A study of the levels of copper and zinc in menopausal females

Meenakshi Gupta • Usha Singhal • M Hussain.
Dept. of Physiology, J.N. Medical College, AMU, Aligarh

Summary : **Trace elements play an important role in the normal physiology of the human body. The levels of trace elements change with age. The present study was undertaken to determine the effect of age on serum copper and zinc concentration and copper-zinc ratio in apparently healthy post-menopausal females. A marked increase in serum copper concentration and the copper zinc ratio as well as a decrease in the serum zinc concentration was observed. The above findings have been discussed with the possibilities of trace elements being given as supplement therapy in this age group.**

Introduction:

Much attention has been focused by workers on the role of trace elements in pregnancy and menstruation. (Halstead et al 1968, Prema et al 1980) The all important subject of menopause has not yet got the attention it deserves. With a higher life expectancy and more and more women coming into the menopausal age group, a study in this direction is highly desirable. With this information available about pregnancy and menstruation we decided to conduct a study to estimate the levels of the trace elements, copper and zinc and study their relationship to menopause

Material and Method

The present study was conducted on menopausal females reporting to the out patient clinic of JNMC hospital with a mean age of 57.7± 10.2 years. Levels of copper and zinc were estimated in the blood samples collected from the subjects. A total of 40 females were studied. The subjects were divided into 4 groups according to their ages

Group I	45 to 49 years
Group II	50 to 59 years
Group III	60 to 69 years
Group IV	70 and above

Females with any systemic disease and those on replacement therapy were excluded

Estimation of serum copper and zinc:

Five ml of venous blood was drawn. Samples were kept at room temperature until the blood clotted and serum separated. Serum was transferred to another vial and stored at 4 degrees centigrade. The analysis of copper and zinc was done within one week of collection, by double beam absorption spectrophotometer.

Observations:

Table I shows the mean serum copper levels obtained in the study. Gradual increase in the serum copper levels were found from group I to Group IV. The peak value of 128.75 ±12.0 (µg/dl was observed in Group IV and the lowest level was seen in Group I i.e 90 ±19.3 µg/dl

Table I also shows the mean serum zinc levels in different groups. There was a constant decline in the levels of serum zinc from Group I to Group IV. The maximum minimum range was 113.54 ±14.7 µg -/dl to 69.75 ±9.57 µg/dl. The peak value was found in Group I and the lowest in Group IV.

The change in serum copper and zinc levels through different groups were opposite in nature and showed inverse relationship between them.

Copper/zinc ratio has also been calculated for each group (Table I). It was found that there was a gradual increase in copper/zinc ratio from 0.79 to 1.85 through Group I to Group IV.

Discussion:

The present study was undertaken on 40 female subjects between the age of 45 to 80 years to assess the serum levels of trace elements. The mean serum copper and zinc levels were observed within the normal range. The mean serum copper level was 106.52 ± 21.10 µg/dl as

compared to 118 ± 21µg/dl Halstead et al (1968). The mean serum zinc was observed to be 93.22 ± 22.2 µg/dl as compared to normal values of 96 ± 13 µg/dl reported by Halstead et al (1968).

Serum copper and zinc levels show an inverse relationship with each other as shown in Table I. Here the mean values of copper were increasing from Group I to Group IV, whereas mean values of zinc were decreasing through the same groups. This is in confirmation with the findings of many workers (Halstead et al 1968; Prema et al 1980).

All the changes in the levels of the mean values of copper and zinc from Group I to Group II, Group II to Group III, and from Group III to IV were found non-significant ($p<0.1$), except the change in the zinc level from Group III to IV which was statistically significant, indicating that zinc levels decrease sharply in subjects above the age of 70 years. Moreover the change from Group I to group III and IV were also found significant ($p<.001$). These findings point to the fact that while change in the concentration of copper and zinc was gradual from Group I to Group IV yet as the age gap increased, the changes in serum concentration became more prominent, particularly in Groups III and IV with respect to Group I.

In this study, we found that serum copper was increasing with age of the subjects, perhaps some factors like estrogen may be responsible for rising copper levels from Group I to Group IV. Schenker et al (1969), concluded in their study that besides change in estrogenic activities other factors also affect the serum copper levels; of these the liver plays an important role. The hypercupremia of pregnancy is probably due to mobilisation of copper from maternal tissue(Fay et al 1945)specially from liver, (Rasuli & Akrish 1963).

It is possible that there may be some metabolic changes in the liver which can cause high copper levels in the post menopausal women. It may be possible that in the absence of any study of menopausal and post-menopausal copper levels, the researchers in the past working on serum copper levels in pregnant females may have overlooked the other factors and related serum copper levels entirely to estrogen levels. The increasing serum copper levels could be attributed to competitive absorption of copper with zinc at the intestinal site (Abdullah, 1970). Hence the level of copper increases with the decline on zinc from Group I to Group IV inversely related with each other.

Madaric et al (1994), observed that there was a decrease in serum zinc, an increase in serum copper and an increase in copper/zinc ratio with increasing age. This finding is similar to results obtained in our study.

Table I

Comparison of mean serum levels of copper and zinc and their ratio in different age groups

Group	No. of Subjects	Mean value (mg.dl) copper	zinc	Copper/zinc Ratio
I	11	90±19.3	113.54±14.7	0.79
II	12	100.5±13.3	97.3±22.3	1.03
III	9	114±17.5	83.8±11.6	1.36
IV	8	128.75±12	69.75±9.5	1.85

Sandstead et al (1982), also reported a decline in serum zinc levels with age. The factors which lead to a decrease in zinc level in elderly subjects can be many, such as food choices and energy needs. The energy needs are determined by body mass and rate of metabolism. Body mass and metabolic rate tend to decrease with age (Sandstead et al 1982). In our study the females were of low or mid-socio economic status with less weight. In elderly the energy intake also decreases which may be responsible for low zinc intake. The type of food also determines the zinc intake. Zinc absorption is impaired if the diet has low protein content (Sandstead et al 1982). Zinc levels are also decreased in anaemic subjects because there is an abnormal shift of plasma zinc into erythrocytes in cases where there is a decreased rate of cell division and maturation as in folic acid and vitamin B 12 deficiency (Prasad 1981).

Keeping the above mentioned facts into consideration it can be assumed that since most of the menopausal women are anaemic, they also have decreased serum zinc levels

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