ORIGINAL RESEARCH PAPER

Physiology

KEY WORDS: Superoxide dismutase, sustained hand grip

TO STUDY CORRELATION BETWEEN THE SUPER OXIDE DISMUTASE LEVELS AND SUSTAINED HAND GRIP TEST IN DEPRESSIVE SUBJECTS OF PRAVARA RURAL HOSPITAL OF WESTERN MAHARASHTRA

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ABSTRACT

Background: Psychiatric disorders are important contributors to the disease burden and dysfunction universally. Stress during the lifetime of a human being induces a series of psychological and physiological changes.

Material and Methods: The present observational case control study was conducted in Department of Physiology for a period of three years. A total of 83 depressive cases diagnosed by Psychiatrist and 100 normal individuals without any psychiatric disorder were taken as controls included in the study. Non-probability purposive sampling method was used for selection of subjects. Comparison between the Super oxide dismutase Levels and sustained hand grip test in Depressive subjects was studied.

Results: The superoxide dismutase levels showed a significant decrease and increase in mean values of sustained hand grip (HGT) in depressive patients. Conclusion: Superoxide dismutase and sustained hand grip plays an important role in monitoring in depressive patients.

INTRODUCTION

Psychiatric disorders are important contributors to the disease burden and dysfunction universally. Stress during the lifetime of a human being induces a series of psychological and physiological changes. The hyperactivity of hypothalamic-pituitary axis is one of the commonest neurobiological changes in depressive patients. The kick over of hypothalamic-pituitary axis is one of the commonest neurobiological changes in depressive patients.[1] The aim of the study is to correlate superoxide dismutase levels and sustained hand grip test (autonomic dysfunction) in male depressive subjects.

Disruption in the antioxidant defense mechanism plays an important role in neuropsychiatric disorders.[2] Increased pro-inflammatory cytokines, decrease the number of neurons and mitochondrial dysfunction along with disturbance in hypothalamic-pituitary-adrenal axis.[3] As depression is associated with oxidative stress it was decided to study the levels of superoxide dismutase in depressive subjects and compare them with normal controls. Also considering the association of autonomic dysfunction with its effect on relative incidence and death this study was carried out to assess sustained hand grip test in depression and compare them with control group.

MATERIAL AND METHODS:

The present observational case control study was conducted in the Department of Physiology and Psychiatry, Rural Medical College and Hospital, Pravara Institute of Medical Sciences (DU).The study protocol was approved by Institutional Ethics Committee, Loni, for the period of three years. The signed informed consent was obtained from all participants with Non-probability purposive sampling method used for satisfying the inclusion criteria**.**

In control (Group I) the inclusion criteria were, the controls were free from depression in the age group 20-55 years males. In exclusion criterion there was no history of any consumption of psychotropic substances and patients suffering from HTN, COPD, Asthma, Diabetes were excluded from the study.

In depression cases (Group II) the inclusion criteria was the depression cases were diagnosed by psychiatrist & rated on the basis of Hamilton's depression scale in the age group 20-55 years males and were willing to participate in the study whereas the exclusion criteria was history of consumption of psychotropic substances and patients suffering from HTN, COPD, Asthma, Diabetes were excluded from the study. A written consent was obtained from all subjects. The blood sample was collected in plain bulb from both depression cases & controls from cubital vein with all aseptic precautions. Serum was separated by centrifugation at 3000 rpm for 10 minutes.

Antioxidants test conducted in cases and controls was done by method Marklund S and Marklund G, 1974: 469-472 [4] and by using **"CANWIN"** Cardiac Autonomic Neuropathy Analyzer sustained hand grip test was assessed. It is a fully automatic windows based instrument which gives graphical interpretation and keeps subject's data.

Table No.1.1: Comparison of superoxide dismutase in group I and group II

Antioxidants	Control (Group I) n=100 Mean ± SD	Range	Depression cases (Group II) n = 83 Mean ± SD	Range	P value
Superoxide dismutase U/g Hb					
Category I (26)	1450.42 ±92.95	1332 -1594	Category I (11)	997.00 ±82.00	1005 -995	0.01
Category II (38)	1447.82 ±92.95	1332 -1580	Category II (39)	972.87 ±73.93	1005 -996	0.01
Category III (36)	1449.81 ±101.56	1000 -996	Category III (33)	965.00 ±65.99	1000 -996	0.00

In table 1.1, shows the estimated mean values of the superoxide dismutase which is significantly low in depression patients (Group II) as compared to control group (Group I) (Unpaired 't' test, *p* value<0.05)

Table No. 1.2: Comparison of Sustained hand grip test in group I and group II

Sympathetic functions	Control (Group I) n=100 Mean ± SD	Range	Depression cases (Group II) n = 83 Mean ± SD	Range	P value
Sustained hand grip test (HGT) (Increase in DBP in mmHg)					
Category I (26)	2.08 ±0.67	0.0-4.0	Category I (11)	2.55 ±1.50	00-6.0	0.03
Category II (38)	1.93 ±0.72	0.0-4.0	Category II (39)	3.23 ±1.48	2.0-8.0	0.05
Category III (36)	2.00 ±1.05	2.0-8.0	Category III (33)	4.00 ±1.91	2.0-8.0	0.03

In table 1.2, the sympathetic functions such as sustained hand grip test (HGT) (Increase in DBP in mmHg) are shown. The sustained hand grip test (HGT) was significantly increased in depression cases as compared to control (Unpaired't' test, *p* value < 0.05).

DISCUSSION:

Depression is a most common diagnosed illness in patient attending psychiatric clinic or any other mental health facility. Several factors contribute to the cause of depression.In

depression, the levels of free radicals are increased compared to the cellular anti-oxidant defense. Studies have also reported that there is autonomic imbalance in patients suffering from depression On this basis, in the present study, levels of superoxide dismutase and sympathetic function such as sustained hand grip test in patients of depression was studied and were compared with healthy normal controls. In total, 183 males were included in the present study consisting of 100 healthy normal controls and 83 patients suffering from depression. They belong to age group 20-55 years and were further subdivided into category I (20-30 years), category II (31 – 40 years) and category III (41 -55 years).

In the present study a significant decrease in the levels of superoxide dismutase was observed in cases of depression. Similar results were also obtained by Kuloglu M et *al* in 2002 and Rukmini M *et al in* 2004.[5,6]

Can M *et al* in 2011 suggested a decrease in activities of antioxidant enzymes which is a sign of increased oxidative stress in mood disorder.[7]

Bajpai A *et al* in the year 2014 reported superoxide dismutase as a potent oxidative stress marker. Superoxide dismutase decreases the oxidative stress status and is altered in various diseases and is decreased significantly in cases of depression.[8]

Gawryluk J *et al* in 2011 reported decreased levels of superoxide dismutase. Superoxide dismutase was found to decrease in patients of depression. Same findings were seen in the present study.[9]

The sympathetic functions included in the present study are the sustained hand grip test (HGT). It is concluded that there is significant increase in mean values of hand grip test in depression patients (p value < 0.05) which indicates increase in diastolic blood pressure in depressive patients.

Carmilla M *et al* in 2009 found increase in diastolic blood pressure in depressive patients which are similar to present study. Anxious patients have significantly higher mean diastolic blood pressure but not systolic blood pressure.[10]

The higher diastolic blood pressure in anxious individuals reflects a chronic condition of psychological arousal in these subjects, which is clinically accompanied by increased sympathetic nervous activity and decreased parasympathetic activity.

There is remarkable similarity between the present study and study by Wu C et al (2010) regarding the diastolic blood pressure which is increased in both studies.[11]

Shah M *et al* in 2013 showed that increased blood pressure is directly related to the degree of depression.[12]

Mejia-Lancheros C *et al* (2014) showed that rise in diastolic blood pressure was greater in patients of hypertension with depression.[13]

Adamis D *et al* 2000 studied that there was increase in both systolic and diastolic blood pressure. The present study shows an increase in diastolic blood pressure in patients suffering from depression. [14]

Shinagawa M *et al* 2002 also reported similar results with our study showing increased diastolic blood pressure in patients suffering from depression. [15]

Thus present study gives a clear idea regarding status of antioxidant defense system, level of oxidative stress status and the role of sympathetic nervous system, in patients suffering from depression as compared to healthy controls.

CONCLUSION:

The present study concludes that utility of superoxide dismutase and sustained hand grip test (HGT) plays an important role in diagnosis, treatment and monitoring of depressive patients.

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