

Outcomes of Oxidative Stress in Spontaneous Miscarriage. A Cross-Sectional Clinical Prospective Study

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ABSTRACT

Aims and Objectives: The aims and objectives of current study were to investigate biological role of enzymatic antioxidants against reactive oxygen species in normal and recent spontaneous miscarriage pregnant women.

Results: In control group mean standard deviation (mean \pm SD), of blood serum levels regarding age, number of spontaneous miscarriages, hemoglobin, random glucose levels, catalase, superoxide dismutase, glutathione peroxidase were (24.8 \pm 23.7, 0.00 \pm 0.01, 15.4 \pm 2.41, 135.95 \pm 3.12, 106.97 \pm 13.94, 12.96 \pm 1.71, 12.50 \pm 6.5) whereas in study group these biomarkers showed a remarkable significant (P<0.005) changes such as (25.1 \pm 13.7, 2.10 \pm 10.01, 13.14 \pm 12.11, 145.65 \pm 7.10, 98.89 \pm 12.84, 10.06 \pm 0.11, 7.20 \pm 1.0) respectively.

Conclusion: The results of this study claimed that in study group the concentration of reactive oxygen species were higher than the enzymatic antioxidants which is a prediction of spontaneous miscarriages in pregnant women.

Keywords: Spontaneous miscarriage, Enzymatic antioxidants, Reactive oxygen species, Gestation

INTRODUCTION

Early pregnancy loss or spontaneous miscarriage or spontaneous abortion are all same terms used for loss of a nonviable, intrauterine pregnancy before 20 weeks gestational age [1]. Spontaneous miscarriage occurred within 20 weeks of gestation naturally and pregnancy become lost [2]. There is a difference in between naturally occurring spontaneous abortion and induced abortion. Different researchers claimed in their studies, the possibilities of spontaneous abortion is very high in first trimester [12]. It has concluded by different researches that in case of asymptomatic spontaneous abortion the death of embryo or fetus is occurred because of insufficient uterine contractions [10].

In a global study it was stated that 27.3 million abortions performed each year in all over the world and it is a significant cause of maternal death [13]. It is reported by considering different case reports and studies that early pregnancy loss and induced abortions are major cause of the maternal deaths because of septicemia and hemorrhage [15]. Spontaneous abortion may be incomplete abortion or complete abortion depends upon the circumstances and medical complications of mother [14]. In recurrent abortion three or more consecutive pregnancy losses are possible and septic abortion caused infections in the biological system.

Oxidative stress is a non-equilibrium state of reactive oxygen species (ROS) and antioxidants in the body [13]. When the concentration of free radicals become increased than the required amount of antioxidants which caused lipid peroxidation [17]. It is a naturally occurring process by which the process of ageing stimulated. In spontaneous abortion oxidative agents play a key role in stress induced cytotoxic and genotoxic [21]. A study indicated that oxidative stress changed the placental movement and its pathophysiology which is a cause of spontaneous abortion [18].

Different researchers described in their studies the role of reactive oxygen species in impaired placental vascularization, oxidative endothelial damage and immune malfunctioning [11]. They claimed that dysfunction of placenta is a major cause of abortion further this situation is created with the formation of extra free radicals than the antioxidants which caused anti-phospholipid syndrome [20]. Multiple physiological and biochemical functions of the biological system like fertilization, embryo development, oocyte maturation and embryo development are disturbed because of oxidative stress [19]. In another study it was seen that oxidative stress resist follicular growth and uterine movement which may cause spontaneous abortion [7].

MATERIALS AND METHODS

Subjects for study: 83 subjects were selected for this study and divided them into two different groups. 43 healthy pregnant women (n=43) were in control group (CG), while in study group (SG) 40 pregnant women (n=40) were those who face current spontaneous miscarriages and complications. The gestational age of pregnant women of study group were 8 to 10 weeks at the time of spontaneous miscarriages. The average age of all subjects in (CG) and (SG) were in between 25-30 years respectively.

Collection of samples: 5 ml blood samples from veins of subjects were taken into chilled tubes conditioning EDTA for parameters observation. Different antioxidant enzymes produced in response of reactive oxygen species in the body are catalase, superoxide dismutase and glutathione peroxidase measured from serum blood through Spectrophotometry kit method assays.

Data analysis: Collected raw data of this study were statistically analyzed by applying SPSS. Version 21, p- Values of each parameter comparison were consider as (p<0.005) and for group comparison chi-test is used. In regression analysis the results of each parameters were presented by tables and graphs.

RESULTS

Table 1: Control group (CG), healthy pregnant women (n= 43)

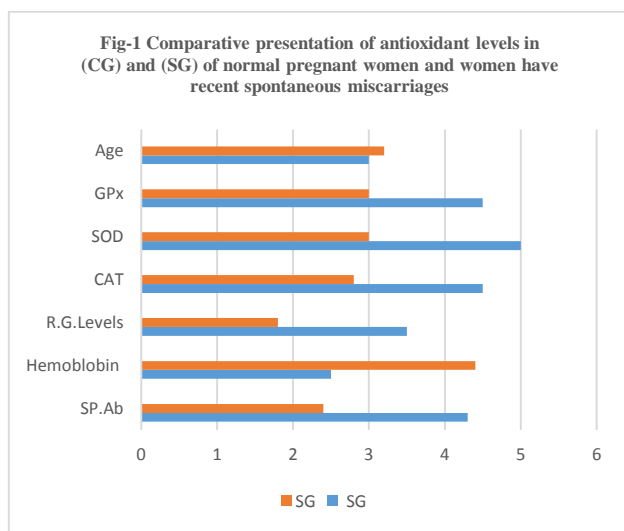
Biomarkers	SI Units	Blood Serum levels (mean \pm SD)	P<0.005
Age		24.8 \pm 23.7	0.001
No of spontaneous miscarriages		0.00 \pm 0.01	0.000
Hemoglobin	g/dl	15.4 \pm 2.41	0.000
Random glucose levels	mg/dl	135.95 \pm 3.12	0.000
Catalase	MU/l	106.97 \pm 13.94	0.000
Superoxide dismutase	u/ml	12.96 \pm 1.71	0.000
Glutathione peroxidase	μ g/mL	12.50 \pm 6.5	0.000

The current study described significant (P<0.005) changes in different parameters of control and study groups of pregnant women. In control group mean standard deviation (mean \pm SD), of blood serum levels regarding age, number of spontaneous miscarriages, hemoglobin, random glucose levels, catalase, superoxide dismutase, glutathione peroxidase were (24.8 \pm 23.7, 0.00 \pm 0.01, 15.4 \pm 2.41, 135.95 \pm 3.12, 106.97 \pm 13.94, 12.96 \pm 1.71, 12.50 \pm 6.5) whereas in study group these biomarkers showed a remarkable significant (P<0.005) changes such as (25.1 \pm 13.7, 2.10 \pm 10.01, 13.14 \pm 12.11, 145.65 \pm 7.10, 98.89 \pm 12.84,

10.06±0.11, 7.20 ± 1.0) respectively. All the significant changes (P<0.005) among normal pregnant women and women have recent spontaneous miscarriages in (CG) and (SG) comparatively presented graphically in Fig-1.

Table 2: Study group (SG), pregnant women have recent spontaneous miscarriages (n=40)

Biomarkers	SI Units	Blood Serum levels (mean ±SD)	P<0.005
Age		25.1±13.7	0.001
No of spontaneous miscarriages		2.10±10.01	0.000
Hemoglobin	g/dl	13.14± 12.11	0.001
Random glucose levels	mg/dl	145.65±7.10	0.003
Catalase	MU/l	98.89 ± 12.84	0.000
Superoxide dismutase	u/ml	10.06±0.11	0.000
Glutathione peroxidase	µg/mL	7.20 ± 1.0	0.002



DISCUSSION

Branch et al., (2010) described in their study that reactive oxygen species (ROS) like superoxide, hydrogen peroxide etc. are produced during different metabolic pathways and these are very harmful for biological system. Biri et al., (2019) elaborated the reduction of ROS through enzymatic antioxidant species such as catalase, superoxide dismutase and glutathione peroxidase. In a study it was claimed that superoxide dismutase convert superoxide free radical into H_2O_2 and O_2 [15]. Similarly hydrogen peroxide converted into water and oxygen with the enzymatic action of catalase [19].

Different researchers mention in their studies that co-factors are not required for the function of catalase and superoxide dismutase [6]. Therefore these antioxidants through their enzymatic mode of action reduces the harmful toxicity of reactive oxygen species in the body [5]. Prooxidative and antioxidative metabolic processes are presentation of physiology of pregnancy [13]. In a study it was noted that the production of reactive oxygen species are directly proportion to the formation of antioxidants but in case of oxidative stress caused disturbance in their equilibrium [19]. When highly reactive metabolites of oxygen become increased the antioxidant defense power decreased and origination of disturbed cellular homeostasis occur [9].

It was concluded in the present study that a significant change (P<0.005) in stress markers such as blood serum levels of

catalase, superoxide dismutase and glutathione peroxidase were seen in study group as compared with the control group. The statistical data of study group showed a remarkable decreased in stress defender enzymes. The blood serum levels of antioxidants are highly significant (P<0.005) and showed a valuable decreased as compared to the control group.

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