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Determination of Sialic acid, Paraoxonase-1and IgG levels in Patients with Polycystic Ovary Syndrome in Messan Female Patients

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Abstract

Polycystic ovary syndrome (PCOS) is a heterogeneous disorder . PCOS affects 6–10% of women during their reproductive life. Patients with PCOS are in the high risk for coronary heart disease because of their abnormal lipid profile, insulin resistance and obesity. The present study aimed to shed a light on the contribution of sialic acid, paraoxonase and immunoglobulin G as a clinical indicator in the pathogenesis of PCOS. Seventy five female patients with age range (16-38) years taken from Al-Sadder Teaching Hospital and Al-Zahrawi Hospital in Governorate of   Messan through the period from July 2013 to December 2013 and twenty five apparently health subject as a control group were enrolled in this study. The patients were divided into three groups depending on duration of PCOS ,the duration of groups ,G2 range from 3 months to 12 and group G3 from 12 months to 24 months and G4 from 24 months to 48 months and more. Investigation included estimation of serum levels of sialic acid (SA), paraoxonase (PON1) and immunoglobulin G (IgG) . Serum SA levels were highly significant in PCOS patients as compared with control group. Also, significantly higher were found between PON1 and IgG with duration.

Conclusion

From this study a conclusion was drawn that elevation of concentration of sialic acid, PON1 and IgG levels can be useful in predict risk for heart disease and DM   .

Key Words: PCOS, Sialic acid, PON1, IgG

This paper is part of PhD thesis of the first author

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Introductin

Polycystic ovary syndrome is a heterogeneous disorder . PCOS affects 6–10% of women during their reproductive life [1]. Its complete phenotype is manifested by ovulatory dysfunction, hyperandrogenism and polycystic ovaries [2]. Patients with PCOS are in the high risk group for coronary heart disease because of their abnormal lipid profile, insulin resistance and obesity [3]. Sialic acid (SA), terminal residue of the oligosaccharide side chain of glycoproteins and glycolipids, is a cardiovascular risk factor known to increase in type 2 diabetes mellitus [4].Sialic acid is involved capillary permeability, platelet aggregation and activity of enzymes, by antigenetic activity and receptor function [5]. Sialic acid binding immunoglobulins (Ig)-like lectins (siglecs) belong to I-type lectin with a selective expression on the haematopoetic cell lineages [6]. The fraction of IgG that is α-2,6-sialylated exhibits anti-inflammatory activity and sialylation is proposed to enable binding to the cell surface lectin, dendritic cell-specific intercellular adhesion molecule- 3-grabbing nonintegrin (DC-SIGN) [7]. The mechanism to explain the putative sialic acid-dependent binding of IgG, Fc to DC-SIGN, as well as to the IgE receptor, CD23 [8] . Previous studies showed that interactions between Siglecs and sialic acids are involved in host-pathogen interactions as well as in host self-recognition [9]. Accumulating evidence indicates that Siglecs play critical roles in immune signaling and functions. Sialic acid in the human body are mainly found interminal oligosaccharide of glycoprotein in structure acute phase reactants their concentrations increase rapidly at the beginning of inflammatory reaction [10] . Paraoxonase-1 (PoN-1), is an enzyme synthesized in the liver [11]. Serum PNO1 activiy was found to be reduced in a number of pathological conditions including coronary artery disease [12], hypercholesterolemia , type 2 diabets , polycystic ovary syndrome [13], and renal failure [14]. PON1 is recognized as an antioxidant enzyme because it hydrolyzes lipid peroxides in oxidized lipoproteins [15], and increases the risk factors for cardiovascular disease [16], including hyperandrogenism (HA), impaired fibrinolysis, increased systemic low grade inflammation, an elevated prevalence of subclinical and clinical atherosclerosis [16, 17]. The enzyme not only hydrolyzes several organo phosphorus insecticides and nerve agents, which is involved in the protection against xenobiotic toxicity [18]], but also inhibits LDL oxidation , increases macrophage-associated cholesterol efflux, and possesses antioxidant, anti-inflammatory, and anti- atherogentic properties [19]. Recent studies show that the lactonase activity of PON1 could play important roles in hydrolyzing and detoxifying oxidative stress mediators and inhibit homocysteinylation of protein, which could be involved in protecting against protein inactivation,cell damage and atherosclerosis [18].

Aim of this Study

The present study aimed to determination Sialic acid, Paraxonase -1 and Immunoglobulin G as anti inflammatory in PCOS patients which can be pride the risk for heart disease and DM clinical indicator of polycystic ovary syndromes.

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Material and Method

Five ml of blood were drawn from all subjects enrolled in this study, and kept in plain tubes left to clot at room temperature for 15 min. Then centrifuged at 3500 g for 10 min to separate the serum.

Subjects

The present study was performed on a group of 100 female patients with PCOS from Messan, AL-Sadder Teaching Hospital and AL-Zahrawi Hospital   during July 2013 to December 2013.They were diagnosed by physician at the hospital   using Ultra sound .The patients were   divided into three groups depending on duration of PCOS,which the duration of (G2) from 3 monthes to 12 months ,(G3) from 12 months to 24 months, (G4) from 24 to 36 months and more . In addition, to group (G1) 25 healthy individuals were enrolled in the study as a control group G1.

Sialic acid and PON-1 Determinations

Sialic acid and PON-1 have been estimated by   using enzyme Linked Immuno Sorbent Assay (ELISA) technique using the manufacturer instruction as supplied with kit from Cusabio, China.

IgG Determination

IgG was determined acoording to the manufacturer instruction as supplied with kit from Bussero (MI) Italy.   .

Statistical Analysis

Results were expressed as Mean± SEM. Student-test was   used to show the difference between groups variation which considered significant when P- values are ≤ 0.05. The correlation coefficient (r) test is used to describe the association between the different studied parameters.

Results

Table (1) showed the levels of sialic acid, paraoxonase-1 and IgG concentration in   sera of G1, G2, G3 and G4 for patients and control respectively. The results showed significant increase in levels of sialic acid in G2 and G4 comparing to G1, while there is non-significant increase in G3 comparing to G1. Also, there is significant decrease in PON-1levels in G2 comparing to G1,while there is non-significant decrease in PON-1 levels in G3 and G4 comparing to G1. The results also showed non-significant decrease in G2 comparing to G1and non-significant in G3comparing to G1, while there is increase in G4 comparing to G1.

Table (2) showed the correlation relation of sialic acid, PON-1and IgG for patients with duration of disease. The results showed positive correlation in G2 and G4 for sialic acid with duration (r =0.158, r =0.019), while negative correlation was found between G3 and duration (figure 1). Also, the results showed positive correlation in G2 and G4 (r =0.123, r = 0.071   ) for PON-1 with duration, while negative correlation was found in G3 for PON-1 with duration (figure 2) . Also, the results showed negative correlation in G1,G3 and G4 in patients groupswithduration(figure3).

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Discussion

The result in the present study showed that the serum level of sialic acid was higher in patients with PCOS. Serum SA have been reported to be risk factor for cardiovascular disease and found strong expression of Siglec-11 in human PCOS ovaries. Interestingly somewhat increased expression of Siglec-11 was also observed in post-menopausal ovaries compared with premenopausal ones [20]. Seventy five women with PCOS and 25 controls were included and it was found that SA levels were similar in G2 and G3 (10.5±2.011) and (10.25±2.051) and level of SA in G3 elevated (13.66±2.73).This result is incontrast with Ali (2012) in his study, Ali found level of sialic acid did not differ [10]. Previous study showed that sialic acid levels are lower, when metformin as a drug [5], while other study showed none of the novel surrogate biochemical markers of cardiovascular risk was raised in our women with PCOS [21]. Women with PCOS cluster risk factors associated with risk of atherosclerosis, these risk factors include dyslipidemia and oxidative stress [22]. In this study, serum PON1 activity was found that levels in G2 were lower (174.7± 34.95) compared with levels in G3 and G4 was similar (321.5± 64.31) and 324.2±64.85) respectively .Also In this study, serum PON1activity was significantly lower in patients with PCOS than healthy controls. Recent literature search revealed there are few studies about PON1 activity in PCOS patients. In addition, it suggested that decreased antioxidant PON1 activity might contribute to increased susceptibility for the development of atherosclerosis risk in women with PCOS [23].   .

The results of the current study indicate that PON1 activity was significantly decreased in patients with PCOS when compared with healthy controls.In previous study, reduced serum PON1 activity has been reported to be associated with insulin resistance [24]. Also lower serum PON1 activity has been associated with increased susceptibility to atherosclerosis, neuro pathy and other complications in diabetic population compared with healthy controls [25]. IgG is the most abundant immunoglobulin, accounting for approximately 75% of the total amount of serum immunoglobulin, and the major immunoglobulin of secondary immune response [26]. So as recent study have shown that the minor subset of circulating IgG that have α-2-6 linked sias terminating its N-glycan has an inhibitory potential, working through the human DC-S1GN   receptor on regulatory macrophages to up regulates FCR γ II B on other macrophages, and thereby dampen [27]. This is also suggested to be the mechanism of action of intravenous pooled human IgG (IVIG) that is used for immune suppression in the clinical; the worth mostly involves a single model system for autoimmune disease (Anthony et al.2011). The result in the present study showed that the serum level of IgG was highly significant increased (P<0.001) G2 (493.08± 98.61)mg/dI compared to control healthy group and G3 (513.93±102.7) and G4 (590.4±241.5). While non-significant difference (P>0.05) was noticed among the patient groups .The conclusion could be drawn from this study that the levels of sialic acid and PON-1 can be useful in predicted the risk for heart disease and DM.

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Table No. (1):- Level of Sialic acid, PON1and IgG in sera of the studied groups.

Parameter	Mean ±SEM G1	Mean ±SEM G2	Mean ±SEM G3	Mean ±SEM G4	G1vs G2	G1vs G3	G1vs G4
Sialic acid	7.17±1.434	10.05±2.011	10.25±2.051	13.66 ±2.733	S	NS	S
PON-1	397.8±79.568	174.77±34.955	321.56±64.313	324.25±64.85	HS	NS	NS
IgG	450.11±90.02	493.08±98.61	513.9±102.78	590.4±241.50	NS	NS	S

P values
< 0.05 considered significant (S)   **P values < 0.001**
considered high significant (HS)   **P values > 0.05**
considered non- significant (NS)

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Table No. (2): Correlation relation analysis between biochemical parameters among three studied groups.

Parameter	r &P	G2	G3	G4
Sialic & months	r	0.158	- 0.297	0.019
	P	P>0.05	P>0.05	P>0.05
PON-1& months	r	0.123	- 0.033	0.071
	P	P>0.05	P>0.05	P>0.05
IgG & months	r	- 0.143	- 0.089	- 0.140
	P	P>0.05	P>0.05	P<0.05

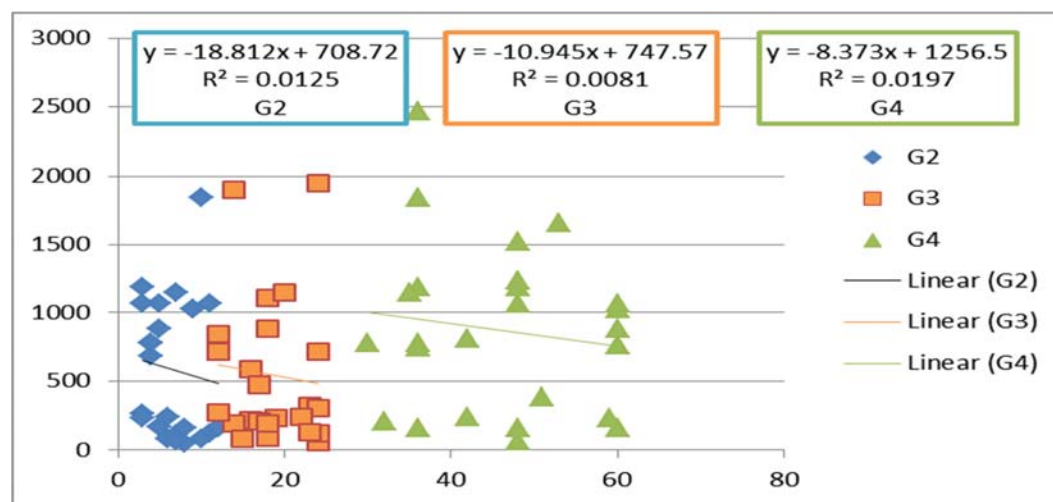P values< 0.05 considered significant (S)   P values< 0.001 considered high significant (HS)   P values>0.05 considered non- significant (NS)   R values mean correlation coefficient

Figuer No.(1): correlation between Sialic acid and duration of disease in months.

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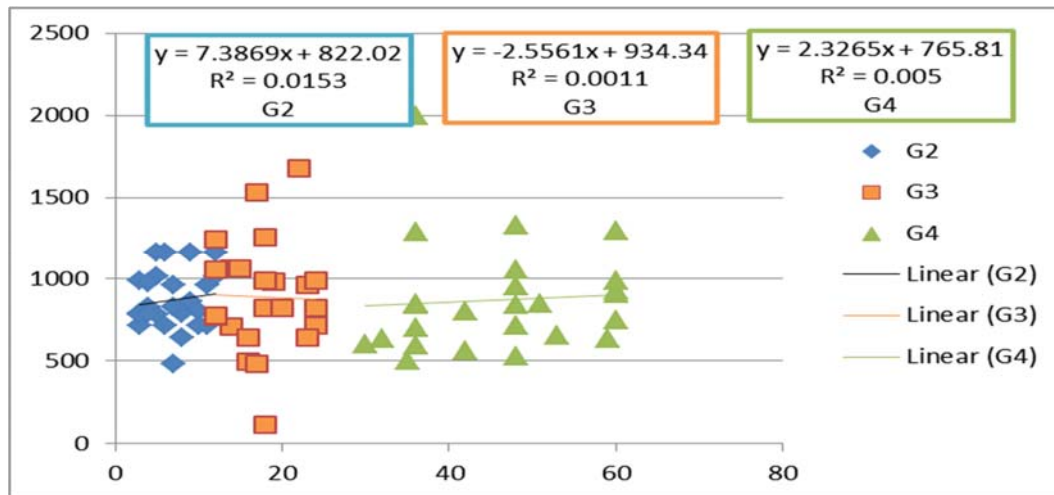Vol. 27 (3) 2014

Figuer No.(2): correlation between PON1 and duration of disease in months.
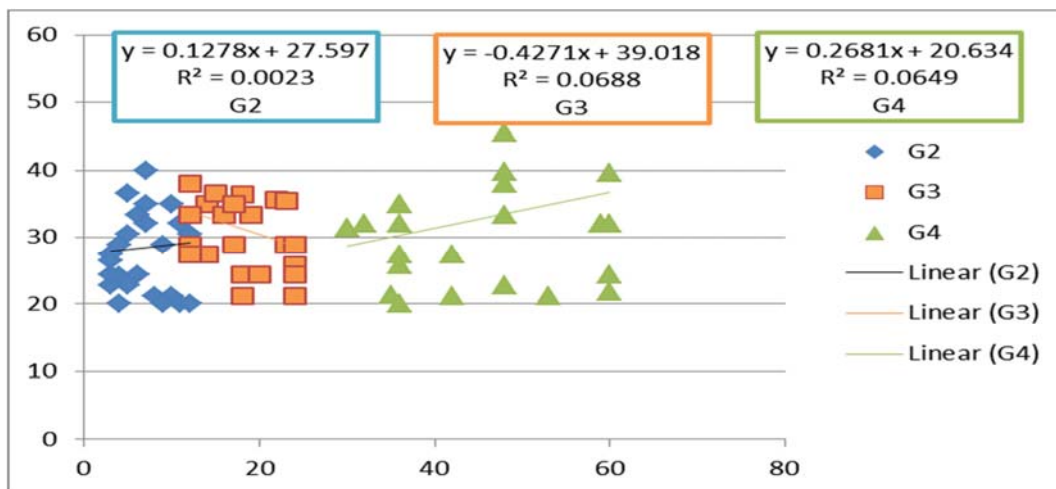

Figure No(3): correlation between IgG and duration of disease in months.

تقدير مستوى حامض السياليك وانزيم الباروكسينيز-1 والكلوبيولين المناعي G في مريضات متلازمة تكيس المبايض في ميسان

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الخلاصة

متلازمة تكيس المبايض هو اضطراب غير متجانس. وهذا المرض يؤثر في 6-10% من النساء خلال حياتهم الانجابية. المرضى الذين يعانون من تكيس المبايض يكونون اكثر عرضة للاصابة بأمراض القلب التاجية بسبب الدهون غير الطبيعية ومقاومة الانسولين والبدانة.الدراسة الحالية تهدف الى تسليط الضوء على مساهمة حامض السياليك وانزيم الباروكسينيز والكلوبيولين المناعي G علامات بايولوجية سريرية في التسبب بمتلازمة تكيس المبايض. تم اخذ 75 مريضة بعمر (16-38) سنة من مستشفى الصدر التعليمي ومستشفى الزهراوي الجراحي في محافظة ميسان للمدة من تموز 2013 الى كانون الاول 2013 وكذلك مجموعة السيطرة وعدت مجموعة اولى. قسمت الحالات المرضية على ثلاث مجاميع بالاعتماد على مدة الاصابة بمرض متلازمة تكيس المبايض, أذ عدت المدة من 3 اشهر الى 12 شهراًمجموعة اولى, ومن 12 شهراً الى 24 شهراً مجموعة ثانية, والمدة من 24 شهراً الى 48 شهر وأكثر مجموعة رابعة. تم التشخيص بتقدير مستوى حامض السياليك وانزيم الباروكسينيز والكلوبيولين المناعيG في كل المجاميع المدروسة وبينت النتائج وجود ارتفاع جوهري بمستوى حامض السياليك ,و الباروكسينيز ,والكلوبيولين المناعيG. ومن هذه الدراسة التي اجريت نستنتج أن ارتفاع مستوى تركيز حامض السياليك وانزيم الباروكسينيز والكلوبيولين المناعيG   يمكن ان يساهم في التنبوء بالاصابه بمرض تكيس المبايض.

الكلمات المفتاحية :ـ تكيس المبايض , حامض السياليك , انزيم الباروكسينيز ,والكلوبيولين المناعي G