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ORIGINAL ARTICLE

Evaluation of inflammatory markers in preeclampsia

Prashant Kumar

Professor, Department of Biochemistry, Major S D Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India

ABSTRACT:

Background: Preeclampsia is a serious complication of pregnancy characterized by high blood pressure (hypertension) and signs of damage to another organ system, most commonly the liver and kidneys. The present study was conducted to evaluate inflammatory markers in preeclampsia. **Materials & Methods:**90 females with third trimester of pregnancywere divided into 3 groups of 30 each. Group I were mild preeclamptic, group II were severe preeclamptic and group III were controls. Body mass index (BMI) and mean arterial pressure, serum IL-10 and TNF-α concentrations were measured. **Results:** The mean gestational age in group I subjects was 34.2 weeks, in group II was 33.1 weeks and in group III was 33.6 weeks. The mean BMI was 30.5 Kg/m2 in group I, 29.2 Kg/m2 in group II and 29.7 Kg/m2 in group III. The difference was non- significant (P>0.05). In group I, group II and group III, the mean IL-10 was 9.7 pg/mL, 12.3 pg/mL, 4.8 pg/mL. TNF-α was 30.4 pg/mL, 65.2 pg/mL and 6.9 pg/mL in group I, group II and group III respectively. hs-CRP was 9.6mg/L, 12.1 mg/L, and 4.3 mg/L in group I, group II and group III respectively. Urinary protein level was 1390.4 mg/24 hours, 4124.6 mg/24 hours, and 136.8 mg/24 hours in group I, group II and group III respectively. The mean MAP was 114.2 mm Hg, 136.4 mm Hg, and 84.2 mm Hg in group I, group II and group III respectively. The difference was significant (P< 0.05). **Conclusion:** Inflammatory markers play a significant role in the pathophysiology of preeclampsia, contributing to endothelial dysfunction, vascular injury, and maternal systemic inflammation.Preeclamptic women have high levels of hs-CRP, TNF-α, and IL-10, which suggests that these markers can be used identifying the severity of preeclampsia.

Keywords: Preeclampsia, pregnancy, inflammatory markers

Corresponding author: Prashant Kumar, Professor, Department of Biochemistry, Major S D Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India

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INTRODUCTION

Preeclampsia is a serious complication of pregnancy characterized by high blood pressure (hypertension) and signs of damage to another organ system, most commonly the liver and kidneys. It typically occurs after the 20th week of pregnancy and can lead to serious, even life-threatening complications for both the mother and the baby if left untreated.[1] Preeclampsia often presents with symptoms such as high blood pressure (hypertension), proteinuria (protein in the urine), swelling (edema), sudden weight gain, severe headaches, vision changes (such as blurred vision or sensitivity to light), abdominal pain, and nausea or vomiting.[2]

Some women with preeclampsia may not experience any symptoms, making regular prenatal care and monitoring vital for early detection.In preeclampsia, there is evidence of systemic inflammation, which is believed to play a role in the pathogenesis of the condition. Several inflammatory markers have been studied in association with preeclampsia.CRP is an acute-phase reactant produced by the liver in response to inflammation or tissue injury. Elevated CRP levels have been observed in women with preeclampsia.[3]

Increased CRP levels in preeclampsia may reflect underlying endothelial dysfunction and systemic inflammation.IL-6 is a pro-inflammatory cytokine that plays a key role in the inflammatory response. Elevated levels of IL-6 have been reported in women with preeclampsia.IL-6 may contribute to endothelial dysfunction and the systemic inflammatory response observed in preeclampsia.TNF-α is another pro-inflammatory cytokine involved in the inflammatory response. Elevated levels of TNF-α have been found in preeclamptic women.TNF-α may contribute to vascular dysfunction, hypertension, and endothelial injury in preeclampsia.IL-10 is an anti-inflammatory cytokine that counteracts the effects of pro-inflammatory cytokines. Altered IL-10 levels have been observed in preeclampsia.[4,5]

Dysregulation of IL-10 may contribute to the imbalance between pro-inflammatory and anti-inflammatory factors in preeclampsia.[6] PlGF is a vascular endothelial growth factor that plays a role in angiogenesis and vascular function. Reduced levels of PlGF have been associated with preeclampsia. Decreased PlGF levels may reflect placental dysfunction and impaired vascular remodeling in preeclampsia.[7,8]The present study was conducted to evaluate inflammatory markers in preeclampsia.

MATERIALS & METHODS

The present study consisted of 90 females with third trimester of pregnancy. All gave their written consent to participate in the study.

Data such as name, age, etc. was recorded. They were divided into 3 groups of 30 each. Group I were mild preeclamptic, group II were severe preeclamptic and

group III were controls. Body mass index (BMI) and mean arterial pressure were calculated. Three mL blood sample and 24 hours urine sample were collected. Serum IL-10 and TNF-α concentrations were measured by sandwich enzyme-linked immunosorbent assay (ELISA) method. Serum hs-CRP and urinary protein levels were quantified by immuno-turbidimetric assay and pyrogallol red method respectively. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Demographic profile

Parameters	Group I	Group II	Group III	P value
Gestational (weeks)	34.2	33.1	33.6	0.82
BMI (Kg/m2)	30.5	29.2	29.7	0.75

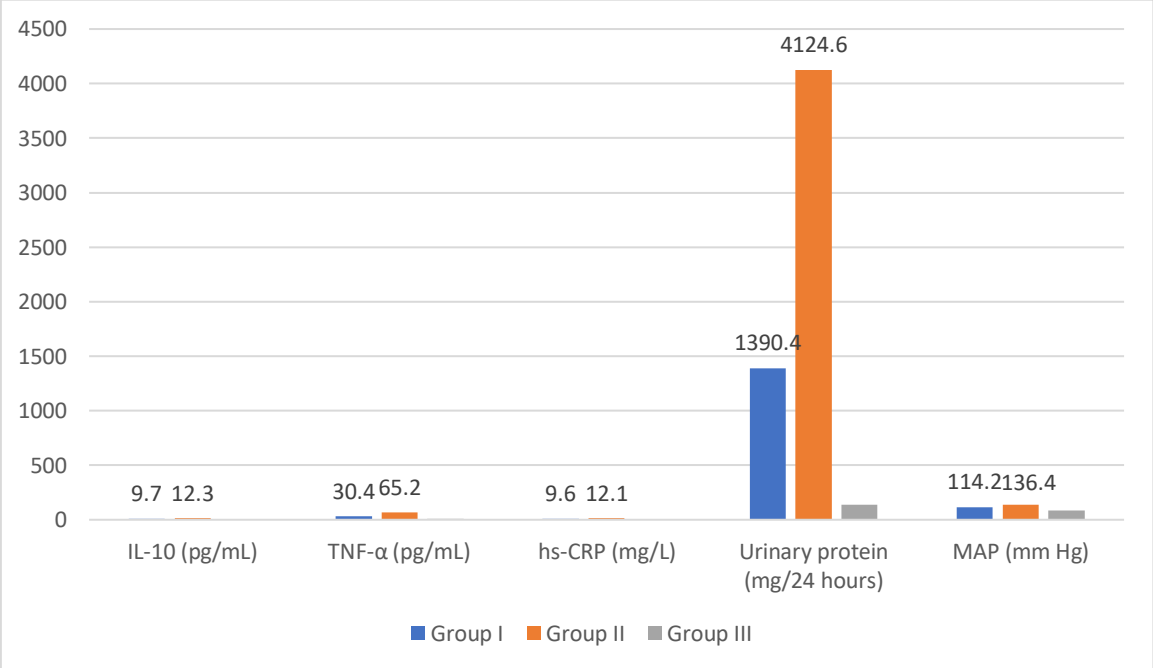
Table I shows that mean gestational age in group I subjects was 34.2 weeks, in group II was 33.1 weeks and in group III was 33.6 weeks. The mean BMI was 30.5 Kg/m2 in group I, 29.2 Kg/m2 in group II and 29.7 Kg/m2 in group III. The difference was non- significant (P>0.05).

Table II Comparison of biochemical parameters

Parameters	Group I	Group II	Group III	P value
IL-10 (pg/mL)	9.7	12.3	4.8	0.02
TNF-α (pg/mL)	30.4	65.2	6.9	0.05
hs-CRP (mg/L)	9.6	12.1	4.3	0.03
Urinary protein (mg/24 hours)	1390.4	4124.6	136.8	0.01
MAP (mm Hg)	114.2	136.4	84.2	0.02

Table II, graph I shows that in group I, group II and group III, the mean IL-10 was 9.7pg/mL, 12.3pg/mL, 4.8pg/mL.TNF-α was 30.4pg/mL, 65.2pg/mL and 6.9pg/mLin group I, group II and group III respectively. hs-CRP was 9.6mg/L, 12.1mg/L, and 4.3mg/Lin group I, group II and group III respectively.Urinary protein level was 1390.4mg/24 hours, 4124.6mg/24 hours, and 136.8mg/24 hoursin group I, group II and group III respectively. The mean MAP was 114.2mm Hg, 136.4mm Hg, and 84.2mm Hg in group I, group II and group III respectively. The difference was significant (P< 0.05).

Graph I Comparison of biochemical parameters



DISCUSSION

Preeclampsia is diagnosed based on clinical signs and symptoms, including high blood pressure and proteinuria.[9] Other diagnostic tests may be performed, including blood tests to assess liver and kidney function, urine tests to measure protein levels, and fetal monitoring to assess the baby's well-being.[10]Regular prenatal care, including blood pressure monitoring and urine testing, is crucial for early detection and management of preeclampsia.[11,12] The present study was conducted to evaluate inflammatory markers in preeclampsia.

We found that mean gestational age in group I subjects was 34.2 weeks, in group II was 33.1 weeks and in group III was 33.6 weeks. The mean BMI was 30.5 Kg/m2 in group I, 29.2 Kg/m2 in group II and 29.7 Kg/m2 in group III. Can et al[13]included 36 cases with mild preeclampsia, 36 cases with severe preeclampsia and 33 cases of normotensive pregnant. High sensitive C-reactive protein (hsCRP) and serum amyloid A (SAA) were measured by enzyme-linked immunosorbent assays, serum procalcitonin was measured by enzyme-linked fluorescent immunassay. Mean arterial pressure (MAP) was used as an indicator of the severity of the disease. In severe preeclampsia group hsCRP, serum amyloid A and procalcitonin levels were significantly higher than mild preeclamptic and normotensive groups. SAA and hsCRP levels were higher in mild preeclamptic group when compared with normotensive pregnant but no significant difference was found in procalcitonin between these groups. There were significant correlations between hsCRP, SAA, procalcitonin and MAP.

We found that in group I, group II and group III, the mean IL-10 was 9.7 pg/mL, 12.3 pg/mL, 4.8 pg/mL. TNF-α was 30.4 pg/mL, 65.2 pg/mL and 6.9 pg/mL in group I, group II and group III respectively. hs-CRP was 9.6mg/L, 12.1 mg/L, and 4.3 mg/L in group I, group II and group III respectively. Urinary protein level was 1390.4 mg/24 hours, 4124.6 mg/24 hours, and 136.8 mg/24 hours in group I, group II and group III respectively. The mean MAP was 114.2 mm Hg, 136.4 mm Hg, and 84.2 mm Hg in group I, group II and group III respectively. Garcia et al[14]conducted a nested case-control study in a prospective cohort of 506 normotensive women recruited before the 30th week of gestation (mean gestational age of 21.8 weeks). At enrollment, flow-mediated dilation was measured in the brachial artery using a 7.5-MHz transducer. C-reactive protein plasma concentrations and leukocyte count were also determined at study entry. Patients were followed until delivery, and medical records were reviewed for each patient to confirm the presence or absence of preeclampsia or gestational hypertension.Of the women studied, 14 developed preeclampsia, 18 developed gestational hypertension, and 474 remained normotensive. Two normotensive pregnant control subjects were randomly selected for each case, matched by maternal age, gestational age, and body mass index at enrollment. Women who subsequently developed preeclampsia had lower flow-mediated dilation (13.4% +/- 4.3% v 18.2% +/- 7.2, P = .026), higher C-reactive protein plasma concentrations (8.7 +/- 5.5 mg/dL v 5.3 +/- 4.3 mg/dL, P = .022) and leukocyte count (10.3 +/- 2.0 x 10(9)/L v 9.1 +/- 2.0 x 10(9)/L, P = .036).

Hwang et al[15]established reference values for highly sensitive C-reactive protein (hsCRP) in normal pregnancy and determined whether disease severity could be predicted by serum hsCRP concentration in women with severe pre-eclampsia (PE).The median values of hsCRP in each group were 0.76 mg/L (0.16-13.61 mg/L), 1.53 mg/L (0.39-20.31 mg/L), 2.08 mg/L (0.50-9.45 mg/L), and 2.28 mg/L (0.44-8.11 mg/L) and showed a trend toward increase. Serum levels of hsCRP were positively correlated with each severity indicator of PE.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that inflammatory markers play a significant role in the pathophysiology of preeclampsia, contributing to endothelial dysfunction, vascular injury, and maternal systemic inflammation.Preeclamptic women have high levels of hs-CRP, TNF-α, and IL-10, which suggests that these markers can be used identifying the severity of preeclampsia.

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