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Effect of Zinc Supplement on Certain Element Levels of Sedentary People and Male Sportmens

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Abstract: Purpose of the study realized is to determine the effect of zinc supplement for 6 weeks on certain mineral levels of male sporters and sedentary persons. Study is realized on 40 healthy male subjects whose ages varied between 18 and 22, and research groups are constituted as follows. Subjects were classified into four groups of 10 persons, and pretest and posttest design is utilized in this study.
1st Group: Control group for which no application is performed (Sedentary)
2nd Group: Sedentary group only with zinc supplement (Zinc)
3rd Group: Training group with zinc supplement (Zinc + Training)
4th Group: Sporters' group who are training (Training)

Zinc supplement (3 mg/kg/day) is given to the subjects in Groups 2 and 3 in addition to their normal diets for 6 weeks. Furthermore weight training is performed by 3rd and 4th groups for 6 weeks on 4 days of a week and for 90 – 120 minutes, and 1st group constituted the control group in which no application is performed. Measurements are made in the beginning (pretest) and at the end (posttest) of the study. **Findings:** No difference was determined in the values of zinc, copper and magnesium values of groups in the beginning of the study. However increases in all parameters were determined together with the zinc supplement of six weeks and exercises realized. Increases in the groups with zinc supplement were higher. **Results:** Results of the study reveal that zinc supplement of 6 weeks and exercises influence zinc, copper and magnesium values of male sporters and sedentary persons.

Key words: Zinc supplement, sportmen, elements, Training, Minerals.

INTRODUCTION

It is shown that continuous exercise at high level may influence the zinc metabolism for a long time period (Cordova et al., 1995). Exercise has a significant effect on the zinc metabolism. Besides its short-term effects on the zinc metabolism, it is shown that continuous high-level exercise may influence the zinc metabolism for a long duration (Kara, 2007).

While serum zinc concentration is 19% higher immediately after the race in male dogs participating in snow ski racing of 70 km and lasting 5 hours, in comparison to the value before the race; it is reported that these values returned to their originals 1 day after the race (Cordova, 1994). It is pointed out that increase in the plasma zinc levels after exercising may not be described as a natural consequence of the hemo-concentration mechanism (Cordova, 1990).

The reason of increase in the plasma zinc levels observed immediately after the exercises is considered to be muscle leaking the zinc into the extracellular fluid after the muscle damage taking place during exercises (Mundie et al., 2001). It is determined that there is a significant increase in the plasma zinc levels and also an important decrease in the erythrocyte zinc immediately after the exercises, and that both parameters return to their values before exercising after a rest of half an hour (Baltacı et al., 2008). This information supports that intracellular zinc goes out of the cells during exercising. In another study, it is concluded that serum zinc levels of both trained and untrained subjects increased after acute exercising, however this increase did not show any difference among the groups, thus increase in the zinc level is not related with the training level (Mcdonald, 1998).

The importance of not ignoring the relationship of zinc with copper and other metals is pointed out when applying zinc supplement to the sporters (Haymes, 1991). Especially it is accepted that zinc supplement over the level recommended for sporters destroy the copper absorption, and this situation may influence the performance adversely (Brun et al., 1991). Serum zinc levels of 20 gymnasts whose ages varied between 12 and 15 were found to be lower than their control group, and serum zinc levels of female gymnasts were determined to be lower than the male gymnasts (Kılıç, 2003).

Purpose of this study is to determine the effect of zinc supplement and exercises for 6 weeks on certain element levels of sedentary people and male sporters.

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MATERIAL AND METHOD

Subjects:

40 healthy male subjects whose ages varied between 18 and 22 participated in the research. Subjects were classified into four groups of 10 persons. Pretest-posttest design is used in this study. Population of the study is constituted by the students who are staying in credit hostels of Adıyaman University and who are not doing any physical exercise and who are actively doing physical exercise in different branches and who are subjected to the same nutrition program.

1st Group: Control group for which no application is performed (S)
2nd Group: Sedentary group only with zinc supplement (Z)
3rd Group: Training group with zinc supplement (ZT)
4th Group: Sporters' group who are training (T)

Zinc supplement (2.5-3 mg/kg/day) is given to the subjects in Groups 2 and 3 in addition to their normal diets for 6 weeks. Furthermore weight training is performed by 3rd and 4th groups for 6 weeks on 4 days of a week and for 90 – 120 minutes, and 1st group constituted the control group in which no application is performed.

Magnesium, Zinc and Copper Measurements:

Blood samples (2 ml) taken with injectors were centrifuged and their plasmas were eluted, then they were kept at -20 degrees in tubes with plastic covers till the time of analysis, and atomic absorption spectrophotometer was used to determine these measurements.

Statistical Analyses:

Variance analysis is utilized in the study to determine the differences between the measurements of groups; and Duncan's Multiple Range Test is applied to specify the groups that have differences. Comparison of groups to determine the differences between measurements is made by means of t-test. Statistical analyses are made by utilizing SPSS 16.0 package program.

Findings:

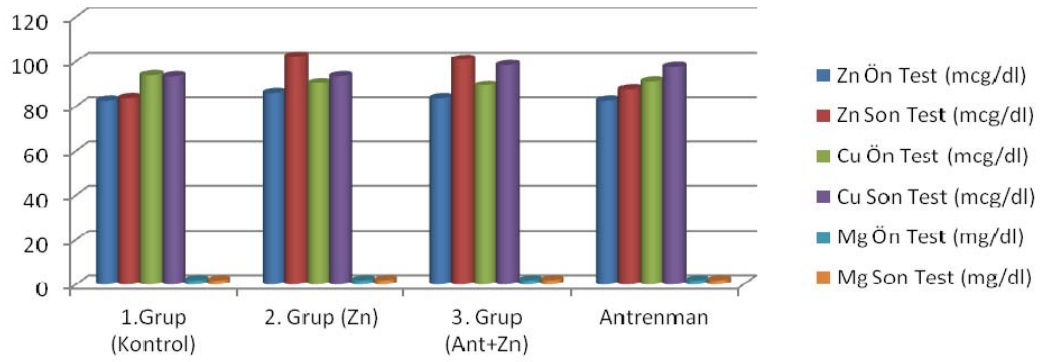
Zinc, copper and magnesium values of the groups are given in Table 1. When zinc values are examined, there is no difference between the values of 1st group ($p>0.05$). There is a ($p<0.05$). There is no difference between the pretest measurements of the groups ($p>0.05$). When Posttest measurements of groups are investigated as their 2nd measurements, it is seen that there is a significant difference between the groups with zinc supplement and the other groups ($p<0.05$). There is no difference between the Pretest and Posttest values of the 1st and 2nd groups according to their Copper values given in Table1 ($p>0.05$). However, the differences between the Pretest and Posttest measurements of 3rd and 4th groups are statistically significant ($p<0.05$). There is a meaningful difference between the posttest values of the 3rd and 4th groups and posttest values of 1st and 2nd groups ($p<0.05$).

When Magnesium values are investigated, there is no difference between the Pretest and Posttest values of 1st group ($p>005$). There is a significant difference between the values of 2nd group before and after the supplement ($p<0.05$). In a similar way, statistical difference is found between the Pretest and Posttest values of 3rd and 4th groups ($p<0.05$). There is no significant difference between the Pretest measurements when intergroup comparison is examined ($p>0.05$). However, differences between the Posttest measurements is important ($p<0.05$)

Table 1: Zinc, Copper, Magnesium Values of Experimental Groups.

Values	Measurements	1st Group (Control)	2nd Group (Zn)	3rd Group (Trai.+Zn)	4th Group (Training)
Zn (mcg/dl)	I. PRETEST	82.60±11.65ax	85.92±8.65ax	83.66±9.78ax	82.64±8.65ax
	II.POSTTEST	83.70±7.88az	102.38±8.54bx	100.96±8.03bx	87.49±7.91by
Cu (mcg/dl)	I. PRETEST	94.10±10.25ax	90.55±8.78ax	89.35±7.45ax	91.36±8.65ax
	II.POSTTEST	93.60±10.30ay	93.65±7.68ay	98.44±7.21bx	97.65±7.65bx
Mg (mg/dl)	I. PRETEST	1.85±0.56ax	1.88±0.81ax	1.86±0.60ax	1.81±0.47ax
	II.POSTTEST	1.81±0.59az	1.95±0.51bx	1.96±0.54bx	1.87±0.68by

a,b,c; Differences in the Measurements Having Different Letters in the Same Column are Important ($p<0.05$).
x,y,z; Differences in the Measurements Having Different Letters in the Same Line are Important ($p<0.05$).
Ist Measurement: Before Supplement (Pretest); IInd Measurement: After Supplement (Posttest)



Graphic 1: Zinc, Copper and Magnesium Levels of Experimental Groups.

RESULTS AND DISCUSSION

When zinc, copper and magnesium values of the groups in Table 1 are examined, there is no difference between the pretest and posttest zinc values of the 1st group (control group) ($p>0.05$). Besides this, pretest value of the 2nd group (with zinc supplement) is determined as 85.92 mcg/dl and posttest value as 102.38 mcg/dl. Pretest zinc level of the 3rd group (training group with zinc supplement) is specified as 83.66 mcg/dl and posttest zinc level as 100.96 mcg/dl. Pretest value of the 4th group (training group) is measured as 82.64 mcg/dl and the last measurement has increased to 87.49 mcg/dl ($p<0.05$). It is observed that pretest and posttest values of the groups with zinc supplement increased more than the other groups, and that there is also difference between the measurements of the training group which is the 4th group ($p<0.05$). When findings are discussed, it can be said that training performed regularly causes significant increases in terms of copper mineral. Kılıç (2003) has supplemented approximately 2.5-3 mg zinc to the sporters and sedentary people in his study realized on matmen. Zinc level of the group supplemented with zinc has increased further. Plasma zinc copper levels of 16 athletes were measured before and after the marathon race, and values obtained were compared with the values of sedentary people, and it is found that plasma zinc and copper levels of athletes were higher than the sedentary people (Cordova, Navas, 1998). In a study realized on professional volleyball players, 12 volleyball players and 12 sedentary people were subjected to training during 3 months. At the end of the study, serum zinc levels of active volleyball players are found to be higher in comparison to the sedentary people (Cinar et al., 2007). Çınar has examined the effect of training program on the minerals and found the zinc value ad 92.70 before the training and as 96.20 after the application (Haymes, 1991). It is revealed that high level continuous exercising may influence the zinc metabolism for long duration.

When we examine copper values in Table 1, there is no difference in the pretest and posttest values of the 1st group ($p>0.05$). Similarly, there is no significant difference between the pretest and posttest measurements of the 2nd group (with zinc supplement) ($p>0.05$). However, pretest copper level of the 3rd group (training group with zinc supplement) is determined as 89.35 mcg/dl and posttest copper level as 98.44 mcg/dl. It is specified that pretest measurement of 4th group is 91.36 mcg/dl and its last measurement increased to 97.65 mcg/dl ($p<0.05$). Increase between the measurements of 3rd and 4th group is statistically significant ($p<0.05$). According to the results of the study, zinc supplement and training program shall raise the magnesium value in the blood. Studies realized on this subject support our findings (Marella,1993; Cordova, 1998 14). Researchers have reported in their study on rats that copper values have increased significantly in comparison to pretest values as a result of swimming program applied (Cordova, 1990).

There is no difference between the pretest and posttest values of the 1st group when magnesium values are investigated in Table 1 ($p>0.05$). It is specified that values of the 2nd group before and after supplement have increased in comparison to their pretest values ($p<0.05$). In a similar way, there is a statistically important increase between the pretest and posttest measurements of the 3rd and 4th groups ($p<0.05$). Strong changes in the serum or plasma magnesium levels are closely related with the intense and continuous exercises (Brun et al., 1995). Results of studies performed by various researchers (Moğulkoç et al., 1997) show similarity with the findings of our study.

Our study reveals that zinc supplement and training realized during 6 weeks influence the zinc, copper and magnesium values of male sporters and sedentary subjects.

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