ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 10 | October - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ASSOCIATION OF BIOCHEMICAL AND INFLAMMATORY MARKER PREECLAMPTIC FEMALES

Biochemistry

Vandana Kumari Biochemist , Department of Biochemistry, Jaipur National University, Jaipur, Rajasthan, India.

Mahadev Choudhary* Senior Demonstrator, Department of Biochemistry, Govt. Medical College and Associated Hospitals, Barmer, Rajasthan, India (Rajasthan University of Health Sciences). *Corresponding Author

Ghanshyam Gahlot Senior Demonstrator, Department of Biochemistry, Govt. Medical College and Associated Hospitals, Barmer, Rajasthan, India (Rajasthan University of Health Sciences).

Bushra fiza Professor, Department of biochemistry, Mahatma Gandhi medical College and hospital, jaipur, Rajasthan, India (Mahatma Gandhi University of medical sciences and technology).

ABSTRACT

Objectives: To measure the inflammatory marker C-reactive protein levels in women with pre-eclampsia and compare its level in the normal pregnant women.

Methodology: This comparative cross-sectional study was conducted in the Department of Biochemistry in association with Department of Obstetrics and Gynaecology of Mahatma Gandhi Medical College & Hospital Jaipur, Patients diagnosed for preeclampsia, visiting the outpatient Department (OPD) of Gynaecology fulfilling the inclusion criteria were enrolled for the study, 100 patients taken for the study, 50 with preeclampsia and 50 healthy control group.The serum concentrations of C-reactive protein were determined by immunoturbidimetric assay. The variables were analyzed on SPSS software version 16 and $p \leq 0.05$ was considered as significant.

Results: There was no significant difference in the age (p-value = 0.122) and gestational age (p-value =0.09) between women with pre-eclampsia and normal pregnancy. Mean serum C-reactive protein concentration was significantly raised (p-value < 0.001) in women with pre-eclampsia (38.16 ± 11.35) in comparison to normal pregnant women (3.37 ± 1.19).

Conclusion: The findings of this study indicated the increased C-reactive protein levels in women with preeclampsia as compare to normal pregnant women. The level of C-reactive protein can be utilized as inflammatory and biochemical marker in the pre-eclampsia. Furthermore, screening of pregnant women for C-reactive protein levels during early antenatal period in high risk obstetrical cases may be helpful in diagnosis of pre-eclampsia, which may reduce the feto-maternal morbidity and mortality.

KEYWORDS

C-reactive protein, Preeclampsia, Pregnancy

INTRODUCTION

Pre-eclampsia is the disorder of pregnancy specified by hypertension and proteinuria ensuing later in pregnancy[1]. It is one of the prime contributors of raising feto-maternal morbidity and mortality[2]. It complicates 2–5% of the pregnancies worldwide; whereas the prevalence is higher in the underdeveloped countries[3]. The exact etiology of the pre-eclampsia is still debatable and various factors are considered to have a role in the pathogenesis, such as genetical and immunological factors, increased insulin resistance and oxidative stress, nutritional deficiencies and prostaglandin imbalance[4]. The inflammation and anti-angiogenesis mechanisms have demonstrated the vital components in its pathogenesis8. Previous literature has proposed the endothelial dysfunctions as the possible key factor in the pre-eclampsia and emphasized the function of C-reactive protein[5]. C-reactive protein is the plasma protein released during the acute phase of inflammation in early phase by the liver and contributes by interacting with complement system.

C-reactive protein increases in earlier phases of inflammation by more than 1000-fold, marking its increased synthesis by hepatocytes[6]. Defective placentation in pre-eclampsia along with the involvement of markers of angiogenesis consisting of soluble endoglin and fms-like tyrosine kinase 1 (sFlt1or sVEGFR-1) and cytokines were observed at higher levels in women with pre-eclampsia suggesting the C-reactive protein role in the acute phase along with the increment of these markers[7]. The C-reactive protein detection in amniotic fluid suggests its role in preeclampsia. Furthermore, it has also been linked to increased cardiovascular disorder risks exhibiting its association with pre-eclampsia[8], which may show C-reactive protein as a possible predictor and contributor in the pathogenesis of preeclampsia. Increased maternal concentrations of C -reactive protein have been valuable in diagnosing subclinical infection in pregnancy with preterm labour and premature rupture of membranes. Previously, elevated levels of C-reactive protein during gestation have been associated with adverse pregnancy outcomes showing the presence of intrauterine infection[9].

Various other studies have also exhibited the correlation of systolic and diastolic BP with levels of C-reactive protein and found increased concentrations with severity of pre-eclampsia[10]. Another study reported the correlation between mean arterial pressure and C-reactive protein in women with preeclampsia, however, limited literature is available in our setting. Early identification of the inflammation by detecting increased C-reactive protein levels may assist to prevent pre-eclampsia; thus current study was conducted to estimate the increased C-reactive protein level as the important biochemical marker for pre-eclampsia.

The objectives of the present study were to measure the serum C-reactive protein in women with pre-eclampsia and compare its level with normal pregnant women.

MATERIAL AND METHODS

The study was conducted in Department of Biochemistry in association with Department of Obstetrics and Gynaecology of Mahatma Gandhi Medical College & Hospital Jaipur, Patients diagnosed for preeclampsia, visiting the outpatient Department (OPD) of Gynaecology fulfilling the inclusion criteria were enrolled for the study, 100 patients taken for the study, 50 with preeclampsia and 50 healthy control group.The study was conducted subject to approval from **the Institutional Ethics Committee** (IEC) vide letter MGMCH/IEC/JPR/.08/. dated.26/09/2019. Written and informed consent was obtained from all participants before enrolment into the study.

The subjects were recruited by non-probability consecutive sampling technique. The inclusion criteria for controls and cases were pregnant women with normal pregnancy and diagnosed pre-eclampsia, respectively and between 16-45 years of age in their second or third trimester of pregnancies. Those women with preeclampsia that were diagnosed to have essential hypertension, chronic kidney disease, cardiac diseases, connective tissue disease, autoimmune disorders and tuberculosis were excluded.

Pre-eclampsia for the present study was defined as blood pressure (BP) ≥ 140/90 mmHg and proteinuria ≥ 0.3g/24h after completion of 20th weeks of pregnancy in the women with normal BP, previously24. The normal level of C-reactive protein is 1-3 mg/L and > 3.0 mg/L was labeled as positive[25].

The venous blood (5ml) was collected from subjects by standard protocol after written informed consent. After allowing the blood to clot in a test tube, the supernatant serum was obtained after centrifugation and sample stored at -20oC for afterward analysis26. The levels of C-reactive protein in serum were determined by Vitros 5600 – Dry Chemistry Analyzer immunoturbidimetric assay. Blood samples for all subjects (patients and control group) were collected using standard aseptic technique and analyzed for following investigations:Serum C-reactive protein, Serum Lactate dehydrogenase, Serum Urea, Serum Creatinine, Serum Uric Acid (Using Vitros 5600 – Dry Chemistry Analyzer). The results obtained presented as mean ± SD and subjected to statistical evaluation. A p-value of ≤0.05 shall be considered as statistically significant.

STATISTICALANALYSIS

The categorical and continuous variables were analysed on SPSS software version 1628. The mean and standard deviation (SD) were computed and comparison of means was analysed by Student t-test. For the present study, p value ≤ 0.05 was considered as significant.

RESULTS

The present study was planned to study CRP and LDH in Preeclamptic females and compare them with normal pregnant females. The study population consisted of 100 subjects (50 patients, 50 control groups). Patients were taken from out-patients and in-patients in department of Obstetrics and Gynecology, Mahatma Gandhi Medical College and Hospital, Jaipur. Patient was selected based on the pre-defined inclusion and exclusion criteria and after obtaining informed consent. Blood sample are collected and analyzed for estimation of serum CRP, LDH, UREA, URIC ACID, and CREATININE. 50 healthy pregnant females were included as control groups. Mean age of presentation with PE is 27.54±5.26 years, as shown in table (1) and figure (1). In the present study Systolic BP [147.8±14.50mm/ Hg] and Diastolic BP [91.2±11.04 mm/Hg] of PE patients is higher than control groups. It is statistically significant (p value 0.00) as shown in table (2) figure (2) and table (3) and figure (3). CRP was elevated in women with PE and can be used to predict the preterm delivery in women with elevated CRP. In the present study CRP levels of PE patients is higher than control groups [38.16±11.35]. It is statistically significant (p value 0.00) as shown in table (4) figure (4). In the present study Uric Acid levels of PE patients is higher than control groups [6.65±0.63]. It is statistically significant (p value 0.00). In the present study Creatinine levels of PE patients is higher than control groups [17.23±3.06]. It is statistically significant (p value 0.00).

OBSERVATION TABLES

Table 1: Comparison of Age between Control and Patient group

Groups	Age (years)	t-value	P-value
Controls (n=50)	29.54 ± 5.90	1.556	0.122
PE (n=50)	27.54 ± 5.26		

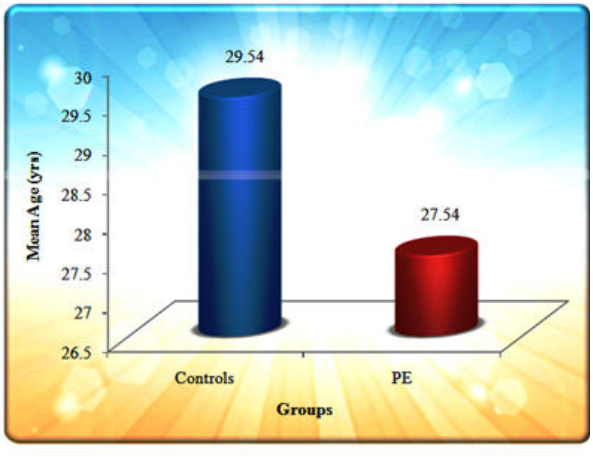

Figure 1: Comparison of Age (Years) between Control and Patient group

Table 2: Comparison of Systolic BP between Control and Patient group

Groups	Systolic BP	t-value	P-value
Controls (n=50)	123.6 ± 6.92	-10.64	0.000
PE (n=50)	147.8 ± 14.50		

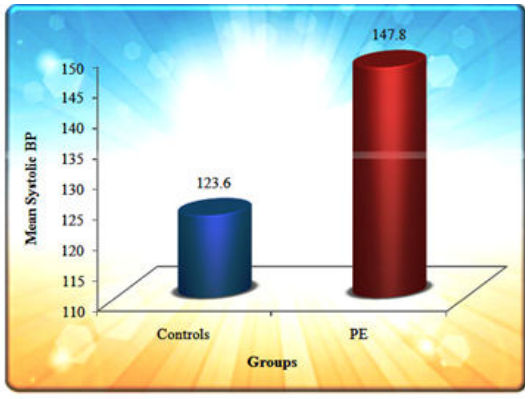

Figure 2: Comparison of Systolic BP between Control and Patient group

Table 3: Comparison of Diastolic BP between Control and Patient group

Groups	Diastolic BP	t-value	P-value
Controls (n=50)	80.2 ± 7.95	-5.71	0.000
PE (n=50)	91.2 ± 11.04		

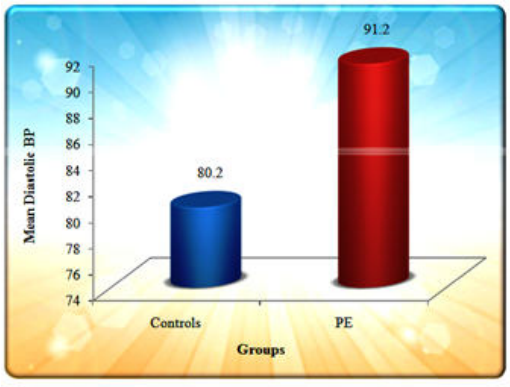

Figure 3: Comparison of Diastolic BP between Control and Patient group

Table 4: Comparison of C-reactive protein between Control and Patient group

Groups	C-reactive protein	t-value	P-value
Controls (n=50)	3.37 ± 1.19	-21.54	0.000
PE (n=50)	38.16 ± 11.35		

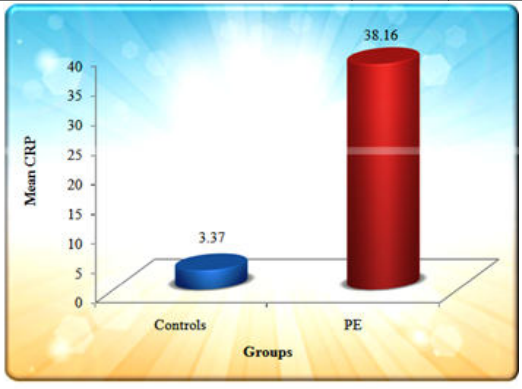

Figure 4: Comparison of C-reactive protein between Control and Patient group

DISCUSSION

Pre-eclampsia is the systemic inflammatory disease correlated with endothelial cell dysfunction.[7] Previous studies have exhibited the contribution of factors related to endothelial activation or

inflammation, including the role of C-reactive protein, as a sensitive indicator of tissue inflammation and impairment in the pre-eclampsia.[9]

During pregnancy increased C-reactive protein levels have been associated with obstetrical complications including premature birth, pre-eclampsia, small for gestational age and low birth weight of newborns; and its levels in mid pregnancy may help in the prediction of late gestational complications until delivery. It is also an important biomarker to evaluate and monitor the treatment response and prediction of outcome in inflammatory disorders.[10]

In the present study, C-reactive protein levels were measured in women with pre-eclampsia and compared with levels in the normal pregnant women. The mean age of women with normal pregnancy and pre-eclampsia was 27.2±4.4 and 27.9±4.3 years, respectively in the present research. This age range is with the agreement of the findings of the study of Gammill HS, et al results were also consistent with the present study, exhibiting no significant difference of age between both groups. In our study, no significant differences in mean gestational age between both groups were present.

In this study, C-reactive protein levels were found increased in women with pre-eclampsia as contrast to normal pregnant women (p-value< 0.001); where, mean C-reactive protein levels were 2.80±1.3 mg/dl in women with preeclampsia and 0.63+0.39 mg/dl in normal pregnant women. Similar results were observed in Mohammadi B 201033 study, depicting a significant relationship between C-reactive protein levels with pre-eclampsia. Another study performed by Begum G 201720 found that the serum C-reactive protein concentration was higher in women with pre-eclampsia with contrast to normal pregnant women with a mean serum level of C-reactive protein as 10.52±10 in women with preeclampsia and 5.10±6.2 in women with normal pregnancy. Das KK 201534 also found a significant association of serum C-reactive protein level with hypertension in both severe and mild pre-eclamptic patients (p-value < 0.0001).

Similarly, in agreement with the findings of our study Ali Z, et al found increased concentration of C-reactive protein as inflammatory marker, after second trimester in women with pre-eclampsia. Previously, researchers have observed correlation of C-reactive protein levels with the severity of pre-eclampsia; furthermore its levels are also found valuable in prediction of peri-neonatal mortality in early onset severe preeclampsia.[11]

Therefore, the increased C-reactive protein levels in preeclampsia may serve as inflammatory marker and reflect severity of disorder in patients delivering earlier as compared to women with preeclampsia with less severity and delivering later in pregnancy.[12]

CONCLUSION

The findings of this study indicated the increased C-reactive protein levels in women with preeclampsia as compare to normal pregnant women possibly explaining the exaggerated inflammation in preeclampsia. Our study findings suggest that C-reactive protein levels can be utilized as an inflammatory and biochemical marker in pre-eclampsia.

DISCLOSURE STATEMENT

This study is investigator initiated. The authors declare that they have no competing/conflict of interests in relation to this article.

ACKNOWLEDGEMENT

Dr. Bushra fiza, Professor & Guide. The authors are grateful to Sr. Professor for her helps in scientific discussion and takes responsibility for the integrity of the data and the accuracy of the data analysis.

CONSENT FOR PUBLICATION

- Not applicable.
- Ethics approval and consent to participate.
- The study protocol was approved by the medical ethics committee of **the Institutional Ethics Committee** (IEC) vide letter MGMCH/IEC/JPR/.08/. dated. 26/09/2019 Jaipur, Rajasthan (State), India.

REFERENCES:

[1]. Ghaffar B, Memon SH, Khidri FF. Assessment of serum lipid and uric acid levels in women with normal pregnancy and pre-eclampsia. J Liaquat Uni Med Health Sci. 2019; 18(02): 169-74. doi:10.22442/jlumhs.191820622.
[2]. Khidri FF, Ali FK, Ghafar B, Ahmed HS. The Intrapartum eclampsia: A case series presented at tertiary care hospital. Professional Med J. 2019; 26(08): 1389-92.
[3]. Tannetta D, Masliukaite I, Vatish M, Redman C, Sargent I. Update of syncytiotrophoblast derived extracellular vesicles in normal pregnancy and preeclampsia. J Reprod Immunol. 2017; 119: 98- 106. doi: 10.1016/j.jri.2016.08.008.
[4]. Saha PK, Kaur J, Goel P, Kataria s, Tandon R, Saha L. Safety and efficacy of low dose intramuscular magnesium sulphate (MgSO4) compared to intravenous regimen for treatment of eclampsia. J Obstet Gynaecol Res. 2017;43 (10):1543-9. doi: 10.1111/jog.13424.
[5]. Khidri FF. Various presentations of preeclampsia at tertiary care hospital of Sindh: A Cross- Sectional Study. Curr Hypertens Rev. 2019; 15: 1.[Epub ahead of print]
[6]. Redman CW, Sargent IL, Taylor RN. Immunology of normal pregnancy and preeclampsia. In: Taylor RN, Roberts JM, Cunningham FG, Lindheimer MD, eds. Chesley's hypertensive disorders in pregnancy: Elsevier; 2015. p. 161-179.
[7]. Anim-Nyame N, Gamble J, Sooranna SR, Johnson MR, Steer PJ. Relationship between insulin resistance and tissue blood flow in preeclampsia. J Hypertens. 2015; 33(5): 1057-63.
[8]. Achamrah N, Ditisheim A. Nutritional approach to preeclampsia prevention. Curr Opin Clin Nutr Metab Care. 2018;21(3):168-73.
[9]. Mary VP, Chellatamizh M, Padmanaban S. Role of serum LDH in preeclampsia as a prognostic factor–a cross sectional case control study in tertiary care hospital. Int J Reprod Contracept Obstet Gynecol. 2017; 6(2): 596-8.
[10]. Khidri FF, Waryah YM, Ali FK, Shaikh H, Ujjan ID, Waryah AM. MTHFR and F5 genetic variations have association with preeclampsia in Pakistani patients: a case control study. BMC Med Genet. 2019; 20(1): 163
[11]. Ahmed AM, Alqosaibi A, Mohamed MA, Soliman MG. Evaluation of some cytokines and gene expressions in pre-eclampsia. Pak J Biol Sci. 2019; 22(3): 148-53.
[12]. Sproston NR, Ashworth JJ. Role of C-reactive protein at sites of inflammation and infection. Front Immunol. 2018; 9: 754.
[13]. Baruah P, Goswami RK, Phukan PK. Serum concentrations of C-reactive protein and uric acid correlate with severity of pre-eclampsia. Int J Sci Res. 2019; 8(8): 12-14.