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Role of Oxidative Stress and Antioxidant Status in Preeclampsia

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Abstract

The present study was undertaken to provide further evidence about the role of oxidative stress and antioxidant status in preeclampsia. 50 preeclamptic patients in the third trimester and 50 normal healthy subjects in the third trimester with normal blood pressure and no complications were recruited for the present study by convenient sampling technique. S.MDA and erythrocyte glutathione concentration were estimated by standard methods described in the literature. Data was analyzed by SPSS 20.0. Values are expressed as mean \pm SD. P- value <0.05 was taken as significant. We conclude that both the oxidative stress and anti-oxidants have a role in preeclampsia. We recommend further detailed studies in this area with higher sample size and more biomarkers.

Keywords: Antioxidant status, Oxidative stress, preeclampsia

1. Introduction

Preeclampsia is a potentially dangerous complication of pregnancy particularly in developing countries globally affecting approximately 8% of all pregnancies. The cause of preeclampsia remains largely unknown, but oxidative stress and a generalized inflammatory state are featured of the maternal syndrome [1]. The proposed "2-stage model" in which reduced placental perfusion (stage 1) leads to the maternal syndrome (stage 2) is likely to provide a simplified, yet largely accurate, description of the origin of severe early-onset disease, but may be less relevant for later-onset milder disease [2, 3].

Pre-eclampsia, a life-threatening complication of pregnancy, typically starts after 20th week of pregnancy and is related to increased blood pressure (BP $\geq 140/90$ mmHg) and protein in mother's urine (urinary albumin ≥ 300 mg/24 h). The symptoms of preeclampsia range from mild to severe. However, the prevalence of preeclampsia varies in different populations and in different ethnic groups [4]. Women with moderate pre-eclampsia generally have no symptoms. Women with severe pre-eclampsia, or with very high blood pressure, may feel unwell, with symptoms such as a headache, upper abdominal pain, or visual disturbances [5]. Pre-eclampsia remains as an important maternal health problem in India and well documented population level studies to assess the determinants of pre-eclampsia are few in India.

The present study was undertaken to provide further evidence about the role of oxidative stress and antioxidant status in preeclampsia.

2. Materials and methods

The study was approved by Institutional Ethics Committee. A written, informed consent was obtained from all the participants. The study was performed in accordance with the "Ethical Guidelines for Biomedical Research on Human Participants, 2006" by the Indian Council of Medical Research and the Declaration of Helsinki, 2008.

2.2 Participants, inclusion and exclusion criteria

50 preeclamptic patients in the third trimester and 50 normal healthy subjects in the third trimester with normal blood pressure and no complications were recruited for the present study by convenient sampling technique. The following criteria were used to recruit the patients.

2.3. Inclusion criteria

1. Willing participants

2.4. Exclusion criteria

1. Preeclamptic patients with hypertension

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2. Patients with kidney or liver diseases
3. Patients with GDM or other antenatal complications.

2.5. Determination of S.MDA and erythrocyte glutathione concentration

S.MDA and erythrocyte glutathione concentration were estimated by standard methods described in the literature [6, 7, 8].

3. Data analysis

Data was analyzed by SPSS 20.0. Values are expressed as mean \pm SD. P-value <0.05 was taken as significant.

4. Results

Results are presented in figure 1 and 2. Figure 1 presents the comparison of S.MDA levels in case and controls. S.MDA levels were significantly ($p <0.05$) increased in cases when compared to control group.

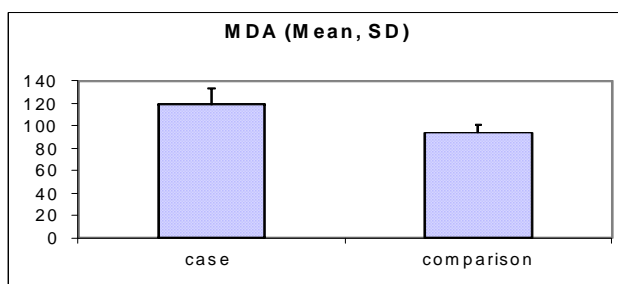


Fig 1: S.MDA levels in case and control groups.

Figure 2 presents whole blood glutathione levels in case and control groups. Significant decrease in whole blood glutathione levels was observed in cases when compared to control group.

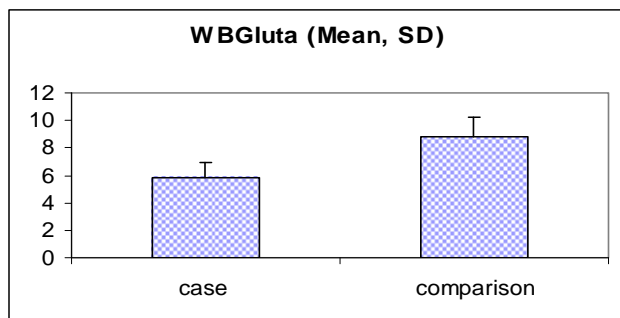


Fig 2: Whole blood glutathione levels in case and control groups.

5. Discussion

It was reported that there was deficiency in the maternal protective antioxidant systems or increased production of lipid peroxidation products, LPO and MDA in African women with pre-eclampsia as compared with normal pregnancy. However, there was evidence of increased cord plasma concentrations of MDA and vitamin E in eclampsia as compared with normal pregnancy and pre-eclampsia. The placenta may be effective in removing MDA. The antioxidant uric acid serves as a protective role whilst the antioxidant and oxidant capacity in the different study groups remained unchanged [9, 10, 11]. In contrast, it was also reported that there was lack of generalized state of oxidative stress in women with preeclampsia [12]. In the present study, we have observed a significant increase in S.MDA levels in cases when compared to control group.

Earlier studies have reported that placental glutathione and glutathione peroxidase are found to have decreased values in patients with preeclampsia [13, 14]. In contrast, it was also reported that no significant difference was found in glutathione levels in case and control groups [9]. In the present study, we have observed significant decrease in the glutathione levels in cases when compared with control group.

6. Conclusion

We conclude that both the oxidative stress and antioxidants have a role in preeclampsia. We recommend further detailed studies in this area with higher sample size and more biomarkers.

6.1. Conflicts of interest: Nil

7. References

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