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Original Research

Evaluation of oxidative stress in preeclampsia

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ABSTRACT

Background: Preeclampsia is onset of hypertension and either proteinuria or oedema after 20 weeks of gestation in previously normotensive women. The present study was conducted to evaluate oxidative stress in pregnant women. **Materials & Methods:** 64 pregnant women were divided into 2 groups of 23 each. Group I comprised of 50 pre- eclampsia pregnant females and group II had healthy pregnant females. Level of MDA, vitamin C and Vitamin E by calorimetric method was measured. **Results:** The mean BMI was 32.6 kg/m^2 in group I and 28.4 kg/m^2 in group II, parity in group I was 2.3 and in group II was 2.8. The mean gestational age in group I was 32.6 weeks and in group II was 33.2 weeks. The mean vitamin C level in group I was 0.34 mg/dl and in group II was 2.60 mg/dl. The mean vitamin E level in group I was 0.32 mg/dl and in group II was 0.92 mg/dl. The mean MDA level in group I was 12.3 nmol/ml and in group II was 4.7 nmol/ml. The difference was significant (P< 0.05). **Conclusion:** There was higher level of MDA and decreased vitamin C and E level in pre- eclampsia patients.

Key words: Pre- eclampsia, MDA, Pregnancy.

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INTRODUCTION

Preeclampsia defined as onset of hypertension and either proteinuria or oedema after 20 weeks of gestation in previously normotensive women. 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.[1]

Some evidence suggests that placental and systemic oxidative stress play a crucial role in the development of preeclampsia.[2] The potential causes of oxidative stress may be ascribed to a series of physiological changes, mineral deficiencies and increased oxygen consumption during pregnancy. Reduced perfusion and ischemic reperfusion in placenta result in placental hypoxia and, as a consequence, leading to raised synthesis of the free radical including superoxide anion in placenta.[3]

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.[4]

Free radicals produced in preeclampsia are suspected of increasing the utilization of antioxidants. It is unclear whether endothelial dysfunction due to excess oxidative stress and antioxidant insufficiency are implicated in development of preeclampsia or improper function as caused by established preeclampsia may lead to oxidative stress.[5] The present study was conducted to assess oxidative stress in pregnant women.

MATERIALS & METHODS

The present study was conducted among 64 pregnant women. All were informed regarding the study and their written consent was taken.

Demographic profile such as name, age etc. was recorded. Patients were divided into 2 groups of 23 each. Group I comprised of 50 pre- eclampsia pregnant females and group II had healthy pregnant females. 10 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 subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table II Assessment of parameters

Parameters	Group I	Group II	P value
BMI	32.6	28.4	0.15
Parity	2.3	2.8	0.94
Gestational age	32.6	33.2	0.19

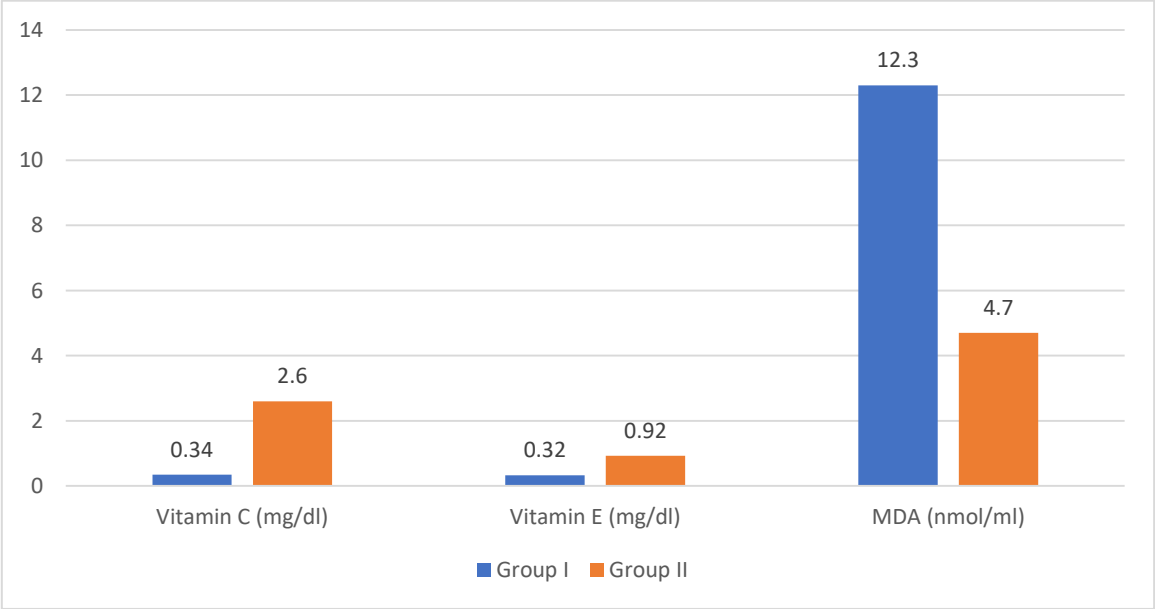
Table II shows that mean BMI was 32.6 kg/m^2 in group I and 28.4 kg/m^2 in group II, parity in group I was 2.3 and in group II was 2.8. The mean gestational age in group I was 32.6 weeks and in group II was 33.2 weeks. The difference was non- significant (P> 0.05).

Table II Assessment of MDA, vitamin C and E

Parameters	Group I	Group II	P value
Vitamin C (mg/dl)	0.34	2.60	0.01
Vitamin E (mg/dl)	0.32	0.92	0.05
MDA (nmol/ml)	12.3	4.7	0.02

Table II, graph I shows that mean vitamin C level in group I was 0.34 mg/dl and in group II was 2.60 mg/dl. The mean vitamin E level in group I was 0.32 mg/dl and in group II was 0.92 mg/dl. The mean MDA level in group I was 12.3 nmol/ml and in group II was 4.7 nmol/ml. The difference was significant (P< 0.05).

Graph I Assessment of MDA, vitamin C and E



DISCUSSION

An excessive increase in biomarkers of oxidative stress and lipid peroxidation has been reported in women with preeclampsia. Increased lipid peroxidation is considered to be a causative pathogenesis factor for preeclampsia.[6] To support this concept, increased plasma lipid peroxidation products known as malondialdehyde (MDA) have been reported in preeclamptic women compared with healthy pregnant women.[7] In fact the increased production of lipid peroxides in preeclamptic women may cause vascular endothelial cell dysfunction.[8] However, despite these reports, a few studies failed to approve the association between lipid peroxidation level and endothelial dysfunction in early or late preeclampsia. The association of maternal oxidative stress with subsequent development of pregnancy complications has been investigated in some studies.[9]

Although scientific evidence indicated that free radicals and oxidative stress might play a significant role in pre-eclampsia, not all studies have produced consistent results about antioxidant balance in preeclampsia. While some studies reported a decreased level of enzymatic and non-enzymatic antioxidant in placenta, erythrocytes or plasma.[10] The present study was conducted to assess oxidative stress in pregnant women.

We found that mean BMI was 32.6 kg/m^2 in group I and 28.4 kg/m^2 in group II, parity in group I was 2.3 and in group II was 2.8. The mean gestational age in group I was 32.6 weeks and in group II was 33.2 weeks. Taravati et al[11] included 2953 cases and 3621 controls, a statistically significant reduction in total antioxidant capacity, nitric oxide, superoxide dismutase, glutathione, vitamin E and C was observed in preeclampsia women. On the other hand, a statistically significant increase in malondialdehyde, protein carbonyl, total peroxide, glutathione peroxidase, catalase and uric acid were observed in preeclampsia women. The increased products of oxidative stress, which were found in the present meta-analysis might be an underlying mechanism for endothelial dysfunction in preeclampsia. This meta-analysis provides a scientific support that primary reduction of antioxidant capacity and increased levels of oxidative stress products may induce a condition in which the pathways responsible for blood pressure homeostasis are disrupted. In conclusion, it is hypothesized when oxidative stress is established, a protective response is induced by increasing some antioxidants. Further studies are warranted to investigate the role of dietary supplementation and genetic variation in women with different ethnicity.

We found that mean vitamin C level in group I was 0.34 mg/dl and in group II was 2.60 mg/dl. The mean vitamin E level in group I was 0.32 mg/dl and in group II was 0.92 mg/dl. The mean MDA level in group I was 12.3 nmol/ml and in group II was 4.7 nmol/ml. 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.

CONCLUSION

Authors found that there was higher level of MDA and decreased vitamin C and E level in pre- eclampsia patients.

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