

# Serum Copper, Zinc and Selenium Levels in Subjects With and Without Metabolic Syndrome

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## To the Editor:

Metabolic syndrome (MS) is defined as the clustering of cardiovascular risk factors and is associated with increased risk for cardiovascular morbidity and mortality [1, 2]. Oxidative stress has been hypothesized as one of the main mechanisms leading to MS [3]. Since copper, zinc and selenium are co-factors of antioxidant enzymes a lot of studies in different regions have been conducted in order to find possible differences in these trace element levels in subjects with or without MS [4-7]. However, their results were conflicting [4-7]. Therefore, the aim of the present study was to compare serum copper, zinc and selenium levels in subjects with or without MS.

A total of 51 subjects (17 males/34 females, mean age  $\pm$  standard deviation (SD):  $69.0 \pm 9.4$  years, body mass index (BMI)  $\pm$  SD:  $33.8 \pm 5.1$  Kg/m<sup>2</sup>) with MS and 54 subjects without MS (22 males/32 females, mean age  $\pm$  SD:  $69.8 \pm 9.7$  years, BMI  $\pm$  SD:  $29.6 \pm 3.7$  Kg/m<sup>2</sup>), consecutively selected from the outpatient clinic of our hospital were enrolled into the study. Subjects having three or more of the criteria according to the NCEP ATP III report [8] were defined as having the MS. A thorough physical examination was performed and a detailed medical history was obtained for each participant. All measurements were performed in

the morning, after 10 - 12 hours fast. Blood samples were drawn for measurement of serum copper, zinc and selenium levels. Serum levels of copper, zinc and selenium were determined by use of atomic mass spectrometry (ZEE nit 700, Analytical Jena, Germany).

Trace element levels did not differ between subjects with or without MS: copper levels ( $120.7 \pm 35.5$  vs.  $117.4 \pm 39.2$   $\mu$ m/l,  $P = 0.65$ ), zinc levels ( $91.5 \pm 28.3$  vs.  $94.6 \pm 23.4$   $\mu$ m/l,  $P = 0.54$ ) and selenium levels ( $106.4 \pm 33.8$  vs.  $102.8 \pm 28.7$   $\mu$ m/l,  $P = 0.56$ ). Univariate regression analysis showed that serum copper and selenium levels did not correlate with any of the MS components. Serum zinc levels correlated negatively only with glucose levels ( $\beta = -0.50$ ,  $P = 0.03$ ) (Table 1).

The present study showed that serum copper, zinc and selenium levels are not associated with the presence of MS. The Third National Health and Nutrition Examination Survey showed that serum selenium levels were similar in subjects with or without MS [5]. Furthermore, the Supplementation en Vitamines et Mineraux Antioxydants (SU.VI.MAX) trial [4], showed that serum selenium concentrations were not associated with MS. However, a recent study in Europe showed that only selenium was positively associated with a higher odd of MS in women but not in men. This association was not confirmed between copper or zinc and MS [9]. With regard to zinc the lack of association reported in our study is in accordance with the results of the SU.VI.MAX trial [4]. With regard to zinc and copper the lack of association is in accordance with the results of a study conducted in Iran [7].

In conclusion, the present study showed that serum copper, zinc and selenium levels are not associated with the components or the presence of MS. The only observed association was between serum zinc and glucose levels.

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**Table 1.** Correlations Between Serum Copper, Zinc and Selenium Levels and Components of Metabolic Syndrome

	Copper		Zinc		Selenium	
	beta	P-value	beta	P-value	beta	P-value
Waist circumference (cm)	0.49	0.88	-0.13	0.56	-0.19	0.49
HDL-cholesterol (mg/dl)	0.07	0.49	-0.01	0.96	-0.08	0.35
Triglycerides (mg/dl)	0.01	0.98	0.02	0.54	-0.01	0.96
Glucose (mg/dl)	-0.62	0.07	-0.50	0.03	-0.09	0.75
Systolic blood pressure (mmHg)	-0.24	0.27	-0.08	0.58	0.23	0.22
Diastolic blood pressure (mmHg)	0.16	0.69	0.13	0.63	-0.04	0.90

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