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Original Research

Assessment of oxidative stress in preeclampsia- A clinical study

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ABSTRACT:
Background: Oxidative stress had an important role in the pathophysiology of preeclampsia The present study was conducted to assess oxidative stress in pregnant women.
Materials & Methods: 40 pre- eclampsia pregnant cases and 40 healthy pregnant cases were enrolled. Plasma was separated and analyzed for MDA, vitamin C and Vitamin E by calorimetric method.
Results: The mean parity in group I was 2.4 and in group II was 2.7, BMI was 31.4 kg/m^2 in group I and 29.5 kg/m^2 in group II. The mean gestational age in group I was 32.5 weeks and in group II was 33.6 weeks. The mean MDA level in group I was 12.4 nmol/ml and in group II was 4.5 nmol/ml. The mean vitamin C level in group I was 0.31 mg/dl and in group II was 2.74 mg/dl. The mean vitamin E level in group I was 0.30 mg/dl and in group II was 0.95 mg/dl. The difference was significant (P< 0.05).
Conclusion: Higher level of MDA and decreased vitamin C and E level in pre- eclampsia patients is indicative of oxidative stress.
Key words: Pre- eclampsia, vitamin C, vitamin E level.

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INTRODUCTION

Preeclampsia defined as onset of hypertension and either proteinuria or odema after 20 weeks of gestation in previously normotensive women.[1] It is multi system progressive disorder, with an increased risk for maternal and/or fetal mortality or serious morbidity. The main treatment of the pre-eclampsia is the termination of the pregnancy.[2] The risk–benefit ratio of induced preterm delivery and maternal–fetal complications is important factor in decision of the termination. So, the early diagnosis women at high risk of preeclampsia are key issues in the management of pre-eclampsia.[3]

In recent years, algorithms for estimating the risk for developing preeclampsia by combining maternal characteristics, blood pressure, Doppler ultrasound and serum markers have been developed. Detection rates of up to 90% for early onset preeclampsia (delivery before 34 weeks' gestation) have been published.[4]

Previous studies shows that oxidative stress had an important role in the pathophysiology of preeclampsia. Reduced perfusion and ischemic reperfusion in placenta result in placental hypoxia and raised synthesis of the free radical in placenta.[5] In non pre-eclamptic women this free radicals in endothelial cells is neutralized by antioxidant molecules. During pregnancy alterations in maternal and fetal metabolism due to changes in the levels of various enzymatic and non-enzymatic antioxidants will affect pregnancy outcome. The potential causes of oxidative stress may be ascribed to a series of physiological changes, mineral deficiencies and increased oxygen consumption during pregnancy.[6] The present study was conducted to assess oxidative stress in pregnant women.

MATERIALS & METHODS

The present study was conducted in the department of Gynaecology & Obstetrics. It comprised of 80 pregnant women. All were informed regarding the study and their consent was taken. Ethical approval for the study was obtained before starting the study.
Data such as name, age etc. was recorded. Patients were divided into 2 groups. Group I included 50 pre-eclampsia pregnant cases and group II had healthy pregnant cases. Ten mL of venous blood was collected in EDTA bottles using disposable syringes, after an overnight fast of 12 hours. Plasma was separated and analyzed for MDA, vitamin C and Vitamin E by calorimetric method. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of cases

Groups	Group I	Group II
Status	Pre-eclampsia	Normotensive
Number	40	40

Table I shows that group I had pre- eclampsia and group II had normotensive patients. Each group comprised of 40 subjects.

Table II Assessment of parameters

Parameters	Group I	Group II	P value
Parity	2.4	2.7	0.91
BMI	31.4	29.5	0.12
Gestational age	32.5	33.6	0.14

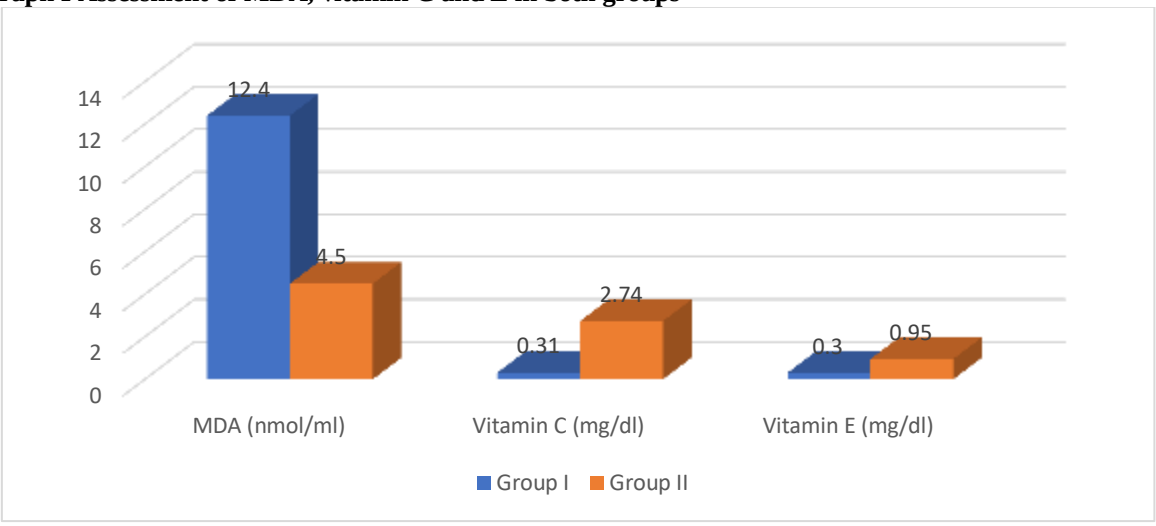
Table II shows that mean parity in group I was 2.4 and in group II was 2.7, BMI was 31.4 kg/m^2 in group I and 29.5 kg/m^2 in group II. The mean gestational age in group I was 32.5 weeks and in group II was 33.6 weeks.

Table III Assessment of MDA, vitamin C and E in both groups

Parameters	Group I	Group II	P value
MDA (nmol/ml)	12.4	4.5	0.01
Vitamin C (mg/dl)	0.31	2.74	0.02
Vitamin E (mg/dl)	0.30	0.95	0.04

Table III, graph I shows that mean MDA level in group I was 12.4 nmol/ml and in group II was 4.5 nmol/ml. The mean vitamin C level in group I was 0.31 mg/dl and in group II was 2.74 mg/dl. The mean vitamin E level in group I was 0.30 mg/dl and in group II was 0.95 mg/dl. The difference was significant (P< 0.05).

Graph I Assessment of MDA, vitamin C and E in both groups



DISCUSSION

Preeclampsia is a hypertensive disorder of pregnancy. A lot of effort was done to diagnose the exact mechanism of preeclampsia. The free- radicals play an important role in this pathophysiology.[7] It has been suggested that this may be due to increased cell turn over or due to decrease radical scavenging mechanisms.

It is not well clear whether oxidative oxidative stress and antioxidant insufficiency are the direct cause of preeclampsia or secondary consequence of preeclampsia.[8] Determination of the level of various antioxidants or the oxidative stress end products offers guidelines for the diagnosis and management of preeclampsia. So will decrease maternal and fetal mortality.[9] The present study was conducted to assess oxidative stress in pregnancies by measuring serum malondialdehyde (MDA) levels.

In present study, group I had pre- eclampsia and group II had normotensive patients. Each group comprised of 40 subjects. Taravati et al[10] assessed serum malondialdehyde (MDA) level, a product of lipid peroxide and the antioxidant (vitamin C and E) in pregnant women with or without preeclampsia. Patient are divided to two group; Group 1 (n=50): pregnant women between 28 and 40 weeks' gestation with preeclampsia and Group 2 (n=50): the control group includes pregnant women without hypertension episode during their pregnancy. Serum MDA levels were raised in women with preeclampsia compared with normal pregnancy. A positive correlation was seen between MDA level and both systolic and diastolic blood pressure in preeclamptic and normal pregnancies respectively. Vitamin C, E level shows highly significant decrease in Pre-eclamptic women than normal one. Significant negative correlation between vitamin C level (mg/dl) and both systolic blood pressure and diastolic blood pressure respectively. Significant negative correlation between vitamin E level (mg/dl) and both systolic blood pressure and diastolic blood pressure respectively.

We found that mean parity in group I was 2.4 and in group II was 2.7, BMI was 31.4 kg/m2 in group I and 29.5 kg/m2 in group II. The mean gestational age in group I was 32.5 weeks and in group II was 33.6 weeks. Sandstrom et al[11] in their study a total of 2773 (4.4%) nulliparous women subsequently developed preeclampsia were enrolled. The prespecified variables model was superior the other two models, regarding prediction of preeclampsia with delivery <34 and <37 weeks, both with areas under the curve of 0.68, and sensitivity of 30.6%) and 29.2% at a 10% false positive rate, respectively. The performance of these customizable multivariable models at the chosen false positive rate, was significantly better than the binary NICE- guidelines for preeclampsia with delivery <37 and 37 weeks' gestation. We found that the mean MDA level in group I was 12.4 nmol/ml and in group II was 4.5 nmol/ml. The mean vitamin C level in group I was 0.31 mg/dl and in group II was 2.74 mg/dl. The mean vitamin E level in group I was 0.30 mg/dl and in group II was 0.95 mg/dl. Karacey et al[12] assessed the plasma and serum maternal total antioxidant status, circulating levels of lipid peroxidation breakdown products (MDA), protein oxidation markers (AOPPs), myeloperoxidase (MPO) and lipid hydroperoxide (LHP) in preeclampsia, gestational diabetes mellitus (GDM) patients and compared them with noncomplicated normal pregnancies between 24 and 36 weeks of gestation. 27 GDM, 27 preeclampsia and 29 noncomplicated singleton pregnancies were included. TAS was decreased in GDM and preeclampsia when compared to normal pregnancies. MDA levels were higher only in GDM group than normal pregnancies. AOPP levels were increased but MPO and LHP levels were not changed both in GDM and preeclampsia when compared to normal pregnancies. The shortcoming of the study is small sample size.

CONCLUSION

Authors found higher level of MDA and decreased vitamin C and E level in pre- eclampsia patients is indicative of oxidative stress.

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