Comparative Study of Serum Malondialdehyde Levels as a Marker of Oxidative Stress in Patients of Pregnancy-induced Hypertension and Controls

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ABSTRACT
Hypertensive disorders are the most common medical complications of pregnancy, with a reported incidence ranging between 5 and 10%. In pregnancy-induced hypertension, many complex homeostatic modifications occur, some are harmful to the mother and fetus, while others are beneficial.

The objective of this study was to determine the serum malondialdehyde (MDA) in pregnancy-induced hypertension (PIH) and to compare them to that of normal pregnant women.

Materials and methods: The study was carried out in the department of biochemistry which included total 30 patients of PIH age group of 20 to 40 years and age and sex matched controls. Serum MDA was estimated by method of Nourooz-Zadeh J et al using trichloroacetic acid and thiobarbituric acid. Mean and standard deviation were calculated for serum MDA. Statistical analysis was done using SPSS no. 17 and student t-test.

In the present study, statistically significant increase in levels of lipid peroxidation MDA was observed PIH as compared to those in normal pregnant controls.

Keywords: Malondialdehyde, Oxidative stress, Pregnancy, Hypertension.

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INTRODUCTION
Hypertensive disorders are the most common medical complications of pregnancy, with a reported incidence ranging between 5 and 10%. The incidence varies among different hospitals, regions and countries. In India, the incidence of preeclampsia is reported to be 8 to 10% of the pregnancies. Hypertension in pregnancy strikes mostly the primigravidae after 20th week of gestation and frequent occurrences are seen near term. It contributes significantly to the cause of maternal and perinatal mortality and morbidity.

Pregnancy-induced hypertension (PIH) includes a group of hypertensive disorders, gestational hypertension which is without edema and proteinuria, preeclampsia and eclampsia with edema and proteinuria. In PIH, many complex homeostatic modifications occur, some are harmful to the mother and fetus, while others are beneficial. In health, oxidation by free radicals and neutralization by antioxidants remain in balance. When the reactive oxygen species (ROS) are in abundance, oxidative stress occurs which is thought to be the causative factor in PIH.

Oxidative stress describes the damage that occurs when reactive oxygen species (ROS) overwhelm the antioxidant defenses of the host. Oxidant stress may play an important role in the pathogenesis of hypertension in pregnancy and may be a final common pathway leading to tissue damage. Malondialdehyde (MDA) is an aldehyde considered to be the terminal compound and the most important marker for monitoring lipid peroxidation and oxidative damage induced by ROS which is strongly associated with development of serious disease, it is also considered as a thiobarbituric reactive substance.

MATERIALS AND METHODS
Pregnant women from MGM Medical College and Hospital, Aurangabad, were selected for the study from April 2012 to March 2013. The study was carried out in the department of biochemistry which included total 30 patients of PIH age group of 20 to 40 years. Selection cases: selection cases of PIH were done after assessing for BP > 140/90 mm Hg, proteinuria, edema and within 28 to 42 weeks of gestation. Age matched 30 normal pregnant women with blood pressure <140/90 mm Hg without edema or proteinuria and within 28 to 42 weeks of gestation constituted the control group.

Exclusion Criteria
Illness like anemia, diabetes mellitus, essential hypertension, renal insufficiency, cardiovascular disease which by themselves are known to alter free radical status were excluded from study.
**Collection of Blood Sample**

Five milliliter venous blood was collected with the informed consent of all patients. It was taken from both normal as well as study groups for determination of oxidative damage in terms of lipid peroxidation product—MDA. After clot formation, the tubes were centrifuged at 4000 rpm for 10 minutes. Serum thus separated was analyzed immediately for MDA. Serum MDA was estimated by method of Nourooz-Zadeh J et al.\(^8\) Statistical analysis was done using SPSS version 16 and student t-test.

**RESULTS**

There was highly significant increase in serum level of MDA in hypertensive pregnant women. This because MDA considered to be the most sensitive and final stage of peroxidation and it considered as a marker of pro-oxidant level and indicator of oxidative stress, and it is the end product of lipid peroxidation.

The values obtained on analyzing specimens collected from PIH and normal pregnant groups are tabulated (Table 1). The mean values and standard deviation also have been calculated for comparative study of PIH and normal pregnant groups. The values of subject and controls groups are also graphically represented for comparison. The graphs were plotted using values of all the study parameters. The graphs show significantly decrease of hemoglobin level in subjects were observed compared to the controls. Malondialdehyde significantly increases in PIH as compared to normal pregnant women (Graph 1).

**DISCUSSION**

Reactive oxygen species functions as signal transducers in normal physiology, however, their overproduction may result in numerous human health problems. Although the body’s own defense mechanism plays a crucial role to control the levels of these free radicals, the levels of antioxidants that counterbalance these oxidative radicals get impaired themselves. The present study was planned to detect lipid peroxidation products, i.e. MDA in PIH.

In the present study, the lipid peroxidation product like MDA levels has been measured in plasma of hypertensive pregnant women. It was found that higher O\(_2\) free radical production, evidenced by increase levels of MDA in hypertensive pregnant women. The present study shows that there is significant difference between PIH and normal pregnant regarding serum MDA (see Table 1).

Rise in MDA could be due to increased generation of ROS due to the excessive oxidative damage generated in the hypertensive patients.\(^9\) These O\(_2\) species in turn can oxidize many other important biomolecules including membrane lipids. The lipid peroxides and free radicals may be important in pathogenesis of PIH.\(^10\)

In similar previous study was done on pregnant women with PIH, it was found that there was a significant increase in erythrocytes MDA levels, actives of SOD and GP level.\(^9\)

In contrast to the present study, some studies have reported that there are no evidences of increased lipid peroxidation in PIH.\(^11\)

**CONCLUSION**

On the basis of the results of the present study, it may be concluded that PIH is associated with generation of free radical. Oxidative stress, therefore, has the potential for being used as a marker for PIH. However, further studies are needed to assess the oxidative stress in PIH.

**REFERENCES**