

# POLYCYSTIC OVARIAN SYNDROME; DETERMINATION OF ALTERATIONS IN GLUCOSE LEVEL AND LIPID PROFILE

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**ABSTRACT: Objective:** The objective of the present study was to determine the changes in the glucose level and lipid profile in patients with polycystic ovarian syndrome (PCOS). **Study Design:** Descriptive study. **Place and Duration of the study:** This study was conducted at Institute of Molecular Biology and Biotechnology, The University of Lahore from June 2009 to June 2010. **Patients and Methods:** Total 50 patients with PCOS were included and 50 age-matched control subjects were also selected for comparison. Their glucose levels and lipid profile were assessed using commercial kits. The data thus obtained was subjected to statistical analysis. **Results:** Significant differences ( $P < 0.05$ ) in fasting blood glucose level and individual parameters of lipid profile were observed in women with PCOS. A higher prevalence of hypertriglyceridemia, hypercholesterolemia, higher LDL, lower HDL and higher fasting blood glucose levels was explored in PCOS women than controls. **Conclusions:** Abnormal glucose level and lipid profile in PCOS women showed that these women are at an increased risk of developing diabetes and subsequently cardiovascular diseases.

**Key words:** Polycystic ovarian syndrome, Hyperandrogenism, LDL-C.

## INTRODUCTION

Polycystic ovarian syndrome (PCOS) is considered as the most common endocrine disorder that affects women of reproductive age. It is characterized by hyperandrogenism and chronic anovulation<sup>1</sup>. Women presenting with PCOS have more risks for developing hypertension, dyslipidemia<sup>2</sup>, insulin resistance, impaired glucose tolerance and diabetes mellitus type-II<sup>3</sup>. Metabolic syndrome is prevalent in women with PCOS and it is associated with high risk of cardiovascular disease (CVD)<sup>5</sup>. The National Cholesterol Education Program's Adult Treatment Panel III defines metabolic syndrome as if there is the presence of at least 3 of the following 5 conditions: abdominal obesity characterized by the waist circumference  $> 88$  cm, serum triglycerides (TG)  $\geq 150$  mg/dL, serum high density lipoprotein cholesterol (HDL-C) less than 50 mg/dL, blood pressure (BP) 130/85 mm Hg or higher, and serum fasting glucose 110 mg/dL or more<sup>4</sup>. The exact etiology of metabolic syndrome is not obvious, however, obesity, insulin resistance and genetic predisposition are the key players involved in its pathogenesis<sup>6</sup>. Obesity and insulin resistance are connected with hypertension, dyslipidemia and DM-2. The link between insulin resistance and associated dyslipidemia, hypertension

and atherosclerosis is though intricate, dysregulated fatty acid metabolism seems to be a major contributing factor for developing insulin resistance syndrome particularly because of its relation with CVD<sup>7</sup>. The present study was designed to investigate the variations in glucose levels and lipid profile in women with PCOS so that the risk factors i.e. DM-2 and CVD for PCOS can be unraveled.

## MATERIALS & METHODS

This study was carried out at Institute of Molecular Biology and Biotechnology, The University of Lahore. 50 women with PCOS and 50 age-matched healthy control subjects were included in the study. A questionnaire was answered by each patient. 2-3ml blood sample was collected from each individual. The samples were processed and analyzed for the estimation of fasting glucose (FG), parameters of lipid profile i.e. total cholesterol (TC), triglycerides (TG), low density lipoprotein-cholesterol (LDL-C) and high density lipoprotein-cholesterol HDL-C using commercial enzyme assay kits. All the data thus obtained was statistically analyzed using independent t-test. P value less than 0.05 was considered as significant value.

## RESULTS

All the results are shown in Fig-1. The values at y-axis are expressed in mg/dl. Fasting glucose levels were observed higher in PCOS women compared with controls. Similarly, compared with control group, TC and TG were also elevated in women with PCOS. LDL-C was slightly raised. HDL-C was observed low in women with PCOS comparable with controls. A statistically significant difference i.e.  $P < 0.05$  was obtained for all studied parameters.

**Fig-1. Comparison of FG, TC, TG, LDL-C and HDL-C levels in control subjects and women with PCOS**



## DISCUSSION

Metabolic syndrome is a pathological hallmark of PCOS. Both lipid and nonlipid risk factors are the manifestations of metabolic syndrome and identify individuals at increased risk for coronary heart disease and type 2 diabetes mellitus<sup>8-12</sup>. Central obesity, hypertriglyceridemia, low levels of high-density lipoprotein (HDL) cholesterol, hypertension, and elevated fasting plasma glucose concentrations are associated with these risk factors<sup>8</sup>. Abnormalities in glucose levels and lipid profile parameters were observed in the present study. Fasting glucose levels were observed high in women with PCOS comparable with controls which depict the risk of developing diabetes in an advanced age. David et al 2006, found the highest positive predictive value of fasting plasma glucose of 110mg/dL or greater for the presence of metabolic syndrome in women with PCOS. Women who have PCOS, as many as 30% have impaired glucose tolerance (IGT) and an additional 7.5% have diabetes<sup>5</sup>. The lipid profile of PCOS patients is significantly disturbed. The levels of TG, total and LDL-C are usually found high in them<sup>4</sup>. On contrary, HDL-C and particularly HDL2 subfraction levels are down regulated<sup>18,19</sup>. In our

study, hypercholesterolemia and hypertriglyceridemia were the predominant lipid abnormalities. Similarly, disturbed levels of LDL-C i.e. high and HDL-C i.e. low were observed in comparison to controls. Dysregulated glucose and lipid profile parameters in women with PCOS clearly demonstrate the risk of developing diabetes and subsequently cardiovascular diseases. The progression of metabolic syndrome can be mitigated by dietary factors and activity levels<sup>16</sup>. Some parameters of metabolic syndrome can be improved by exercise, dietary modifications and metformin therapy<sup>4,17</sup>. Women with PCOS must be informed about the potential long term risks of developing DM-2 and likely CVD in future<sup>5</sup>.

## CONCLUSIONS

Elevated levels of fasting glucose, total cholesterol, triglycerides and LDL-C and low levels of HDL-C were observed in women with PCOS compared with controls which suggest a risk of developing diabetes and subsequently cardiovascular problems. A better understanding of the pathogenesis of insulin resistance that is associated with complications of the polycystic ovary syndrome has led to novel insulin-lowering (which indirectly lowers glucose intolerance) and lipid profile lowering novel therapies. Research that is focused on the genetic and environmental determinants of the polycystic ovary syndrome may provide the basis for new treatment methods and possible prevention of the syndrome and its sequel.

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