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Correlation between Highly Sensitive C-Reactive Protein Level in Cases of Preeclampsia with or without Intrauterine-Growth Restriction

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Abstract

Preeclampsia is a hypertensive disorder that affects 4% of pregnant women, in which the exact cause cannot identified it is one of the major causes of maternal and fetal morbidity and mortality, also it puts a burden on perinatal outcome as prematurity and intrauterine growth restriction. Continuous search for predictive markers of severe PE is important and can be used to target high risk women for effective preventive treatment.

Aim of study: To evaluate that Highly Sensitive C-Reactive Protein can be used as predictive factor for severity of preeclampsia and whether it can be used to predict development of Intrauterine growth restriction.

Patients and methods: This is a cross-sectional study includes 80 pregnant women with their age 18-35 years, their gestational age range between 32-40 weeks, admitted to AL-Zahraa teaching hospital in Najaf, whose diagnosed as PE based on blood pressure measurement and proteinuria. Full history and clinical examination were performed, venous blood aspirated for each woman for biochemical analysis, Liver functions tests, Renal function tests, Highly Sensitive C- Reactive Protein, and Doppler ultrasound.

Results: The patients divided into those with mild PE and severe PE, with or without IUGR. No significant difference between the level of Highly Sensitive C-Reactive Protein and the severity of PE as p value was (0.779), but there is significant difference between the presence of IUGR and the level of Highly Sensitive C-Reactive Protein when it is ≥ 2 mg/L as the p value was (0.020).

Conclusion: We conclude that Highly Sensitive C-Reactive Protein is not significantly associated with the severity of Preeclampsia but associated with intra uterine growth restriction.

Keywords: C-Reactive Protein; Intrauterine-Growth Restriction; Preeclampsia

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Introduction

CRP (C-Reactive Protein) is an acute phase protein which is increased in systemic inflammation. It is the first acute phase protein to be described and is an exquisitely sensitive systemic marker of inflammation and tissue damage [1]. CRP is sensitive index of systemic inflammation that predicts adverse atherosclerotic events, including myocardial infarction, stroke, peripheral vascular disease, and death [2]. Elevated CRP level are correlated with obesity [3].

It is to be known whether CRP and obesity are associated which predisposes to PE [4]. Systemic maternal inflammatory response to pregnancy is responsible for endothelial dysfunction which gives the clinical and pathological picture of PE [5]. The association between first trimester CRP levels and subsequent PE supports the hypothesis that systemic inflammation is involved in the pathogenesis of PE [6]. HsCRP can be used as an early marker of low-grade inflammation and further help in detecting pathophysiological process early in pregnancy so as to predict adverse pregnancy outcome and try preventive therapies well in time. Human placenta produces hsCRP and release it predominantly into the maternal blood and it can be found in amniotic fluid and fetal urine, its increased amount directly relates to poor pregnancy outcome. However, the real source of amniotic fluid hsCRP, its regulation and its function during pregnancy is not clear [7].

Patients and Methods

This is a cross-sectional study including 80 pregnant women, their ages between 18-35 years, admitted to Al-Zahraa teaching hospital for maternity and pediatric over period of 8 months, their GA between (32-40) weeks, as proven by last menstrual period or early pregnancy U/S. An approval on the study was taken from gynecology and obstetrics

department then ethical committee in the college of medicine/Kufa University. We clarify the procedures included in the study for the patients and take their agreement for participation in the study and in taking information, investigations, and subsequent blood aspiration. WE classify our patients into 2 groups: Group A: mild PE→BP systolic 140-160 and diastolic 90-109 with Albumin ≥+ Group B: Severe PE→BP systolic ≥160 and diastolic ≥110 with Albumin ≥++ or Oliguria <500ml/24hrs., Thrombocytopenia, Epigastric pain, Pulmonary edema, Persistent Cerebral or visual disturbances. Full history was taken from the patients including obstetrical history, previous medical history, previous hypertension, previous APH, drug used and family history. We exclude diabetes mellitus, chronic renal disease and chronic hypertension. Full examination including blood pressure (in left lateral position), pulse rate, edema, done for all patients. Venous blood had been aspirated from each patient with the following investigations: CBC, RFT, LFT, and Doppler U/S. HsCRP levels were estimated from the sera of the patients using ELISA (enzyme linked immune sorbent assay) method by commercial kit SIGMA-ALDRICH.

Results

This is a cross-sectional study including 80 pregnant women having PE with age range 18-35 years; it includes the patients with PE as follows: 25 patients with mild PE with mean age of (26.84±5.22), 55 patients with severe PE having mean age of (27.84±7.28).The result was assist using T-Test at a level of significance P value ≤0.05 (Table 1).

As Shown in Table 1, there is no significant difference between patients with mild PE and those with severe PE regarding their age, parity, GA or RBS level, but there is highly significant difference between the two groups regarding the systolic and diastolic BP as the P value is (0.000) (Table 2).

The result also shows that there is no significant difference between the severity of PE and presence or absence of IUGR as shown in Table 2. The result also shows that there is significant difference between patients with PE and IUGR and PE without IUGR when hsCRP ≥ 2 mg/l (high risk), but there is no significant difference in those with or without IUGR when the hsCRP level < 2 mg/l as shown in chart Table 3.

The Result also shows that there is no significant difference between mild and severe PE when level of hsCRP < or ≥ 2 mg/l as shown in Table 4.

Table 1: Demographic and clinical characteristics of women with Mild & Severe PE.

Characteristics	Group A	Group B	P value
Number	25	55	
Age	26.84±5.22	27.84±7.28	0.489
Parity	0.911±1.7	0.777±0.849	0.646
Gestational age	37.40±2.08	36.89±2.19	0.324
Random blood sugar	93.48±7.97	96.8±11.2	0.135
Systolic blood pressure	144.00±5.77	161.6±16.4	0
Diastolic blood pressure	96.80±4.54	106.64±9.67	0

Table 2: Patients with mild and severe PE with and without IUGR (P Value=0.210).

	IUGR	Without IUGR
Mild preeclampsia	4	21
Severe preeclampsia	17	38

Table 3: Correlation between patients with IUGR and level of hsCRP.

Parameter	PE with IUGR	PE without IUGR	P value
	Number= 21	**Number= 59**	
	Mean ±SD	**Mean ±SD**	
Low risk	1.063±0. 537 mg/l	1.106±0.442mg/l	0.846
High risk	7.52±3.65 mg/l	5.28±2.21mg/l	0.02

Table 4: Level of hsCRP between mild and severe PE.

Parameter	Mild preeclampsia	Severe Preeclampsia	P value
	Number= 25	**Number= 55**	
	Mean ±SD	**Mean ±SD**	
Low risk	1.263±0. 523 mg/l	1.072±0.324 mg/l	0.24
High risk	8.323±4.884 mg/l	6.729±3.580mg/l	0.233

Discussion

C-reactive protein is a marker of tissue necrosis and inflammation. CRP are elevated in pre-eclampsia, but there is still a debate about its usefulness as marker for pre-eclampsia during the first and second trimester of pregnancy [4]. In present study we found that there is significant difference in the level of hsCRP when it is ≥2 between women with PE who have IUGR baby and those without IUGR, as the mean level of those with PE and IUGR is 7.52±3.65, and for those without IUGR is 5.28±2.21. This is similar to study from Gandevani SB, et al. (2012), who found that there was significant relationship between hsCRP level in mild and severe PE and with IUGR and birth weight [8]. Also, Adali E, et al. (2011), found that hsCRP has shown a correlation with IUGR and birth weight and Savvidou MD, et al. (2002), reports elevated CRP level at 10-14 weeks of gestation in women who develop PE or delivered IUGR babies [9,10]. While Tjoa ML, et al. (2003) reported no difference between PE with IUGR group and normal outcome pregnancies [11]. These differences from our study may be due to the cutoff value of hsCRP used in different studies. In current study there was no significant difference in the level of hsCRP between mild and severe PE, this is similar to the result of Tavana TZ, et al. (2011) who found that serum concentration of CRP did not show statistically significant changes among mild PE, severe PE, chronic HT and normal pregnancy [12]. Hossein Ayatollah 2007 found that higher level of hsCRP in mild and severe PE than normal pregnancy and this result suggest that hsCRP are increased more in severe PE than mild PE and may be useful in prediction and diagnosis of severity of PE. Kumru S, et al. (2006), who found that hsCRP levels increase in women with PE. Elevated serum levels of hsCRP in preeclampsia women are correlated with clinical and biochemical parameters of PE. Determination of S. hsCRP levels may be used as a marker for the severity of PE, and this is not an agreement with our study and also Devi TS, et al. (2013) who found that hsCRP can be used as predictive marker for PE [13,14]. It was observed that there was strong association between high TSH level and development of PE [15-22]. We conclude that hsCRP is not statistically different between mild and severe PE, while it is significantly higher in IUGR group.

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