

## Study of Incidence of Metabolic Syndrome in PCOS

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**Abstract:** Incidence of Metabolic Syndrome (MBS) is increasing now-a-days and it is also called as insulin resistant syndrome. It is a retrospective study conducted in Department of OBG, KGH, Visakhapatnam over a period of two years. 111 PCOS cases were reviewed and 90 cases were met with inclusion criteria. So, we compared them with 90 non-PCOS patients. The study was taken up to study the incidence of MBS in PCOS patients and we observed the difference between PCOS and non-PCOS groups. We collected the data of PCOS and non-PCOS groups and compared parameters like Waist circumference (WC), HDL, systolic blood pressure (SBP), triglycerides (TG), BMI, Diastolic blood pressure (DBP) and Fasting blood sugar (FBS). We observed that the PCOS group have high WC, SBP & TG levels and low HDL levels than the non-PCOS group but not significant. The parameters like BMI, DBP and FBS are high in women with PCOS significantly than the non-PCOS. So, we concluded the metabolic syndrome and its components are common in women with PCOS (34.4%).

**Keywords:** BMI; DBP; FBS; HDL; MBS; non-PCOS; PCOS; SBP; TG.

### I. Introduction

Metabolic syndrome is characterized by three main interrelated abnormalities: elevated plasma glucose, dyslipidemia, and elevated blood pressure, which directly contribute to a pro-thrombotic and pro-inflammatory state, predisposing to the development of atherosclerotic cardiovascular disease and type 2 diabetes mellitus<sup>1</sup>. Hyperinsulinemia and insulin resistance are the common underlying metabolic abnormalities seen in PCOS and metabolic syndrome. Insulin resistance with elevated circulating insulin levels induces unfavourable changes in the lipid metabolism and increased androgen production from the theca cells. Androgen excess may support the presence of an unfavourable metabolic state leading to dyslipidemia and central distribution of fat (android pattern). In obese women, excess insulin and androgens may contribute to the development of the PCOS and metabolic syndrome<sup>2</sup>. The android pattern of fat distribution may be the result as well as the cause of hyperandrogenism, setting up a vicious circle of hyperinsulinism, hyperandrogenism, central adiposity, and metabolic abnormalities<sup>3</sup>.

The diagnosis of metabolic syndrome in an individual requires that the three abnormal findings are present out of five following clinical characteristics<sup>4</sup>.

- 1) Hypertension >130/85 mm of Hg
- 2) TG  $\geq$ 150mg/dl or higher
- 3) HDL <50mg/dl
- 4) Abdominal obesity - >35'' of waist circumference
- 5) FBS - >100mg/dl or higher

The prevalence of MBS is higher occurring in 23.7% USA populations over 20%<sup>5</sup>. The prevalence also increases with age from 6.7% in 3<sup>rd</sup> decade to 43.5% in 7<sup>th</sup> decade<sup>6</sup>. Several factors affecting the prevalence of metabolic syndrome include obesity, insulin resistance, diabetes mellitus and PCOS. The recent suggestion was made to screen all obese women with PCOS for metabolic syndrome<sup>7</sup>. The purpose of the study is to study the incidence of MBS in PCOS group in comparison with non-PCOS group of same age. We wish to determine that the prevalence is influenced by a) the criteria used ATP III, b) the way in which PCOS is diagnosed. The most widely adopted criteria proposed by American nation cholesterol panel are ATP III (Adult Treatment Panel III). These criteria require the presence of 3 out of 5 common risk factors<sup>8</sup>.

**II. Methodology**

The present study was a retrospective and a comparative study of PCOS and non-PCOS groups. We reviewed 111 PCOS cases and 90 cases were met with inclusion criteria. So, we compared them with 90 non-PCOS patients. 90 PCOS women within an age group of 30-40 years who attended to the OBG, KGH, Visakhapatnam were evaluated. They were diagnosed retrospectively according to the ESH<sup>9, 10</sup> RE/ASRM criteria (presence of atleast 2 of the following symptoms a) chronic anovulation b) hyperandrogenism c) PCOS ovaries). Parameters like Waist circumference, SBP, DBP, HDL, triglycerides, FBS, BMI were collected from the data of both PCOS and non-PCOS cases. We took the prior permission of the institute before collecting the data. We diagnosed them as PCOS because hyperandrogenism would be clinical (hirsutism, alopecia, and acne) or subclinical only with increasing serum testosterone and dehydroepiandrosterone sulfate and PCOS ovaries were diagnosed by ultrasonography by Rotterdam conference criteria.

The prevalence of MBS was assessed by the ATP III criteria. MBS was diagnosed in subjects presenting with at least 3 out of 5 risk factors.

Presence of Diabetes and altered glucose tolerance was determined according to the American Diabetic Association (ADA) criteria.

Blood glucose was determined using `glucose oxidase` method.

HDL cholesterol was estimated by cholesterol esterase method following selective precipitation of apolipoprotein B containing lipoproteins with polyanion solution.

Triglycerides levels were estimated enzymatically as glycerol on a ROCHE automated chemistry analyser following hydrolysis with lipase.

All lipid analysis had intra and interassay variations of less than 3%. BMI was calculated by dividing individual weight by height.

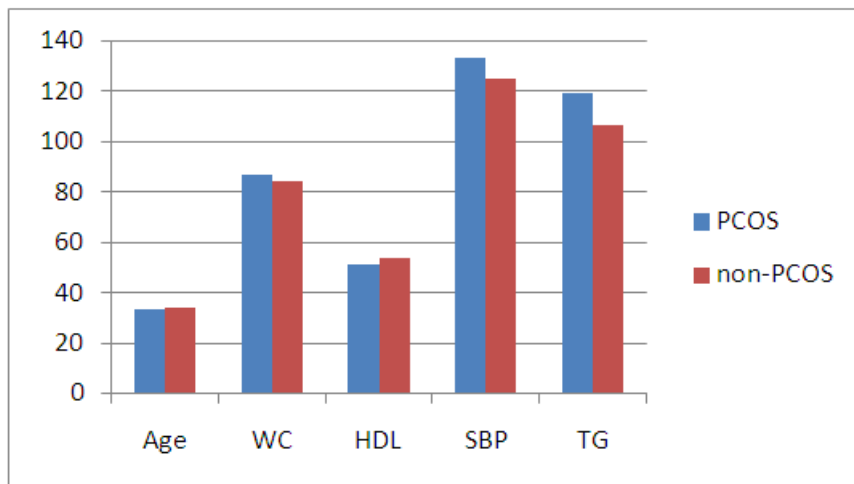
**III. Results**

The clinical data of women with PCOS and controls are depicted in Table I.

**Table I:** Clinical data in women with PCOS and normal controls.

Category	Age(year)	Waist circumference(cm)	HDL	Systolic blood pressure (mm of Hg)	Triglycerides
Non PCOS	34.3	84.3	54.0	124.9	106.2
PCOS	33.3	86.9	51.0	132.9	118.8

P value more than 0.01(not significant)



Patients with PCOS have higher waist circumference, systolic blood pressure, triglycerides, HDL when compared with non-PCOS patients (P value > 0.01)

Increased WC was found in 59 patients (65%)

Decreased HDL was found in 28 patients (31%)

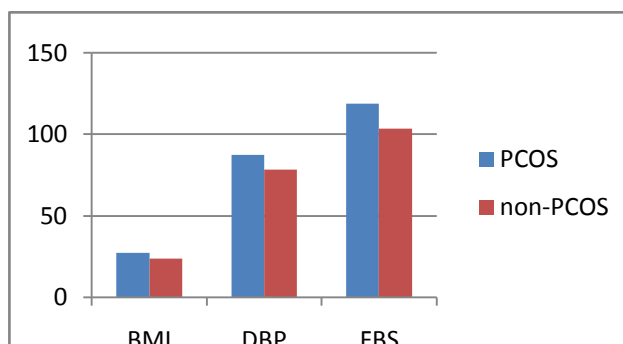
Increased triglycerides was found in 30 patients (33.3%)

Increased systolic BP was found in 30 patients (33.3%)

**Table II:** Clinical data in women with PCOS and normal controls.

	BMI	Diastolic BP	Fasting blood sugar
Non PCOS	24.1	78.6	103.6
PCOS	27.5	87.6	118.9

P value less than 0.01(significant)



PCOS women with high FBS is seen in 29 (32.2%)

Increased BMI is found in 26 (28.8%)

Increased Diastolic BP is found in 31 (34.4%)

#### IV. Discussion

Our data suggested that MBS is high in women with PCOS when compared to non-PCOS women. This is done by using the most common method of ATP III method for assessing the presence of metabolic syndrome in PCOS women. The prevalence of metabolic syndrome in PCOS is 34.4% (31 out of 90). The present study shows that the overall prevalence of metabolic syndrome in women with PCOS presenting with infertility is 34.4%. In comparison, a study done on Indian women, who included both adolescent as well as adult women with PCOS, reported a prevalence of 46.2% by the International Diabetes Federation criteria.

Earlier studies have suggested that certain phenotypes of PCOS women have a higher risk of developing metabolic syndrome and consequently long-term risk of cardiovascular disease/type 2 diabetes mellitus<sup>11</sup>. The prevalence of metabolic syndrome has been found to be higher in weight-matched PCOS women compared to non-PCOS women<sup>12</sup>.

Hahn et al. established a prevalence of metabolic syndrome of 33.8% in German women with PCOS (International Diabetes Federation criteria) and found that the prevalence rate increased with obesity and age<sup>13</sup>. 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, overweight, and obese women, respectively<sup>14</sup>. In our study, the prevalence of metabolic syndrome also increased with BMI as shown in Table 2, 28.8% of PCOS women

In the present study, 32.2% PCOS women were found to have diabetes while the prevalence of increase in diastolic BP was 34.4%, stressing the need for screening women with PCOS for these derangements.

A multivariate logistic regression analysis showed that BMI, FBS and diastolic BP were better predictors of metabolic syndrome in women with PCOS compared to other parameters. Our finding of BMI correlating with presence of metabolic syndrome in women is in agreement with earlier study by Kavitha et al.,

Screening all infertile women with PCOS would be ideal but is not always practical, especially in a low-resource scenario. Identifying risk factors for screening would be an alternate strategy. Our results suggest that women having any of the following risk factors: Increased BMI, high diastolic BP, increased FBS are at a greater risk of having the metabolic syndrome.

However, the results need to be cautiously interpreted as the present study has certain limitations. The study was done at a tertiary care centre. A larger sample size will be required for a more precise estimate of the prevalence of metabolic syndrome.

#### V. Conclusion

90 patients of PCOS were observed for BMI, diastolic BP, Fasting blood sugar, triglycerides, systolic BP, HDL and compared with non-PCOS women. After analysis the significant results were:

1. FBS is increased in 29%
2. BMI is increased in 28.8%
3. Diastolic BP is increased in 34.4%
4. HDL is decreased in 31%.

So, we concluded that the incidence of MBS is increased in women with PCOS (34.4%)

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