Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page:www.jamdsr.com doi:10.21276/jamdsr Index Copernicus value [ICV] =82.06

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Determination of oxidative stress in preeclampsia

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ABSTRACT:

Background: Preeclampsia is characterized as the development of hypertension and either odema or proteinuria in previously normotensive women after 20 weeks of gestation. The present study was conducted to determine oxidative stress in pregnant women. **Materials & Methods:**74 pregnant womenwere divided two groups of patients. Group I had 37 pregnant cases with pre-eclampsia, while group II featured 37 healthy cases of pregnancy. Plasma was isolated and examined for MDA, vitamin C, and vitamin E. **Results:** Group I had pre- eclampsia and group II had normotensive patients. Each group comprised of 37 subjects. The mean gestational age in group I was 32.4 weeks and in group II was 33.1 weeks. The mean parity in group I was 2.3 and in group II was 2.5. The mean BMI in group I was 31.4 kg/m2 and 30.5 kg/m2 in group II. The difference was non- significant (P> 0.05). The mean vitamin C level in group I was 0.34 mg/dl and in group II was 2.76 mg/dl. The mean vitamin E level in group I was 0.31 mg/dl and in group II was 0.98 mg/dl. The mean MDA level was 12.2 nmol/ml in group I and 4.7 nmol/ml in group II. The difference was significant (P< 0.05). **Conclusion:**Oxidative stress is indicated by greater MDA levels and lower vitamin C and E levels in pre-eclamptic patients.

Key words: vitamin C, vitamin E, Pre- eclampsia

Received: 20-06-2019 Accepted: 22-07-2019

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This article may be cited as: Akansha. Determination of oxidative stress in preeclampsia. J Adv Med Dent Scie Res 2019;7(8):385-388.

INTRODUCTION

Preeclampsia is characterized as the development of hypertension and either odema or proteinuria in previously normotensive women after 20 weeks of gestation. With a higher risk of significant morbidity or maternal and/or fetal mortality, it is a multisystem progressive illness.[1] Pregnancy termination is the primary treatment for pre-eclampsia. When deciding whether to terminate a pregnancy, it's crucial to consider the risk-benefit ratio of both induced preterm delivery and maternal-fetal problems. Thus, early detection of preeclampsia in women at high risk is crucial for managing preeclampsia.[2]

Algorithms that use maternal features, blood pressure, Doppler ultrasound, and serum indicators to estimate the risk of developing preeclampsia have been developed recently.[3] There have been publications showing up to 90% detection rates for early onset preeclampsia (delivery before 34 weeks gestation). According to earlier research, oxidative stress played a significant part in the pathogenesis of preeclampsia.[4] Placental hypoxia and increased free radical production are caused by decreased perfusion and ischemia reperfusion in the placenta. Antioxidant molecules neutralize the free radicals in endothelial cells in women who are not pre-eclamptic.[5] The course of the pregnancy will be impacted by variations in the amounts of different enzymatic and non-enzymatic antioxidants, which will modify both the mother's and the fetus' metabolism.The potential causes of oxidativestress may be ascribed to a series of physiological changes,mineral deficiencies and increased oxygen consumptionduring pregnancy.[6] The present study was conducted to determine oxidative stress in pregnant women.

MATERIALS & METHODS

The present study was conducted on 74 pregnant women. All were informed regarding the study and their consent was taken. All were recruited after obtaining their written consent.

Data such as name, age etc. was recorded. There were two groups of patients. Group I had 37 pregnant cases with pre-eclampsia, while group II featured 37 healthy

cases of pregnancy. After a 12-hour overnight fast, ten milliliters of venous blood were drawn using disposable syringes and placed in EDTA bottles. Using a calorimetric technique, plasma was isolated and examined for MDA, vitamin C, and vitamin E. 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	37	37

Table I shows that group I had pre- eclampsia and group II had normotensive patients. Each group comprised of 37 subjects.

Table II Assessment of parameters

Parameters	Group I	Group II	P value
Gestational age (weeks)	32.4	33.1	0.74
Parity	2.3	2.5	0.52
BMI (Kg/m^2)	31.4	30.5	0.14

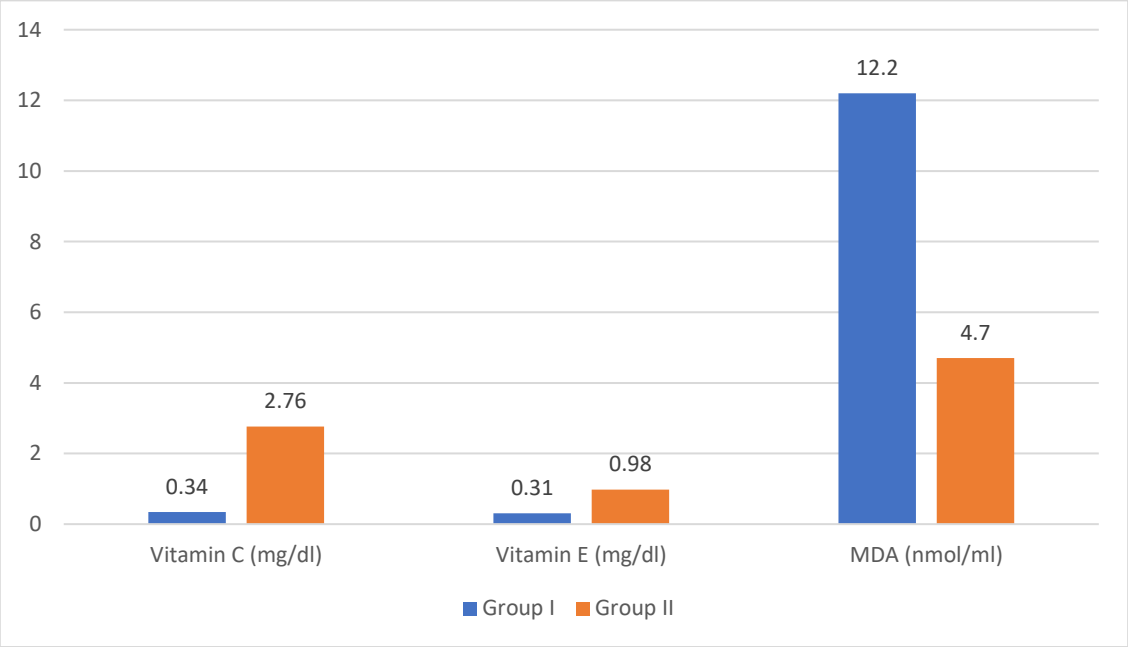
Table II shows that the mean gestational age in group I was 32.4 weeks and in group II was 33.1 weeks. The mean parity in group I was 2.3 and in group II was 2.5. The mean BMI in group I was 31.4 kg/m^2 and 30.5 kg/m^2 in group II.The difference was non- significant (P> 0.05).

Table III MDA, vitamin C and E level

Parameters	Group I	Group II	P value
Vitamin C (mg/dl)	0.34	2.76	0.02
Vitamin E (mg/dl)	0.31	0.98	0.05
MDA (nmol/ml)	12.2	4.7	0.01

Table III, graph I shows that the mean vitamin C level in group I was 0.34 mg/dl and in group II was 2.76 mg/dl. The mean vitamin E level in group I was 0.31 mg/dl and in group II was 0.98 mg/dl. The mean MDA level was 12.2 nmol/ml in group I and 4.7 nmol/ml in group II. The difference was significant (P< 0.05).

Graph I MDA, vitamin C and E level



DISCUSSION

Preeclampsia is a pregnancy-related hypertension condition. Much work has gone into determining the precise cause of preeclampsia. Free radicals are a significant component of this pathogenesis. There have been suggestions that this could be the result of either a decline in radical scavenging systems or an increase in cell turnover.[7] It is unclear if antioxidant deficiency and oxidative stress are the primary causes of preeclampsia or if they are a subsequent effect of

preeclampsia.[8,9] The level of different antioxidants or the end products of oxidative stress can be used to determine preeclampsia and provide guidance for its diagnosis and treatment. Consequently, fetal and maternal mortality will decline.[10,11]The present study was conducted to determine oxidative stress in pregnant women.

We observed that group I had pre- eclampsia and group II had normotensive patients. Each group comprised of 37 subjects.In evaluating preeclampsia and gestational diabetes mellitus (GDM) patients, Karacey et al[12] compared the patients' 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) with those of noncomplicated normal pregnancies between 24 and 36 weeks of gestation. There were 29 straightforward singleton pregnancies, 27 cases of preeclampsia, and GDM. Compared to normal pregnancies, TAS was lower in GDM and preeclampsia. Only the GDM group's MDA levels were higher than those of normal pregnancies. Comparing GDM and preeclampsia to normal pregnancies, AOPP levels were up but MPO and LHP levels were unchanged.

We found that the mean gestational age in group I was 32.4 weeks and in group II was 33.1 weeks. The mean parity in group I was 2.3 and in group II was 2.5. The mean BMI in group I was 31.4 kg/m^2 and 30.5 kg/m^2 in group II. Sahu et al[13] enrolled 30 normal and 30 PIH cases in their third trimester of pregnancy and the following estimations were done: Serum Malondialdehyde level (MDA), Vitamin E, triglycerides (TG), total cholesterol (TC), HDL-cholesterol (HDL-C) and LDL-C. The PIH cases had significant rise in both systolic and diastolic blood pressure (BP) (P=<0.0001). There was a significant rise in the fasting triglycerides, total cholesterol and LDL-C levels in PIH (P=<0.0001). MDA was twice in the cases and Vitamin E was half the levels that of controls (P=<0.0001). The level of rise of serum lipids did not significantly correlate with the rise or fall in MDA. In PIH cases there was a negative correlation of diastolic BP with MDA (P<0.05). Early detection of these parameters is going to aid in better management of PIH cases.

We observed that the mean vitamin C level in group I was 0.34 mg/dl and in group II was 2.76 mg/dl. The mean vitamin E level in group I was 0.31 mg/dl and in group II was 0.98 mg/dl. The mean MDA level was 12.2 nmol/ml in group I and 4.7 nmol/ml in group II. Kashinakunti et al[14] enrolled 30 preeclamptic and 30 healthy pregnant women. Fasting venous blood samples were collected during antepartum period and serum levels of malondialdehyde, ascorbic acid (Vitamin C) and uric acid were measured. In the preeclamptic group malondialdehyde (MDA), a lipid peroxidation product was significantly increased, while serum antioxidant ascorbic acid was significantly decreased (P< 0.001), whereas uric acid level increased significantly (P<0.001). The findings of the presentstudy suggesting that lipid peroxidation is an importantfactor in the pathogenesis of preeclampsia. In preeclampsia serum antioxidants areexcessively utilized to counteract the cellular changes mediated by free radicals.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that oxidative stress is indicated by greater MDA levels and lower vitamin C and E levels in pre-eclamptic patients.

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