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EFFECT OF THE WRESTLING TRAINING TO LEVELS OF THE SERUM ZN AND FE

HALUK KOC, SAVAS SEYFI, MUHSIN HAZAR
Gazi University, Schools Of Physical Education And Sports, Ankara, TURKEY

ABSTRACT

The purpose of this study is to investigate serum levels of zinc and Fe in well- trained male wrestling team during and after an aerobic maximal exercise. Thirty well-trained young male wrestlers completed the wrestling training protocol. Blood samples were collected before the exercise, immediately after exercise and 1 h after the exercise. Serum was analyzed for Zn and Fe by using inductively coupled plasma optical emission spectrometry (ICP-OES) method. İt was observed that the maximal aerobic exercise have a significant effect on the serum levels of zinc and ferrum in elite wrestlers ($p < 0.01$).

Key Words: ICP-OES, Aerobic exercise, Zn, Fe.

Introduction

Zinc is associated with more than 200 enzymatic systems. It is involved in the synthesis of nucleic acids, protein synthesis, growth inflammatory syndromes, testosterone secretion and cerebral function. The systemic availability of zinc in tissues is highly influenced by the balance of anabolic and catabolic processes regulating the renewal of soft and skeletal tissues. Most of the body zinc content is present in muscle (60 %) and bone (30 %). No hormone has been identified in zinc metabolism specifically and uniquely, but Mg-and Ca-regulating hormones may effect zinc metabolism directly or indirectly'. Zinc status has an important effect upon the physical performance. Zinc is essential for many enzymes involved in energy metabolism during exercise (e.g. carbonic anhydrase, lactate dehydrogenase, superoxide dismutase).This trace element plays a role in tissue repair (J.R. Berning And S.N. Steen, 1998, D. Konig, C. Weinstock, J. Keul And H. Northoff, 1998).

Because of these reasons, zinc's role in exercise and its relationship to athletic performance are receiving attention. However there is no consensus regarding to the blood levels of zinc after the exercise. Some researchers claimed that blood zinc level was depleted after the exercise while others said the opposite (S. Savas, O. Senel, H. Celikkan, A. Ugras And L. 2006). Low blood levels zinc levels were reported in professional football players who participated in a daily physical training program of progressively increased workloads. During exercise, zinc may be redistributed from less to more metabolically active tissues. Runners were found to have lower blood zinc levels but higher red blood cell zinc concentrations, possibility suggesting a redistribution of zinc during exercise (A. Singh, P.A. Deuster And Rb. Moser, J. 1990). (Van Loan et al 1999; Deruisseau et al 2002; Kikukawa and Kobayashi 2002) (S. Savas, O. Şenel, I. Okan, M Levent Aksu, 2007) . Kaya (M. Kaya, 2008); Hazar (M. Hazar); Aslan (F. Arslan, 2009), Savas (S. Savas, 2009).

Iron has a special place in nutrients as regard to effecting the performance. Iron is present in the structure of the blood and it is vitally important for the transport of oxygen. The total amount of iron in the human body is 4 g. 2.5 gram is present in hemoglobin which gives the red color of red blood cells. The remaining part 1.5 is stored as a stock. The iron in hemoglobin has a vital role in the transport of oxygen.

The transfer of iron from the tissues to blood is carried out by the use of copper. The iron coming from the dead red blood cells is used for the creation of new hemoglobin (S. Savas, 2005). This study was carried out to determine the effect control combat method applied to the wrestlers upon the iron and zinc levels of the body.

Effect of the Training to Levels of the Serum Zn and Fe

Metals	Variables	N	(X) (ug L')	Standard deviation	p
Zn	Before training	30	359,92	7,73	0.000*
	After training	30	303,07	5,61	
Fe	Before training	30	28,56	5,21	0.000*
	After training	30	33,46	3,00	

P<0.01

Table-1

ZİNC AND FE LEVELS BEFORE AND AFTER THE EXERCISE (REASERCH GROUPS)

Metals	Variables	N	(X) (ug L')	Standard deviation	p
Zn	Before training	30	271,55	4,93	0,008
	After training	30	271,69	1,79	
Fe	Before training	30	25,70	0,19	-
	After training	30	25,43	0,22	

P>0.05

Table-2. Zinc and fe levels before and after the exercise (control groups)

Zinc is an essential micronutrient for human body. Acute zinc deficiency results loss of weight, exhaustion, loss of endurance, osteoporosis and increase in viscosity of blood (A. Micheletti And R. Rossi, 2001, S. Khaled, J.F. Brun, G. Cassanas, L. Bardet And A. Orsetti, Clin, 1999).Van Loan et al. (M.D. Van Loan, B. Sutherland, N.M. Lowe, J.R. Turnlund And J.C. King, Int. J. 1999) found that isokinetic extension resulted a decrease of 67 % in plasma zinc levels which cause a significant decrease in muscle strength and total work capacity.Rodriguez Tuya et al.(I.R. Tuya, E.P. Gil, M.M. Marino, R.M.G. M. Carra And A.S. Misiego, Eur. J. Appl. 1991) reported a higher plasma-Zn level in anaerobic (judo and fencing) than aerobic (cycling and endurance). There are also studies in literature indicating that zinc levels remained unchanged after exercise. A study reported that the serum zinc levels in rats subjected to heavy exercise did not change, (H.C. Lukaski, W.W. Bolonchuk, L.M. Klevay, D.B. Milne And H.H. Sandstead, Am. J. Clin, 1983). In another study it was claimed that sub-maximal exercise did not effect the plasma zinc levels (A. Singh, F.M. Moses, B.L. Smoak And P.A. Deuster, 1992).

The reason why the Cu serum level didn't show any change with exercise may be due to exercise was anaerobic. Copper is present in cytochrom oxidase enzyme and carries electrons to oxygen during glucose metabolism. in aerobic exercise. The studies reveal that there is no correlation between the copper deficiency and the physical exercise taken (M. Hazar, F. Arslan, 2009). In this study, scrum levels of Zn and Cu before the exercise, immediately after the exercise and I h after maximal anaerobic (75 %) exercise were investigated in elite boxers. The aerobic capacity of the sportsman was observed to increase with the provision of adequate iron content. The prolonged iron deficiency results in the complication named anemia (S. Savas, 2005).

Methods

Experimental:

Thirty male subjects who are Turkish national wrestlers participated to this study. The median age of the participating subjects was 19, 64 ± 1.13 (year) ranging from 18 to 22. The other physical characteristics of the subjects were as follows (mean ± SD): weight (Kg) 80, 07 ± 15.68 (range 50-120), height (cm) 176.97 ± 6.69 (range 157-182).

Training protocol of the participants:

The participants were subjected to a 1.0 h, 80 - 100 % control combats training.

Intensity of loading: 80 – 100 % maximal

Time: 1 hour.

General Resting: 12 minutes (Stretching)

1- 7-8 minutes General warm up

2- 15 minutes technical warm up

3- 6 minutes control combats training (referee control)

4- 12 minutes jogging and stretching.

Blood sampling:

Blood samples were drawn from the antecubital vein of the subjects right before, immediately after and I h after exercise. Sample preparations and measurements: On the I mL blood samples was added 2.0 mL HNO.i and the samples were digested in Berghof/Microwave Digestion system MWS-3 microwave apparatus. The microwaves were kept at 160 °C for 5 min and at 190, 100 and 80 °C for 10 min each. The totally digested samples were diluted to 10 mL with the addition of deionized water 18.3 mohm cm"'.

Zinc and copper were analyzed directly using inductively coupled plasma optical emission spectrometry (ICP-OES, Perkin Elmer, Optima 5300 DV, USA).

Statistical analysis:

Statistical analysis was performed with SPSS Ver. 15.0 for Windows. Statistical significance was set at $p < 0.01$ (with 95 % confidence levels). Te descriptive statistics of the data, the t-test of significance between the pre and post tests results the trace metal levels

Results and discussion

Before training and after the training maximal loading (aerobic) in serum zinc and fe levels, respectively were found to be 271.55± 4.93 and 271.69 ± 1.79 ug /L and these values for Fe were 25.70 ± 0.19 and 25,43 ± 0,22.mg/L. It was observed that the application of maximum loading to the elite wrestlers caused significant change in their zinc and Fe serum levels after the exercise as regards to their pre and post exercise values ($p < 0.01$) (Table-1).there is no need for outside oxygen. That explains the fact that the serum copper levels remains highly stabile during an anaerobic exercise. The reason for not observing any significant change during anaerobic exercise may be attributed to the fact that there was enough zinc content in the body to meet the demand. There are also studies in literature showing that blood copper and zinc levels do not change with exercise (A. Cordova And J.F. Escanero, A. Singh, F.M. Moses, B.L. Smoak And P.A. Deuster, 1992).

Therefore the results obtained in this study are in good accordance with literature.

Conclusion

This study revealed that there were not any significant changes in the serum zinc and copper levels of elite boxers before, just after and 1 h after the exercise. The results showed that the Zn and Fe content of the body were enough to meet the demand and there was no need to supplements after the maximum load anaerobic exercise.

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