



## STUDY OF OXIDATIVE STRESS, SERUM MAGNESIUM, URIC ACID AND URINE PROTEIN LEVELS IN PRE-ECLAMPSIA AND ECLAMPSIA

### Biochemistry

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### ABSTRACT

**AIMS AND OBJECTIVES:** To evaluate various biochemical parameters in cases comprising pre-eclampsia and eclampsia and to compare the results with control group, endothelial and histiocyte markers[CD31,CD34].

**MATERIALS AND METHODS:** The study was conducted in the departments of Biochemistry and pathology, government Medical College and General Hospital, suryapet. 44 subjects of pre-eclampsia and eclampsia patients in third trimester were selected as cases and 44 age and gestational age matched normal antenatal women served as controls, kidney biopsy was done IHC was done for CD31, CD34.

**OBSERVATIONS AND RESULTS :** Total 44 primi cases of pre-eclampsia and eclampsia in their third trimester were selected, out of which 24 cases were pre-eclamptic and 20 cases were eclamptic. 44 healthy primi age and gestational matched subjects were selected as controls. CD31 and CD 34 were shown positive in endothelial cells and histiocytes in kidney biopsy.

**CONCLUSIONS :** Serum malondialdehyde levels are significantly increased in the pre eclampsia and eclampsia patients, Serum glutathione s transferase levels are significantly decreased in pre-eclampsia and eclampsia cases, Serum magnesium levels are also significantly increased in cases, Serum uric acid levels are increased significantly in cases, Urine protein per day was significantly elevated in total cases when compared to healthy controls.

### KEYWORDS

MDA, Malondialdehyde, GST, Glutathione s transferase

### INTRODUCTION

Pre-eclampsia is defined as a pregnancy specific syndrome observed after the 20th week of pregnancy with systolic blood pressure of  $\geq 140$  mm of Hg or diastolic blood pressure of  $\geq 90$  mm of Hg accompanied by significant proteinuria (i.e., urinary excretion of  $\geq 0.3$  g protein per day).<sup>1</sup> Proteinuria is an important sign of preeclampsia and the diagnosis is questionable in its absence.<sup>1</sup> In these women, blood pressure usually returns to baseline within days to weeks after delivery. Nearly 5.8 lakhs of women die every year in the world from causes related to pregnancy.<sup>2</sup> Worldwide prevalence of PIH is around 5-15% of all pregnancies. In India, the incidence of PIH was 27.2 per 1000 in 1990 and it has risen to 41.2 per 1,000 by 2009. Approximately 30% of hypertensive disorders of pregnancy are caused by chronic hypertension and 70% cases are diagnosed as gestational hypertension/pre-eclampsia/eclampsia.<sup>3</sup>

### MATERIALS AND METHODS

The study was conducted in the departments of Biochemistry and Pathology in Government Medical College, Suryapet of Telangana State. In the study 44 subjects of pre-eclampsia and eclampsia patients in third trimester were selected as cases and 44 age and gestational age matched normal antenatal women served as controls. kidney biopsy was obtained and CD31 and CD34 markers were done. Informed consent was obtained from all the subjects and the study protocol was approved by the institutional ethical committee.

**Cases:** Primi pregnant women with the age group of 18 - 35 years in third trimester of gestation (28 - 40 weeks), diagnosed with pre-eclampsia and eclampsia on the basis of clinical history, examination, blood pressure  $>140$ mmHg/90mm Hg along with proteinuria and convulsions.

**Controls:** Apparently healthy primi pregnant women between 18 - 35 years in the third trimester (28 - 40 weeks).

Pregnancy with underlying systemic diseases like diabetes and renal disease. and Multiple pregnancies cases were excluded.

### OBSERVATIONS AND RESULTS

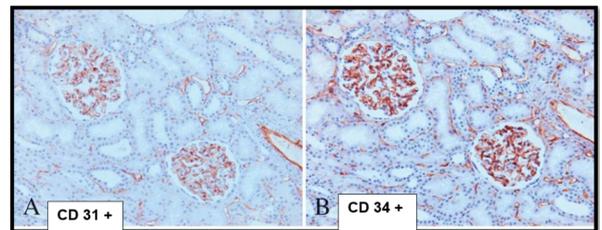
A total of 44 primi cases of pre-eclampsia and eclampsia in their third trimester were selected, out of which 24 cases were pre-eclamptic and 20 cases were eclamptic and 44 healthy primi age and gestational matched subjects were selected as controls.

**Table 1 : Mean  $\pm$  SD and p values of cases and controls**

PARAMETER	CASES	CONTROLS	p VALUE
Serum MDA nmol/ml	5.17 $\pm$ 1.81	1.77 $\pm$ 0.82	< 0.001
Serum GST IU/l	45.09 $\pm$ 12.41	88.26 $\pm$ 25.69	< 0.001
Serum Magnesium mg/dl	1.59 $\pm$ 0.38	2.04 $\pm$ 0.33	< 0.001
Serum Uric acid mg/dl	6.55 $\pm$ 1.99	4.19 $\pm$ 1.0	< 0.001
24 hour urinary protein mg/day	923.68 $\pm$ 375.39	185.68 $\pm$ 46.25	< 0.001

Significant increase (p value < 0.001) is observed in all the parameters in all cases compared to controls. CD31 and CD34 IHC was positive[FIG:1]

**FIG:1, SHOWING IHC POSITIVITY IN RENAL BIOPSY**



### DISCUSSION

In the present study, comparison was done between 44 primi antenatal cases with pre-eclampsia and eclampsia and 44 apparently healthy age and gestational age matched primi pregnant women. The significance of the parameters between the cases and controls and also between pre-eclampsia and eclampsia cases, is discussed.

The mean serum MDA level was increased in cases (5.17 $\pm$ 1.81) when compared to normal pregnant women (1.77 $\pm$ 0.82) and it was statistically significant (p value < 0.001). The mean level of GST was decreased in cases (45.09 $\pm$ 12.41) when compared to controls (88.26 $\pm$ 25.69) and it was also statistically significant. (p value = 0.001). It can be concluded that there was increase in oxidative stress and decrease in the antioxidant status in cases compared to controls. The results are consistent with the previous studies

Gupta S et al<sup>4</sup> assessed the association of lipid peroxidation and

antioxidant status with pre-eclampsia and concluded that pre-eclampsia is associated with increased concentrations of oxidative stress markers including lipid peroxidation products and a reduction in antioxidant concentrations.

In this study, the mean serum level of magnesium in cases is  $1.59 \pm 0.38$  and in controls it was  $2.04 \pm 0.33$ . Serum magnesium level is reduced in cases as compared to controls and there is a significant statistical difference ( $p$  value  $< 0.001$ ). The findings of this study correlate well with the other studies. The studies conducted by Akinloye et al<sup>5</sup>, Seema et al.,<sup>6</sup> compared magnesium in pre-eclamptic cases and normotensive controls. Results showed that magnesium was lower in pre-eclamptic women when compared to normal pregnant women. Although the explanation for such result is unclear, the proposed theory is that magnesium promotes vascular muscle relaxation thereby decreasing its levels in the serum.

In this study, the mean serum value of uric acid was increased in cases ( $6.55 \pm 1.99$ ) than in controls ( $4.19 \pm 1.0$ ) and the difference was statistically significant ( $p$  value  $< 0.001$ ). This is consistent with the other studies. Saleh F et al.,<sup>7</sup> found significant increase in the serum uric acid levels in patients with pre-eclampsia and stated that it was a good predictor of maternal disease progression and fetal outcome.

Significant proteinuria is commonly defined as 2+ by dipstick testing, equal to or greater than 300 mg per day. Glomerular endotheliosis causes increased leakage of protein in urine. The amount of leakage of protein reflects hypoproteinemia, which further alters intravascular oncotic pressure and causes generalized edema. This study showed 24 hour urinary protein levels to be higher in cases ( $923.68 \pm 375.39$ ) than in controls ( $185.68 \pm 46.25$ ) and the difference was statistically significant ( $p$  value  $< 0.001$ ). This is consistent with other studies.

Nazli Hossain et al.,<sup>8</sup> concluded in their study that 24 hour urine protein was increased in pre-eclampsia and found strong correlation between spot urinary protein to creatinine ratio and 24 hour urinary protein.

IHC positivity in kidney biopsy specimens show positivity of markers CD31 and 34 in correlation with study done by saac E. Stillman. et al.<sup>9</sup>.

## SUMMARY AND CONCLUSIONS

The results of this study are in correlation with the previous studies suggesting that lipid peroxidation, magnesium and uric acid appears to be of immense value in understanding the pathogenesis of pregnancy induced hypertension.

Based on the results of the present study and data available from literature, it is clear that in pregnancy induced hypertension, there is altered antioxidant status, the decreased enzymes and increased products of lipid peroxidation suggesting the evidence of oxidative stress in pre-eclampsia and eclampsia. In these patients antioxidants may be utilized to a greater extent to counteract free radical mediated cellular changes. But it remains unknown whether these changes are a cause or consequence of the disease.

Despite extensive clinical trials, no proper therapeutic approaches are available either for treatment or prevention of pre-eclampsia and eclampsia. Anti hypertensive drugs, corticosteroids or magnesium sulfate (RCOG Guideline No. 10(A)) can be given to ameliorate the symptoms and it allows safe delivery with a more mature foetus.

Very importantly, biomarkers might ensure a reliable early disease assessment in asymptomatic pregnant women, in particular among target groups at increased risk based on their clinical history.

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