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Original Research Article

Study of serum catalase in depression at Pravara institute of medical sciences

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ABSTRACT

Background: Depression is caused as a multifactorial psychiatric disorder and the reasons associated are genes, environmental, psychological, and biological factors. There are several molecular changes in the pathogenesis of depression. Antioxidants in the body like catalase was found to be deranged in patients suffering from depression.

Materials and Methods: The present observational cases-control study was carried out in the Physiology Department of Rural Medical College Loni in collaboration with Psychiatry department.

Total 183 subjects recruited for study. Out of total subjects 83 patients were diagnosed with depression and 100 were normal individuals without any psychiatric disorder. A non-probabilistic international sampling method was adopted for the selection of subjects.

Results: Significant decrease in serum catalase was observed in patient suffering from depression as compared to normal healthy individuals (p value < 0.05).

Conclusion: The present study finds decreased serum catalase levels in patient suffering from depression as compared to the normal healthy controls.

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1. Introduction

Depression will be the major cause of disability worldwide after cardiovascular disease (CVD).Psychiatric disorders in persons could results in change of mood, loss of interest, disturbances in sleep and appetite. It also results in low physical energy, and poor ability to concentrate.[1] Smoking and high levels of cholesterol are additional contributory factors to the behavioral disorders of depression in cardiac conditions.[2] The brain is susceptible to oxidative injury due to increased oxygen utilization and increased free radicals and lowered antioxidant defense mechanisms. Disturbances in the antioxidant defense mechanism can play a part in a wide range of neuropsychiatric disorders.[3]

The antioxidant defense mechanisms protect the cells by removing the free radicals. Antioxidant defense system consists of enzymatic and nonenzymatic antioxidants. Enzymatic antioxidants consist of superoxide dismutase (SOD), catalase (CAT), gluthione peroxidase (GPx), Glutathione reductase (GR) and glutathione-S-transferase (GST). The non-enzymatic antioxidants include reduced glutathione (GSH), vitamin-C (ascorbic acid), vitamin-E (α- tochopherol), N-acetylcystine (NAC), uric acid, carotenoids, flavonoids, ubiquinol etc.[4]

Free radicals/ reactive oxygen species generation is a continuous process in the human body and is involved in many pathophysiological states. The antioxidants are affected in these states and are also the basis of antioxidant therapy like choice regarding the nature of antioxidant and duration of therapy involved; delivery at specific site,

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specificity of targeting free radicals and direct assay of free radical/ reactive oxygen species.[5]

Above mentioned studies are focused on the role of free radicals and antioxidants in patients of the depression. Few studies are done from developing countries like India and very less among the rural population. So we decided to study an important antioxidant serum catalase in patient suffering from depression in the rural population from western Maharashtra.

2. Materials and Methods

The present observational case control study was conducted in Department of Physiology, Rural Medical College and Hospital, Pravara Institute of Medical Sciences (DU), Maharashtra.

Study was approved by Institutional Ethical Committee (IEA) Loni.

A total of 83 depressive cases diagnosed by Psychiatrist were included in the study. Additionally, a total of 100 normal individuals without any psychiatric disorder were taken as controls.

All cases and controls were age matched and both were selected from age group between 20-55 years.

All the participants were informed about the study in local language and their queries were addressed. Those willing to participate in the study with written informed consent were selected for study.

Non-probability purposive sampling method was adopted for selection of subjects. The patients newly diagnosed by psychiatrist and having depression were assessed with Hamilton's Depression Scale and were included in the study.

The control group consists of healthy volunteers without depression.

Following were inclusion and exclusion criteria for selection of control and depression cases.

Cases and controls were further divided in to three groups according to age

Category I – 20-30 years, Category II – 31-40 years, Category III – 41-55 years

	Inclusion criteria	Exclusion criteria
Controls	1. The controls were free from depression	1. History of consumption of psychotropic substances
	2. Males in the age group – 20-55 years	2. Age group more than 55 years
	3. Free from clinical morbidities other than depression	3. Hypertension
	Willing to participate in the study	
Cases	1. The depression cases were diagnosed by psychiatrist and rated on the basis of Hamilton's depression scale.	1. History of substance use disorder
	2. Males in the age group: 20-55 years	2. Age group more than 55 years
	3. The cases were free from clinical morbidities	3. Hypertension.

2.1. Investigation

The blood sample was obtained from each case and control from cubital vein using sterile needle and syringe (Dispovan,5 ml) with all aseptic precautions. Plain bulb was used for blood collection. Serum was separated by centrifugation at 3000 rpm for 10 minutes.

Estimation of Serum Catalase was done by Aebi H method.[6]

2.2. Data analysis

The data was analyzed by using Statistical Package for the Social Sciences version 22 for window (SPSS v 22). A probability (p) value of < 0.05 was considered as significant.

3. Results and Discussion

Depression is a most common diagnosed illness in patient attending psychiatric clinic or any other mental health facility. Many factors could contribute to the depression in an individual. In depression, the levels of free radicals are elevated compared to the cellular anti-oxidant defense, which decreases the scavenging, suppressing and counteracting mechanism of the antioxidants against the free radicals.

Studies have reported that there is a definite antioxidant level imbalance in patients suffering from depression.[4,5] On this basis, in the present study of an antioxidant serum catalase in patients of depression 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 only male patients were included because female patients not supportive and denied to participate.

In present study, there was a significant difference observed in the mean values of serum catalase levels in control(group I) as compared to depression cases (group II) ($p<0.05$).

In the present study a significant decrease in the levels catalase was observed in cases of depression as compared to the healthy control subjects. Similar results were also obtained by other researchers in their studies.[7,8]

Table 1: Comparison of anthropometric parameters in group I and group II

Anthropometric parameter	Control(Group I) n = 100 Mean± SD	Depression cases(Group II) n = 83 Mean ± SD		P value
Age (years)				
Category I 20-30 years (n=26)	26.35 ± 2.53	Category I 20-30 years (n = 11)	26.45 ± 2.68	0.05
Category II 31-40 years (n = 38)	35.75 ± 2.80	Category II 31-40 years (n = 39)	36.03 ± 3.10	0.05
Category III 41-55 years (n = 36)	46.72 ± 4.14	Category III 41-55 years (n = 33)	46.91 ± 3.48	0.05

Table 2: Comparison of catalase 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
Catalase (kU/l)						
Category I (26)	43.01 ±7.16	31.41 -59.65	Category I (11)	25.04 ±1.97	22.45 -29.32	0.04
Category II (38)	43.59 ±8.44	31.44 -59.75	Category II (39)	24.38 ±3.71	17.45 -29.55	0.00
Category III (36)	42.98 ±8.77	17.56 -29.55	Category III (33)	24.26 ±3.59	17.56 -29.55	0.01

Kuloglu M et al. and Rukmini M et al. reported that sustained oxidative stress may increase catalase enzyme activities. Increase in the antioxidant enzymes catalase are adaptive response of these enzymes leading to increased production of oxygen due to oxidative degradation of the catecholamines.[7,8]

Atmaca M et al., and Dadheech G et al. in their study suggested that there is a cumulative heavy burden of free radicals that depleted the antioxidant in chronic condition of schizophrenia. Increased oxidative stress in this condition is responsible for the depletion of antioxidants.[9]

Can M et al suggested a decrease in activities of antioxidant enzymes which are indicative of increased oxidative stress in mood disorder. Superoxide dismutaseas a potent oxidative stress marker. It is a scavenger of reactive oxygen species and eventually eliminates them and decreases the oxidative stress status. Superoxide dismutase levels are altered in various diseases and are decreased significantly in cases of depression.[10]

Gawryluk Jet al reported decreased levels of glutathione a major antioxidant present in the brain, on post-mortem in prefrontal cortex from patients with psychiatric disorders especially patients suffering from major depressive disorder (MDD). Glutathione peroxidase was found to reduce in patients suffering from depression. Similar findings were seen in the present study. Gawryluk J, et al. suggested that the patients suffering from MDD were more susceptible to oxidative stress.[11]

However, in contrast to our findings, one study reported no changes in the antioxidant enzymes and red blood cell enzymatic antioxidants.[12]

The disturbance in the oxidant-antioxidant equilibrium is quite evident in the mental dis orders like depression and schizophrenia. It is due to abnormal activities of the antioxidant enzymes like superoxide dismutase and glutathione peroxidase. There is depleted antioxidant enzyme status due to their increased utilization with the elevated oxidative stress which has been reported aptly by researchers.[13–15]

4. Conclusions

The present study highlights the changes in catalase levels in patients suffering from depression.

Limitation of the study: As only male candidates were recruited for the study it could not applied to females. Age group selected was 20–55 years so cannot applied to population below or above this age range.

Future implications: The present study highlights the decreased levels of serum catalase in patients suffering from depression as compare to the normal healthy individuals. Study gave the baseline data in patients from rural population and can be used for further research in the field. This issue should be addressed properly while treating the patient suffering from depression.

5. Source of Funding

Nil

6. Conflict of Interest

None.

7. Acknowledgement

None.

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