



## SERUM ZINC AND COPPER LEVELS IN HIV POSITIVES PATIENTS

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### ABSTRACT

**Background:** Micronutrient deficiencies, which are commonly observed with advanced HIV disease, have been associated with higher risks of HIV disease progression and mortality. **Objectives:** The Aim of the present study was to assess Serum Zinc and copper levels among IV Patients and correlate it with age, sex and duration of infection. **Methodology:** Descriptive cross-sectional study was conducted in the Dhiraj hospitals, Sumandeep vidypeeth university, SBKS Medical College, blood samples obtained from 150 HIV sero-positive

individuals and age and gender matched healthy controls were analyzed for zinc, and copper using spectrophotometer. Data were analyzed by Statistical computer software. **Results:** The (mean $\pm$ SD) of Serum copper and zinc were (22.9 $\pm$ 1.7mg/dl, 7.1 $\pm$ 0.9mg/dl) in patients and (16.3 $\pm$ 3.3 mg/dl, 11.5 $\pm$ 3.0 mg/dl) in control group, respectively. The Serum Zinc level was significantly decreased in HIV patients (P value, 0.05) while Serum Copper level was significantly increased compared to healthy individual. There was strong negative correlation between Serum zinc levels and duration of HIV disease ( $r = -0.5$ ,  $p$  value =0.00) and age of patients ( $r = -0.58$   $p$  value = 0.01). There was weak positive correlation between copper level and duration of HIV disease ( $r =0.16$ ,  $p$  value =0.223) and age of patients ( $r =0.4$ ,  $p$  value =0.05). The differences in Serum copper and Zinc levels were insignificant between male and female in HIV patients ( $p$  value > 0.05). **Conclusion:** This study indicates that Zinc and copper levels are altered in HIV infected patients with more decreased Zinc level suspected with increased duration of HIV disease.

**KEYWORDS:** Serum zinc, Serum copper, HIV.

## INTRODUCTION

HIV/AIDS is one of the major public health problems for the last decades. HIV continues to be a major global public health issue, having claimed more than 39 million lives so far. In 2013, 1.5 [1.4–1.7] million people died from HIV-related causes globally. There were approximately 35.0 [33.2–37.2] million people living with HIV at the end of 2013 with 2.1 [1.9–2.4] million people becoming newly infected with HIV in 2013 globally.<sup>[2]</sup> Trace elements deficiencies have been observed with advanced HIV disease, and many studies reported its deficiency with higher risks of HIV disease progression and mortality, and many of these micronutrients are required for improving immune systems in HIV infected patients<sup>[3,4]</sup>, and also it was observed that micro nutrient supplements are associated with a delay in HIV disease progression and reduce mortality in HIV positive persons not receiving highly active antiretroviral therapy.<sup>[5]</sup> Other features reported to be associated with HIV progression are body weight loss and wasting,<sup>[6]</sup> and all of these factors are considered independent predictors of HIV-related morbidity and mortality.<sup>[7,8]</sup> Micronutrient deficiencies, body weight loss, and wasting in advanced HIV disease are attributed to decreased food intake, malabsorption and fluids redistributions associated with HIV infection.<sup>[9,10]</sup> Zinc and copper are minerals required by the human body. They are necessary cofactors for many enzymes and their serum levels are regulated by metallothionein protein. As a result of this regulation, copper levels decrease as zinc levels increase and vice versa. People with HIV/AIDS who wish to take zinc supplements should also supplement copper.<sup>[11]</sup> Trace elements, particularly the cation zinc and copper, have been reported to decrease in disease conditions associated with non-viral agents in the community.<sup>[11]</sup> The findings of these studies suggest that the reductions of these cations in blood are not disease specific but rather follow a pattern of metabolism. A pinolic acid derived from tryptophan metabolism act as zinc binding ligands and facilitate its absorption and distribution in the human system. Inositol hexaphosphate (phytate), proteins and total zinc content also affect the absorption and utilization of zinc.<sup>[12]</sup> The decreased Zinc level observed patients with HIV is caused by impair the utilization of zinc by disturbing protein synthesis, and decreased intestinal absorption and may be related to massive cells destruction associated with the infection. Therefore, Zinc supplementation should be considered in HIV patients.<sup>[11]</sup> The aim of the present study to assess plasma Zinc and copper Levels among HIV Patients and correlate it with age, sex and duration of infection.

## MATERIAL AND METHODS

This study was a descriptive, cross-sectional, hospital based study, was done in Dhiraj Hospital, SBKS Medical college, Gujarat, between APRIL- 2014 TO APRIL 2015. Study population included 150 Patients with HIV (90 males and 60 females) and 50 (32 males and 18 females) healthy people as control groups, HIV individual age ranged between 20 – 60 years).

**Exclusion criteria of the study:** patients with Alzheimer's Disease, lymphoma, celiac disease, rheumatoid arthritis, and ulcerative colitis, Wilsons disease, Menkes syndrome, anaemia.

**INCLUSION CRITERIA:** All the patients who were tested positive for HIV in serum (positivity was determined by ELISA using two different Antigens) adults over 20 years of age., registered at the HIV clinic of the Hospital, willing to participate in the study cirrhosis, and haemolysed sample will be excluded from the study.

**Blood samples:** A 2.5ml venous blood sample was obtained from each patient using standard venipuncture technique. Serum specimens were collected as heparinised container after centrifugation at 3000 rpm for 5 minutes. The specimen stored at freezed until analysis. Interview with the test group was done to obtain the clinical data; clinical data were assessed by medical doctor. Permission of this study was obtained from to local authorities in the area of the study. An informed consent was obtained from each participant in the study after explaining objectives of the study. Zinc and copper levels were estimated by spectrophotometry method.

**Statistical analysis:** The mean  $\pm$  SD was calculated for all quantitative variables. The data collected in this study were analyzed using SPSS vs16. The normality was checked by Shapiro-wilk test. The quantitative variables between two groups were compared using student T. test or Mann Whitney U test as appropriate. Pearson correlation coefficient was estimated between the variables. P value less than 0.05 was considered significant. Statistical analyses were performed using statistical package for social sciences (SPSS) versions 16.

## RESULTS

The results of copper and zinc levels in serum of HIV patents and control groups are demonstrated in Table.<sup>[1]</sup> The results indicated that, in HIV infected patients, copper is

significantly reduced and Zinc is significantly increased ( $P$  value  $< 0.05$ ). The correlation between copper level and duration of HIV, and age of were insignificant. The increase of Zinc level significantly correlated positively with both duration of HIV and age. The plasma Zinc level and Copper level were significantly correlated negatively in HIV individuals.

Comparison of copper and zinc levels between HIV patients with control groups (mean  $\pm$  S.D).

parameters	controls (50)	Cases (150)	p value
Sr copper	16.3 $\pm$ 3.3	22.9 $\pm$ 1.7*	0.00
Sr zinc	11.5 $\pm$ 3.07	7.1 $\pm$ 0.95*	0.00

\*, p value  $< 0.005$

## DISCUSSION

HIV infection is a condition caused by the human immunodeficiency virus (HIV).<sup>[1]</sup> The condition gradually destroys the immune system, which makes it harder for the body to fight infections. Considerable evidence indicates that Zinc and copper are minerals required by the human body. They are necessary component of many enzymes.<sup>[3, 4]</sup> In this study patients with HIV revealed significant increase in the mean serum copper level when compared with the control subjects (22.9 $\pm$ 1.7Mg/dl) (16.3 $\pm$ 3.3 Mg/dl) respectively and. These findings are consistent with previous study done by Neil *et al*, 1991, who reported that there was a significant increase in the mean of serum copper concentration when compared with control group.<sup>[13]</sup> Also, the results of the present study showed that, there is significant decrease in the mean serum zinc levels in patients (7.1 $\pm$ 0.95Mg/dl) when compared with mean serum zinc level of control group (11.5 $\pm$ 3.07 Mg/dl) with ( $P$ -value  $< 0.05$ ). This finding agrees with a study done by (Khalili *et al*, 2008) who reported that there was a significant decrease between zinc levels in patients and zinc level of control group.<sup>[14]</sup>

In addition the present study showed weak positive correlation between copper level and duration of disease( $r = 0.16$ ,  $p$ , 0.223) and age of patients ( $r = 0.4$ /  $p$ , 0.05). These findings show no difference in between males and females which agree with a study done by (Bilbis *et al* 2010).<sup>[15]</sup>

The results of the present study shows that there is strong negative correlation between serum zinc levels and duration of disease ( $r = -0.5$ ,  $p$  value  $= 0.00$ ) and age of patients ( $r = 0.58$ ,  $p$  value  $= 0.01$ ) and insignificant difference when compared between male (7.1 $\pm$ 0.92 Mg/dl) and female (7.3 $\pm$ 1.03 mg/dl) in HIV patients ( $p$  value  $= 0.554$ ). These findings agree with a

study done by (Bilbis *et al*, 2010). Accordingly we suggest that zinc supplementation may be of benefit in HIV-infected children and adults. Well designed trials to test the effects of zinc supplementation in HIV-infected individuals are required; the consequences of zinc deficiency and supplementation on elements of the immune response critical to HIV infection should be examined.

## CONCLUSION

This study demonstrated significant decrease in zinc in HIV seropositive cases when compared with the controls, conversely copper were significant increased. Both the observations were statistically significant. This observation can help to guide the supplementation of Zinc in seropositive patients.

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