

Oxidative Stress Marker and Antioxidants in Amniotic Fluid in PIH

Kalpna Lohiya*

Department of Biochemistry, SRTR Govt. Medical College, Ambajogai, Maharashtra, India

ABOUT THE STUDY

Birth of a mature and innocent baby is one of the amazing creatures of the nature. Power of creativity makes mother strong and satisfied. Though safe and secure pregnancy is a dream of every woman, hypertension occurs in 7%-9% of all pregnancies (ACOG, 2000). Pre-Eclampsia (PE) accounts for about 8% of these cases (Von Dadelszen and Magree, 2000). Pregnancy is a physiological stressful condition with an increased requirement of tissue oxygen because of a rapidly developing embryo and a subsequent fetal growth. The fetus is surrounded by Amniotic Fluid (AF). AF plays an important role in fetal development and growth. It originates from maternal and fetal tissues. It reflects the fetal situation. AF is an aquatic and sterile environment where fetuses can easily move. It provides protection to the fetus against external injury [1]. Provides a constant temperature to protect from heat and loss. It gives cushioning effect to fetus.

One of the most common and potential life threatening complications of pregnancy is Pregnancy Induced Hypertension (PIH). Frequency is 5%-15% in general population of pregnant women. Pregnancy Induced Hypertension (PIH) is a syndrome of hypertension in pregnancy, with or without proteinuria and edema. Hypertensive disorders are the most common medical complication of pregnancy and the major cause of maternal and infant disease and death worldwide. Small vessel spasm is considered the most important cause for hypertension in pregnant and non-pregnant state. The major risk to the fetus results from decreased placental perfusion leading to decreased supply of oxygen and nutrients necessary for fetal growth and wellbeing. The etiology of this disease remains unclear, but pathophysiology occur during pregnancy are vasoconstriction and coagulation which leads to endothelial dysfunction and immune-activation with the development of hypertension during pregnancy, which is the primary cause of Pre-Eclampsia (PE)

The onset of labour is associated with pain, fear, anxiety and hypoxia. Uterin contraction reduces blood flow leading to tissue ischemia and reperfusion which induces the production of Free Radicals (FR). Pregnancy represents a complex state in

reproductive biology in which the mother and the fetus may is increased cardiac output due to increased blood volume, which results in oxidative stress [2]. If production of Reactive Oxygen Species (ROS) overwhelms total antioxidant capacity of cell, condition is known as oxidative stress, leading to the generation of FR. ROS include molecules like hydrogen peroxide; ions like hypochlorite ion; radicals like the hydroxyl radical; and the superoxide anion which is both ion and radical.

ROS are products of the body's incomplete reduction of oxygen molecules. It is assumed that numerous anatomical, physiological and metabolic changes occur in mother's body during pregnancy and they support the production of ROS. Placenta filled with mitochondria is the main source of ROS. Free radicals are cluster of atoms that contain an unpaired electron in their outermost orbit of electrons. The free radicals can have deleterious effects during pregnancy by triggering pre-eclampsia and PIH. In recent days, lipid peroxidation has drawn much attention. The increase in lipid peroxidation has been related to the pathogenesis of many degenerative disorders such as oxidative damage to DNA.

The present study was conducted at Department of Biochemistry of our institute. Thirty patients with Pregnancy Induced Hypertension, (PIH) were admitted in labor room in hospital. Control group consist of thirty normal healthy pregnant women admitted in labor room of hospital having same age and socio-economic status [3]. Blood stained amniotic fluid samples were excluded from the study. Amniotic fluid samples were collected by Artificial Rupture of Membrane (ARM) in sterile test tube, shortly prior to delivery. Samples were centrifuged and processed for respective parameters early as possible.

Following biochemical parameters were studied in amniotic fluid.

- Thiobarbituric Acid Reactive Substances.(TBARS)
- VitaminC
- VitaminA
- SOD

Correspondence to: Kalpna Lohiya, Department of Biochemistry, SRTR Govt. Medical College, Ambajogai, Maharashtra, India, E-mail: klplhya@gmail.com

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Table 1: Demographic data of Controls and PIH cases.

Character		Control	PIH	"p" Value
		(Mean SD)	± (Mean SD)	±
Number of cases		30	30	30
Age (years)		23.96±2.44	24.95±2.82	N. S.
B. P.	Systolic (mmHg)	113.4±4.60	144.16±2.28	p<0.01
	Diastolic (mmHg)	74.7±2.36	95.6±1.60	p<0.01

There is no significant difference in age between controls and cases, but there is significant increase in blood pressure ($p<0.01$) in PIH cases as compared to controls. (Table 1)

Table 2: Comparison of Oxidants and Antioxidants between Controls and Cases.

Parameters	Controls	PIH Cases	p Value
Lipid Peroxides (TBARS) nmol/ml	0.033±0.74	0.202±0.163	p<0.05
Vitamin C (ug/ml)	5.436±1.30	2.433±0.71	p<0.01
Vitamin A (ug/dl)	23.06±7.86	15.07±4.78	p<0.05
SOD (U/ml)	0.145±0.124	0.075±0.022	p<0.001

There is significant increase in Lipid peroxides (TBARS) levels in PIH cases than Controls and Significant decrease in Vitamin C ($p<0.01$) and Vitamin A ($p<0.05$) levels in PIH cases than Controls.

There is highly significant decrease in SOD levels ($p<0.001$) in PIH cases as compared to controls (Table 2).

Discussion

Reactive oxygen species and antioxidants have been studied by many authors in maternal and fetal serum, but there are very few studies in amniotic fluid. Keeping this in mind, the present study was undertaken to evaluate the status of Thiobarbituric Acid Reactive Species (TBARS) and antioxidants in amniotic fluid in normal pregnant women and in PIH. In our study we observed the increase in systolic and diastolic blood pressure in PIH cases. Free radicals may trigger blood pressure. Oxidative stress caused due to increased lipid peroxides plays an important role in pathogenesis of preeclampsia.

In the present study, we observed a significant rise in lipid peroxidation product (TBARS) in PIH cases than control ($p<0.05$). Increased oxidative stress may be responsible for increasing lipid peroxidation product levels in PIH cases [4,5]. Recognition of lipid peroxidation involvement in the pathogenesis of disease is important because the deleterious effects of this process might be prevented by administration of scavenging systems; antioxidants. In our study we observed significant decrease in the levels of antioxidant vitamin C in PIH cases than the controls ($p<0.01$). Vitamin C as a water soluble antioxidant, trap most of the Free radicals present in aqueous phase of plasma. It functions as the first line antioxidant defense against free radicals present primarily in the plasma. So they get utilized primarily by the free radicals. This may be the reason that Vitamin C shows significant low levels.

CONCLUSION

The marked decrease in the levels of lipid soluble antioxidant vitamin A in PIH than controls ($p<0.05$). When capacity of free radicals exceeded than water soluble antioxidants, free radicals can then diffuse to cell membrane, initiating lipid peroxidation. So lipid soluble antioxidants may be utilized after utilization of water soluble antioxidants. This may be the reason of decreasing vitamin A levels in PIH. Antioxidant is a molecule capable of slowing or preventing the oxidation of free radicals. The significant decrease in the levels of SOD in PIH than in controls ($p<0.001$) If the generation of harmful radicals exceeded than the capacity of cells to protect against them then these radicals scavenges chain breaking antioxidants like SOD. This results in decreased values of SOD. Because of the strenuous nutritional demands of a growing fetus, pregnancy represents nutritionally perilous state for every pregnant woman as she provides nutrients to support her child's rapid growth in addition to fulfill her own metabolic needs.

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