

## LEVELS OF COPPER AND ZINC IN DEPRESSION

R. L. NARANG\*, K. R. GUPTA\*, A. P. S. NARANG\*\*  
AND RAJVIR SINGH\*\*\*

*Department of Psychiatry\* and Biochemistry\*\*,  
Dayanand Medical College & Hospital, Ludhiana - 141 001 and*

*\*\*\*Department of Veterinary Physiology,  
Punjab Agriculture University, Ludhiana*

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**Abstract :** The study was undertaken to estimate plasma copper and zinc in thirtyfive depressed patients. Two blood sample were drawn from each patient, one before starting treatment and the second after recovery from depression. The results were compared with the thirtyfive normal healthy individuals. The mean plasma copper in controls, depressed patients and in patients after recovery were 106.82, 122.14 and 104.22 µg/dl, respectively. The copper levels in patients when depressed were significantly higher as compared to controls and after recovery from depression. The mean plasma zinc levels in controls, depressed patients and after recovery were 115.80, 107.62 and 125.68 µg/dl, respectively. No significant difference could be obtained between control and depressed patients. However, the values were significantly higher in recovered patients compared to patients with depression.

**Key words :** Copper                      Zinc                      depression                      recovery

### INTRODUCTION

During the last decade there has been a rapid increase in the number of trace elements shown to be essential and of potential significance in human and nutrition. The possibility that an excess or a deficiency of trace element can produce psychiatric symptoms has been considered in several studies. Schizophreniacs have been associated with zinc and manganese deficiency and the patients improved when the levels of these elements were corrected (15). There is a considerable evidence that vanadium may play role in depressive psychosis (14). Psychiatric disturbances have been reported in patients with disorders of other trace elements like copper and zinc (7). Elevation of serum copper and ceruloplasmin levels in schizophrenia have been reported (15). Increased levels of serum copper has been commonly seen in gastrointestinal tract cancer (13).

One of the most common conditions associated with zinc deficiency is acrodermatitis enteropathica.

This is characterised by skin lesions and gastrointestinal symptome. Psychiatric complications are known to occur in this condition (12). Other medical conditions associated with zinc deficiency are acute psychiatric complications like depression (9) and thought disorders occurring in normal orientation (8), low zinc levels have been shown to be acting as cofactor in the pathogenesis of dementia (3, 17). Zinc deficiency is associated with relative copper excess. Various studies have indicated low zinc and high copper levels in schizophrenia. Low zinc have been found in brain autopsy specimens from schizophrenics (10). A psychiatric syndrome characterised by thought disorder was followed by acute zinc deficiency (8). The present study reports a plasma copper and zinc levels in patients with depression.

### METHODS

Thirtyfive patients attending the Psychiatry outpatient department of Dayanand Medical College & Hospital were selected using Feigher's criteria for

\*\*Corresponding Author

depression (5). Patients were required to score at least 16 on the Hamilton Rating Scale for depression (6). There were twentyone males and fourteen females. First, blood sample was drawn before that start of medication and if the patient was already taking any medicine it was stopped for a week. The second blood sample was drawn when the patient had recovered with a Hamilton Rating Scale score of less than five (1). Thirtyfive normal healthy individuals were taken as controls and were matched to the patients for age and sex.

Plasma was separated from ten ml of heparinised blood. It was digested with acid mixture (10 parts by volume of nitric acid, 3 parts of perchloric acid and 1 part of sulphuric acid). The clear digest was diluted with deionised water to make the final volume of 5 ml. Copper and zinc were estimated using atomic absorption spectrophotometer (Varian Techtran AA<sub>6</sub>). Student t' test was applied to test the significance of two values.

## RESULTS AND DISCUSSION

The levels of plasma copper and zinc are represented in Table I. The plasma copper in depressed

TABLE I : Levels of plasma trace elements in various groups ( $\mu\text{g/dl}$ ).

Group	Plasma Copper	Plasma Zinc
	(Means $\pm$ S.D.)	
Controls (n = 35)	106.82 $\pm$ 16.46	115.80 $\pm$ 24.88
Depressed (n = 35)	122.14 $\pm$ 28.65	107.62 $\pm$ 21.94
Recovered (n = 35)	104.22 $\pm$ 17.37	125.68 $\pm$ 18.24

group was significantly higher as compared to control ( $P < 0.01$ ). After recovery, copper levels were significantly lower compared to levels during depression ( $P < 0.005$ ). The plasma zinc levels in depressed patients showed no significant difference when compared to controls ( $P > 0.05$ ). However, patients after recovery showed significant increase in plasma zinc levels ( $P < 0.01$ ).

Elevation of serum copper in schizophrenia has been reported by various workers (15, 16). Barrass *et al* (2) have summarised the effects of tranquilizers and antidepressants on the ceruloplasmin catalysed oxidation of the biogenic amines, noradrenaline and 5-hydroxytryptamine. They suggested that ceruloplasmin, which accounts for 95% of copper in normal individuals, may effect the relative concentration of noradrenaline and 5-hydroxytryptamine in those areas of brain where these compounds act as neurotransmitter. Ceruloplasmin, by its effects on the life time of biogenic amines could function in the regulation of brain chemistry (11). Interference with this enzyme may lead to a chemical imbalance reflected in the appearance of abnormal mental status. High copper levels could also block the function of dopamine beta-hydroxylase which is highly concentrated in locus ceruleus resulting in impaired noradrenaline synthesis.

Zinc levels showed significant rise after recovery when compared to levels in the patients during depression. Zinc supplementation reverses excessive emotionality (15). Acute zinc deficiency can cause depression which improves by zinc supplementation (9). Antipsychotic drug perphenazine increases hippocampal zinc (4). It is presumed that antidepressant drugs may increase the brain zinc levels which have beneficial effect on patients of depression.

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