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THE ACUTE EXERCISE THE EFFECT OF THE SUPPLEMENTATION OF GLYCEROL AND THE FATIQUE ON THE LEVELS OF SOME MINERALS AND HCT, THB AND GLUCOSE

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Abstract

Objective: The aim of this research is to investigate the effect of the applied glycerol reinforcement on the levels of Na, K, İca, HCT, THB and Glucose in sportsmen and sedanter individuals before the accute exercise.

Method: 10 healthy sportsmen, in their avarage age 18.20 ± 0.61, avarage height 178,20 ± 1.78 cm and avarage body weight 65.17 ± 2.04 kg, interested in athletism in an elite level and 10 healthy sedanter men, in their age 19.70 ± 0.47, avarage height 169,10 ± 2.21 cm and avarage body weight 71.09 ± 1.87 kg as a control group, that's to say, 20 people have participated in this research as tested people. In the first day, the examples of blood have been taken from S and C's elbow veins before and after the shuttle run test. After 1 day break, in the 3rd day, before 2 hours of the same exercise test (GET) , the solution has been applied to both 2 groups by mixing it with 1 gr/kg glycerol water and the same test has been applied again. Before and almost after the applied ET and GET throughout 2 days, the qualified parameter levels of taken blood examples have been determined.

Result: It has appeared the level of HCT, THB and Na of C group ($p<0.005$) in an important level, after GET the unimportance of this increase. After ET, the decrease of K levels of C group ($p<0.05$) in an expressive level and the absence of the important difference after GET have been determined. It hasn't appeared the expressive difference in the İca levels of C group after ET and GET. After ET and GET the important increase of glucose levels of C group ($p<0.05$) have been determined.

There is no important difference in the levels of HCT, THB, Na and K of S group after ET and GET. The decrease of İca level of S group has been determined ($p<0.05$) in an important level after ET and GET. It has appeared the increase of glucose levels of the same group after ET and GET in an excessive level and the importance of this increase before ET and GET.($p<0.005$)

It has appeared the absence of the important difference of the levels of HCT, THB and K between 2 groups, but that C group has higher level of Na than S group in an excessive level after ET and GET, the İca level of C group is higher than S group and after GET the glucose level of S group is higher than C group in an excessive level.

Conclusion: In conclusion, in this research, it can be said that the applied submaximal exercise has caused the unimportance differences in the amount of THB related with osmotic pressure and HCT concentration and Na, K and İca levels and the applied liquid glycerol reinforcement or their loses together with this exercise protocol haven't changed osmotic pressure of blood liquid in this quantity and period at least and so they haven't affected hemoconcentration mechanism in an important level and it can be thought that the reason of the increase in glucose levels is the acceptance of glycerol and the content of the exercise protocol.

Key words: Exercise, Glycerol, Electrolyte, Hematology.

Introductıon

Agents such as glycerol and dextran have been given to the sportsmen by way of oral and intravenous to increase the volume of the plasm and maintain the exercise in a long time. In the studies, it has been informed that loading glycerol to the sportsmen with various methods increases their performances very much (A. Coutts, et al, 2002, R.A. Robergs and S.E. Griffin, 1998, P. Montner, et al, 1996). It has been focused that glycerol, which has been given before exercise, has the important effects on decreasing the internal heat and increasing the velecity of the perspiration in addition to datas that the application of the glycerol increases the osmolarity of the plasm and the volume of the plasm and decreases the volume of the urine (R. Murray et al, 1991). Decreasing in the volume of the plasm has been also able to increase the level of THB because of the level of HCT.

During the exercise, the potassium in the muscular tissues goes out of the cell and increases the blood stream by way of the local vasodilatation as physiologic. In the heavy exercise, hyperkalemia can appear to decrease even the level of ATP. The existence of the level of serum Na above 145mEq/L has been known as hypernatremia. The hypernatremia can result from dehydration or Na retention. The dehydration needs to appear more than increase in Na, K for the existence of the hypernatremia. The existence of the dehydration more than Na, K has caused Na concentration in the plasm (G.B. Haycock, 2006).

The source of the energy changes according to the type and time of the exercise. During the low intense exercise, the loss of glucose is equal to the appearence of the glucose and glucose concentration remains in the same degree. During the avarage and heavy intense exercise, the rate of the appearence of the glucose is more than the rate of glucose which muscules has used and this situation causes the increase in blood glucose concentartion (J.A. Romijn,1993). When the violance of the exercise increases, carbonhydrates have become a main source of energy. When the violance of the exercise increases more and more, carbonhydrates can be produced by only using them (S. Paker, 1998).

The type, violance and time of the exercise have affected the hematology parameters. In the acute exercise, hematologic changes also have been explained with the homeconcentration mechanism and the loss of the plasm.

Results

Table. C and S Groups of Values Before and After Exercise

		T.Ö		T.S	
	G	***Rest*** Mean±SE	***Exhaustion*** Mean±SE	***Rest*** Mean±SE	***Exhaustion*** Mean±SE
HCT(%)	C	47,37±0,60 **b**	53,78±2,30 **a**	47,70±1,85 **ab**	48,45±1,26 **b**
	S	48,90±2,49 **ab**	49,86±1,00 **a**	44,95±1,23 **b**	46,21±1,45 **ab**
Na(mmol/L)	C	140,45±0,66 **b**	**A** 144,15±0,44 **a**	143,96±1,04 **a**	145,77±0,86 **a**
	S	141,92±0,96 **ab**	**B** 141,82±0,54 **b**	142,54±1,09 **ab**	145,00±0,86 **a**
K(mmol/L)	C	4,77±0,28 **a**	4,15±0,16 **b**	4,44±0,12 **a**	4,23±0,04 **ab**
	S	4,35±0,19	4,78±0,23	4,73±0,14	5,35±1,01
İCa(mmol/L)	C	1,29±0,01	**A** 1,32±0,03	1,28±0,006	**A** 1,29±0,01
	S	1,27±0,01 **a**	**B** 1,21±0,01**b**	1,26±0,01 **a**	**B** 1,20±0,03 **b**
THb(g/dl)	C	16,08±0,21 **b**	18,14±0,83 **a**	16,21±0,63 **ab**	16,50±0,42 **ab**
	S	16,61±0,84 **ab**	17,38±0,43 **a**	15,27±0,42 **b**	15,71±0,49 **ab**
Glikoz(mg/dl)	C	64,86±4,04 **c**	91,57±4,87 **a**	76,14±2,51 **b**	**B** 79,43±2,52 **ab**
	S	65,00±2,23 **c**	104,14±9,83 **a**	80,43±3,18 **b**	**A** 106,00±7,58 **a**

AB: In the same column, the differences between avarage values are ($p<0.05$) important among the group carrying different letters.

abcd: In the same line, the differences between avarage values are ($p<0.05$) important within group carrying different letters.

C: Control group

S: Sportsman group

BS: Before supplementatıon

AS: After supplementatıon

It has appeared the level of HCT, THB and Na of C group ($p<0.005$) in an important level, after GET the unimportance of this increase. After ET, the decrease of K levels of C group ($p<0.05$) in an expressive level and the absence of the important difference after GET have been determined. It hasn't appeared the expressive difference in the İca levels of C group after ET and GET. After ET and GET the important increase of glucose levels of C group ($p<0.05$) have been determined.

There is no important difference in the levels of HCT, THB, Na and K of S group after ET and GET. The decrease of İca level of S group has been determined ($p<0.05$) in an important level after ET and GET. It has appeared the increase of glucose levels of the same group after ET and GET in an excessive level and the importance of this increase before ET and GET.($p<0.005$)

It has appeared the absence of the important difference of the levels of HCT, THB and K between 2 groups, but that C group has higher level of Na than S group in an excessive level after ET and GET, the İca level of C group is higher than S group and after GET the glucose level of S group is higher than C group in an excessive level.

Materıal

Total 10 sportsmen whose avarage ages are 18.20± 0.61 years, avarage heights are 178,20± 178 cm and body weights are 65.17±2.04kg and who are interested in the branch of athletism in the elite level and 10 healthy and sedentary men whose avarage ages are 19.70±0.47 years, avarage heights are 169,10± 2.21 cm and avarage body weights are 71.09± 187 kg as a control group, that's to say, 20 people have been participated in this study as experimentals.

Method

S: Sportsmen group (n:10)

C: Control Group (n:10)

ET: First day before exercise test

GET: Third day before exercise test

Before and after shuttle run test (ET) , in the first day S and C groups' blood samples have been taken from their elbow veins. After one day break in the third day before 2 hours out of the same exercise test (GET) they have been given to both 2 groups as solution by mixing 1 gr/kg glycerol with water and the same test has been applied again. Before and after ET and GET applied in every 2 day, the levels of bloof exemples (fatique) have been determined by using the device labelled with EIRMA point (USA) and CC cartridge.

Exercise Test

20 m mecic running test which applied to people being in experiment is multi-leveled test aiming getting tired of people and its first level is warming up tempo. People run first 20 m distance as coming and going. Running speed is controlled with a tape giving signal voice. People started running when they firstly heard signal voice and reached the line by second signal voice. When they heard second signal voice they were backed to starting line by turning back and the running went on with these signals.The people set their own tempos as being on the other side of the patch when they heard the signal. The running which was slow at the beginning is increased at ever 10 seconds. If a person can't reach the line before signal, but if she can reach other signal, person went on the test. If person can't reach 2 signals after and after, test is finished. The tiredness is formed on people with this way.

Statıstıcal Analysıses

Avarage values and Standard errors of parameters of all experimentals have been counted. Indepented 't' has been used in the importance determination of differences among groups. The repetead measurement has been applied by analyzing variancein the determination of differences in the in-group. Paired 't' has been applied in the determination of differences.

Dıscussıon and Conclusıon

It has been informed that after giving the glycerol which provides the decrease in the volume of the plasm by way of oral has affected the hepatic and renal metabolism with the effects on the seperation of the body heat (R. Murray, et al, 1991), therefore, it will be able to cause important cahanges in some hematologic parameters of sportsmen and sedentary individuals who exercise regularly (G.J. Rietjens, et al, 2002).

In the research, the increase in HCT and THB in both 2 groups after ET and GET, but the important increase in C group after ET ($p<0.05$) have been observed. It has been informed that the acute submaximal exercise increases the numbers of erythrocyte, Hct and Hb in proportion to the values before exercise in an understandable way and this increase is related with the loss of the plasm which the exercise causes (S. Akar, et al, 1992). Altough these changes in the hematologic parameters have been observed immediately after the exercise, it shows that these changes turn into the the level of the rest within 24 hours following the exercise (H. Beydağı, et al, 1994). In the study, it can be thought that there is the increase in HCT and THB in the C group after ET and because of the loss of this increase, glycerol has prevented the loss of the plasm by decreasing the osmotic pressure in the sedentary individuals after GET. However, the non-existence of the important differencein the intergoups has prevented this idea. The reason for the unimportant increase in HCT and THB in S group and important increase in HCT and THB in C group ($p<0.05$) after exercise test has been explained with hemoconcentration related with exercise and the important thing is also giving high blood in terms of hemotocrit from splanic circulation to circular circulation. Comparably, B.J. Freund, et al, (1991) have determined the important increase in the levels of the hemoglobine of the experimentals when they exercise with % 60-80 of max VO2. S. Patlar and E. Keskin, (2007) have informed that avarage intense and submaximal exercise increases the levels of HGB and HCT in the importatnt degree and glycerol supplemetation applied with exercise protocol has no effect on the levels of HGB, HCT.

In the research, the increase in the level of glucose in C and S groups in the important degree after ET ($p<0.05$), this unimportance of the increase in C group after GET, but the understandable increase in S group ($p<0.05$) have been observed. The intesity of the exercise affects muscles' use of glucose and the production of the glucose. During the exercise, the production of the glucose increases to satisfy the increasing need of glycogen of the muscles (N. Marmy-Conus, et al, 1996). When the intensity of the exercise increases from %25 of VO_2

to %65 and %85 of VO_2, the increase in the rate of the appearence of glucose has been determined. During the low intense exercise, the loss of the glucose is equal to the appearence of the glucose and glucose concentration remains in the same degree. During the avarage and high intense exercise, the rate of the appearence of the glucose is more than the rate of the glucose that muscles uses and this situation causes the increase in the blood glucose concentration (J.A. Romijn, et al, 1993).

M. Gleeson, et al, (1986) have given glucose, glycerol and placebo to 6 experimentals (age 32.3±3 year) before exercise and they have made them exercise in the level of 45 min. %75 max VO_2 until they become fatique. When glucose has been taken, no differences between measured blood glucose concentration and placebo, glycerol have been determined after exercise. C. Aydın, et al, (2000) have determined the understandable increase in the levels of the glucose ($p<0.01$) after aerobic and anaerobic exercise. They have informed the unimportance of the increase in the level of the glucose between 2 exercises.

During the period of the low intense exercises, the body has worked as an aerobic and the most of the production of the energy has been satisfied from the fat. When the intensity of the exercise increases more and more, carbonhydrates has become the main sourceof the energy, muscles have gone towards to glycogen which is the more effective source of the energy (H. Beydağı, et al, 1994).

It can be said that the exercise applied in the study is an submaximal exercise and causes the fatique, the energy is provided from carbonhydrates because the violance of the energy increases more and more and this causes the increase in the levels of the glycose.

In the study, the increase in the level of Na of C group in the important degree after ET, unimportance of this increase after GET have been observed. The decrease in the levels of K (Potassium) of C group after ET in an understandable degree ($p<0.05$), but after GET no differences ha ve been determined. The understandable differences in the levels of Ica in C group after ET and GET have not been seen .

There have no differences in the levels of NA and K of S group after ET and GET. R.L. Pieschl et al, (1992) it has been determined that there are important increase in the levels of Na in the sportsmen after 400 m sprint run, no difference in K and the decrease in the level of İca in S group after ET and GET in the important degree ($p<0.05$).

It has been seen that between 2 groups, there are no important differences in the levels of K (potassium), but the level of Na of C group after ET is higher than those in S group ($p<0.05$), the level of İca of C group is higher than those in S group in an important degree ($p<0.05$). ıt has been informed that many hormonal changes accompanied with exercise affect the absorbtion of Ca F.S. Navas, et al, (1997), the loss of Ca increases thanks to perspiration during the exercise (R.C. Klesges, et al, 1997). In the acute and chronic metabolic asidose the increase in the swing of Ca can happen from the bone to circulation (P. Sriboonlue 1996). It can be said that this increase in C group results from the lack of adaptation to exercise.T.E. Aguilera et al, (2000) have determined that there is the increase in the levels of Na and K in 17 sportsmen after exercise, V. Çinar et al, (2009) have determined that fatique increases the levels of Ca and K after exercise.

In conclusion, it can be said that applied submaximal exercise affects the levels of HCT, THB, Na, K and İca and this will be explained with the adaptation to the exercise and the loss of the plasm because of exercise, when considering the intensity and the time of the exercise test, the energy is provided from carbonhydrates and this causes the important increase in the levels of glucose. In this study, it can be said that applied glycerol supplementation has no important effect.

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