Oxidative stress biomarkers in serum of patients with PCOS

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Abstract: Oxidative stress (OS) is measured as a potential inducing part in the detection of PCOS, which is one of the most universal multifarious endocrine disorders and a foremost cause of aridity, distressing approximately 12% of women in the humankind, as OS has close relations with PCOS characteristics, just as insulin resistance (IR), hyperandrogenemia, and never-ending annoyance. It has also been shown that DNA alteration with relocate stimulate by OS are implicated in tumor pathogenesis, tumor cell survival, proliferation, invasion and angiogenesis Furthermore, present study prove that the females with PCOS are tale to have an rising threat of cancers, when there is Lipid peroxidation (42.45 mg/dl) and Uric acid analytes show highly significant in Polycystic ovarian syndrome patients P≤0.05 and 0.01. As a result, the more severe OS in PCOS is regarded as an important prospective spur for the increase risk of cancers, and this study aims to investigate the probability and latent pathogenic mechanism of the exceeding development, providing perceptive belief and evidence for preventing the cancer potentially caused as a result of PCOS.

Key words: Lipid peroxidation, Uric acid, PCOS, Serum.

1. INTRODUCTION

PCOS is a notorious cause of menstrual irregularity as well as infertility. Generally, irregular menstruation is associated with anovulation. Among 30-40% of women cause amenorrhea are found to have PCOS (Ehrmann, 2005; Goldzieher and Green, 1962). The description of PCOS has subsisted notorious and still remains ambiguous owed to the syndrome's heterotrophic environment. During the year of 1935, the foremost information on women with polycystic ovaries has depict, the term "polycystic ovarian syndrome" was customary as other clinicians perceive the connection flanked by hyperinsulinemia, androstenedione, testosterone levels, and PCOS (Burghen *et al*, 1980). Conversely, a wide spectrum of clinical manifestations, include impaired glucose tolerance (Legro *et al*, 1999), dominance of type II diabetes (Dahlgren et al, 1992), improved risk of hypertension and dyslipidemia, and elevate endothelial dysfunction (Khan *et al*, 2006) promote difficult the contest on vital PCOS. The presence study of clinical or biochemical hyperandrogenism or polycystic ovaries with regular cycles was broadly interpreted as PCOS (Adams *et al*, 1986; Franks, 1989). Besides, environmental factors such as diet or stress also can trigger basic risk factors and caused the enhancement of PCOS. Oxidative stress such as lipid peroxidation and uric acid, which is generally known to be present in women with PCOS regardless of whether they are lean or have alterations or metabolic abnormalities, has been documented in infertile women (Sabuncu *et al*, 2001). Additionally, LPO levels in plasma can be exaggerated by the rate of detoxification by others tissues. Therefore, essential information may lack when MDA is measured only in plasma or serum. Hence we examined the hypothesis that LPO and uric acid levels in plasma may be a better oxidative marker to correlate more significantly and independently with the clinical symptoms in PCOS patients.

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2. MATERIALS AND METHODS

Subjects: PCOS patients diagnosed according to the Rotterdam criteria. No of Patients 50 subjects with PCOS and healthy patients used for the evaluation of oxidative stress markers in serum. According to progesterone measurements and ultrasound examination, Number of women 50 subjects was noninvasively trail provisionally as amenorrheoic and anovulatory based on imagine and testing of hormone assays for the aid of cystic diseases. Distinctive ovarian morphology has detected by ultrasound was not measured as an inclusion criterion. In this experimental study, Alcoholics or chronic smokers did not bear from any systemic diseases in the vein of hypertension or any diabetic dilemma. Patients suffering from disease of any origin other than polycystic ovary syndrome were excluded from the study.

Collection of PCOS Plasma samples: The heparinised venous blood samples bring about under asceptic conditions, from these subjects in fasting status were used for the investigation. Serum was separated by centrifugation at 5,000 g for 15 minutes. Separated serum was used for the evaluation of lipid peroxidation and Uric acid in PCOS patients.

Lipid peroxidation Assay : The evaluation of thiobarbituric acid reactive substances (TBARS) levels in plasma were determined by a method based on the reaction with thiobarbituric acid (TBA) at 90–100°C using a profit-making kit from Cayman Chemical Company (Ann Arbor, MI). TBARS are expressed in terms of malondialdehyde (MDA) levels. The values are expressed as mg/dl.

Uric acid: It was measured in serum using a Semi Automated auto analyzer and Immulite 2000 analyzer (Siemens Medical Solutions Diagnostics, Deerfield, IL, USA) employing a uricase methodology coupled to the production of hydrogen peroxide. The values are expressed as mg/dl.

Statistical Analysis: Statistical analysis between controls and plasma was performed by the student t-test using the SPSS package. The data were expressed as mean ±SE. $p < 0.05$ was considered as significant.

3. RESULTS

The mean + SE of Serum Lipid peroxidation and Uric acids are indicated in the table1. There was a statistically significant increase in the Serum Lipid peroxidation and Uric acids. Lipid peroxidation, a well-established mechanism of cellular injury in animals which is used as an indicator of oxidative stress in cells and tissues. Lipid peroxides are not fixed and putrefy to form a complex series of compounds including reactive carbonyl compounds. No differences were found in the uric acid concentrations between PCOS and BMI-matched healthy women ($P < 0.01$). Serum uric acid concentrations were inversely connected to sex hormone binding globulin (SHBG) concentrations, and optimistically with body mass index (BMI), insulin concentrations and androstenodieone in the PCOS cases. Our results suggest that quantity of plasma uric acid does not correlate with metabolic disease in patients with PCOS.

4. DISCUSSION

In the present study the lipid peroxidation product i.e. MDA levels have been increased significantly in serum of the patients with polycystic ovary syndrome (42.45 mg/dl) compared to controls. The MDA substrate rise in serum due to increase cohort of reactive oxygen species (ROS) owed to the disproportionate oxidative damage cause in these PCOS patients. These oxygen species in turn is able to oxidize many other significant biomolecules with membrane lipids. In earlier study reports of elevated MDA levels have been bear out in patients with PCOS (Yildirim *et al*, 2007). The decrease in the levels of these non enzymatic antioxidant parameters like Uric acid may be due to the increased turnover, for preventing oxidative damage in these patients suggesting an increased defense against oxidant damage. PCOS is a life-time assorts endocrinopathy; long-term management of this frequent disorder must consider all the consequences of the syndrome, including the metabolic comorbidities in which oxidative stress may play a role. For this purpose, the finding of a clinically helpful individual marker of oxidative stress in patients with PCOS would be of importance. Regarding therapeutic strategies, correction of oxidative stress by improving antioxidant defences through body fat mass reduction, pharmacological agents, exercise and/or dietary modification might have beneficial effects in PCOS, as has been demonstrated for insulin resistant disorders (Abdel-Wahab *et al.*, 2002; Vincent et al., 2007; Wright and Sutherland, 2008). Although experimental data suggest that strategies targeting oxidative stress might prove useful for PCOS (Masharani *et al*., 2010; Rzepczynska *et al.*, 2011). In order to overcome the impact that the heterogeneity resulting from clinical and/or methodological issues might have had on the results of the meta-analyses (i.e. LPO and Uric acid

activities) as the sub analysis of studies and subgroups matched for age and BMI were no longer heterogeneous.

In conclusion, oxidative stress is increased in patients with polycystic ovary syndrome. The results of our study have shown higher oxygen free radical production & decreased Uric acid activity, support to oxidative stress in PCOS. The increased activities of antioxidant enzymes of Plasma LPO may be a compensatory regulation in response to increased oxidative stress in women with PCOS.

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Table.1 Metabolic characteristic of oxidative stress marker in PCOS (N=50)

Parameter	Controls	Serum	P value
Age	26.89± 2.14	26.72± 2.09	P < 0.01[b]
BMI (Kg/m^2)◎	21.13 ± 2.34	21.45 ± 4.54	P < 0.05[a]
Waist hip ratio Circumfrence	76.57 ± 2.96	76.27 ± 2.87	P < 0.05[a]
Lipid Peroxidation (mg/dl)	16.45 ± 2.56	42.45 ± 2.96	P < 0.05a
Uric Acid (mg/dl)	6.23 ± 1.34	6.98 ± 1.65	P < 0.01a

Values are expressed as Mean±SE

[a] P <0.05 compared to controls

[b] P <0.01 compared to controls