

Association of metabolic syndrome in polycystic ovarian syndrome

Pooja Jeengar, Madhubala Chauhan

Correspondence: Dr Pooja Jeengar, PG Student in Department of Obstetrics & Gynaecology, RNT Medical College, Udaipur, Rajasthan; Email- poojajeengar@rediffmail.com

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ABSTRACT

Objective: The aim of the study is to observe the association of metabolic syndrome in Polycystic Ovarian Syndrome (PCOS). **Materials and Methods:** A group of 50 women having documented features of PCOS (according to Rotterdam criteria 2003) underwent detailed evaluation for presence of metabolic syndrome (according to NCEP criteria) and compared with 50 women having normal pelvic study. **Result:** Twenty nine (58%) out of 50 PCOS women met criteria of metabolic syndrome as compared to 36% patients of control group. Waist circumference, systolic and diastolic blood pressures, fasting glucose had a significantly higher value among those with PCOS in comparison to those without the PCOS. **Conclusion:** The metabolic syndrome and its individual components are common in PCOS, particularly among obese women.

Keywords: Polycystic ovarian syndrome, metabolic syndrome.

Polycystic ovarian syndrome (PCOS) is the most common form of anovulatory infertility. It is also one of most common endocrine disorder in women of reproductive age, affecting 5% to 10% of women worldwide. It is characterized by combination of hyperandrogenism (either clinical or bio – chemical), chronic anovulation and polycystic ovaries [1]. PCOS is frequently associated with insulin resistance and obesity [2]. Affected women seem to have a form of the metabolic syndrome that manifest itself in early adult life with gynecological symptoms. The etiology of PCOS is uncertain. The most common cause of insulin resistance and compensatory hyperinsulinemia

is obesity [3]. Despite insulin resistance in adipose and skeletal muscle, the ovary remains relatively sensitive to insulin. Potentially a gene or series of genes renders the ovaries susceptible to insulin [4-8]. Both insulin and insulin like growth factor 1 along with increased LH have stimulatory effect on thecal cells leading to thecal hyperplasia, increased androgen secretion, arrest of follicular development and therefore, anovulation along with menstrual disturbances. Insulin also acts on liver to inhibit production of sex hormone binding globulin (SHBG) and insulin like growth factor-1 (IGF-1). This leads to increase in biologically available free testosterone. Thus insulin resistance not only increases

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secretion of ovarian androgen but also promotes an increase in proportion of free (active) hormone.

It is well recognized that visceral distribution of body fat, common in syndrome is of greater consequences to the metabolic effect of insulin resistance than obesity per se. Central obesity and insulin resistance lead to an altered lipolytic response to insulin, with impaired suppression of release of free fatty acids from adipose tissues. An increased flux of free fatty acids from central sites enters the portal circulation, increasing the availability of substrate to the liver for VLDL- triglyceride production. Furthermore, women with the syndrome exhibit increased activity of hepatic lipoprotein lipase, an enzyme responsible for conversion of large lipoprotein particle to smaller more atherogenic particles. PCOS (Polycystic ovarian syndrome) is one condition commonly detected in a younger age group. PCOS affected patients may gain particular benefit from early screening for cardiovascular risk factor. So, this study was aim to observe the association of metabolic syndrome in Polycystic Ovarian Syndrome.

Methods

This is an observational study which is conducted at the Department of Obstetrics and Gynecology, RNT Medical College, Udaipur (Rajasthan) during the period of January 2015 to December 2015. Fifty apparently healthy non-pregnant females of 15-35 years having documented features of PCOS (according to Rotterdam criteria, 2003) are selected from those attending the outpatient department (OPD) and assessed for presence of metabolic syndrome (according to NCEP criteria) and compared with 50 women having normal pelvic study.

Inclusion criteria-

1) Cases - Women between 15-35 years with PCOS (according to Rotterdam criteria, 2003)

2) Control - Women between 15-35 years with normal pelvic study.

Exclusion criteria-

- 1) Diabetes
- 2) Hypertension
- 3) Any cardiovascular disease

Investigations: Age, weight, waist circumference and blood pressure were recorded.

Collection of blood samples: 5ml of venous blood was collected in heparinised bottle after an overnight fast of 12 hrs. Serum was separated and the following parameters were estimated - 1. Estimation of fasting blood sugar, 2. Estimation of total cholesterol by CHOD-PHOD/phosphor tungstate method of Alliance 16, 3. Estimation of High Density Lipoprotein (HDL) cholesterol by CHOD – POD phosphotungstate method by Burstein 17, 4. Estimation of triglycerides by glycerol phosphate oxidase method of Jacob 18.

Rotterdam PCOS diagnostic criteria [9]: Two out of three should be present – 1) Oligoovulation/anovulation (amenorrhea or oligomenorrhoea), 2) Clinical and/or biochemical signs of hyperandrogenism (hirsutism/ acne/ alopecia/ elevated levels of free or total testosterone) and 3) Polycystic ovaries on USG.

NCEP diagnostic criteria for metabolic syndrome [10]: Three out of five should be present – 1) Fasting plasma glucose ≥ 100 mg/dl, 2) Systolic blood pressure > 130 mm of Hg or diastolic BP > 85 mm of Hg, 3) Waist circumference > 35 inches, 4) Serum triglyceride ≥ 150 mg/ dl and 5) HDL cholesterol ≤ 50 mg/dl.

This study is approved by institutional ethics committee. Each patient had undergone a detailed clinical examination and a relevant laboratory evaluation. The data were collected in structured proforma and it was analyzed with relevant statistical methods.

Results

A group of 50 women having PCOD underwent detailed evaluation for presence of metabolic syndrome and compared with 50 women having normal pelvic study. Mean age of the patients who entered the study is 23.68 ± 4.85 years with maximum (68%) patients in the age group of 15-25 years. Mean age of control group is 25.18 ± 5.4 years. Thus age of the patients in case group is slightly on lower side as compare to control group. Sixty six percent of PCOS patients were obese. Sixty percent of patients had typical appearance of PCO on ultrasonography. Clinical manifestation of

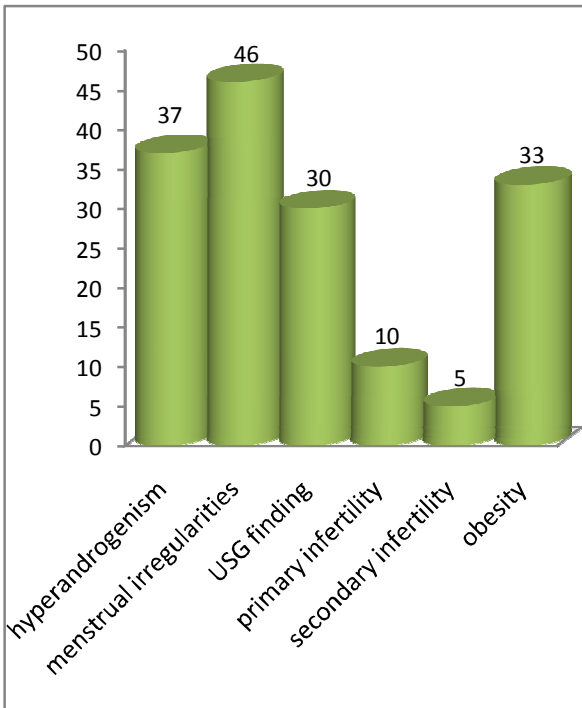


Figure 1: Clinical presentation of PCOS patients

hyperandrogenemia is seen in 34 (74%) of PCOS patients. Oligo / amenorrhea is seen in 46 (92%) of patients. Primary infertility is seen in 10 (20%) and

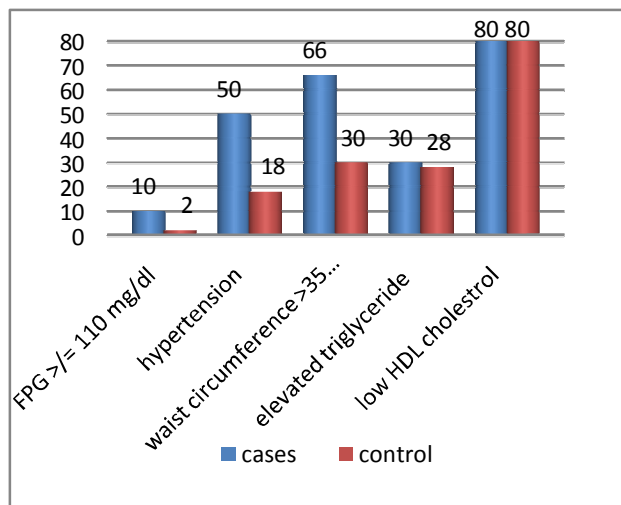


Figure 2: Comparison of components of metabolic syndrome

secondary infertility in 5 (10%) of cases (Figure 1).

Fifty eight percent of patients with PCOS show features of metabolic syndrome as compared to 36% patients of control group. Ten percent of PCOS patients show impaired glucose tolerance as compared to 2% of control group. Waist circumference >35 inches is seen in 66% of cases as compared to 30% patients in control group. Hypertriglyceridemia is seen in 30% and 28% patients of cases and control respectively. HDL - C <50 mg/dl is seen in 80% patients of both groups (Figure 2).

Comparing the mean data for different variables, it was noted that waist circumference, systolic and diastolic blood pressures, fasting glucose had a significantly higher value among those with PCOS in comparison to those without the PCOS (table 1).

Discussion

In our study women with abdominal obesity i.e. increased waist circumference (> 35 inches) and ultrasound findings are taken as identifiable factors for detecting PCOS cases. Ultra-sound findings are similar in women with abdominal obesity and in a smaller group of lean patients with PCOS [11]. The results of our study indicate 58% prevalence of metabolic syndrome in PCOS. This is greater than the observations of 42 % and 46 % prevalence made by Ramprasad Dey et al [12] and Glueck CJ et al [13] respectively. Two other studies had also shown the prevalence of metabolic syndrome 47.3% (Ehrmann's et al, 2006) [14] and 33.4% (Dokra's et al, 2005) [15] respectively among sampled women with PCOS. The age adjusted prevalence of metabolic syndrome has shown that women in between 15-25 yrs have higher prevalence (68%) of metabolic syndrome, in comparison to only 32% in 26-35 yrs age group. It may be because of a comparatively younger age group took part in our study as most of young girls presented to OPD with menstrual problems and married women with primary infertility with average duration of infertility of 2.4 years. Another very important factor for younger patients developing metabolic syndrome may be related to their life style. Dietary habits

(consumption of fast food etc.), lack of exercise, sedentary life style etc make them prone to develop obesity in their early life which is the root cause of

In case of other components like HDL-C, triglycerides, blood pressure, fasting glucose concentrations individual prevalence corroborated with

Table 1: Mean of different components of metabolic syndrome

Criteria	Cases	Control	P- Value
Age (years)	23.6±4.85	25.18±5.4	-
Waist circumferences (inches)	35.98±3.49	33.06±3.21	P<0.001
SBP (mm of Hg)	129.96±10.32	123.92±7.5	P<0.001
DBP (mm of Hg)	83.32±8.06	78.84±6.9	P<0.001
Fasting blood sugar (mg/dl)	95.96±11.95	92.5±9.3	P<0.001
Serum Triglyceride (mg/dl)	145.21±26.89	131.3±24.6	P<0.05
HDL-C (mg/dl)	42.67±7.90	45.14±6.9	P<0.05

P value <0.05 is considered statistically significant

that observed by Glueck CJ et al and Ramprasad Dey et al. (table 2). Presence of a fasting plasma glucose of 110 mg/dl or greater was seen in 10% of cases which is in concordance with the study done by Glueck et al having 11% patients with high value of FBS. In control group this is seen in only 2% of patients. This suggests that impaired glucose tolerance secondary to insulin

development of both PCOS and metabolic syndrome. Life style playing a role in development of metabolic syndrome can also be explained by the fact that majority of patients who develop metabolic syndrome in our study belong to urban areas.

resistance is one of the most important factors in development of PCOS. Thus PCOS become a high risk factor for development of metabolic syndrome.

In our study waist circumference above the threshold of 35 inches was found in 66% cases which

HDL – C values < 50 mg/dl was seen in 80% patients of both groups. This may be because most patients using saturated fatty acids in our locality. Hypertriglyceridemia is seen in 30% and 28% patients

Table 2: Comparison with other studies

Criteria	Ramprasad Dey et al	Glueck CJ et al	Present study
Age (years)	28.2±5.8	31±9	23.6±4.85
Waist circumferences (inches)	36.4±4.9	45.6±5.6	35.98±3.4
SBP (mm of Hg)	130	131±13	129.9±10.3
DBP (mm of Hg)	87.8±3.3	83±7	83.32±8.06
Fasting blood sugar (mg/dl)	99.3±20.4	94±22	95.96±11.9
Serum triglycerides (mg/dl)	167.7±29.4	192±152	145.2±26.9
HDL-C (mg/dl)	42.6±6.8	39±7	42.67±7.90

of cases and control respectively. This suggests that in our study dyslipidemia does not show much association with PCOS patients. This may be because of comparatively younger patients taking part in our study but this should also be taken into consideration that these patients are at high risk to develop metabolic syndrome in their later life. Factors other than insulin resistance may be implicated in pathogenesis of dyslipidemia and this may require further studies.

was significantly higher than the control group (30%). It is suggestive of obesity playing a major role in development of metabolic syndrome in PCOS patients. Twenty seven patients out of 33 obese patients show presence of metabolic syndrome. Development of obesity in younger age is again attributed to sedentary life style. Thus there is a strong need to aware the patients about life style modification at an early age.

Conclusion

It is observed from the study that the prevalence of metabolic syndrome in women with PCOS is significantly greater than that in normal women. Thus there is an urgent necessity to assess the rising trend of metabolic syndrome among the women with PCOS and to take early measures for primary prevention of its long term sequel.

Conflict of interest: None. **Disclaimer:** Nil.

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Pooja Jeengar¹, Madhubala Chauhan²

¹ PG student in Department of Obstetrics and Gynecology, R.N.T. Medical College, Udaipur, Rajasthan, India; ² Senior Professor in Department of Obstetrics and Gynecology, R.N.T. Medical College, Udaipur, Rajasthan, India