean WHtR (controls)
Saghafi-Asl et al[11]	2013	Iran	23	40	0.612+/-0.054	0.589+/-0.062
Donthu et al[12]	2017	India	86	-	0.6005+/-0.058	-
Present study	2020	India	60	30	0.48+/-0.05	0.48+/-0.04

BMI

BMI was calculated from weight and height of the subjects using Quetelet index. According to the WHO classification of obesity, the BMI was categorized into <24.99 as normal, 25-29.99 as over-weight and >30 as obese.

The mean BMI of study population was 26.39±4.17 in PCOS group and 26.37±3.79 in non PCOS group. Majority of subjects were overweight, consisted of 38% in PCOS group and 47% in non PCOS group followed by normal BMI (37%) in PCOS group and obese (33%) in non PCOS group (Table 1).

Anthropometry

WHR was as calculated as: waist circumference/hip circumference and the cut off value was taken 0.85.

90% subjects in PCOS group and 93% in non PCOS group had waist hip ratio <0.85 whereas 10% subjects in PCOS group and 7% in non PCOS group had ratio >0.85. The calculated mean WHR of subjects was 0.73±0.08 in both groups (Table 2).

WHtR was calculated using formula: waist circumference/height of subjects. For analysis cut off value used was 0.55.

Majority of subjects had WHtR value <0.55 consisted of 90% subjects in PCOS group and 95% in non PCOS group whereas 10% subjects in PCOS group and 75 in non PCOS group had ratio >0.55. The mean WHtR of study population was 0.48±0.05 in first and 0.49±0.04 in second group respectively (Table 3).

The mean±SD values of BMI, WHR and WHtR was 26.39±4.17, 0.73±0.08, 0.48± 0.05 respectively for group A whereas for group B observed values were 26.37±3.79, 0.73±0.08 and 0.49±0.04 respectively (statistically insignificant) (Table 4).

DISCUSSION

BMI

As far as BMI was concerned, Pirwany et al observed that mean BMI of cases was 29.4 and for controls was 28.5.[6] Valkenburg et al observed mean BMI for cases and controls were 26.6 and 24.4 respectively whereas Berneis et al found, values were 28.4 for cases and 28.0 which were near same.[7,8] In 2008, Macut et al did a study in which mean BMI were 24.9 and 23.7 for cases and controls respectively.[9] Rocha et al observed values were 29.1 and 27.4 respectively.[10] Saghafi-Asl et al in 2013 observed the highest mean BMI to be 32.27±3.46 and 30.91±3.88.[11] On the other hand, Donthu et al in 2013 found mean BMI was 27.93±4.64.[12] The mean BMI in present study was 26.39±4.17 in PCOS group and 26.37±3.79 in non PCOS group which is comparable with all except Saghafi-Asl et al (2013) (Table 5).[11]

Anthropometry

Anthropometry included WHR and WHtR.

Mean WHR

WHR in the present study is 0.73±0.0 for cases as well controls which is comparable to Macut et al whereas, rest studies by Pirwany et al, Saghafi-Asl et al and Donthu et al had higher values as mentioned in Table 6.[6,11,19,25]

Mean WHtR

WHtR value for cases as well for controls, observed in present study is 0.48±0.05 which is much less as compared to studies done by Saghafi-Asl et al (0.61 and 0.59) and Donthu et al (0.60) as shown in Table 7.[11,12]

Limitations

This study didn't take into consideration, the phenotypic types of PCOS and Ferriman Gallwey score in

examination. This study didn't obtain a daily calorie intake calculation for subjects.

CONCLUSION

Anthropometric parameters are recommended as a screening tool in women with PCOS so as to improve endocrinological and metabolic disturbances not only to treat PCOS but also to reduce long term health risks. An early treatment for obesity should be a priority to prevent cardiometabolic complications in future.

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