

Study of Oxidative Stress in Patients of Pregnancy Induced Hypertension

Dhananjay V. Bhale^{*}, Roshan K. Mahat^{**}

^{*}Professor and HOD, ^{**}PG Student, Department Of Biochemistry, MGM Medical College, Aurangabad, Maharashtra, INDIA.

*Corresponding Address:

dr.bhale@gmail.com

Research Article

Abstract: In Pregnancy Induced Hypertension many complex homeostatic modifications occur, some are harmful to the mother and foetus, while others are beneficial. Lipid peroxidation is an important causative factor in the pathogenesis of pregnancy induced hypertension. **Pregnancy Induced** The objective of this study was to determine the serum Malondialdehyde (MDA) as a marker of oxidative stress 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 Pregnancy Induced Hypertension (PIH) age group of 20-40 years and age and sex matched controls. Serum malondialdehyde (MDA) was estimated by method of Nourooz-zadeh J *et al.* using trichloro acetic 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.

Key words: P.I.H.:Pregnancy induced hypertension ,preeclampsia.

Introduction

Hypertension (PIH) is a leading cause of fetal growth retardation, infant morbidity, mortality and maternal death. Despite extensive research, there is a limited knowledge of pathophysiology and etiology of PIH. Recent studies have suggested the role of oxidative stress and altered endothelial function in PIH. Hypertensive disorders are the most common medical complications of pregnancy, with a reported incidence ranging between five to ten percent¹. The incidence varies among different hospitals, regions and countries. In India the incidence of preeclampsia is reported to be 8-10 per cent of the pregnancies². Hypertension in pregnancy strikes mostly the primigravidae after twentieth week of gestation and frequent occurrences are seen near term. It contributes significantly to the cause of maternal and perinatal mortality and morbidity³. PIH includes a group of hypertensive disorders, Gestational hypertension which is without edema and proteinuria, preeclampsia and eclampsia with edema and proteinuria. In Pregnancy Induced Hypertension many complex homeostatic modifications occur, some are harmful to the mother and foetus, while others are beneficial. In health, oxidation by free radicals and neutralization by antioxidants remains in balance. When the reactive oxygen species (ROS) are in abundance, oxidative stress occurs which is thought to be the causative

factor in PIH⁴. 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 & may be a final common pathway leading to tissue damage⁵. Malondialdehyde is an aldehyde considered to be the terminal compound & the most important marker for monitoring lipid peroxidation & oxidative damage induced by ROS which is strongly associated with development of serious disease, it is also considered as a thiobarbituric reactive substance^{6,7}.

Materials and Methods

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

Exclusion Criteria

Illness like anaemia, 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

5 ml 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- Malondialdehyde (MDA). After clot formation, the tubes were centrifuged at 4000 rpm for 10 minutes. Serum thus separated was analyzed immediately for MDA. Serum malondialdehyde (MDA) was estimated by method of Nourooz-zadeh J *et al.*⁸ Statistical analysis was done using SPSS version 16 and student t test.

Result

There was highly significant increase in serum level of MDA in hypertensive pregnant women. This because MDA consider to be the most sensitive & final stage of

peroxidation & it considered as a marker of pro- oxidant level & indicator of oxidative stress & it is the end product of lipid peroxidation. The values obtained on analyzing specimens collected form PIH and normal pregnant groups are tabulated. 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 shows significantly decrease of Haemoglobin level in subjects were observed compared to the controls. MDA significantly increases in PIH as compared to normal pregnant women.

Table 1: Showing the comparable values of MDA in PIH and normal Pregnant women

Women in different groups	MDA(nmol/ml)
Normal pregnant	2.7±0.4
Pregnancy induced hypertension	4.6±0.9*

*p<0.05 in comparison with normal non-pregnant women

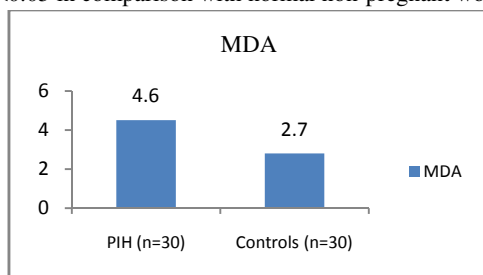


Figure 1: Comparison of MDA in PIH with normal pregnant women (controls)

Discussion

ROS 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 Pregnancy Induced Hypertension (PIH). In the present study, the lipid peroxidation product like malondialdehyde (MDA) levels has been measured in plasma of hypertensive pregnant women. It was found that higher O₂ free radical production, evidenced by increase levels of MDA in hypertensive pregnant women. The present study shows that, there is significant difference between PIH & normal pregnant regarding serum MDA. Rise in MDA could be due to increased generation of reactive oxygen species (ROS) due to the excessive oxidative damage generated in the hypertensive patients.⁹ These O₂ species in turn can oxidize many other important biomolecules including membrane lipids. The lipid peroxides & free radicals may be important in pathogenesis of PIH.¹⁰ In similar previous study was done on pregnant women with pregnancy induced hypertension, it was found

that there was a significant increase in erythrocytes MDA levels, activates of SOD, & GP level.⁹ In contrast to the present study, some studies have reported that there are no evidences of increased lipid peroxidation in PIH.^{11,12}

Conclusion

On the basis of the results of the present study, it may be concluded that pregnancy induced hypertension 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

- Anastasakis E, Papantoniou N, Daskalakis G, et al. Screening for pre-eclampsia by oxidative stress markers and uteroplacental blood flow. *J Obstet Gynaecol.* 2008 Apr;28(3):285-9. doi: 10.1080/01443610802042852.
- Sibai, B.M. (1992). Hypertension in pregnancy. *Obstet. Gynecol. Clin. North Am.* 19, 615.
- Krishna Menon, M.K. and Palaniappan, B. (1994). Hypertensive disorders of pregnancy. In Mudaliar Menon (ed.). *Clinical Obstetrics.* 9th edn. Orient Longman, Madras, 133-154.
- National High Blood Pressure Education Programme Working Group. 1990.
- Agarwal A, Gupta S, Sharma R K. (2005). *Reprod Biol Endocrinol.* 3: 28
- Taylor RN, De Groot CJ., Cho YK., Lim KH. Circulating factors as markers & mediators of endothelial cell dysfunction in preeclampsia. *Semin Reprod. Endocrinol.* 1998; 16:17-31.
- Subdhi, AW., Davis SL., Kipp, RW. Antioxidant status & oxidative stress in elite alpine ski races. *Int. J. Sport Nutr. Exerc. Metab.* 2001;11(1):32-4.
- Hong YL., Yeh SL., Chang., CY. Total plasma Malondialdehyde levels in 16 Tawianese college students determined by various Thiobarbituric acid tests & an improved high performance liquid chromatography based method. *Clin. Biochem.* 2000; 33(8): 619-25.
- Nourooz-zadeh J, Tajaddini Sarmadi J, MC Carthy. S. et al. elevated levels of authentic plasma hydroperoxides in NIDDM, *Diabetes* 1995;44: 1054-1058.
- Mohan, KS., & Venkataramana, G. Status of lipid peroxidation, Glutathione, ascorbic acid, vitamin E & antioxidant enzymes in patients with Pregnancy induced hypertension. *Indian J. Physiol. Pharmacol.* 2007;51(3): 284-88.
- Aksoy, H., Taysi, S. Bakan, E. Antioxidant potential & transferring & lipid peroxidation in women with preeclampsia. *J. Invest. Med.* 2003; 51: 284-87.
- Regan, CL., Levine, RJ., Baird, DD. No evidence for lipid peroxidation in severe preeclampsia. *Am. J. Obstet. Gynecol.* 2001; 185: 572-78.
- Anastasakis E, Papantoniou N, Daskalakis G, et al. Screening for pre-eclampsia by oxidative stress markers and uteroplacental blood flow. *J Obstet Gynaecol.* 2008 Apr;28(3):285-9.