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Study on Antioxidant Status in Mother and Their Newborn According To Birth weight

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ABSTRACT

In healthy humans, a balance exists between oxygen-derived free-radical production and their removal by antioxidants. In newborn inadequate antioxidant defences may contribute to the pathogenesis and some complications of prematurity. 60 Newborn and their mother were analyzed for antioxidative status. The purpose of this study to measure birth weight of new born babies as well as determining cord blood total antioxidant status. Serum extracted from cord blood of subjects was used for the laboratory determination of Antioxidant status, malondialdehyde. There were positive correlations between birth weight and AOS(r= 0.761,p<.0001) There were significant negative correlations between birth weight and MDA(r=-0.739; p<.0001)

Keywords: Antioxidant status, malondialdehyde, Pregnancy, Birthweight

INTRODUCTION

Pregnancy is a state in which adaptation and balance between oxidant and antioxidant may be easily disrupted. Oxidative stress is normally high during pregnancy than a normal mother due to increased oxygen consumption and energy needs. Newborn are more susceptible to oxidative stress due to increase production of free radical at birth and incompletely developed antioxidant mechanism. Antioxidants are first line of defence and have protective effect from the action of free radicals. Glutathione peroxidase, superoxide dismutase, vitamins as well as uric acid are antioxidants expected to counteract the effects of free radical injury. The level of antioxidant in low birth weight babies is significantly low in cord blood1. According to WHO, weight of less than 2500 gm (2.5 Kg) at the time of birth is considered low birth weight infants 2. Further, oxidative stress in various studies has emerged as a likely promoter of pregnancies related disorders several like spontaneous abortion, pre-term labor and low birth weight3. Free radicals have the ability to bind most normal cellular component. They react with

membrane bond, lipids, denature protein and attack nucleic acid. A variety of products are produced from decomposition of lipid peroxide such as MDA (malondialdehyde). Using the total antioxidant assay, the antioxidant status of preterm babies has been shown, in one study to be depressed when compared with term babies4. Preterm infants are deficient in antioxidant and are under increased oxidative stress. Due to enhanced free radical generation and immature antioxidant mechanism birth related complications like low birth weight and increased mortality5. Significant structural alteration takes place and lead to cell death by apoptosis andnecrosis6

MATERIAL AND METHODS

The Study was conducted in the Department of Biochemistry, S.M.S. Medical College and Hospital Jaipur. Subjects were selected among those attending the Department of Obstetrics and Gynecology, Mahila Chikitsalya, S.M.S. medical college Jaipur. 60 healthy normal newborn (at term) and their

mothers were recruited for the study. Women with prolong labor and those with fetal congenital malformation, hypertensive, diabetic, preeclampsia, eclampsia and smokers were excluded from the study. Cord blood sample was collected from new baby's immediately after delivery born and centrifuged 3000rpm for 10minutes at and supernatant was extracted into plain screw cap specimen bottle. The serum was therefore kept frozen until laboratory analysis. Babies were also weighed in kilogram. For mother blood sample were collected from pregnant anticubital vein of women. Biochemical Analysis Total antioxidant status was measured using method of (Koracevic et al., 2001)7. Malondialdehyde was estimated by +thiobarbituric acid (TBA) assay method of Buege & Aust, 1978 on spectrophotometer8.

Table 1 shows comparison of AOS in newborn and their mother according to newborn birth weight. A significant increase in cord blood antioxidant Status with birth weight of Newborn seen. Antioxidant Status in group 1 (Birth weight < 2.25Kg) was 1.16 ± 0.43 mmol/l followed by 1.91 ± 0.57 mmol/l in 2, (birth weight 2.25-3.5Kg) group and 2.82 ± 0.44 mmol/l group 3(birth weight >3.5 Kg) (Table 1). Similarly serum antioxidant Status was found to be significantly low in low birth weight babies' mother. Positive correlation was seen between newborn antioxidant status level and Birth Weight (r=0.761, p<.0001) Similarly serum antioxidant activity was found to be significantly low in low birth weight babies' mother i.e. 1.41±0.56 mmol/l as compare to normal 2.25-3.5 Kg and high birth weight >3.5 Kg babies' mother respectively 2.17±0.55' mmol/l and 3.03±0.75 mmol/l

RESULTS:

Group	Newborn		Mother		
	mean±S.D.	Range	mean±S.D.	Range	
	(mmol/l)	(mmol/l)	(mmol/l)	(mmol/l)	
Group 1	1.16±0.43	0.60-2.3	1.41±0.56	0.46-3.0	
(N = 20)					
Group 2	1.91±0.57	1.0-3.0	2.17±0.55	1.2-3.5	
(N = 30)					
Group 3	2.82±0.44	2.0-3.5	3.03±0.75	1.5-3.73	
(N =10)					

Table 1: Antioxidant Status in Newborn and their Mother according to Birth Weight

AOA : Antioxidant Status

Table 2: shows MDA (malondialdehyde) in group 1 was $2.54\pm0.82 \mu mol/l$, group 2 Newborn was $1.85\pm.425 \mu mol/l$ and in group 3 Newborn was $1.07\pm0.25 \mu mol/l$.Mean MDA(malondialdehyde) was found to be significantly high in low birth weight < 2.25Kg babies' mother i.e. $3.01\pm0.50 \mu mol/l$ as compared to normal 2.25-3.5 Kg and high birth weight >3.5 Kg babies' mother i.e. $2.64\pm0.6 \mu mol/l$ and $1.98\pm0.61 \mu mol/l$ respectively. Such association indicates enhance oxidative stress in low birth weight children.

Table 2:	Serum	Malondialdeh	vde (MDA) in newborı	ı and their n	nother according	ng to birth	weight
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Group	Newborn		Mother	
	mean±S.D.	Range	mean±S.D.	Range
	(µmol/l)	(µmol/l)	(µmol/l)	(µmol/l)

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Group 1	2.54±0.82	1.6-3.84	3.01±0.50	2.08-4.0
(N=20)				
Group 2	1.85±0.42	1.28-3.04	2.64±0.60	1.76-4.8
(N=30)				
Group 3	1.07±0.25	0.64-1.44	1.98±0.61	1.12-3.2
(N=10)				

MDA : malondialdehyde

Positive Correlation was seen between Birth Weight and Antioxidant Activity (r=0.761, p<0.0001). MDA (malondialdehyde) of Newborn was negatively and strongly associated to their Birth Weight (r=-0.739, p<0.0001).Similarly Positive Correlation was seen between Birth Weight and Antioxidant Activity of Mother (r=0.612, p<0.0001). MDA (malondialdehyde) of Mother was negatively and strongly associated to Birth Weight (r=-0.558, p<0.0001)(Table 3)

Table 3: Correlation between birth weight and with various parameters of Newborn and mother

Parameters	Correlation	Correlation	P – Value
	coefficient	Coefficient	
	Newborn(r)	Mother(r)	
Antioxidant Status	0.761	0.612	< 0.0001*
(mmol/l)			
Malondialdehyde(MDA)	-0.739	-0.558	< 0.0001*
(µmol/l)			

*The mean difference is significant at P < 0.001



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DISSCUSSION: The present study showed association between oxidant/Antioxidants and birth weight in newborn and their mother. Oxidative state of newborn was studied in the umbilical cord blood immediately after birth. Oxidative stress in babies results of generation of free radical in excess of the available antioxidants. The positive correlation of newborn birth weight to TAS as well as negative correlation with MDA observed in our study shows enhanced oxidative stress in low birth weight infants as compare to normal Birth Weight infant. Increase dietary resources' of antioxidant like β-Carotene should be supplemented during pregnancy. Further, it was seen that Antioxidant Activity in mother increases with increase in newborn antioxidant activity such positive correlation between mother's and newborn antioxidant activity indicates that the nutritional status of mother does influence nutritional status of newborn. The study of oxidative stress during pregnancy represents an efficient way of managing risk to the fetus. Poor fetal growth may further compromise the development of antioxidant defenses of pre-term babies, predisposing them to higher oxidative stress, which in turn may partly account for increased morbidity and mortality in these infants. Normal to high birth weight newborns are less exposed to oxidative stress which is a protective factor for them. This in term affect fetal growth and development improved birth weight, enhance their survival rate and their resistance to disease. Thus improvement in nutritional status specially Antioxidant level in mothers could reduce the risk of oxidative stress in newborn and improve their Birth Weight.

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