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Original article

Maternal serum C-reactive protein and fibrinogen concentration in women with pre-eclampsia

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Abstract

Background: Despite many studies published in recent years concerning pathogenic mechanisms of pre-eclampsia, but this issue remains controversial. The aim of the present study was to compare C-reactive protein (CRP) level and fibrinogen concentration obtained from pregnant women with pre-eclampsia with those obtained from women with normal pregnancies.

Methods: In a case-control study, 40 pregnant women with mild pre-eclampsia were studied. The maternal serum CRP and fibrinogen concentration of the 40 patients were compared with 55 pregnant women with non-preeclampsia as a control group. CRP was examined using quantitive nephlometry and fibrinogen concentration was measured by clotting system. An independent sample t-test was used for analysis.

Results: Maternal serum CRP was higher in women pregnant with pre-eclampsia compared with those from pregnant women normal pregnancies (p= 0.01). The independent t-test did not reveal any statistically significant differences in the fibrinogen concentration between these pregnant women, either with or without pre-eclampsia.

Conclusion: The findings of this study indicated that a novel increased CRP was identified among pregnant women with pre-eclampsia, making inflammatory marker as a promising new approach for the detection of pre-eclampsia.

Keywords: CRP analysis, Female, Fibrinogen, Inflammatory marker, Pregnancy Complications

Introduction

Pre-eclampsia is a relatively common disorder in the second half of pregnancy of unknown etiology, which associated with hypertension and proteinuria. It is likely that this condition can cause maternal and fetal/neonatal morbidity and mortality if it is no detected early (1). There is controversy regarding pathologic mechanisms of pre-eclampsia, but endothelial dysfunction is considered to underlie many of the pathologic mechanisms of pre-eclampsia (2). Recently, there are also many reports that discuss the role of inflammation as a key factor of endothelial dysfunction (3). It is suggested that a systemic inflammatory response involves both the immune

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system and the clotting and fibrinolytic systems (4). Several studies have been found increased levels of C-reactive protein (CRP) and fibrinogen concentrations in pre-eclamptic women (7, 8). The aim of this study was to compare CRP level and fibrinogen concentration obtained from pregnant women with pre-eclampsia with those obtained from women with normal pregnancies.

Materials and Methods

Study design

This case-control study neasted was conducted on 40 patients with mild pre-eclampsia that diagnosed at the time of admission in obstetrics and gynecology department of Babol University of Medical Sciences (north of Iran). Fifty-five pregnant women who had no pre-eclampsia were randomly selected, matched to cases on age, as a control group. This study was approved by the Ethical Committee of Babol University of Medical Sciences. Informed written consent was obtained from all eligible women.

The pregnant women with high blood pressure were detected in antenatal care in the hospital by physical examination and detection of protein with a dipstick in random samples, and confirmed using with 24-h urine protein estimation.

The pregnant women with a history of diabetes, renal disease, hypertension, cardiovascular illness, symptomatic infectious diseases, labor pain, premature rupture of membranes or clinical chorioamnionitis and using of corticosteroid during 7 days before entering the study were excluded from the study.

A demographic questionnaire was used to obtain information regarding age, weight, height, and blood pressure. The women rested for 15 minutes before their blood pressures were obtained. The blood pressure was measured twice using a standard mercury sphygmomanometer and an appropriate size cuff.

Urine sampling

Urine samples were collected in one or more containers over a period of 24 hours. Protein was determined by sulfosalicylic acid at admission to the emergency service then using the photometric method. Proteinuria was defined as presence ≥ 300 mg protein in urine in a 24-hour collection. Thus preeclampsia was defined as blood pressure between 140/90 mmHg and 160/100 along with protenuria 300-2000 mg/24h. All women in the pre-eclamptic group were mild pre-eclamptic without severe pre-eclampsia criteria (9).

Blood sampling and measuring of the serum C-reactive protein and fibrinogen

The blood samples were collected when the patient was admitted for evaluation and before initiation of medical therapy. For all patients, level of CRP and fibrinogen concentration was determined in a qualitative laboratory in Babol using qualitative. Nephelometric assay (Binding site kit, UK) for CRP. Fibrinogen was measured with use of the clotting system (Mahsa, Yaran kit, Tehran, Iran). The mean arterial pressure (MAP) was calculated as 1/3 (systolic blood pressure) + 2/3 (diastolic blood pressure).

Statistical analysis

All analysis was performed using SPSS software (Statistical Package for the Social Sciences, version 18.0, SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to report baseline demographic data. For analysis, we used independent sample test, $p<0.05$ was considered significant.

Results

The mean of age women with pre-eclampsia was 25.1 ± 5.2 and without pre-eclampsia was a 23.8 ± 3.6 year, ranged 18-45 years (p= 0.177). The mean value of body mass index of these with and without pre-

Table 1. Characteristics of the pregnant women according to pre-eclampsia

	Normal pregnant women (n=55)	Mild preeclampsia (n=40)	p-value
Maternal age (years)	23.8±3.6	25.1±5.2	0.177
Body mass index (kg.m2)	28.9±3.4	28.8±2.8	0.842
Systolic blood pressure (mmHg)	106.4±9.3	143.5±5.1	<0.001
Diastolic blood pressure (*mmHg*)	66.2±6.5	91.3±2.9	<0.001
Mean arterial pressure (mmHg)	79.6±6.7	108.7±2.8	<0.001

Table 2. Maternal serum C-reactive protein (CRP) and fibrinogen concentration of the pregnant women according to Pre-eclampsia

	Normal pregnant women (n=55)	Mild preeclampsia (n=40)	p-value
Fibrinogen (mg/dL)	348.8±66.7	340.7±65.1	0.559
CRP (g /dL)	2.2±0.8	4.4±5.0	0.010

eclampsia was 28.76±2.8 and 28.9±3 kg / m 2, respectively. There was no statistically significant difference between body mass index and pre-eclampsia. The mean MAP of pregnant women with pre-eclampsia was higher than women with non-preeclampsia ($P < 0.001$). The pregnant women with pre-eclampsia also had significantly higher systolic blood pressure ($p < 0.001$) and diastolic blood pressure compared with those from women with normal pregnancies ($p < 0.001$) (Table 1).

The mean value for maternal serum CRP and fibrinogen concentration of the women with pre-eclampsia was 4.4 ± 5 g/dl and 340.7±65.1mg/dl, respectively. The mean of maternal serum CRP and fibrinogen concentration of those with non-preeclampsia was 2.2 ± 0.8 g / dl and 348.8 ± 66.7 mg/dl, respectively. Statistically significant differences between maternal serum CRP and pre-eclampsia have found ($p < 0.001$). However, there was no statistically significant difference between plasma fibrinogen and pre-eclampsia (Table 2).

Discussion

Numerous researchers have assessed the relationship between the level of maternal serum CRP and mild pre-eclampsia. It is suggested that CRP is a sensitive marker of tissue damage and inflammation and plays a role in the inflammatory response of pre-eclampsia (3). Also Hwang et al determined serum highly sensitive CRP levels increases with pregnancy duration in normal pregnancies, and is higher in women with pre-eclampsia compared with those from women with normal pregnancies (7). But yet, the relationship between CRP and pre-eclampsia is controversial. However, many studies have shown CRP was significantly higher in the women with preeclampsia compared with those from women with normal pregnancies (10, 11, 12, 14). In addition, Ustun et al showed the women with mild pre-eclampsia had a higher levels of CRP than those with severe pre-eclampsia (7, 8, 11). Another recent study reported that serum levels of CRP at 23-25 week of gestation pregnant women who subsequently developed pre-eclampsia compared to women without complications of pregnancy (11). The results of our study support these findings (12, 14).

Also, many studies have reported on the relationship between fibrinogen concentration and pre-eclampsia (8, 16, 18). Some of them have shown that plasma fibrinogen increased with pre-eclampsia (8, 18). While the other studies have reported a decreased fibrinogen concentration among women with pre-eclampsia compared with those from women with normal pregnancies (16, 17). The results of our study have shown no significant differences between fibrinogen concentration and pre-eclamptic pregnancies which are in agreement with three studies, in which authors reported that fibrinogen concentration no correlated with pre-eclamptic pregnancies (8,18).

Conclusion

The present findings have shown a novel increase level of CRP in pregnant women with pre-eclampsia compared with values obtained from women with normal pregnancies. The study suggests that increased CRP can be used as a criterion for diagnosis of pre-eclampsia.

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Conflict of interest

There is no conflict of interest.

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