

LIPID PEROXIDATION IN PREECLAMPSIA

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ABSTRACT: Hypertension in pregnancy is a leading cause of both maternal and fetal mortality and morbidity. Preeclampsia is characterised by hypertension and proteinuria. Lipid peroxidation is an important factor in the pathophysiology of Preeclampsia. The present study was undertaken to determine Serum Malondialdehyde (MDA) levels, a product of lipid peroxidation, in clinically diagnosed Preeclamptic women (n=30) and the values were compared with that of Normotensive pregnant women (n=30) aged between 18-30yrs. All of them were in their third trimester and were primigravida. Serum MDA was estimated by TBARS (thiobarbituric acid reactive substances) method. We observed that Serum MDA levels were significantly increased in Preeclamptic women (p <0.000) as compared to that of Normotensive pregnant women. Increased levels of lipid peroxidation product - MDA may contribute to the pathophysiology of Preeclampsia.

Key Words: MDA, Preeclampsia, Oxidative Stress

INTRODUCTION

Preeclampsia is a multisystem disorder characterised by hypertension to the extent of 140/90 mm of Hg or more, proteinuria (≥ 300 mg/day) and edema induced by pregnancy after twentieth week (Pradnya Phalak et al, 2013). In India, the incidence of Preeclampsia is reported to be 8-10% of the pregnancies (Dhananjaya BS et al, 2012). It contributes significantly to maternal and fetal morbidity and mortality. Recent studies have suggested the role of oxidative stress and altered endothelial cell function in Preeclampsia. In health, oxidation by free radicals and neutralisation 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 Pregnancy Induced Hypertension (PIH) (Dhananjay V Bhale et al, 2013). Oxidative stress describes the damage that occurs when reactive oxygen species (ROS) overwhelm the antioxidant defences of the host. Oxidative stress may play an important role in the pathogenesis of Preeclampsia and may be a final common pathway leading to tissue damage (Agarwal A et al, 2005). Malondialdehyde, is an aldehyde considered to be the terminal compound and the most important marker for monitoring lipid peroxidation and oxidative damage induced by reactive oxygen species (ROS) which is strongly associated with the development of severe disease. It is also considered as thiobarbituric reactive substance (TBARS) (Taylor RN et al 1998, Subdhi AW et al 2001).

MATERIALS AND METHODS

Thirty cases of Preeclampsia and thirty Normotensive Pregnant women attending antenatal clinic at Narayana General Hospital Nellore were enrolled for the study after taking informed consent. Both cases and controls were primigravida, between 18 – 30 yrs of age and were in their third trimester.

Inclusion criteria: Women with Preeclampsia diagnosed based on definition of American College of Obstetricians and Gynecologists (ACOG)s : 1) Systolic Blood Pressure greater than 140 mm of Hg or rise of at least 30 mm of Hg or 2) Diastolic Blood Pressure greater than 90 mm of Hg or rise of at least 15 mm of Hg (manifested on two occasions at least 6 hrs apart) and 3) Proteinuria of 300 mg or greater in 24 hrs urine collection or protein concentration of 1 gm/litre (on two occasions at least 6 hrs apart) (Patil Sadanand B et al 2012). Subjects with normal pregnancy were normotensive and had no proteinuria.

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. Blood samples were collected, the serum was separated and analysed for Malondialdehyde (MDA), a lipid peroxidation product, by Thiobarbituric acid reactive substances (TBARS) method.

Statistical analysis: Data was analysed using statistical software SPSS version 20. Values are expressed as mean \pm SEM. Comparison of values between cases and controls was done using Student's t test. A p value of less than 0.05 was considered statistically significant.

Table 1: Comparison of Serum MDA levels in Preeclampsia and Normotensive Pregnant Women

Parameter	Preeclamptic Women (n=30) Mean \pm SEM	Normal Pregnant Women (n=30) Mean \pm SEM	P value
MDA (nmol/ml)	24.4 \pm 2.38	7.9 \pm 0.28	0.000*

* p values < 0.05 statistically significant. n = number of subjects

RESULTS AND DISCUSSION

Preeclampsia can have significant impact on health of both mother and fetus. In present study, we observed that serum MDA levels were significantly increased in preeclamptic women as compared to that of normotensive pregnant women (p value < 0.000). Similar observations were noted by others (Kashinakunti SV et al, 2010, Sheena PS et al, 2010, Shikha Saxena et al, 2014). In contrast to our study, few studies have reported that there are no evidences of increased lipid peroxidation in preeclampsia (Bowen RS et al 2001, Raijmaker MT et al 2004)

Despite considerable research, the cause of Preeclampsia remains unclear. The key event resulting in the diverse clinical manifestations of preeclampsia is maternal endothelial cell dysfunction (Ullas kamath et al 2011). It has been suggested that free radicals are likely promoters of this maternal endothelial cell dysfunction. (Palan PR et al 2001). One of the important consequences of free radical formation is lipid peroxidation which is reaction of oxidative deterioration of polyunsaturated fatty acids involving direct reaction of oxygen and lipid to form lipid peroxides. Lipid peroxidation is particularly damaging because it proceeds as self perpetuating chain reaction (Phalak P et al 2013).

In view of its potentially destructive character, uncontrolled lipid peroxidation has been suggested as an etiological factor in Preeclampsia. Lipid peroxidation products are the candidate factors that may mediate disturbance of the maternal vascular endothelium. These products may inhibit prostacyclin synthesis and stimulate smooth muscle contraction resulting in wide spread vasospasm, a prominent feature of Preeclampsia (Anjum Sayyed et al 2013)

CONCLUSION

We conclude that Preeclampsia is associated with free radical generation. Thus estimation of MDA may have a predictive role in the assessment of the extent of endothelial damage in Preeclampsia and may help in preventing or foreseeing complications in Preeclampsia. As oxidative stress can provoke endothelial cell dysfunction, pregnant and preeclamptic women should be supplemented with antioxidants to prevent overwhelming effect of oxidative stress.

REFERENCES

- Agarwal A, Gupta S, Sharma RK (2005). Role of Oxidative stress in female reproduction. *Reprod Biol endocrinol*, 3: 28.
- Anjum Sayyed, Alka Sontakke (2013). Study of Lipid Peroxidation and Antioxidant Status in Preeclampsia. *Journal of Krishna Institute Of Medical Sciences University*, volume 2, number 2, 69-76.
- Bowen RS, Moodley J, Dutton MF, Theron (2001). Oxidative stress in Preeclampsia. *Acta Obstet Gynecol Scand*. 80, 719:725.
- Dhananjaya BS, Venkatesh G, Sendhil Kumaran D (2012). Study of correlation between oxidative stress parameters and severity of Preeclampsia. *International Journal of Biological and Medical Research*, 3 (1), 1260 -1262.
- Dhananjay V. Bhale, Roshan K. Mahat (2013). Study of Oxidative stress in patients of Pregnancy Induced Hypertension. *International Journal of Recent Trends in Science and Technology*, volume 9, issue 1, 155-156.
- Kashinakunti SV, Sunitha H, Gurupadappa DS, Shankarprasad, Suryaprakash G, Ingin JB (2010). Lipid peroxidation and antioxidant status in Preeclampsia. *Al Ameen, J Med Sci*, 3 (1):38-41.

- Palan PR, Mikhail MS, Romney SL (2001). Placental and serum levels of carotenoids in Preeclampsia. *Obstet Gynecol*, 98(3): 459-62.
- Patil Sadanand B , Kodliwadmath Mallikarjun V, (Mrs) Kodliwadmath Sheela M , Patil Mamatha B (2012). Lipid Peroxidation and NonEnzymatic Antioxidants Status in Preeclampsia and Postpartum Preeclamptic Women. *National Journal of Basic Medical Sciences*, volume III, issue 1, 39- 43.
- Pradnya Phalak , Jyoti kulkarni , Mona Tilak , A.P.Thorat (2013). Role of lipid peroxidation and antioxidant status in pathogenesis of Preeclampsia. *Indian Journal of Basic and Applied Medical Research*, volume 2, issue 6, 536-539.
- Raijmaker MT, van Tits BJ, Hak-Lemmers HL (2004). Low plasma levels of oxidised low density lipoprotein in Preeclampsia. *Acta Obstet Gynecol Scand*. 83(12):1173-1177.
- Sheena PS (2012). Comparative study oxidative stress in Pregnancy Induced Hypertension, Preeclampsia and Eclampsia. *International Journal of Biomedical and Advance Research*, 3 (11): 810-814.
- .Shikha Saxena, Prem Chandra Srivastava, K.V.Thimmaraju, Biswajit Das, Ayaz K Mallick (2014). Study of Serum Malondialdehyde and uric acid in Pregnancy Induced Hypertension and its medicolegal significance. *J Indian Acad Forensic Med.*, volume 36, number 1, 55-60.
- Subdhi AW, Davis SL, Kipp RW (2001). Antioxidant status and oxidative stress in elite alpine ski races. *Int. J. Sport Nutr. Exerc .Metab*. 11(1): 32.
- Taylor RN, DeGroot CJ, Cho YK, Lim KH (1998). Circulating factors as markers and mediators of endothelial cell dysfunction in Preeclampsia. *Semin. Reprod. Endocrinol.* , 16:17-31.
- Ullas Kamath, Guruprasad Rao, Shobha U Kamath, Lavanya Ra i (2011). Maternal and fetal indicators of oxidative stress during Pregnancy Induced Hypertension (PIH). *International Journal Of Applied Biology and Pharmaceutical Technology (IJABPT)*, Volume 2, issue 2, 405-410.

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