Original Research Article.

Assessment of Alteration in Coagulation Parameters in Patients with PCOS: An Observational Study

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ABSTRACT

Background: Polycystic Ovarian Syndrome (PCOS) is one of the most common endocrine system disorders that affect women in their reproductive age. Alterations in the coagulation profile of the patients have been reported in the past literature in patients with PCOS. Hence; under the light of above mentioned data, we planned the present study to assess the alterations occurring in coagulation parameters in patients with PCOS.

Materials & Methods: The present study included evaluation of alterations in the coagulation profile of the patients with PCOS. A total of 85 patients diagnosed with PCOS were included in the present study. A total of 85 age-matched healthy controls were included in the present study. All the patients were called in the morning and fresh blood samples were collected. Samples were sent to pathology department for assessment of haematological and coagulation parameters. All the results were compiled on Microsoft excel sheet and were evaluated by SPSS software.

Results: Mean fibrinogen and D-Dimer levels of the subjects of the PCOS group were 3.40 g/l and 0.22 mg/l respectively. Mean fibrinogen and D-Dimer levels of the subjects of the control group was 2.80 g/l and 0.26 mg/l respectively.

Factor VIII and vWF levels of the subjects of the PCOS group were 1.35 IU/mol and 0.99 IU/L respectively. Factor VIII and vWF levels of the subjects of the control group were 0.9 IU/mol and 0.87 IU/L respectively.

Conclusion: Some amount of alteration in the coagulation profile does occur in PCOS patients.

Key words: Coagulation, Polycystic Ovarian Syndrome.

INTRODUCTION

Polycystic Ovarian Syndrome (PCOS) is one of the most common endocrine system disorders that affect women in their reproductive age. It represents a condition in which an estimate of 10 small cysts of a diameter ranging between 2 and 9 mm develop on one or both ovaries and/or the ovarian volume in at least one ovary exceeds 10 ml.[1,2]

Diagnostic criteria are expert-based and debated as they do not incorporate known metabolic abnormalities related to aberrant insulin action, such as glucose intolerance, diabetes, and dyslipidemia, that affect many women with the syndrome. Symptoms that are most troublesome to patients include hirsutism, obesity, infertility and menstrual disorders. Long-term sequelae of the syndrome, such as an increased risk for cardiovascular events based on risk factor profiling, are unclear from epidemiologic studies.[3,4] The etiology of the syndrome is likely heterogeneous and genetic studies have been consistent with a complex genetic disease,. Interestingly, the candidate genes identified in multiple genome wide association studies that

fit best into existing ideas of the pathophysiology are gonadotropin and gonadotropin receptor genes. Alterations in the coagulation profile of the patients have been reported in the past literature in patients with PCOS.[5-8]

Hence; under the light of above mentioned data, we planned the present study to assess the alterations occurring in coagulation parameters in patients with PCOS.

MATERIALS & METHODS

The present study was carried out in the Department of Obstetrics & Gynaecology, Rama Medical College Hospital & Research Centre, Pilkhuwa, Hapur, Uttar Pradesh (India) and it included evaluation of alterations in the coagulation profile of the patients with PCOS. Written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 85 patients diagnosed with PCOS were included in the present study. A total of 85 age-matched healthy controls were included in the present study.

Inclusion Criteria

- Patients within the age group of 20 to 38 years,
- Patients diagnosed with PCOS
- Patients with negative history of any other systemic illness,
- Patients with negatives history of any other hormonal disorder

All the patients were called in the morning and fresh blood samples were collected. Samples were sent to pathology department for assessment of haematological and coagulation parameters. Auto-analyser was used for assessing the fibrinogen and factor VIII levels. ELISA technique was used for estimation of plasma fibrin D-dimer. All the results were compiled on Microsoft excel sheet and were evaluated by SPSS software. For determination of level of significance, Chi-square test was used.

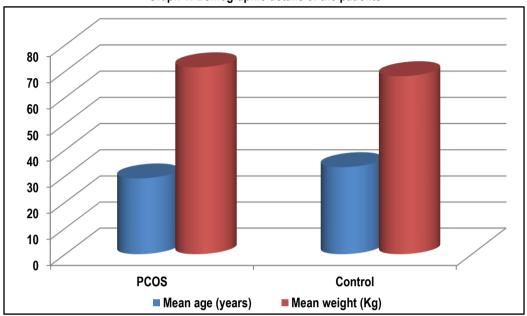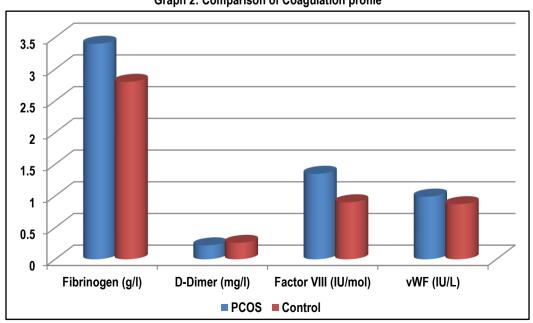**Graph 1: Demographic details of the patients**

Table 1: Comparison of Coagulation profile

Parameter	PCOS	Control	P- value
Fibrinogen (g/l)	3.40	2.80	0.02*
D-Dimer (mg/l)	0.22	0.26	0.74
Factor VIII (IU/mol)	1.35	0.90	0.03*
vWF (IU/L)	0.99	0.87	0.94

*: Significant

Graph 2: Comparison of Coagulation profile

RESULTS

A total of 170 subjects were included in the present study. Among these subjects, 85 were PCOS subjects while the remaining 85 subjects were control. Mean age of the PCOS subjects was 29.1 years, and mean age of the subjects of the control group was 33.4 years. Mean fibrinogen and D-Dimer levels of the subjects of the PCOS group was 3.40 g/l and 0.22 mg/l respectively. Mean fibrinogen and D-Dimer levels of the subjects of the control group was 2.80 g/l and 0.26 mg/l respectively. Factor VIII and vWF levels of the subjects of the PCOS group were 1.35 IU/mol and 0.99 IU/L respectively. Factor VIII and vWF levels of the subjects of the control group were 0.9 IU/mol and 0.87 IU/L respectively.

DISCUSSION

In the present study, mean fibrinogen and D-Dimer levels of the subjects of the PCOS group was 3.40 g/l and 0.22 mg/l respectively. Mean fibrinogen and D-Dimer levels of the subjects of the control group was 2.80 g/l and 0.26 mg/l respectively. Factor VIII and vWF levels of the subjects of the PCOS group were 1.35 IU/mol and 0.99 IU/L respectively. Factor VIII and vWF levels of the subjects of the control group were 0.9 IU/mol and 0.87 IU/L respectively. Mannerås-Holm L et al investigated whether women with PCOS have disturbed circulating levels of fibrinolysis/coagulation markers and, if so, whether the disturbances are related to hemodynamics, metabolic variables, sex steroids, SHBG, lipids, and inflammatory variables in women with PCOS. Anthropometric variables, hemodynamics, circulating hemostatic and inflammatory markers, and serum lipid profile were measured in women with untreated PCOS and controls. Low SHBG and high insulin might partly explain the BMI-independent difference in PAI-1 activity between women with PCOS and controls. High-sensitivity C-reactive protein and E-selectin may be involved in regulating fibrinogen in PCOS.[9] Atiomo WU et al investigated PAI-1 activity in women with PCOS and to compare it with unaffected controls of a similar BMI. PAI-1 activity, insulin, glucose, triglycerides, total cholesterol, LDL cholesterol, HDL cholesterol, FSH, LH, PRL, testosterone, SHBG, 17-hydroxyprogesterone, plasminogen, fibrinogen (alpha2 antiplasmin, blood pressure and insulin sensitivity with a homeostasis model assessment (HOMA) computer programme. There was no significant difference in BMI or in (log) PAI-1 activity in women with PCOS compared with controls. The median fasting insulin level was significantly higher, and insulin sensitivity significantly lower in the PCOS group. Women with PCOS also had a significantly higher free androgen index, LH/FSH ratio and a lower HDL/total cholesterol ratio. However blood pressure and all other lipid and haematological measurements were not significantly different between both groups. Plasminogen activator inhibitor-1 activity is not raised in women with PCOS independent of obesity and these results do not support the hypothesis that it may contribute to their anovulatory infertility, or increase their risk of thrombosis.[10]

Shan Y et al evaluated the levels of coagulation and fibrinolytic markers during the first trimester of pregnancy in women with polycystic ovary syndrome (PCOS) and determine the effects of PCOS and obesity on the levels of these hemostatic markers. A cross-sectional study was conducted in Beijing, China, on women with PCOS (n = 50), healthy women (n = 50), pregnant women with PCOS (n = 50), and healthy pregnant women (n = 50) at 12 weeks of pregnancy. Coagulation and fibrinolytic parameters were measured. The interaction between PCOS and pregnancy appears to exert effects on the activities of coagulation factors VIII and X. The interaction between PCOS and obesity also seems to affect the level of von Willebrand factor. Pregnant women with PCOS, especially women who are obese, are observed to be in a more prohemostatic state during the first trimester.[11] Huang Y et al evaluated the status of coagulation and fibrinolytic system in PCOS patients undergoing controlled ovarian hyperstimulation (COH) process. Of the 97 women, 30 patients with PCOS composed the study group; 67 women of child-bearing age with normal endocrine function composed the control group. All participants underwent GnRH agonist standard long protocol, and plasma HCY, FVIII, FX, and D-dimer levels as well as hormone parameters were measured at day of full downregulation, hCG priming, and embryos transfer. On day of full downregulation, FX levels were significantly higher in PCOS group (P < 0.01). On hCG priming day, FX and estrogen levels in PCOS group were higher than in the control group and FVIII levels were significantly lower on day of embryos transfer whereas FX and E2 levels were significantly higher in PCOS group. Hypercoagulable state during peri-implantation phase would probably lead to poor microcirculation of endometrium and be one of the most important disadvantages of successful implantation and subsequent clinical pregnancy.[12] Słopień R et al assessed the fibrinolytic and metabolic system parameters in obese patients with polycystic ovary syndrome (PCOS) and to compare them in obese PCOS patients and women with simple obesity. They measured blood levels of 17beta-estradiol, testosterone, prolactin, luteinizing hormone (LH), follicle-stimulating hormone (FSH), dehydroepiandrosterone sulfate (DHEAS), total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), glucose and insulin. Their results show ED that fibrinolysis is not suppressed in women with PCOS and that there is no difference in fibrinolytic activity between obese patients with PCOS and women with simple obesity.[13]

CONCLUSION

Under the light of above obtained data, the authors conclude that some amount of alteration in the coagulation profile does occur in PCOS patients. However; future research is recommended for assessing the exact role of the coagulation parameters in the pathophysiology of PCOS.

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