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# The Effect of Power Development Exercise During 6 Weeks on sICAM and E-Selectin Levels of Turkish National Young Male Boxing Team Athletes

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**ABSTRACT** The objective of this paper is to compare the levels of E-selectin and sICAM on active athletes who performed power developing exercise throughout 6 weeks. Blood samples were taken from participants (experiment and control groups) before and after exercise. The data obtained was analysed with SPSS 16.0 package. For testing non-parametric difference between depended groups Wilcoxon Signed Rank test, and for independent groups Mann Whitney U test was used. The significance value was determined at 0.05 and 0.01 percent probability level. There were no significant differences in E-selectin and sICAM values of control group before and after exercise and there was a significant difference at $p<0.01$ in E-selectin and sICAM values of experimental group, before and after exercise. As a result sICAM and E-selectin values of active athletes were determined as higher than control group. It can be suggested that regular exercise has positive effects on sICAM and E-selectin levels.

## INTRODUCTION

Sport is a way to develop and improve human muscle and nervous system and mental, physical, physiologic and metabolic reactions. Sport emphasis on the physical activity rehabilitation properties (Beasley 1982). Adhesion molecule causes to migrate the leukocytes in the inflammation region. The migration of the leukocytes in the inflammation region is a dynamic process (Aytekin et al. 2004). The adhesion molecule of the sICAM and E-selectin on the cell surface have important roles to relate cell to cell (Springer 1990; Carlos et al. 1984). sICAM is an adhesion molecule that takes place in endothelial and security cells (Paziraei et al. 2015). Researchers defined the ICAM as in soluble form of the adhesion molecular in human body serum, and indicated that ICAM can be beneficiary and important in the diagnosis and evaluation of the pathological statue in plasma level. (Seth et al. 1991; Rothlein et al. 1991). It can also emphasis on the inflammation and infection statue evaluation. Power developing exercise usually increases the plasma catecholamine or cortisol level and leukocyte distribution decrease. Strong exercise increases muscle destruction as a result of inflammation. However, it is not clear that leukocytes have always the task in recovery of muscle destruction and inflammation (Seth et al. 1991; Rothlein et al. 1991). According to the data obtained, there are fewer studies about adhesion molecular functions in exercise (Tilz et al. 1993; Smith et al. 2000).

## MATERIAL AND METHODS

Experimental group; Turkish national boxing team with 20 athletes and 17.65±0.98 age, 67.80±12.32 kg weight, 174.45±6.50 cm average height. Control group consisted of 20 healty individuals who did not perform exercise. Control group were individuals with 19.15±1.26 age range and 72.20±8.21 kg average weight, 175.65±5.37 cm average height range. In this paper the sICAM and E-selectin amounts were measured and evaluated in experimental and control group.

In power developing exercise protocol there were performances like warm-up, iron pumping, bench press, ground training, cross-country running, two and half hours a day and six days per week. Before and after exercise blood samples were taken two times from experimental and control groups during 6 weeks of power devel-

oping exercise. In this paper some properties of individuals such as age, sex, height and weight were measured. The sample of blood was taken in medical faculty biochemical laboratory of Ataturk University and collected in the gel biochemical tubes. The samples in the tubes remained in the room temperature to coagulate in 30 minutes. After this process, the blood samples were centrifuged in the 3000 around/min as 10 minutes and the serum samples were prepared. The serum of sICAM and E-selectin to use for the tests were kept at -80 °C. The blood samples taken at +4 °C, were centrifuged and the reached serum was frozen and it was kept at -80 °C to use for the test. In this paper commercial kit (Inuitrogen Cat No: KHS5412/KHS5411, CA-USA) was used to determine the sICAM level and was tested by the ELISA (Enzyme Linked Immuno Sorbent Assay) method. To determine E-selectin level commercial kit (Human's E-selectin Platinum ELISA BMS205/BMS205ten Vienna, Austria) was used and tested by the ELISA method.

**Statistical Analysis**

To analyze the data SPSS 16 was used for the windows software program. To measure the non-parametric difference between dependent groups Wilcoxon Signed Rank test was used and to measure the non-parametric difference between independent groups Mann Whitney U test was used. The significant difference was determined at five and one percent probability levels.

## RESULTS

The control group age, average height, weight and body mass index were 19.15, 175.65 cm, 72.20 kg and 23.35 respectively.

The experimental group average age, average height, weight and body mass index were 17.65, 174.45 cm, 67.80 kg and 22.15 respectively.

According to the Tables 1 and 2, the properties of experimental and control group were similar.

According to the results of Table 3, the E-selectin and sICAM amounts before and after exercise did not have significant difference at

**Table 1: Control group physical properties average amounts**

| | *N* | *Minimum* | *Maximum* | *Mean* | *Std. deviation* |
|---|---|---|---|---|---|
| Age | 20 | 17.0 | 21.0 | 19.1 | 1.2 |
| Height | 20 | 167.0 | 185.0 | 175.6 | 5.3 |
| Weight | 20 | 56.0 | 85.0 | 72.2 | 8.2 |
| Body Mass Index (BMI) | 20 | 18.9 | 26.8 | 23.3 | 2.0 |

**Table 2: Experimental group physical properties average amounts**

| | *N* | *Minimum* | *Maximum* | *Mean* | *Std. deviation* |
|---|---|---|---|---|---|
| Age | 20 | 16.0 | 20.0 | 17.6 | 0.9 |
| Height | 20 | 160.0 | 186.0 | 174.4 | 6.5 |
| Weight | 20 | 48.0 | 91.0 | 67.8 | 12.3 |
| BMI | 20 | 18.6 | 28.4 | 22.1 | 2.8 |

**Table 3: The amount of E-selectin and sICAM before and after exercise for the experimental and control group**

| *Groups* | *Groups* | | *N* | *X* | *SS* | *z* |
|---|---|---|---|---|---|---|
| *E-Selectin* | *Control Group* | Before exercise | 20 | 13.8 | 4.8 | 0.0 |
| | | After exercise | 20 | 13.8 | 4.8 | |
| | *Experimental Group* | Before exercise | 20 | 130.6 | 24.3 | 3.9** |
| | | After exercise | 20 | 149.5 | 24.0 | |
| *sICAM* | *Control Group* | Before exercise | 20 | 177.1 | 50.5 | 0.0 |
| | | After exercise | 20 | 177.1 | 50.5 | |
| | *Experimental Group* | Before exercise | 20 | 934.4 | 487.4 | 3.9** |
| | | After exercise | 20 | 1372.7 | 514.2 | |

*p<0.05, **p<0.01

five percent probability level for the control group. But the amount of E-selectin and sICAM before and after exercise had significant difference at one percent probability level for the experimental group.

The interaction of E-selectin amounts before exercise had significant difference at one percent probability level for the experimental and control group. The interaction of E-selectin amounts after exercise had significant difference at one percent probability level for the experimental and control group. The interaction of sICAM amounts before exercise had significant difference at one percent probability level for the experimental and control group. The interaction of sICAM amounts after exercise had significant difference at one percent probability level for the experimental and control group.

## DISCUSSION

The purpose of this paper was to evaluate the effects of 6 weeks power developing exercise on the sICAM and E-selectin serum levels of Turkish young male national boxing team athletes. Before and after exercise the amount of E-selectin and sICAM did not have significant difference for the control group, but there was a significant difference between the amount of sICAM and E-selectin before and after exercise at one percent probability level. Before and after exercise, E-selectin and sICAM amount was at one percent probability level for experimental and control group. There are few studies about the effects of sICAM and E-selectin serum levels on actively exercising athletes.

Anyways, there are some researches about exercise with adhesion molecule of sICAM and E-selectin serum. The results of study showed that exercise as 3 hours go up and 2 hours go down increase plasma sICAM and E-selectin concentration (Tilz et al. 1993). In another study exercise as 3 hours go up and 2 hours go down, causes to increase the sICAM levels (Gearing et al. 1993). In a study on 11 individuals indicated that after marathon plasma sICAM levels increased at one percent probability level (Akimoto et al. 2002). The researchers indicated the relationship between plasma sICAM concentration level and exercise types, especially by the bicycle ergometer, can increase the muscle damage under strong conditions (Smith et al. 2000). According to the studies, high strong exercises have no influence on the sICAM and E-selectin serum levels at five percent probability level (Aoki et al. 1993). In another research it was reported that neutrophils show a significant increase but E-selectin concentration was not affected by eccentric exercise (Tsujisaki et al. 1991). In addition to that in a study which was conducted to college-men, it was determined that resistance training performed at high intensity decreases sICAM level and this result may be due to several factors (Park et al. 2015).

Individuals between 21-45 age ranges were studied and showed that one week dynamic exercise has effects on the plasma sICAM at five percent probability level. E-selectin also has influence on exercise (Rehman et al. 1997). In another study 20 young athletes were examined and indicated that two months of speed training and power exercise increased the blood samples adhesion molecular sICAM and could improve the body mechanism against infection (Baum et al. 1994). Another study on the high school students with 14-18.5 age range showed that immune mechanism which was affected by the exercise indicated that doing 1.5 hours of exercise

**Table 4: The interaction of E-selectin and sICAM amounts before and after exercise for the experimental and control group**

| *Groups* | *Groups* | | *N* | *X* | *SS* | *z* |
|---|---|---|---|---|---|---|
| *E-Selectin* | *Before Exercise* | Experimental group | 20 | 130.6 | 24.3 | 5.4** |
| | | Control group | 20 | 13.8 | 4.8 | |
| | *After Exercise* | Experimental group | 20 | 149.5 | 24.0 | 5.4** |
| | | Control group | 20 | 13.8 | 4.8 | |
| *sICAM* | *Before Exercise* | Experimental group | 20 | 934.4 | 487.4 | 5.4** |
| | | Control group | 20 | 177.1 | 50.5 | |
| | *After Exercise* | Experimental group | 20 | 1372.7 | 514.2 | 5.4** |
| | | Control group | 20 | 177.1 | 50.5 | |

*p<0.05, **p<0.01

increased adhesion molecular and sICAM at one percent probability level (Nemet et al. 2004). With sixty percent of one hour exercise, studies on the individuals who were non-athletes and athletes doing exercise with bicycle ergometer showed less increase at sICAM and E-selectin levels at p=0.028. So the other research results were similar to this study's results. As a result, for active athletes during 6 weeks power developing exercise effects was significant on the sICAM and E-selectin levels (Ballantyne et al. 1991).

## CONCLUSION

In conclusion, in this paper the effect of power development exercises during six weeks on sICAM and E-selectin levels were examined, it was reached that, intensive exercises significantly increase sICAM and E-selectin levels compared to before training on athletes doing exercise actively and basal levels of athletes are higher than control group.

## RECOMMENDATIONS

It can be suggested that this increase may be related to membrane integrity changing through velocity, intensity and duration of exercise and protein synthesis. In order to clarify the subject studies at molecular level should be carried out.

## NOTE

This paper was summarized by a part of Ph.D. Dissertation of Muhammed Kiziltunc.

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