

# Role of Antioxidants in Depression

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## ABSTRACT

**Introduction:** Though there are a wide range of stress-induced disorders, depression forms the commonest stress-induced psychiatric disorder.

To combat the biochemical changes that occur as a result of stress, there is the antioxidant defence in the biological system. Secondary defence is by the nonenzymatic antioxidants like vitamin E (alpha tocopherol), vitamin C (ascorbic acid), and beta-carotene.

Therefore, the authors' interest was aroused to examine the status of these antioxidants in the biological system of patients suffering from stress-induced psychiatric disorders.

**Objectives:** The study was carried out with following aims:

- To find out whether patients with depressive disorder have any differences in blood serum levels of vitamin A (beta-carotene), vitamin C, and vitamin E in comparison with normal healthy control group.
- To find out whether supplementation of adequate doses of vitamin A (beta-carotene), vitamin C, and vitamin E leads to improvement in anxiety and depression and reduction in scores of the patients.

**Materials and methods:** Totally, 40 subjects in the age group of 20 to 60 years, who attended psychiatric clinic of a private hospital and who met inclusion and exclusion criterion of the study and consented for psychological evaluation and blood screenings for detecting the serum levels of vitamin A, vitamin C, and vitamin E were included in the study. Approval was sought from the Institutional Ethics Committee for collecting blood samples from these subjects before and after vitamin A, vitamin C, and vitamin E supplements had been given for a period of 6 weeks.

**Results:** It was observed that patients with depression had significantly lower levels of vitamins A, C, and E in comparison with healthy controls. After dietary supplementation of these vitamins for a period of 6 weeks, it was observed that there was significant reduction in the anxiety and depression scores of patients. A significant increase in the blood levels of antioxidants was observed in patients except that of vitamin E.

**Conclusion:** Findings suggest that antioxidant supplement therapy as an adjuvant therapy is useful in patients with stress-induced psychiatric disorders; the results have been discussed.

**Keywords:** Antioxidants, Depression, Stress.

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## INTRODUCTION

In the era of scientific development, technological advances, cut-throat competitions, thriving for superiority, and increasing lifestyle demands have made human population more prone to stressful disorders. Also, with the advent of media, the news of catastrophes and natural calamities across the globe has further increased the feeling of insecurity in human minds.

When we talk about stress in day-to-day life, we are not talking about disorders because presently it has become a part of life, which may reflect in the form of aging, but not as disorders. A disorder is said to be present when some of these stressors are continuously acting over a period of time and have started showing up in the form of certain symptoms/symptom clusters, which persist and reflect in work efficiency, mood, sleep, appetite.

There have been a number of studies that have evaluated the role of antioxidants, and that of oxidative stress leading to a variety of health problems including leukemia,<sup>1</sup> thalassemia,<sup>2</sup> ischemic stroke,<sup>3</sup> hemodialysis,<sup>4</sup> myocardial infarction,<sup>5,6</sup> rheumatoid arthritis,<sup>7</sup> critical illnesses,<sup>8</sup> and issues in postmenopausal women.<sup>9</sup>

Neurotic depression is one of the commonest psychiatric diagnosis in patients attending OPD of psychiatry departments and mental health facilities. The concept of neurotic depression has no uniform description. It probably denotes a type of neurosis with predominant depressive feelings.

Stress places an additional demand on the body, in terms of nutrition. In conditions of stress, there is an increase in adrenal production and mobilization, utilization of vitamin and minerals, e.g., vitamin C, vitamin E, magnesium, potassium, and micronutrients, which further accelerates metabolism of proteins, fats, and carbohydrates and, as a result, produces quick energy to overcome stress.

To combat the biochemical changes that occur as a result of stress, there is the antioxidant defence in the

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biological system. The primary defence is by enzymatic antioxidants like superoxide dismutase, glutathione peroxidase, catalase, nicotinamide adenine diphosphate, glutathione transferase and glutathione reductase, while secondary defence is by the nonenzymatic antioxidants like vitamin E (alpha tocopherol), vitamin C (ascorbic acid), beta-carotene, minerals, and trace elements like zinc.

Therefore, the authors' interest was kindled to examine the status of these antioxidants in the biological system of patients suffering from depression and healthy individuals and examine whether supplementation of antioxidants leads to a change in their psychiatric status.

## OBJECTIVES

In view of the above information and literature available on the subject, very little work has been done in India to explore the role of antioxidants in combating oxidative stress in depressive disorder (neurotic depression). Hence, the study was carried out with following aims:

- To find out whether patients with depression have any differences in blood serum levels of vitamin A (beta-carotene), vitamin C, and vitamin E in comparison with the normal healthy control group.
- To find out whether supplementation of adequate doses of vitamin A (beta-carotene), vitamin C, and vitamin E lead to improvement in depression and reduction in scores of the patients.

## MATERIALS AND METHODS

In order to fulfill the above aims, 60 subjects in the age group of 20 to 60 years who attended the psychiatric clinic of a private hospital in Jaipur and who consented for psychological evaluation and blood screening to determine the serum levels of vitamin A, vitamin C, and vitamin E were included in the study. Approval was sought from the Institutional Ethics Committee for collecting blood sample from these subjects before and after the vitamin A, vitamin C, and vitamin E supplements had been given for a period of 6 weeks.

Totally, 40 patients suffering from neurotic depression and 20 healthy controls were included in the study. Patients attending the outpatient clinic of the hospital for treatment were included after obtaining informed consent.

Diagnosis of patients in the outpatient department of the hospital was confirmed as per the International Classification of Diseases X version (ICD-10) diagnostic criteria and specially designed pro forma was filled up.

### Inclusion Criteria

All patients included in the study met the following inclusion criteria:

- Diagnosis of depression as per ICD-10.

- Age from 20 to 60 years.
- Matched on sociodemographic data (age, sex, education, and economic status).
- Treatment naive for last 6 months or diagnosed for the first time.

### Exclusion Criteria

Any patient meeting one or more of the following were excluded from the study:

- Any chronic physical illness (diabetes, coronary artery disease, chronic lung disease, cancer, etc.)
- History of drug dependence
- Exposed to any antioxidant therapy in past
- Women with symptoms of postmenopausal syndrome (hot and cold flushes).

Patients fulfilling the above inclusion and exclusion criteria were subjected to psychiatric and nutritional evaluations. They were administered the Max Hamilton Depression rating scale (HAM-D) to evaluate the level of depression, and the 24 hours recall method and food frequency questionnaire were employed in order to ensure that patient consumed similar diet throughout the study period. Data were recorded at base time visit and after 6 weeks. However, patients were clinically evaluated by the psychiatrist once in 2 weeks and the investigator was blinded to the psychiatric evaluation.

All patients were divided into two groups:

- *Group I:* 40 patients with diagnosis of depression.
- *Group II:* 20 normal healthy subjects chosen from caregivers of patients who were found to be not suffering from depression on clinical evaluation by the psychiatrist.

Group I was further subdivided randomly into groups A<sub>1</sub> (control) and A<sub>2</sub> (experimental), with 20 patients in each group. Patients in group A<sub>1</sub> were given regular antidepressant treatment by the psychiatrist, while patients included in group A<sub>2</sub> were given similar doses of antidepressants and supplementations of vitamins A, C, and E in a capsule and tablet form. The antioxidant capsules included were 600 mg/day of vitamin A, 1000 mg of vitamin C/day, and 800 mg of vitamin E/day. Vitamins A and C were in the form of tablets containing 300 and 500 mg of each respectively, while vitamin E was in the form of capsule with 400 mg in each capsule. All of them were given twice a day at an interval of 12 hours.

Blood sample was drawn to evaluate the serum levels of antioxidants. The biochemical estimations of serum levels of vitamin A (beta-carotene), vitamin C, and vitamin E were done using the standard techniques.

Data were subjected to statistical evaluation.

**Table 1:** Serum vitamin A levels in healthy control and experimental group of depression at baseline

Statistical parameters	Groups	
	Healthy control	Experimental depression
Mean serum vitamin A (mg)	132.92	90.99
±SD	36.67	57.48

F = 14.98 significant

**Table 2:** Serum vitamin C levels in healthy control and experimental group of depression at baseline

Statistical parameters	Groups	
	Healthy control	Experimental depression
Mean serum vitamin C (mg)	0.96	0.76
±SD	0.37	0.23

F = 7.10 significant

**Table 3:** Serum vitamin E levels in healthy control and experimental group of depression at baseline

Statistical parameters	Groups	
	Healthy control	Experimental depression
Mean serum vitamin E (mg)	0.79	0.54
±SD	0.21	0.23

F = 6.37 significant

**Table 4:** Pre- and postscores of serum antioxidant levels in control depression group

Serum antioxidant	Pre (n = 20)	Post (n = 20)	t-value	Significance
Vitamin A (mg)	84.69 SD ± 53.16	89.2 SD ± 51.22	-0.27	NS
Vitamin C (mg)	0.74 SD ± 0.20	0.8 SD ± 0.21	-0.90	NS
Vitamin E (mg)	0.48 SD ± 0.19	0.49 SD ± 0.15	-0.003	NS

NS: Not significant

## RESULTS

Experimental group (group A<sub>2</sub> patients with depression) and group III healthy controls were statistically comparable based on sociodemographic data, biochemical estimations, and their comparison with healthy control group is as follows.

## DISCUSSION

As evident from Tables 1 to 3, it can be seen that blood levels of beta-carotene (vitamin A), vitamin C, and vitamin E are significantly lower in the experimental group in comparison with the healthy control. These findings have also been earlier reported. Psychiatric symptoms of vitamin C deficiency include depression, hysteria, and hypochondriacal symptoms. Research shows that depression can be eased out by the administration of certain vitamins, which includes vitamin C.<sup>10</sup>

Depression scores have been reduced significantly in the group consuming antioxidant supplements for a period of 6 weeks (Tables 4 and 5). At the same time, it has been observed that postsupplement, the antioxidant levels in the blood have increased to a significant level in the experimental group, which was seen in accordance with the improvement in their clinical status (Tables 4 and 5). The vitamin E levels have not shown significant increase in patients with depression. Antioxidants have also been found to be low in patients with schizophrenia<sup>11-13</sup> and other psychiatric disorders.<sup>14</sup>

**Table 5:** Pre- and postscores of HAM-D in experimental depression group

Group	Pre (n = 20)	Post (n = 20)	t-value	Significance
HAM-D	24.2 SD ± 5.08	1.55 SD ± 1.27	19.32	S

To the best of our knowledge, there have been very few studies that have shown a systematic comparison of pre- and postantioxidant status in stress-induced psychiatric disorders. Therefore, it is suggested that this should be replicated keeping the greater interest of the patients in mind.

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