Zinc Reinforcement and Blood Parameters in Male Sportsmen and Sedanteries

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Abstract: Purpose of the study realized is to determine the effect of zinc supplement for 6 weeks on the blood parameters 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. 5 milliliter blood samples were taken from the subjects for two times and complete blood values were specified. It is determined that thrombocyte, erythrocyte, leucocyte and indexes as hematologic parameters have increased together with the application. **Findings:** Significant increase in the erythrocyte and leucocyte values is observed as a result of the supplement made. **Results:** Results of the study show that together with training, zinc supplement influence the blood parameters in a positive way in the male sporters and sedentary people.

Key words: Zinc,Blood,Sportman,Exercise,Training

INTRODUCTION

Zinc, being present in the structure of more than hundred enzymes in the body, plays a vital role in the growing, development and reproduction systems (Vallee,1993). It is shown that continuous exercises at high level influence the zinc metabolism for a long period of time (Cordova, Alvarez-Mon, 1995). Exercise has an important effect on the metabolism of zinc. Besides short-term effects of exercise on the zinc metabolism, it is revealed that continuous high level exercise can influence the zinc metabolism for a long period of time (Kara,2007). In fact, blood parameters limits type and intensity of the exercises, and also exercise influences the blood parameters and has importance in terms of various blood pathologies (Cavusoğlu, 1991). In a study performed by Akar et al. (Akar et al, 1992), it is shown that acute sub-maximal exercise meaningly increases erythrocyte, hematocrit (Hct), hemoglobin (Hb), leucocyte and thrombocyte numbers in comparison to the values before the exercises; it is concluded this increase is resulting from the loss of plasma caused by exercises. It is asserted that short term exercise performed until getting tired increases the leucocytic parameters, and that this event may not be explained only by hemo-concentration mechanism, and that metabolic changes observed during exercise may be related with the hematologic changes (Ozyener et al., 1994). In a similar way, it is revealed that acute submaximal exercise increase leucocytic parameters and this increase are correlated with the intensity of the exercises (Beydağıet al., 1998; Beydağı et al.,1992). Studies related with the subject show that these changes in the hematologic parameters are seen immediately after the exercises, however these changes return to their relaxation levels in 24 hours after the exercises (Beydağı et al., 1994). In another study, it is stated that acute swimming and running exercises in rats do not cause a significant change in the hematologic parameters (Temocin et al., 1992). On the other hand, it is reported that acute swimming exercises in rats decrease erythrocyte, Hb and Hct ratios in comparison to the values before swimming (Dursunet al., 1990). It is informed that erythrocytary and leucocytic parameters are higher in female children dealing with volleyball and athletics in comparison to the children not doing sports, in the same study it is determined that plasma zinc levels increased only in those dealing with volleyball sports compared to the control subjects (Arslanet al., 1997). In a study performed by Baltacıet al. (Baltacıet al., 1998) higher blood values are obtained for female children doing sports compared to the control subjects, whereas no change is observed among the groups when plasma zinc levels are considered. Similar findings are obtained by Moğulkoç et al. (Moğolkocet al., 1997) in the boys making physical activities. It is expressed that zinc supplement has increased the erythrocyte, hb and hct values in the rate of 17% in rats who were subjected to acute swimming exercise (Cordovaet al., 1993).

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Dissimilarly, it is reported that swimming exercise has also increased lipid peroxidation in rats, that is, it causes cellular injury (Yalcin*et al*., 2000). Besides the important effects of exercise on carbohydrate, protein and lipid metabolisms, it may be asserted that zinc that plays a critical role on the cell division, growth, maturing and on functioning of a wide range of enzymes, can have effect on the physical performance(Hadden, 1998).

Purpose of this study is to determine the effect of zinc supplement of 6 weeks on the blood parameters of sedentary males and sporters.

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 AdıyamanUniversity 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.

Measurement of Blood and Hematologic Parameters:
Taking Blood Samples:

Blood samples are taken from experimental subjects from their forearm veins with 10 cc injectors twice being in the beginning of the study and at the end of implementations of 6 weeks (in the morning on an empty stomach). Serums of blood samples taken were eluted by centrifuge at 4000 revolutions for 5 minutes, and then planned parameters were investigated in Adıyaman state hospital hematology laboratory.

Determination of Hematologic Parameters (Erythrocyte and Its Indexes, Hemoglobin, Hematocrit, Leucocyte and Its Indexes, Trombosit and Its Indexes):

Blood samples of 2 millimeters taken from subjects to tubes with EDTA were processed by utilizing CELL –DYN-3500 R trade mark automatic blood count device in Adıyaman state hospital, Hematology laboratory.

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:

Tablo 1: ResearchGroupsErythrocytes, leucocytes, platelets, hemoglobinand Sub-Groups Measurements.

Değerler	Measurements	1. Group(Control)	2. Group(Zn)	3. Group(Training+Zn)	4. Group Training
WBC (Leucocyte) (K/ul)	I. PRETEST	6.32 ± 0.82ax	6.25±0.59ax	6. 21±0.45ax	6.30±0.74ax
	II.POSTTEST	6.35±0.71ay	6.78±0.51bx	6.69±0.56bx	6.25±0.75ay
RBC(Erythrocyte) (10e6/ul)	I. PRETEST	5.31±0.45ax	5.36±0.45ax	5.25±0.50ax	5.20±0.51ax
	II.POSTTEST	5.25±0.56ay	5.71±0.43bx	5.67±0.55bx	5.53±0.53az
PLT(10e3/ul) (Trombosit)	I. PRETEST	261.70±29.92ax	259.48±37.45ax	263.48±21.56ax	261.71±29.98ax
	II.POSTTEST	259.45±27.74ax	261.42±32.12ax	265.47±28.65ax	266.92±30.07ax
HGB(g/dl) (Hemoglobin)	I. PRETEST	15.76±0.57ax	15.82±0.45ax	15.93±0.54ax	15.80±0.45ax
	II.POSTTEST	15.88±0.56ay	15.89±0.62ay	16.35±0.61bx	16.20±0.58bx
HCT (Hematokrit)(%)	I. PRETEST	48.23±0.48ax	48.12±1.75ax	49.15±2.80ax	50.62±3.24ax
	II.POSTTEST	47.72±0.95ay	49.92±2.21ay	53.40±3.45bx	51.20±2.78ax
MCH(Erythrocyte Indexes) (%)	I. PRETEST	28.54±0.72ax	27.65±1.56ax	28.12±0.86ax	29.42±2.45ax
	II.POSTTEST	29.96±2.50ax	29.96±2.40ax	30.60±2.45ax	30.60±3.20ax
PCT (Trombosit hematocrit)	I. PRETEST	238±0.97ax	245.44±2.56ax	239.93±2.65ax	243.36±1.85ax
	II.POSTTEST	241.12±4.09ax	250.42±3.80ax	243.32±4.20ax	249.56±3.51ax

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)

Values of Erythrocyte, Leucocyte, Trombosit, Hemoglobin of groups and their sub-groups are given in Table 1. When WBC (leucocyte) values of 2ndGroup are examined, there is a difference between the Pretest and

Posttest values (p<0.05). In a similar way, there is also a significant difference between the Pretest and Posttest values of 3rd group's WBC (leucocyte) (p<0.05). There is no difference between the Pretest and Posttest values of the 4th group (p>0.05). When intergroup comparisons are examined, it is seen that there is no difference between their Pretest values (p>0.05). There is an important difference between the WBC (leucocyte) values of 2nd and 3rd groups and 1st and 4th groups, when Posttest values of groups are considered as the 2nd measurements (p<0.05).

There is no difference between the Pretest and Posttest values of 1st group when RBC (erythrocyte) values of groups are examined in Graphic 1 (p>0.05). There is a significant difference between the Pretest and Posttest measurements of RBC (erythrocyte) values of 2nd group (p<0.05). Similarly, there is a meaningful difference between the Pretest and Posttest measurements of 3rd group (p<0.05). There is no important difference between Pretest and Posttest values of 4th group in the RBC (erythrocyte) value (p>0.05). When intergroup comparisons are examined, no difference is observed between the RBC (erythrocyte) Pretest values (p>0.05). On the other hand, there is a difference between the Posttest values of 2nd and 3rd groups and other groups (p<0.05).

There is no difference between the Pretest and Posttest values of all groups when PLT (trombosit) values are examined in Graphic 1 (p>0.05). If intergroup comparison of PLT (trombosit) values is studied, there is no difference between the Pretest and Posttest measurements of the groups (p>0.05).

When we examine HGB (hemoglobin) values in Graphic 1, there is no difference between the Pretest and Posttest values of 1st group (p>0.05). In a similar way, there is no significant change in the Pretest and Posttest HGB (hemoglobin) values of the 2nd group (p>0.05). However, there is an important difference between the Pretest and Posttest measurements of HGB (hemoglobin) parameter of 3rd group (p<0.05). If HGB (hemoglobin) measurements of groups is studied, there is no difference between the groups in terms of the Pretest values (p>0.05). When posttest values are considered, the difference between the values of 3rd and 4th groups and the values of 1st and 2nd groups is statistically important (p<0.05).

There is no difference between Pretest and Posttest values of 1st group when HCT (hematocrit) values of groups are examined in Graphic 1 (p>0.05). In the same way, there is also no difference between the Pretest and Posttest values of the 2nd group and 4th group (p>0.05). A significant difference is determined between the Pretest and Posttest values of only 3rd group, when Pretest and Posttest measurements are considered (p<0.05). If we examine intergroup HCT (hematocrit) measurements, there is no difference between the groups in terms of Pretest values (p>0.05). When posttest values are considered, the difference between the values of 3rd and 4th groups and the values of 1st and 2nd groups is statistically important (p<0.05).

When we examine MCH (erythrocyte indexes) values in Graphic 1, there is no difference between the Pretest and Posttest values of all groups (p> 0.05). Intergroup comparison of MCH (erythrocyte indexes) value shows that there is also no difference between the Pretest and Posttest measurements of groups (p>0.05).

There is no difference between the Pretest and Posttest values of all groups, when we examine PCT (trombosit hematocrit) values in Graphic 1 (p> 0.05). Intergroup comparison of PCT (trombosit hematocrit) value shows that there is also no difference between the Pretest and Posttest measurements of groups (p>0.05).
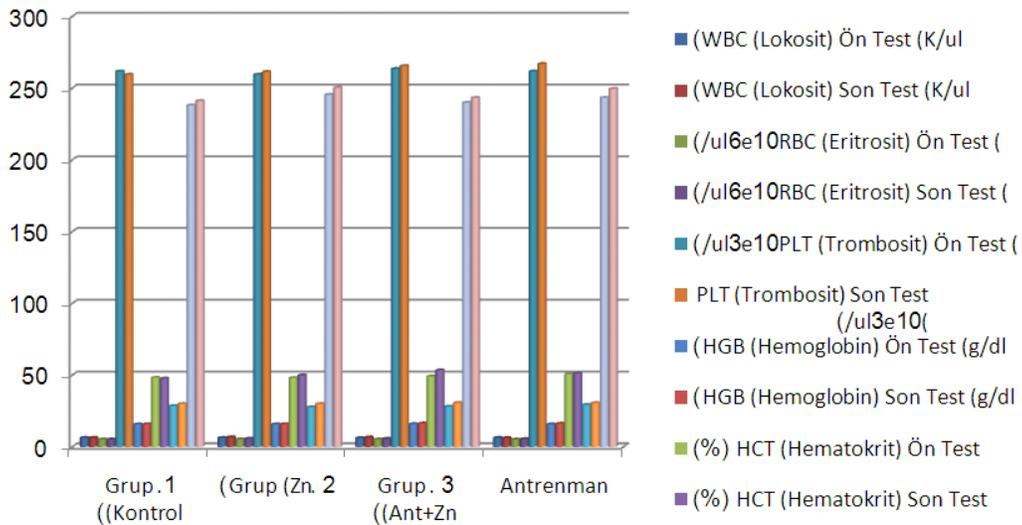
Graphic 1: Erythrocyte, Leucocyte, Trombosit, Hemoglobin Levels of Experimental Groups.

RESULTS AND DISCUSSION

Effects of zinc supplement and weight exercise on the hematologic parameters are examined in the blood samples taken twice in total being 1st measurement determining pretest (before supplement) resting levels and 2nd measurement posttest (after supplement) resting levels in this study, where effects of zinc supplement together with the weight exercises applied to sporters and sedentary people for six weeks and four days in one week on the hematologic parameters are investigated.

It is determined that leucocyte values of group supplemented with zinc have increased in terms of the relation between the pretest values and posttest values when intergroup comparisons are examined. In a similar study, it is stated that leucocytic parameters of sporters increased as a result of the trainings and supplement of magnesium as a trace element regularly for 4 weeks. (Cınar *et al.*, 2007). There is similarity between our study results and results of (Özyener *et al.*, 1994; Cinar *et al.*, 2010). It is asserted that short term exercise performed until getting tired increases the leucocytic parameters, and that this event may not be explained only by hemo-concentration mechanism, and that metabolic changes observed during exercise may be related with the hematologic changes (Henry *et al.*, 2002).

There is no important difference between the pretest and posttest values of 1st group (control group) and 4th group (training group) when RBC (erythrocyte) values of groups are examined in Graphic 1 ($p > 0.05$). There is a significant difference between pretest and posttest values of 2nd group (with zinc supplement) in the RBC (erythrocyte) value ($p < 0.05$). In a similar way, there is also an important difference between 1st and 2nd measurements of the 3rd group (training group with zinc supplement) ($p < 0.05$). When intergroup comparisons are examined for RBC (erythrocyte) values, it is observed that zinc applied to groups with zinc supplement increases the values significantly.

When PLT (trombosit) values are examined in Graphic 1, there is no significant difference between Pretest and Posttest values of all groups ($p > 0.05$). There is also no important difference between the Pretest and Posttest measurements of groups when we investigate intergroup comparison of PLT (trombosit) value ($p > 0.05$). Henry *et al.* (2002) have reported that erythrocyte number in the body decreases together with the mineral amount taken in their study performed on women.

When we examine HGB (hemoglobin) values in Graphic 1, there is no difference between the pretest and posttest measurements of 1st group in terms of HGB (hemoglobin) value ($p > 0.05$). In a similar way, there is no meaningful change in the pretest and posttest HGB (hemoglobin) values of the 2nd group ($p > 0.05$). However, there is an important difference between the pretest and posttest measurements of HGB (hemoglobin) parameter of 3rd group ($p < 0.05$). Similarly, there is also a significant difference between the pretest and posttest measurements of the 4th group ($p < 0.05$). If HGB (hemoglobin) measurements of groups is studied, there is a meaningful increase between the measurements of groups for which training program is applied. Thus as a consequence, it can be said that regular exercise is efficient in the production of HGB. In a similar study, it is stated that HGB parameters of training groups increased as a result of supplement of magnesium as a trace element and trainings performed (Cınar *et al.*, 2007).

Difference between pretest and posttest values of 3rd group as the training group with zinc supplement is determined when HCT (hematocrit) values of groups are examined in Graphic 1 ($p < 0.05$). When MCH (erythrocyte indexes) values are investigated, there is no difference between the pretest and posttest values of all groups ($p > 0.05$). It is reported that supplement and exercise have increased MCH values in the study where different results are obtained, however it may be stated that this difference results from supplement and mineral types.

There is no difference between the Pretest and Posttest values, when we examine PCT (trombosit hematocrit) values in Graphic 1 ($p > 0.05$). Çavuşoglu has determined difference between the pretest and posttest parameters in his study. The reason of this difference is considered to be the type and features of the training program (Çavuşoğlu, 1991).

Whereas blood parameters influence type and intensity of exercise, exercise also influences blood parameters and have importance in terms of blood pathologies (Arslan, 1997). Baltacı *et al.* (1998) have examined certain hematologic values of sporter female children and other people in the control group together with exercising. Leucocyte and other hematologic parameters of sporter group are found to be higher in comparison to the control group.

It is determined that erythrocyte, trombosit, leucocyte and their indexes have increased together with the application. An important increase is observed in the erythrocyte and leucocyte values as a result of the supplement given.

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