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THE EFFECTS OF SWIMMING EXECISE AT 20°C WATER AND L-CARNITINE ON MICE'S BLOOD PARAMETERS

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ABSTRACT

Objective: We aimed to research the effects of swimming exercise that's water temparature 20°C on physiological functions of mice administred exhausted exercise.

Methods and procedures: It was used 60 male mice of the type of balb/C and twelve mountly aged in this research.The mice were divided into four groups consist of non-training(n:15), swiming training(n:15), practical(n:15) and unpracticle(n:15) L-carnitine. L-carnitine as phamalogical agent was used the dose 100mgr/kg (0.4ml) to experiment groups. It was given saline solution the same volume of L-carnitine to control group. The mice were swum until exhaustion in the morris water tank at 20°C ambiant. Swimming exercise was applied during three weeks. Both control group and experiment group mice were measured blood parameters of their pre and post exercises. Blood samples (0.5ml) was taken twice from tail veins of the control and experiment mice during experiments.The blood cell parameter findings obtained by the blood cell counter device. All mice outenasied by eter inhalation long period after experiment three weekly. The findings were evalueted as means ± SEM. Data for the exercise-trained groups were compared to those for the sedentary groups using one-way anova. Statistical significance among groups were evaluated at $p < 0.05$.

Results: The data that's erythrocyte, hemoglobin, haematocrit and RDW, MPW, PDW were founded significantly ($p<0.05$) when it was compared to the findings of control group with only swimming group. The values of leukocyte, erythrocyte, hemoglobin, RDW and trombocyte parameters were founded differences between two groups significantly ($p<0.05$) when it was compared to the findings of the control group with experiment group is swimming and taking L-carnitine. The values of MCV, PLT and PCT were found significantly ($p<0.05$) differences between two groups when the experiment group that's both swimming exercise and taking L-carnitine compared to with the only swimming group.

Discussions and conclusions: It was evaluated that the exhaustion swimming exercise influenced negative effect on hematologic parameters of mice because of cold stress. It must absolutely avoid from heavier swimming exercise to them. We concluded that swimming training protocols, special environment, cold stress and the other factors had to be well-programmed..

Key words: L-Carnitine, Swimming Exercise, Cold stres, Mouse Training

Introductın

It is very important the effects of environmental factors on athletic performance. The athletic performance affects very bad to have inadequat body temperature in all different areas. Water temperature impacts to performance levels in the range of important (T K Okizawa, 2010, R. Greger U Windhorst. 1996, TJ. Doubt, 1991). The water temparature that changes to body tempererature 0.5°C is very effective on cardivascular performance levels and so the athletics peformance is being influenced negatively. There is many literatuture about the effects of different environmental temperature on functionel structure (D Weinert, 2007, J Bittel,1992). The organisms consumpt metabolic energy at the top of level because of the factors to be using contrary to traditional life ways, for example body temparature. It has to use more energy. L-Carnitine is very important for to use the mitokondrial energy production that increase during exercise at the brain, liver and kidney **(LA.** Calò, 2008, S. Baptista 2008, WD Van Marken Lichtenbelt . 2007). Endurance sports affect on energy consumption and macrophages and these state obtains many advantage with both beta oxidation of fetty acits and immunity (Himms-Hagen J. 1995, ICheng GJ. 1990).

Hypotermia can be caused by the swimming exercise under body temperature of water heat and hypotemia is very important for atletic performance (Schaefer VI.1996, Ferreti G.1992). And low temparature, humidity, body composition and other factors are negative effects on performance (TJ Doubt,1991, JP, Wehrlin, 2006, P.Robach,.2005).

The environmental and intrinsic factors stimulate to erythropoiesis. Swimming exercise affects also haemopoietic activity during physical activity (LA Calò, 2008, Aoi W. 2004, D Weinert . 2007).

We aimed with this study that is to demonstrate many different effects of swimming water temparature with using L-carnitine on mice blood parameters and swimming performances.

Materıal and method

This research was done in Erciyes University the center of experimental research center. It was used in our research 60 male mice of the type of balb/C and tuwelve mountly age in this research. The mice were devided into four groups consist of 1.group; control sedantery group(C1), 2.group; only swimming group(C2), 3.group;taking salin solution%0.9=0.4ml(D1), 4.group; taking L-carnitin 100mgr(D2). . All groups were formed with fiveteen mouse. The salin solution (%0.9Nacl) and L-carnitine(Santa Farma-l-cartine/1gr-3ml) were given at the same volume (0.4ml) by intrperitoneal(IP) injection. The mice were swum until exhaustion in the morris water tank at 20°C ambiant. The mice were swum Swimming exercise was applied during three weeks. Both the control groups and experiment groups at mice as pre-post measuring were tested blood parameters of their red blood cell(RBC), wight blood cell(WBC), haemoglobine(Hb), haematocrite(HCT), mean corpuscular volume(MCV), mean corpuscular haemoglobine(MCH), mean corpuscular haemoglobine concentration(MCHC), platelet (PLT), platocrite(PCT) with the animals's swimming time(ST) and body temparature(BT). Blood samples was taken twice during experiments from all mice's tail veins and v.subclavia (0.5ml). .The blood cell parameter findings obtained by the blood cell counter device(CRP Counter, LC-178CRP). All mice outenasied by eter inhalation long period after from experiment three weekly.

The statistically analysis of findings were evalueted as means ± SEM. Data for the control groups and experiment groups were compared by using one-way anova. Statistical significance among groups were evaluated at $p < 0.05$.

Results

The mice tested swimming exercice in the 20°C water heat under laboratory condition. It was were tested the measurable findings are RBC, WBC, Hb, Hct, MCV,MCH, MCHC, PLT and PCT. It has been presented all our findings in Table1-3.

The effects of swimming excercise on some blood parameters which was done in 20˚C swimming water heat, were found like that.(Table 1.):

Table 1: The evaluation of some blood parameters at swimming water heat 20°C.

Parameters	C1 n:12	C2 n:12	D1 n:12	D2 n:12
RBC	9.4±0.3[a]	8.9±0.4[b]	8.4±0.4[a]	9.9±1.2[a]
WBC	5.8±0.3[a]	6.7±3.0[a]	7.9±2.0[a]	8.5±1.0[a]
Hb	15.6±0.4[a]	14.0±0.5[a]	12.7±0.5[a]	12.8±1.0[a]
Hct	48.4±2.3[a]	43.2±2.6[a]	41.5±1.5[a]	43.6±2.1[a]

a: Differents of groups is important to C1 statistically($p<0.05$).
C1:Sedantery, **C2**: Only swimming **D1**: Taking salin solution **D2**:Taking L-carnitine

RBC and WBC levels were found meaningful differences between C1 and other groups that is in favour of swimming groups and taking L-carnitine taken group ($p<0.05$). But it was not important among swimming groups($p>0.05$).

Hb and Hct levels was found meaningful differences statistically between C1 and in decreasing direction to swimming other groups($p<0.05$).

Some haematological parameters which is MCV, MCH, MCHC, PLT and PCT, have been presented in Table 2.

Table 2. The comparison of same haematological parameters at swimming water heat 20°C

Parameters	C1 n:12	C2:12	D1 n:12	D2 n:12
MCV	44.1±0.7[a]	44.8±0.8[a]	44.9±0.6[a]	45.6±1.4[a]
MCH	14.2±0.2[a]	15.6±0.1[a]	14.9±0.1[a]	15.2±0.3[a]
MCHC	32.5±0.2[a]	33.4±0.6[a]	33.8±0.7[a]	33.4±0.9[a]
PLT	470.1±225.1	523.1±243.0	802.0±102.7	729.6±181.3
PCT	0.23±0.1	0.31±0.0	0.45±0.0	0.39±0.0

C1:Sedantery, **C2**: Only swimming **D1**: Taking Salin solu. swim **D2**:Taking L-Carnitine

MCV levels were found meaningful differences between C1 and other groups that is in favour of swimming groups and taking L-carnitine taken group ($p<0.05$). But it was found not important among swimming groups($p>0.05$).

MCH and MCHC levels were found meaningful differences between C1 and other groups that is in favour of swimming groups and taking L-carnitine

group ($p<0.05$). But it was found not important among swimming groups($p>0.05$).
PLT and PCT levels were found very important meaningful differences statistically when were compared with between C1 group and all other groups($p<0.05$) .But it was found not important among swimming groups($p>0.05$).
The findings of swimming time and body temparature levels have been presented in Tablo 3.

Table 3: Table. The findings of the body temparature and the swimming time at water heat 20°C

Parameters	**C1 n:12**	**C2 n:12**	**D1 n:12**	**D2 n:12**
Body Temp. (°C)	38.0±0.2	38.1±0.2	38.5±0.2	38.4±0.3
Swim. Time (min)	----------	43.7±5.3[a]	49.6±6.2[a]	52.6±0.1[a]

C1:Sedantery, **C2**: Only swimming **D1**: Taking Salin solu. swim **D2**:Taking L-Carnitine

The body temparature were not found meaningful differences among all groups statistically ($p>0.05$).
The swimming time levels were found meaningful differences between C2 and other groups which is especially in favour of the taking L-carnitine group ($p<0.05$). The differences between swimming groups was also found important statistically($p<0.05$).

Dıcussıon and conclusıon

The direct physiological response of immersion into cold water typically a rapid tachicardia and intense hyperventilatory drive. This "cold shock" response can be extreemly respiratin resting values to more than 30 breaths and 80L/min in ventilation and 150 beats/min in herth rate in seminude individuals rapidly immersed to the neck in mid cold water (MJ Tipton, ES Golden, 1998). Futhermore, the psychological stres and panic of sudden immersion exert an additional strong in the symphatetic neural system and possible producing of increasing hyperventilation and tachicardia (MJ Barwood, 2006).
It is known that physical activity and its levels increase hematopoietic activity. The swimming excercise also have effects on the blood parameters.The effects of excercise and cold on erythrocyte, hemoglobin and hematocrit levels are altered their levels by releated each other. The erythrocyte levels have increased significantly at the swimming groups according to nonswimming sedantary groups. However, hemoglobin and hematoctrit levels have increased meaningly according to sedantery group. It is known that intensity of excercise, nutrition, l-carnitine and sensory stres are affected these parameters increasingly (S. Baptista 2008).
A number of studies indicate that cold water stress can result in suppression of the erhytropoiesis, heamethologic and immune system in animals and man (Aoi W et al 2004, Cheng GJ et al 1990).
It is known that different water tempratures have different effects on athletic performance according to different cold or warm water temperature (Weinert D. 2007, Bittel J. 1992). Exercise, hipoxia, l-carnitine and other factors stimulate to erythropoiesis (Calò LA.2008). It has increased significantly haematological parameters that's RBC, WBC, Hb and Hct levels corraletion with blood cells. Moreover, cold stres release secretion of adrenaline that's causes to eryhtropoesis (A Kuroshima .1995).
It has indicated that the blood parameters increased in RBC, HCT MCH, MCHC and platelet aggregation values because of concerning the plasma Norepinephrine and epinephrine concentrations(**LA** Calò .2008**,** W Aoi , S Iwashita , 2004).
It has been suggested that early in the response to stress, functions of a variety of cells within the immune system are altered the suppression function of macrophages in cold water stressed mice (GJ Cheng 1990). The cold stress can be compensated with feding, condition level, body composition and other factors because of being adversely affected by the mice's swimming exercise at 20°C water temparature and cold stres.
It is known that is in the swimimng groups were not altered their body temparature meaningfully. Mechanisms of effect of exercise training on cold tolerance are different in adult and aged animals(J Himms-Hagen .1995)
As a result; the swimming mice were survived approximately one hour in this research. It has ben tought that it has been adversely affected their erhytropoiesis and endurance because of swimming exercise in the cold water which is the lower 18°C than mice's body temparature.

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