

Maternal Serum High Sensitive C-reactive Protein in Non-gestation and Preeclamptic Gestation

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ABSTRACT

To investigate the concentration of acute phase reactant (hs-CRP) in women with healthy and preeclamptic pregnancy and to compare it with non pregnant women. Non-pregnant normotensive women (n=30), healthy pregnant women (n=30), women with preeclampsia (n=30) were included in the study. Preeclamptic group was further divided into two subgroups mild (n=21) and severe preeclampsia (n=9). Higher values of serum hs-CRP were found in mild and severe preeclamptic women than those of non-pregnant women and normal pregnant women in third trimester.

Key words: Preeclampsia, hs-CRP, endothelial cell dysfunction, inflammation.

INTRODUCTION

Preeclampsia develops in 5-8% of human pregnancies¹. It is characterized by an elevated blood pressure and proteinuria and develops after 20th weeks of gestation². It is a complication of pregnancy constituting a major cause of maternal and fetal morbidity and mortality. Several etiologies have been implicated in the development of preeclampsia including abnormal trophoblast invasion of uterine blood vessels, immunological intolerance between fetoplacental and maternal tissues, maladaptation to the cardiovascular changes, dietary deficiencies and genetic abnormalities³.

Endothelial cell dysfunction and inflammation are considered to have a role in the pathophysiology of preeclampsia^{4,5}. A generalized activation of circulating leukocytes, characteristics of inflammation, has been found during preeclampsia⁶. Mediators of an inflammatory response are altered in women with preeclampsia, including increased hs-CRP⁷. CRP is a sensitive marker of inflammatory activity in the body. CRP level increases during inflammatory response to tissue injury.⁸

MATERIAL AND METHODS

This case control study was conducted in the Department of Biochemistry M.G.M. Medical College and associated M.Y. Hospital. Indore. The subjects were pregnant women clinically diagnosed as preeclampsia during third trimester (28-40 weeks) with the age 18-35 years (GROUP-C) visiting obstetrics OPD and wards of MY Hospital, The study group was further divided into two subgroups. It comprised of 21 mild preeclamptic pregnant women (SUBGROUP C1) and 9 severe preeclamptic pregnant women (SUBGROUP C2) on the basis of blood pressure, (both systolic and diastolic) proteinuria and pathological edema, which is the diagnostic criteria of preeclampsia. As a control group 30 non pregnant women (GROUP-A) and 30 healthy pregnant women (GROUP-B) were taken. The healthy pregnant women were also in the third trimester (28-40 weeks) of their pregnancy with the age 18-35 years. Group A women were normotensive, nonproteinuric and in child bearing age of 20-40 years. Inclusion criteria for women included in the study were: should not be using any kind of oral contraceptives, anticoagulant drugs, should be non-smokers and non alcoholics and exclusion criteria was: past

history of diabetes, systemic or endocrine disorder, chronic infection, chronic renal disease and hypertension (in group A & B only), women in the labour pains, were excluded from the study.

Preeclampsia was diagnosed according to American College of Obstetrics and Gynecology (ACOG) criteria: a blood pressure higher than 140/90 mm Hg and proteinuria more than 300mg/24h were observed on at least two occasions more than 6hr apart after the 20th weeks of pregnancy. Preeclampsia were classified as severe if diastolic blood pressure increased to at least 110mmHg, proteinuria > 5000mg per day and the presence of headache, visual disturbances, epigastric pain, oliguria, elevated LFT, elevated RFT, thrombocytopenia.

Blood samples were collected in the morning in a plain bulb with aseptic conditions. In the preeclampsia group, blood samples were collected when the patients presented for evaluation and before initiation of medical therapy. Serum hs-CRP levels were measured by kits using an immunoturbidimetric method. The results were expressed as mean \pm SD and analyzed by an independent samples t-test and groups were compared using ANOVA.

Statistical analysis was carried out by using SPSS software, version 20. The level of significance was set at < 0.05.

RESULTS

The Anthropometric factors of the study groups are summarized in table1.

Maternal age and body mass index (BMI) were not significantly different between the groups. ($p>0.05$, Table 1) Gestational age, systolic and diastolic blood pressures were significantly higher in preeclamptic groups as compared to non-pregnant and healthy pregnant women ($p<0.001$, Table 1). The same when compared between mild and severe preeclamptic groups were significantly higher in severe preeclamptic group ($p<0.001$, Table 1).

Serum hs-CRP in healthy pregnant women was raised when compared with non-pregnant women ($p<0.001$) and was found to be highest in preeclamptic women also as compared to non-pregnant women and healthy pregnant women ($p<0.001$, Table2). When hs-CRP in mild preeclamptic women was compared with severe preeclamptic women, it was found to be elevated in the latter group and the difference was significantly higher ($p<0.001$, Table 2).

Table 1: Comparison of mean and standard deviation of Anthropometric factors of study subjects

Anthropometric factors	Group A		Group B		Group C1		Group C2		p value
	mean	\pm SD	mean	\pm SD	mean	\pm SD	mean	\pm SD	
Age (yrs)	23.23	4.2	23.06	2.8	22.90	3.4	22.22	1.48	0.892
BMI (Kg/m ²)	24.29	.136	24.02	1.5	23.98	1.23	24.42	2.39	0.805
Gestational age (wks)	-	-	39.73	3.21	36.38	1.48	33.33	0.88	<0.001
Systolic blood pressure (mm of Hg)	114.7	8.01	114.33	7.27	142.38	6.24	163.22	9.66	<0.001
Diastolic blood pressure (mm of Hg)	74.5	7.23	75	5.08	92.09	6.01	107.77	4.4	<0.001

Table 2: Comparison of mean and standard deviation of hs-CRP of study subjects

Acute Phase Reactant(hs-CRP)	Group A		Group B		Group C1		Group C2		p value
	mean	\pm SD	mean	\pm SD	mean	\pm SD	mean	\pm SD	
(hs-CRP)	2.93	0.86	4.39	0.7	13.21	2.31	17.5	4.05	<0.001

DISCUSSION

Preeclampsia is a disease of pregnancy associated with endothelial cell damage and endothelial cell activation. There is an increasing evidence that preeclampsia is a systemic inflammatory disease ⁹.

Studies have shown that markers associated with endothelial cell activation or damage and inflammation have an active role in preeclampsia ⁷. CRP is produced by the liver and the production is stimulated by the inflammatory cytokines interleukin-6 and TNF-alpha. It is a sensitive marker of tissue damage and inflammation plays an important role in eliciting the inflammatory response characteristics of preeclampsia⁹. CRP acts as a scavenger and is responsible for the clearance of membranes and nuclear antigens ¹⁰. Higher concentration of CRP has been reported during preeclampsia ⁷. In this study it is shown that serum CRP levels were significantly higher in preeclamptic women as

compared to non-pregnant and healthy pregnant women. The levels of CRP in severe as compared with that of mild preeclamptic group were significantly higher with similar chronological age, gestational age and body mass index (Table 2). Present results support the hypothesis that systemic inflammation is involved in the pathogenesis of preeclampsia.

In accordance with previous reports^{7, 9, 11} and our study, preeclampsia is associated with increased CRP levels.

CONCLUSION

It is concluded from the study that high levels of hs-CRP were found in preeclamptic group as compared to non-pregnant and healthy pregnant groups. As compared with mild preeclamptic group, the level of hs-CRP was significantly higher in severe preeclamptic group giving the evidence that preeclamptic pregnancy is a generalized intravascular inflammatory response syndrome.

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