

STUDY OF OXIDANT MDA AND ANTIOXIDANTS SOD AND CATALASE IN PREGNANT & NON-PRENANT WOMEN

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ABSTRACT

Introduction: Pregnancy is state of dynamic changes in body systems resulting in increased oxygen consumption. Pregnancy is associated with oxidative stress. Reactive oxygen species (ROS), are main causes of oxidative stress (OS) which are generated constantly by external and internal stimuli. ROS causes cellular injury by attacking the phospholipids of cell membranes and reacting with polyunsaturated fatty acids commonly associated with disorders of pregnancy. Aim of this study was to evaluate the level of pro-oxidant and antioxidant in healthy non pregnant and pregnant women. **Materials and methods:** Parameters of the oxidative status Malondialdehyde and antioxidant Superoxide dismutase and Catalase was estimated in serum of 35 non pregnant and 35 pregnant women in the age group of 20-40 years. **Results:** Findings were, that there was an increase in Malondialdehyde levels ($p < 0.0001$) and a decrease in superoxide dismutase and catalase activities ($P < 0.0001$ and $P < 0.0001$) in pregnant women significantly.

Conclusion: This study shows that there was difference in oxidative status due to dynamic changes in body and circulation that are inherent. During pregnancy oxidative stress is increased that can be fatal to the health of the mother and the fetus.

Keywords: Oxidative stress, Antioxidants, Normal pregnancy, Whole blood, Serum, MDA, SOD, Catalase

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INTRODUCTION:

Pregnancy is a stressful condition known to be associated with alteration in physiological and metabolic functions of the woman's life.^[1] due to which dramatic and remarkable changes occur during Pregnancy to promote and sustain the growth and maintenance of fetus.^[2] There is drastic increase in oxygen demands and energetic during the Pregnancy for an adequate fetal growth and development. That's why, during the period of Pregnancy oxidative stress is experience by both mother and fetus.^[3] In all cells and tissues lipid peroxidation occurs at low level which is an oxidative process.^[4] Increased lipid peroxidation and decreased antioxidant activity are main cause of complications in pregnancy.^[5] Generation of reactive oxygen species in late pregnancy may be due to negative energy equilibrium. According to Palan et al Oxidative stress is due to excess presence of Reactive Oxygen Species than antioxidants.^[6] While according to Sies and Page disturbance in the balance of prooxidant-antioxidant lead to Oxidative stress.^[7,8] Generation of ROS due to various diseases like atherosclerosis, cancers, pre-eclampsia and many other diseases of the female reproductive tract can result in pathologies affecting female reproduction.^[9,10,11] Oxidative stress is estimated by Malondialdehyde (MDA) level i.e ; measure product of lipid Peroxidation. Peroxides and free radicals induce damage to the body macromolecules and DNA. The level of the oxidants is controlled by antioxidant.^[12,13] An antioxidants are the molecules that scavenge the pro- oxidants . These antioxidant defense mechanisms can be categorized into two types-free radical scavenging and chain breaking antioxidants. Certain biochemical parameters are helpful to assess the progression of pregnancy related problems. Catalase is a

hemoprotein contain four heme groups and encoded by gene in 11th chromosome present in almost every organism. However, most organisms have more than one type of catalase. In human , this enzyme can be produce in the blood , bone marrow , mucous membranes , kidney and liver.^[14] Acatalesemia is an condition mark by low catalase level and elevated oxidative level due to mutation.^[15]

AIMS AND OBJECTIVES:

Aim was to do Comparative study of the oxidative status in pregnant and non-pregnant women.

Objectives: To estimate the Malondialdehyde, Superoxide dismutase and catalase levels in pregnant and non pregnant women

MATERIALS AND METHODS:

This study was conducted in Santosh Medical College and Hospital (Santosh University), Ghaziabad, India and S.M.M.H. Medical College Saharanpur, Uttar Pradesh the Department of Obs. & Gynae and Department of Biochemistry,. Clinically diagnosed & confirmed cases pregnancy in age group 20 to 40 years. The study was approved by the Institute Ethics Committee. Under aseptic conditions 5 ml of sample was collected, After centrifugation, the serum was used for the analysis of MDA , Catalase and SOD using Systronics UV-Visible Double Beam Spectrophotometer 2205, 35 sample of cases(pregnant women) and 35 sample of controls (Normal women) (total 70) was calected.

INCLUSION: Normal Pregnant women of age 20-40 year

EXCLUSION: Subject suffering from any chronic disease, acute infection, diabetes mellitus and anaemic(<6.0 gm% of Hb).

Biochemical measurement

1. Estimation of Malondialdehyde (MDA) was done by Satoh K. (1978) Method.^[16]
2. Estimation of Superoxide dismutase (SOD) was done by Nitroblue tetrazolium (NBT)method^[17]
3. Estimation of catalase activity by ashok k.sinha et .al. (1972) method^[18]

OBSERVATIONS AND RESULT:

Table-1: Comparison of level of MDA between both cases and controls

Groups	MDA (µmol/L)
Cases	4.39±0.98
Controls	1.51±0.70
p-value ¹	0.0001*

Table-1 & Fig.1:- Shows the comparison of level of MDA between both cases and controls. MDA was higher and significant (p=0.0001) among cases than controls.

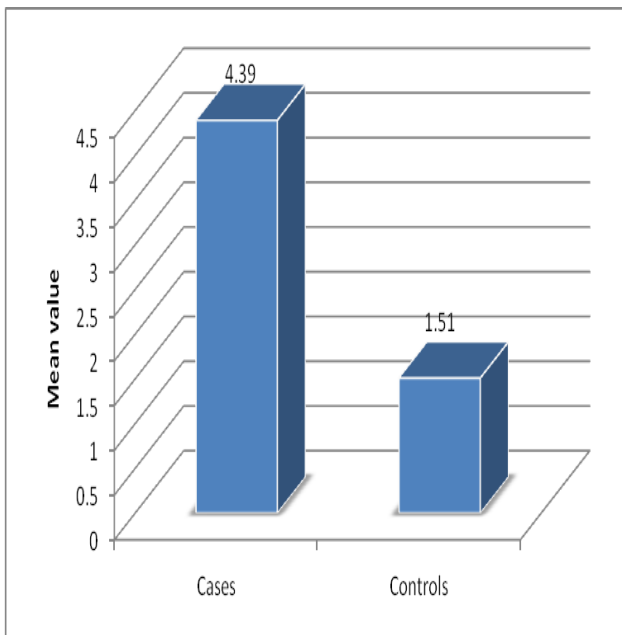


Fig. 1: Comparison of level of MDA between cases and controls

Table-2: Comparison of level of SOD between both cases and controls

Groups	SOD (U/mg protein/min)
Cases	0.44±0.06
Controls	0.96±0.04
p-value ¹	0.0001*

Table-2 & Fig.2:- Shows the comparison of level of SOD between both cases and controls. SOD was lower significantly (p=0.0001) among cases as compared with controls.

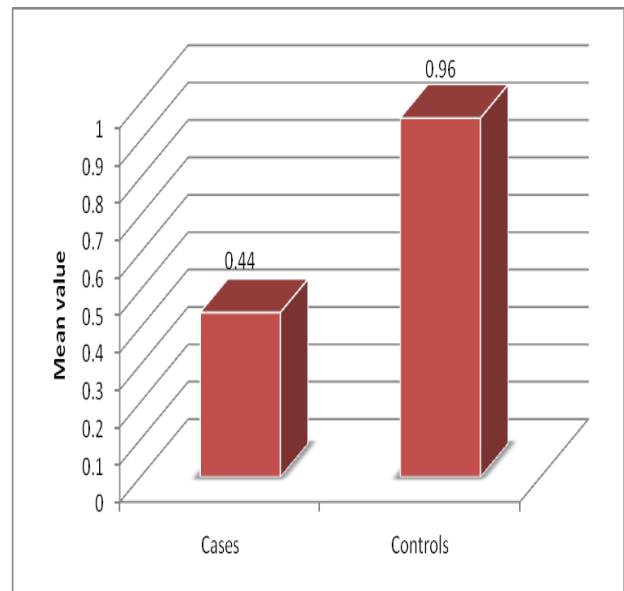


Fig. 2: Comparison of level of SOD between cases and controls

Table-3: Comparison of catalase level between both cases and controls

Groups	catalase (units/mg of protein)
Cases	1.52± 0.85
Controls	3.94±1.18
p-value ¹	0.0001*

Table-3 & Fig.3:- Shows the comparison of catalase level between both cases and controls. catalase was lower significantly ($p=0.0001$) among cases as compared with controls

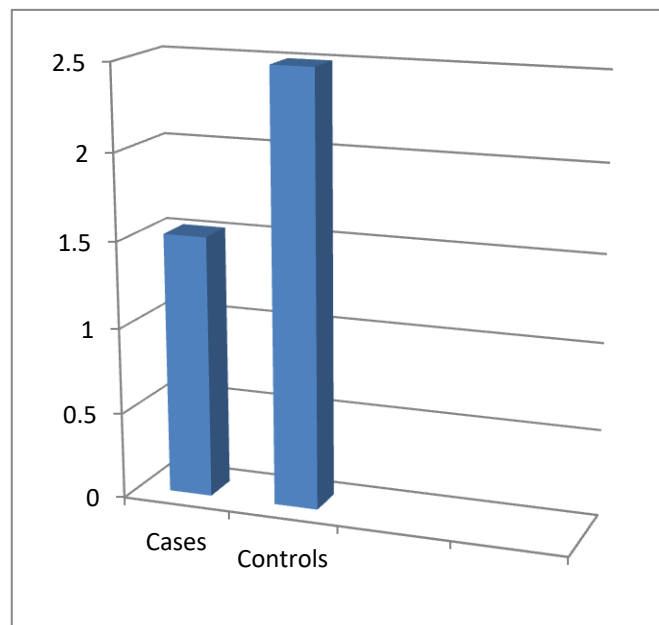


Fig. 3: Comparison of catalase level between cases and controls

A highly significant increase ($p<0.0001$) was found in the levels of Malondialdehyde (MDA) (table-1, figure-1) and a highly significant decrease ($p<0.0001$) was found in the levels of Superoxide dismutase (SOD) (table-2, figure-2) and catalase (table-3, figure-3) in Pregnant women as compared to Non-Pregnant women.

DISCUSSION:

There is increase in oxidative stress in normal pregnancy because of high demand of metabolic and increase requirement of tissue oxygen. MDA serves as a reliable marker to assess damage to tissue induced free radical. MDA is a stable end product of free radicals which is produced by lipid peroxidation. In this study the levels of serum MDA, SOD and catalase were evaluated. The values were compared between Pregnant and Non-Pregnant women. Level of MDA in cases was (4.39 ± 0.98) and (1.51 ± 0.70) in controls. The level of SOD was (0.44 ± 0.06)

in pregnant women and (0.96 ± 0.04) in Non-Pregnant women and in catalase 1.52 ± 0.85 in Pregnant women and 3.94 ± 1.18 in Non-Pregnant women. All the differences were highly statistically significant. We observed that in pregnant women levels of MDA was increase and there was decrease in SOD and catalase levels which was alliance with the results of similar studies. Same results were reported by Ishihara et al.^[19] and Wisdom et al.^[20] both of them studied, lipid peroxide levels in pregnant and non pregnant and find remarkable higher levels of lipoperoxides in pregnant as compared to non-pregnant subjects. This finding are same as the reports made by the study of Toescu et al, Upadhyaya et al and Patil et al they reported that Markers of lipid peroxidation ie (MDA) increased during the progression of normal pregnancy .^[21, 22, 23] Kodliwadmth et al. also observe the same. ^[24] The balance between the production of ROS and activation of antioxidant mechanisms protects the tissues from damage and prevent disorders and the antioxidant system was stronger than peroxidation during pregnancy stipek et al.^[25] and Uotila et al.^[26] Pentieva K et al.^[27] Saikumar P et al.^[28] and Kawashiro Y et al.^[29] reported that LPO increased during the time of pregnancy and LPO decreased as pregnancy progressed was reported by Qanungo S.^[30] The present study was planned to detect lipid peroxidation product while pregnancy a. Since the scope of present study was limited, further large scale studies are required to establish the above fact.

CONCLUSION:

Present study state about the changes that occur in pro-oxidant and antioxidant levels that is either directly or indirectly associated with circulatory changes and this changes are inherent during pregnancy. During pregnancy oxidative stress is increased that can be fatal to the mother and the fetus. Therefore, while

management of pregnancy the above fact should be kept in mind

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