

## EVALUATION METABOLIC SYNDROME IN POLYCYSTIC OVARIAN SYNDROME IN REPRODUCTIVE AGE GROUP WOMEN

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### Abstract

**Background:** The disorder can be morphological (polycystic ovaries) or predominantly biochemical (hyperandrogenemia). Hyperandrogenism, a clinical hallmark of PCOS, can cause inhibition of follicular development, microcysts in the ovaries, anovulation, and menstrual changes

**Objectives:** To study the risk factors for developing metabolic syndrome in PCOS.

**Material and Methods:** This is Prospective study, total 100 patients, department of obs and Gynae, women of reproductive age group (15-45yrs) attending OPD at Darbhanga medical college and Hospital Laheriasarai, Bihar. **Conclusion:** This study helps in recognition of this high-risk group and aid in the enforcement of preventive strategies including therapeutic lifestyle modifications and risk factor management. This will have a promising impact on women's health and will prevent or delay the onset of varying cardiometabolic complications in PCOS.

**Keywords:** PCOS, metabolic syndrome,

### Introduction

PCOS was first identified in 1935 by Stein and Leventhal who noticed a condition among seven women characterized by irregular menstruation, obesity, and hirsutism, acne in addition to cysts on the women's ovaries<sup>1</sup>. Polycystic ovary syndrome (PCOS) is a complex condition characterized by elevated androgen levels, menstrual irregularities, and/or small cysts on one or both ovaries<sup>2</sup>. Insulin resistance (IR) appears to be important in the pathogenesis of PCOS and subsequent metabolic syndrome. The prevalence of metabolic syndrome in PCOS is 40-50%<sup>7</sup>, and is associated with long-term consequences such as cardiovascular disease (CVD), diabetes type II, cancers, sleep apnoea and psychological problems. The term 'Metabolic Syndrome' (syndrome X, insulin resistance syndrome) is widely used in clinical practice and research, consisting of a constellation of multiple interrelated risk factors of metabolic origin, which arises due to underlying insulin resistance, which in turn promotes the development of atherosclerotic cardiovascular disease. The major features of the metabolic syndrome include central obesity, hypertriglyceridemia, low levels of high-density lipoprotein (HDL) cholesterol, hyperglycemia and hypertension. The aim of our study is to find out the prevalence of metabolic syndrome using the IDF criteria in

women with PCOS reproductive age group so that appropriate life style modifications, pharmacological and non-pharmacological intervention would help in combating and preventing the major deadly cardiovascular disease, stroke etc. Due to higher risk of metabolic syndrome in our ethnic population more stringent criteria of metabolic syndrome defined by the International Diabetes Federation (IDF) is used in our study.

**Objectives:** To study the risk factors for developing metabolic syndrome in PCOS

### Review of Literature

Intense research and clinical studies have focused on unravelling the evolution of metabolic syndrome in PCOS. Multiple mechanisms have been proposed. Complex systematic interactions between the various components of metabolic syndrome Insulin resistance and its consequent hyperinsulinaemia, is one of the reasons for the pathogenesis of PCOS. Insulin regulates metabolic and mitogenic pathways that function independent of each other<sup>12</sup>. This might explain the paradoxical insulin sensitivity patterns seen in different tissues, for example, resistance in peripheral tissues and retained sensitivity in the ovarian cortex. Metabolic inertia to insulin has been attributed to a

post-binding defect in the insulin signalling pathway caused by abnormal serine phosphorylation of the insulin receptor<sup>13</sup>. There are rare causes of hyperinsulinemia and hyperandrogenism that are congenital in origin. Peripheral insulin resistance associated with hyperandrogenism and acanthosis nigricans, known as “type A syndrome,” can be due to mutations of the insulin receptor gene, which leads to decreased numbers of insulin receptors in target tissues. Structured assessment for the early detection and management of metabolic syndrome, especially in women of reproductive age, would be of critical importance to the healthcare system. So that it can be applied in the clinical setting, this assessment would need to prioritise risks, standardise evaluation methods, and establish the frequency of further testing.

#### Material and methods

This is Prospective study, total 100 patients, department of obs and Gynae, women of reproductive age group (15-45yrs) attending OPD at Darbhanga medical college and Hospital Laheriasarai, Bihar

**Collection of Data** - Women attending OPD at DMCH Darbhanga Bihar. were selected detailed history including

menstrual, obstetric and medical history were taken. general & systemic examination done. Age, height, weight, BMI, waist circumference.

#### Inclusion criteria

Age group 15 – 45yrs, those diagnosed clinically, biochemically and sonographically as PCOS.

#### Exclusion criteria

Women younger than 15 yr old & older than 45yrs.

Women who are on medications affecting the sex hormones from 6 months prior to study onset.

#### Statistical analysis:

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test or Fischer’s exact test (for 2x2 tables only) was used as test of significance for qualitative data.

#### Result

**Table 1: Distribution of subjects according to metabolic syndrome**

	Frequency	Percent
NO	59	59.0
YES	41	41.0
Total	100	100.0

**Table 2: Distribution of subjects according to age group and metabolic syndrome**

	Metabolic syndrome	No Metabolic syndrome	Total
<b>≤25yrs</b>	11	22	33
	26.8%	37.3%	33.0%
<b>26-30yrs</b>	17	30	47
	41.5%	50.8%	47.0%
<b>31yrs &amp; above</b>	13	7	20
	31.7%	11.9%	20.0%
<b>Total</b>	41	59	100
	100.0%	100.0%	100.0%

P value 0.049, there was a statistically significant difference found between age group and metabolic syndrome

**Table 3: Comparison of Height, weight, Waist circumference, BMI according to Metabolic syndrome**

	Metabolic syndrome		No Metabolic syndrome		P Value
	Mean	SD	Mean	SD	
<b>Height(cm)</b>	154.44	3.26	154.76	3.48	0.640
<b>Weight(kg)</b>	75.54	13.40	57.36	7.70	<0.001
<b>BMI</b>	31.79	5.71	23.80	2.54	<0.001
<b>Waist Circumference(cm)</b>	96.29	9.62	82.54	8.18	<0.001

There was a statistically significant difference found between metabolic syndrome and no metabolic syndrome with respect to weight, waist circumference, BMI. There was no statistically significant difference found between metabolic syndrome and no metabolic syndrome with respect to height.

**Table 4: Comparison of lipid profile according to metabolic syndrome**

	Metabolic syndrome		No Metabolic syndrome		P Value
	Mean	SD	Mean	SD	
<b>S.TGL(mg/dl)</b>	125.83	28.80	108.19	12.87	<0.001
<b>S.HDL(mg/dl)</b>	45.86	6.00	54.85	4.32	<0.001
<b>S.LDL(mg/dl)</b>	104.48	19.65	91.86	9.78	<0.001
<b>T.CHOL(mg/dl)</b>	163.07	27.67	158.36	12.39	0.251

There was a statistically significant difference found between metabolic syndrome and no metabolic syndrome with respect to Serum TGL, Serum HDL, Serum LDL.

There was no statistically significant difference found between metabolic syndrome and no metabolic syndrome with respect to total cholesterol.

**Table 4: Comparison of FBS, SBP, DBP according to Metabolic syndrome**

	Metabolic syndrome		No Metabolic syndrome		P Value
	Mean	SD	Mean	SD	
FBS(mg/dl)	109.85	22.52	92.25	20.11	<0.001
SBP(mm Hg)	130.34	11.26	119.46	8.16	<0.001
DBP(mm Hg)	85.76	6.71	77.08	6.06	<0.001

There was a statistically significant difference found between metabolic syndrome and no metabolic syndrome with respect to FBS, SBP and DBP.

## Discussion

The sample size in the present study is 100. These are 100 women who are diagnosed to have the polycystic ovarian syndrome, but had different presenting complaints. Of the 100 the most common problem is menstrual irregularity (81% had menstrual irregularity in terms of oligomenorrhea and amenorrhea as their presenting complaint). Primary infertility was the presenting complaint in 45%, secondary infertility in 10%, hirsutism in 21% and acanthosis in 17%. Prevalence of metabolic syndrome in our study 41%. Age group from 15 to 45 years were included in the study. We have grouped the study population into 3 categories based on age, Group 1:  $\leq 25$  years, Group 2: 26-30 years, Group 3:  $\geq 31$  years. The prevalence was 26.8% in age Group 1, 41.5% in age group 2 and 31.7% in age Group 3. Of the 100 PCOS patients were studied, 12 patients belonged to Class III and 88 belonged to class IV socioeconomic status. Metabolic syndrome was more prevalent in the class III socioeconomic PCOS population (91.6% in contrast to 34% in class IV socioeconomic PCOS population). Sedentary life style is the probable contributory factor in class III population. The difference is statistically significant with a P value of <0.001.

### BMI:

The prevalence of metabolic syndrome increases as BMI increases in the PCOS population. The mean BMI among the metabolic syndrome is 31.79 and among no metabolic syndrome is 23.80. Out of 41 metabolic syndrome patients in PCOS 3 parameters were present in 26 (63.4%) patients,

4 were present in 13 patients, 5 were present in 2. The most common pattern involved is along with increased waist circumference, low serum HDL and fasting hyperglycemia and the second most common is increased waist circumference along with fasting hyperglycemia and systolic and diastolic hypertension. The major lipoprotein disturbance in metabolic syndrome and is low serum HDL cholesterol level. The cutoff for metabolic syndrome is <50 mg/dl. Of the 41 PCOS 31 patients had serum HDL <50 mg/dl. The mean HDL value in metabolic syndrome group is 45.86 mg/dl and in non metabolic syndrome group it is 54.85 mg/dl, which is statistically significant with a P value of <0.001.

**FASTING HYPERGLYCEMIA** Fasting plasma glucose of 100 mg/dl or more is the criteria for MS. 24 patients out of the 41 metabolic syndrome patients had fasting hyperglycemia accounting for 58.5%. Mean fasting glucose value in MS group is 109.85 and in the non MS group it is 92.25 with P value of <0.001 which is statistically significant.

The waist circumference with ethnicity specific values  $\geq 80$  cm for south asian women is taken as cut off for metabolic syndrome. The mean waist circumference in metabolic syndrome group is 96.29 cm and in PCOS population without metabolic syndrome it is 82.54 cm. There is a statistically significant difference found between metabolic syndrome and no metabolic syndrome with respect to waist circumference as  $p < 0.001$ .

The cut off for hypertension is SBP >130 and/ or DBP >85 mm Hg. Mean systolic BP in MS group is 130.34 mm Hg

and in non-MS group it is 119.46 mm Hg. Mean diastolic BP in MS group is 85.76 mmHg and in non MS group it is 77.08. Of the 41 metabolic syndrome patients, systolic hypertension was present in 18 patients and diastolic hypertension in 24 patients.

### Conclusion

metabolic syndrome is a neglected entity. Multiple mechanisms have been proposed for the evolution of metabolic syndrome in PCOS. In the present study, 41% of PCOS patients had Metabolic Syndrome, Healthy life style modification not only improves their menstrual and ovulatory symptoms, but also prevents the future cardiovascular and other morbid ailments. Lifestyle modification is the only universally accepted intervention.

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