

**INTERNATIONAL JOURNAL OF ADVANCES IN
PHARMACY, BIOLOGY AND CHEMISTRY****Research Article****Assessment of plasma Zinc and copper Levels among
Sudanese HIV Patients in Khartoum State**

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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 plasma Zinc and copper Levels among Sudanese HIV Patients and correlate it with age, sex and duration of infection.

Methodology: Descriptive cross-sectional study was conduct in the (VCT) center in bashaer hospital in Khartoum, blood samples obtained from 40 HIV sero-positive individuals and 18 of age and gender matched healthy controls were analysed for zinc, and copper using atomic absorption spectroscopy device. Data were analyzed by statistical (SPSS version 16) computer software.

Results: The (mean±SD) of plasma copper and zinc were (22.9±1.7 µmol/L, 7.1±0.95µmol/L) in patients and (16.3±3.3 µmol/L, 11.5±3.07 µmol/L) in control group, respectively. The plasma Zink level was significantly decreased in HIV patients (p.value <0.05), while plasma Copper level was significantly increased compared to healthy individual (P.value <0.05). There was strong negative correlation between plasma zinc levels and duration of HIV disease (r = -0.552, p.value =0.00) and age of patients (r = - 0.690, p.value = 0.01). There was weak positive correlation between copper level and duration of HIV disease(r =0.197, p.value =0.223) and age of patients (r =0.385, p.value =0.05). The differences in plasma copper and Zink levels was insignificant between male and female in HIV patients (p.value > 0.05).

Conclusion: This study indicates that Zink and copper levels are altered in HIV infected patients with more decreased Zink level suspected with increased duration of HIV disease.

Key words: plasma zinc, plasma copper, HIV, Sudan.

INTRODUCTION

HIV/AIDS is one of the major public health problems for the last decades. Sub Saharan African region is reported to be highest burden of HIV infection and HIV related deaths. ⁽¹⁾ UNAIDS/WHO estimated that at the end of 2005, ≈40 million persons were living with HIV AIDS, and nearly 5 million persons had become newly infected with HIV during the same year. ⁽²⁾.

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 ^(3,4), 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.⁽⁵⁾ Other features reported to be associated with HIV progression are body weight loss and wasting,⁽⁶⁾ and all of these factors are considered independent predictors of HIV-related morbidity and mortality.⁽⁷⁾ 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.^(9,10)

Zinc and copper are minerals required by the human body. They are necessary cofactors for many enzymes and their plasma 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.⁽¹¹⁾

Trace elements, particularly the cation zinc and copper, have been reported to decrease in disease conditions associated with non-viral agents in the community.⁽¹¹⁾ 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.⁽¹²⁾ 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.⁽¹¹⁾ The aim of the present study to assess plasma Zinc and copper Levels among Sudanese 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 bashaer hospital in H.I.V center the center is located in Khartoum state, between April – September 2013. Study population included 40 Patients with HIV (29males and 11 females) and 18 (9males and 9 females) healthy people as control groups, HIV individual age ranged between 25 – 50 years).

Exclusion criteria of the study: Patients who was suffered from acute Alzheimer's Disease, lymphoma, celiac disease, rheumatoid arthritis, and ulcerative colitis, Wilsons disease, Meknes syndrome, anemia, biliary cirrhosis, and Hemolyzed sample will be excluded from the study.

Blood samples: A 2.5ml venous blood sample was obtained from each patients using standard venipuncture technique. Plasma specimens were collected as heparinized 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 atomic absorption spectroscopy device.

Statistical analysis: The mean±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. Person correlation was used to study association between variables. Chi –square was for comparison of nominal data. 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 plasma of HIV patents and control groups are demonstrated in table (1). The results indicated that, in HIV infected patients, copper is significantly reduced and Zink is significantly increased (P.value < 0.05).

The correlation between copper level and duration of HIV (figure 1), and age of (figure 3) were insignificant. The increase of Zink level significantly correlated positively with both duration of HIV (figure 2) and age (figure 4).

The plasma Zink level and Copper level were significantly correlated negatively in HIV individuals (figure 5).

DISCUSSION

HIV infection is a condition caused by the human immunodeficiency virus (HIV).⁽¹⁾ The condition is reported 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 a necessary component of many enzymes.^(3, 4)

In this study patients with HIV revealed significant increase in the mean plasma copper level when compared with the control subjects (22.9±1.7 Mmol/L) (16.3±3.3 Mmol/L) respectively and. This findings are consistent with previous study done by Neil *et al*,1991 who reported that there was a

significant increase in the mean of plasma copper concentration when compared with control group.⁽¹³⁾

Also, the results of the present study showed that, there is significant decrease in the mean plasma zinc levels in patients (7.1 ± 0.95 Mmol/L) when compared with mean plasma zinc level of control group (11.5 ± 3.07 Mmol/L) 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.⁽¹⁴⁾

In addition the present study showed weak positive correlation between copper level and duration of disease ($r = 0.197$, p -value $= 0.223$). And age of patients ($r = 0.385$, p -value $= 0.05$). These findings agreed with a study done by (Bilbis *et al* 2010) insignificant difference when Comparison of plasma copper level between male.⁽¹⁵⁾ (22.8 ± 7.3 Mmol/l) and female (23.2 ± 3.16 Mmol/l) in HIV patients (p -value $= 0.451$). This findings agreed with a study done by (Bilbis *et al* 2010) between male (36.14 ± 14.31) and female (34.89 ± 13.36).⁽¹⁵⁾

The results of the present study showed that, there is strong negative correlation between plasma zinc levels and duration of disease ($r = -0.552$, p -value $= 0.00$). And age of patients ($r = -0.690$, p -value $=$

0.01). And insignificant difference when Compare plasma zinc level between male (7.1 ± 0.92 Mmol/l) and female (7.3 ± 1.03 Mmol/l) in HIV patients (p -value $= 0.554$). This findings agreed with a study done by (Bilbis *et al*, 2010) between male (18.68 ± 18.18) and female (13.71 ± 14.88).⁽¹⁴⁾ Accordingly we suggest that zinc supplementation may be of benefit in improving health or ameliorating disease 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 decreased plasma zinc in HIV seropositive cases when compared with the controls, conversely copper were significant increased. Both the observations were statistically significant. It may be concluded that the assessment of the above parameters can be of great help to know the prognosis of the disease which may be supportive in trimming the morbidity as well as delaying the mortality of HIV seropositive patients.

Table 1
Comparison of copper and zinc levels between HIV patients with control groups (mean \pm S.D).

Parameters	Control (n=18)	HIV patients (n=40)	p. Value
Copper Mmol/L	16.3 \pm 3.3	22.9 \pm 1.7*	0.00
Zinc Mmol/L	11.5 \pm 3.07	7.1 \pm 0.95*	0.00

* Significant p value < 0.05

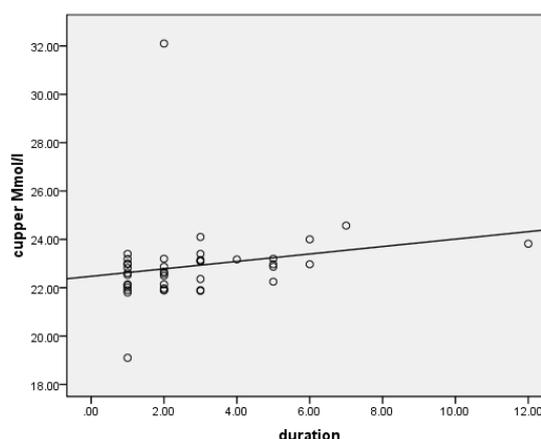


Figure 1
Correlation between copper level and duration of disease (in years).
($r = 0.197$, p -value $= 0.223$).

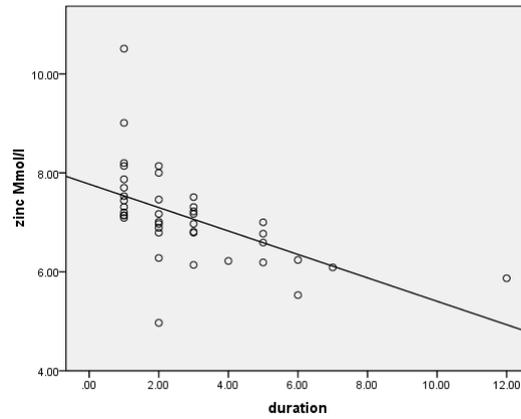


Figure 2
Correlation between zinc level and duration of disease (in years). (correlation: $r = -0.552$, $p.value = 0.00$).

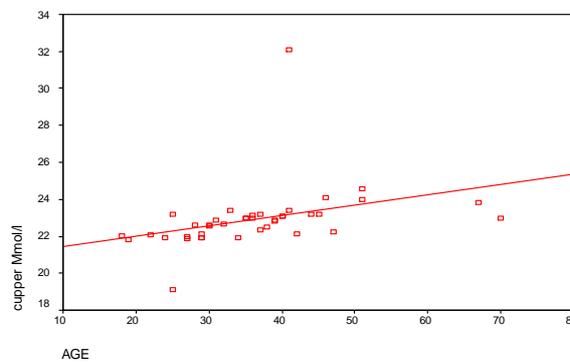


Figure 3
Correlation between copper level and age (in years). (correlation: $r = 0.385$, $p.value = 0.05$).

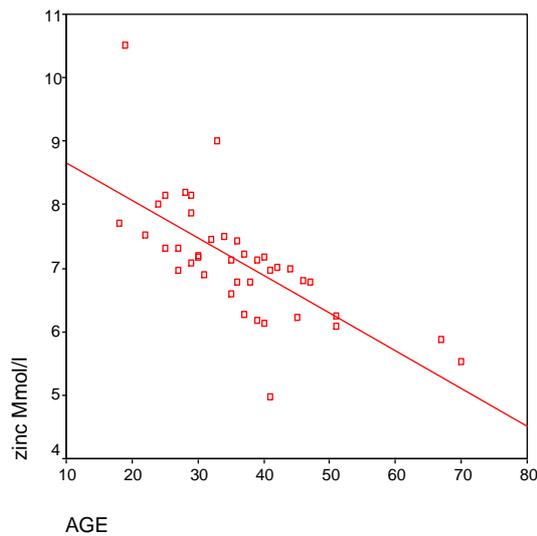


Figure 4
Correlation between zinc level and age (in years) (correlation: $r = -0.690$, $p.value = 0.01$).

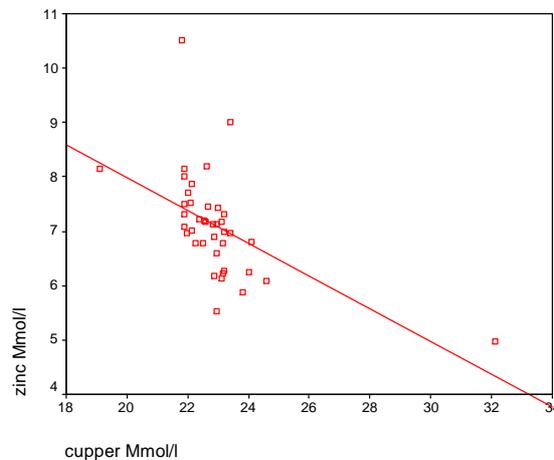


Figure 5
Correlation between zinc and copper levels. ($r = -0.549$, p .value = 0.01).

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