Estimation Some Antioxidants Enzymes in Stress Patients in Babylon City

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Abstract

Oxidative stress can be defined as an increase in oxidative parameters or a decline in antioxidant defense mechanisms. Superoxide dismutase (SOD) and catalase (CAT) are antioxidant enzymes. They areresponsible for eliminating free radicals like superoxide and hydrogen peroxide, and they stand forantioxidant defense mechanisms an entire of fifty patients and twenty five control subjects were collected between April to August 2019 several physiological parameters were calculable similar to (SOD, and CAT). The results of present study illustrated that the patients groups, had greater significant differences ($P \leq 0.05$) levels of *SOD*, and *CAT* in contrast with control groups result at significant differences ($P \leq 0.05$).

Conclusion: We found increased SOD and CAT levels were significantly increased in stress patients

Keywards: *Antioxidant, SOD2, stress, Oxidative; health; toxicity.*

Introduction

Stress is a physical and a psychological state always present in a human being, and forming an integral part of his everyday life. An event may be perceived by an individual as stressful,whereas another individual may not see it as such,for example, the experience of travelling by plane may be perceived as marvellous whereas for somebody else it might prove to be severe and anxiety-causing(1).

On the other hand, the same person may find that the same event causes stress in one situation, whereas in another it causes little or no emotional involvement. There are, of course, situations affecting most people (e.g. unemployment,sudden death, earthquake, separation) but each person interprets and assesses every experience based on his subjective criteria and deals with it in his own, unique way(3).

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Stress causing stimuli may be: biological (disease, surgery), chemical (drugs, toxicsubstances), microbial (viruses, bacteria, parasites), psychological (illness, death, separation,divorce, failure), developmental (premature birth, anatomical defects), socio-cultural (inharmonious interpersonal relationships, financial difficulties), environmental (unemployment, atmospheric pollution) (2).

Reactive oxygen species (ROS), reactive nitrogen species (RNS), other free radicals,and their related molecules are produced during many physiological and pathological processes taking place in different brain regions and in the periphery(4).

The main sources of ROS generation are environmental pollution, harmful ultraviolet rays, and metabolism, phagocyte cells etc,These sources generate free oxygen radicals and further the oxidative stress in the human body. The theory of oxidative stress suggests that the stress leads to cellular degradation which causes a cascade of apoptotic events and finally to the cell death. Oxidative damage caused by free radicals induce the generation of superoxide radical, peroxynitrite and many more radicals that are the major cause how we age and also age related disorders like Alzheimer's,

Parkinson's, neurodegenerative diseases and other related disorders[5].

SOD change superoxide (O2) to hydrogen peroxide (H2O2) and 3 isoforming are known. SOD1 (CuZnSOD) is current in red blood cells (RBCs), SOD2 (MnSOD) is first and foremost mitochondrial and SOD3 is extracellular [7].

Catalase (CAT) is an important endogenous antioxidant enzyme that catalyzes H2O2 detoxification. A number of CAT gene single-nucleotide polymorphisms (SNPs) and mutations have been associated with disease manifestations[8].

Material and Method

Sampling: Fifty blood samples were collected from patient under go stress disease and twenty five samples as control.

Determination of superoxide dismutase (SOD) activity: 50 ul of serum was mixed with 0.2 ml of 0.1 M EDTA [containing 0.0015% NaCN], 0.1 ml of 1.5 mM NBT and phosphate buffer (67 mM, pH 7.8) in a total volume of 2.6 ml. After adding 0.05 ml of riboflavin, the absorbance of the solution was measured against distilled water at 420 nm[6].

Determination of Catalase Activity: CAT activities were determined by measuring the decrease in hydrogen peroxide concentration at 230 nm by the method of Beutler[9]. The assay medium consisted of 1 mol/L Tris HCl-5 mmol/L disodium ethylenediamine tetraacetic acid (EDTA) buffer solution (pH 8.0), 1.0 mol/L phosphate buffer solution (pH 7.0), and 10 mmol/L H2O2. CAT activity was expressed as U/mg protein.

Results

The data demonstrated that the patients groups, had greater significant differences (P≤ 0.05) levels of SOD and catalase in contrast with control groups result as show in table (1) (2),(3).

Table (1): Main features of the study population.

Varation	NO. %
Hypertension	
Hypertension group Non hypertension group	13 (17.33%) 62 (82.66)
11-40) years) (41-60) years 61-80) years)	42(56%) 17 (22.66%) 16(21.33%)
Diabetes	
Diabeteic group Non diabeteic group	10(13.33%) 65(86.66%)
Smoking	
Smoking group Non smoking group	25(33.33%) 50(66.66%)

Tables (2): Serum concentrations of physiological parameters in patients and control groups.

Groups Parameter	Control (Mean ± S.E)	Patients (Mean ± S.E)	P-value of groups
SOD2	3.87±103.15	23.24±399.89	0.0001*>
CAT	3.87±103.15	16.27±239.67	<0.0001*

t-test.
*P ≤ 0.05.
S.E: Standard error

Table (3): The differences among of age, weight,sod and CAT in both gender of study groups

Groups Parameter	Female (Mean ± S.E)	Male (Mean ± S.E)	P-value of groups
SOD2	18.86±354	25.89±405.46	0.05*>
CAT	36.74±210	17.74±243.29	0.42
Age	4.00±35.40	2.61±40.00	0.07
Weight	1.20±71.60	1.43±80.97	0.029*

t-test.
*P ≤ 0.05.
S.E: Standard error

Discussion

The consequences of estimation physiological parameters (SOD, CAT) illustrated that the patients groups, had greater levels in contrast with control groups result at significant differences (P ≤ 0.05).

This study evaluated the SOD and CAT activity in patients with stress. The main finding of our study has indicated that there was an increase in SOD and CAT activity in men with stress compared to the female.

Oxidative stress is a condition associated with an increased rate of cellular damage induced by oxygen and oxygen-derived oxidants commonly known as reactive oxygen species[10]. Reactive oxygen species (ROS) have been implicated in over a hundred of disease states which range from arthritis and connective tissue disorders to carcinogenesis, aging, toxin exposure,physical injury, infection, and acquired immunodeficiency syndrome[11]. The role of oxidative stress in infertility and method for counteracting its impact on reproductive tissues with antioxidants is still in its infancy.

SOD is the enzyme that catalyzes the conversion of superoxide anion radicals (O2•−) to hydrogen peroxide and molecular oxygen, functioning as a controller of cellular reactive oxygen species levels[12]. Past reports denote increased SOD levels in patients with stress and axienty; however, we found that SOD levels were significantly increased in stress and axienty patients[13].

Oxidative stress plays a crucial role in the pathophysiology of stress. In addition, poor appetite, psychological stressors, obesity, metabolic syndrome, sleep disorders, cigarette smoking and unhealthy lifestyle may also contribute to it[14].

Catalase is a crucial enzyme for antioxidant mechanisms and decomposes hydrogen peroxide into water and oxygen.(15) Among stress people, CAT is reported to be increased inpatients compared to controls[16].

Catalase guards the cells from hydrogen peroxide generated with in them. It plays a role in tolerance acquisition to oxidative stress in the adaptive response of cells. Lowercatalase levels are seen in periodontitis[17].

There are some limitations of our study. First The sample size was relatively small, and future studies should be performed in larger samples. On the other hand, the homogeneity of groups is the main strength of our research.

In conclusion, we found increased and SOD and CAT levels were significantly increased in stress patients. These findings should be considered preliminary and needing verification by further studies. Our results should also be considered preliminary and needing confirmation by future studies.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: Non

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