

THE EFFECTS OF ACCUTE SUBMAXIMAL EXERCISE ON SOME STRESS HORMONE LEVEL

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Abstract

Objective: In the study, it is aimed to examine influence of Acute Submaximal exercise in the sportsmen and sedentary individuals who sport regularly on epinephrine and cortisol levels.

Material and method: In the study 20 student subjects were used who were average 17–20 year old and 65–75 weight of 10 healthy male sportsmen from the Higher School of Physical Education and Sports and also 10 healthy boy students studying in other faculties. Subjects were divided into 2 groups: Sedentary group (S) and Exercise Group (E). Blood samples of both groups were taken; the first one before (OD) the specified exercise test and the second (ES) right after the completion of test. The third (E2S) blood sample was taken 2 hours after the exercise and the fourth (E24S) one 24 hours after the exercise

Result: It was seen that Epinephrine OD values of the Group S significantly increased after exercise ($P < 0.05$), while E2S value was indifferent to ES value and E24S value significantly decreased ($P > 0.05$). It was seen found that Epinephrine OD values of the Group E significantly increased after exercise ($P < 0.05$), while there was no significant change in ES and E2S levels, and E24S values significantly decreased ($P < 0.05$) than the values after exercise (ES, E2S). It was found that cortisol OD values of Group S significantly increased after exercise ($P < 0.05$). Although ES2 value was lower than the ES value, it was seen that they were statistically identical and levels of ES, E2S and E24S were significantly higher than OD level ($p < 0.05$). E24S value significantly decreased than ES value ($P < 0.05$). It was found that Cortisol OD values of Group E significantly increased ($p < 0.05$) after the exercise and E2S and ES values were identical while E2S level was found significantly ($P < 0.05$) higher than E24S level. E24S value was found significantly lower than ES value ($P < 0.05$). E24S value was determined to be significantly higher than OD level. When epinephrine and cortisol levels were compared between two groups, any important difference was not seen.

Discussion and conclusion: It was found that there is an important influence of submaximal exercised applied in this study in moderate intensity on Epinephrine and Cortisol levels

Key Words: Exercise, Epinephrine, Cortisol

Introduction

The balance has arised with cooperation between a great number of agents under the hormonal neural control. Factors like physical stress that can change this balance in the body as an acute and chronic illness have activated a great number of homeostatic mechanism. Especially, they have important roles on homeostatic changes such as cardiovascular system and fluid balance in the sportsmen.

It has been informed that there has been the increase in the levels of stress hormones such as epinephrine and cortisol having direct and indirect effects on the regulation of cardiovascular system of organism. The increase has changes according to the intensity, period of exercise and person's exercise situation. In the studies mentioned up to now, it has been known that because of the variation of the environmental conditions, exercise protocol and the features of different experimental, the comment of the hormonal changes is very hard because of exercise.

During exercise, the release of epinephrine out of the adrenal medulla has increased. The intensity and period of the exercise have effect on this

increase. The increase in lipolysis has been seen in parallel with the increase in epinephrine concentration because of the increase in the intensity of the exercise from % 20 max VO₂ to % 65 max VO₂. The increase in the intensity of the exercise has increased epinephrine concentration and the increasing epinephrine concentration has caused the increase in lipolysis (M.R. Rodriguez., and F.C. Edward., 2000). But this answer is lower in the stability performance of sedentary individuals. In addition, it has been seen that when comparing athletes with untrained individuals, before exercise, athletes' epinephrine secretion is more than untrained individuals in these athletes' physical activities it arises as a conclusion of their long-dated accordance with endocrine gland. As a parallel with this accordance, this accordance has been observed in the skeletal muscles, hearts and other tissues. This accordance have the advantage on the athletes' performances. (M. Kjaer., 1998)

Especially it has been informed that there is the definite increase in the level of cortisol in the high intense exercise (Korbak, 1990). The increase in the release of cortisol has parallel with the increase in stress in the exercise. (R. Güneş., 1995).

In this study, it has aimed at the research of the effects of acute submaximal exercise on the levels of serum epinephrin and cortisol in the athletes and sedentary individuals.

Material and method

Material

In this study, 20 healthy sportsmen whose average ages are 22.82 ± 14.9 years and body weights are 73.96 ± 9.16 kg and who study in Selcuk University Physical Training and Sport Colloge and 20 healthy male students who study in other faculties, totally 40 students, have been used as experimentals. Groups:

1. Group: sedentary group; S (n:10),
2. Group: exercise group; E (n:10),

Method

Experimentals have been divided into 2 groups as sedentary group (S) and exercise group (E). Before exercise test mentioned before applied to both 2 groups, the first (0v) and the second blood samples have been taken (AE) immediately after test. After 2 hours out of exercise, the third blood samples (A2E) and fourth samples (A24E) after 24 hours have been taken.

Exercise Test

20 m meci 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.

Times and Abbreviations of the Measurement

1. **Sampling Time:** The value:0 before supplementation :0V
2. **Sampling Time:** Immediately after exercise : AE
3. **Sampling Time :** After 2 hours out of exercise : A2E
4. **Sampling Time:** After 24 hours out of exercise: A24E

Analysises

In the biochemistry laboratory of Selcuk University Medical Faculty, their serums have been attained by transferring blood samples taken from elbow veins as an accordance with (v. Brachialis) type sufficiently to tubes containing Ethylenediaminetetraoetic acid and centrifuging them in 15 min. , 4 C, 3500 rmp immediately. The level of serum epinephrin out of serum samples has been determined with elisa method by using Adrenaline Research EIA-REF=KHB510081.400 (made in Belquim, Lot=3023) Epinephrin Kit. The serum cortisol levels have been determined by using cortisol EIA 96 (Lot=410117 made in San Diego, California, USA), test's kit with the method of elisa in the device labelled with EI \times 800 Biotek readers and counted from K.C. Junner program.

Statistical Analyses

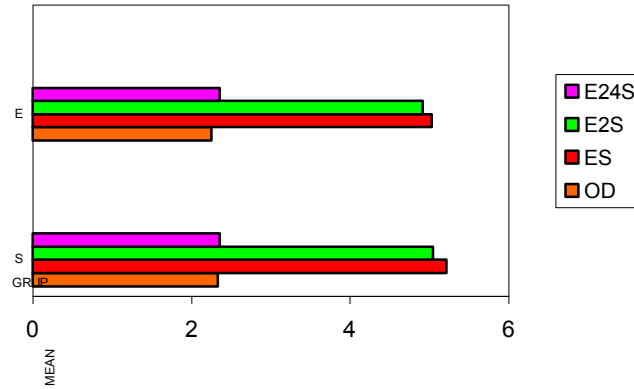
SPSS package program has been used in the acquired statistical analyses. The average values and Standard errors of experimentals' measurement parameters have been counted. Duncon's Multiple Range Test has been used by making variance analysis in the importance control of the differences among groups. In the determination of the in- group, Wilcoxon spelling system has been used in the determination of the statistical differences.

RESULTS

Table 1. The acquired values of the levels of serum epinephrin of all groups: (n:10)

Epinefrin (ng/ml)	OD	ES	E2S	E24S
Gruplar	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD
S	2,33 \pm 0,03 b	5,22 \pm 0,36 a	5,05 \pm 0,46 a	2,36 \pm 0,21 b
E	2,25 \pm 0,14 b	5,03 \pm 0,43 a	4,92 \pm 0,26 a	2,36 \pm 0,31 b

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

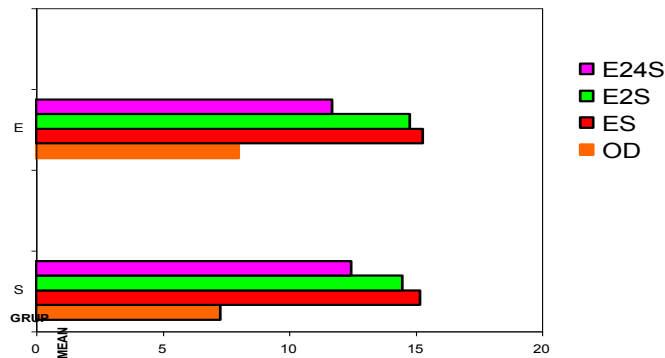


Graphic 1. The averages of epinephrin levels in within group and in-group (ng/ml)

Table 2. The acquired values of the levels of serum cortisol of all groups : (n=10)

Kortizol (ug/dl)	OD	ES	E2S	E24S
Gruplar	Mean±SD	Mean±SD	Mean±SD	Mean±SD
S	7,30±0,22 c	15,19±1,17 a	14,51±0,69 ab	12,47±1,31 b
E	8,04±0,27 d	15,31±0,50 a	14,81±1,48 ab	11,73±1,42 c

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



Graphic 2. The averages of the levels of the cortisol in within group and in-group: (ng/ml)

It was seen that Epinephrine OD values of the Group S significantly increased after exercise ($P < 0.05$), while E2S value was indifferent to ES value and E24S value significantly decreased ($P > 0.05$). It was seen found that Epinephrine OD values of the Group E significantly increased after exercise ($P < 0.05$), while there was no significant change in ES and E2S levels, and E24S values significantly decreased ($P < 0.05$) than the values after exercise (ES, E2S). It was found that cortisol OD values of Group S significantly increased after exercise ($P < 0.05$). Although ES2 value was lower than the ES value, it was seen that they were statistically identical and levels of ES, E2S and E24S were significantly higher than OD level

($p < 0.05$). E24S value significantly decreased than ES value ($P < 0.05$). It was found that Cortisol OD values of Group E significantly increased ($p < 0.05$) after the exercise and E2S and ES values were identical while E2S level was found significantly ($P < 0.05$) higher than E24S level. E24S value was found significantly lower than ES value ($P < 0.05$). E24S value was determined to be significantly higher than OD level. When epinephrine and cortisol levels were compared between two groups, any important difference was not seen.

Discussion and conclusion

While the understandable increase ($p < 0.05$) in the values of epinephrin (OV) of S group has been observed after exercise, the similarity of A2E

's value ($p < 0.05$) with AE and the understandable decrease in A24E 's value ($p < 0.05$) have been observed. The considerable extent of increase in epinephrin' value (0V) of E group with exercise, if it is unimportant, the continuation of this increase after 2 hours, after 24 hours, the considerable extent of the decrease in value according to values after exercise have been observed after exercise. The understandable increase in S group's cortisol values (0V) ($p < 0.05$) after exercise has been determined. Although A2E's value is lower than AE's values, as an statistical situation, the higher and understandable increase in similar AE, A2E, A24E's values than 0V and TS values has been observed. According to A24E and AE's values, it has been determined. Although it decreases, it cannot reach to initial value, that's to say, normal level. The understandable increase in cortisol (0V) values of E group has been observed after exercise. Although A2E 's value is lower than AE, no differences have been observed as a statistical data. When finding A2E and A24E cortisol levels similar, it has been found that A24E' value is lower than AE' value in an understandable level while comparing A24E's value with 0V, the similar results have been determined.

In the study, when analyzing intergroups' values, statistical differences in serum epinephrin and cortisol levels have been observed in any period.

In this study, the increase in epinephrin levels of all groups with exercise have been accepted as a natural consequence of the increase in the sympathetic neural system as directed to the provision of physiologic conditions needed for exercise.

In this study, most studies have supported the increase in determined epinephrin level in all groups with exercise. Thus, R. Bahr., A.T. Hostmark., E.A. Newsholme., (1991), A.S. Darleen., and S.M. Kathleen., (2002) the important increase in serum epinephrin level as related with acute exercise, V. Stich., I. Gliszinski., F. Crampes., et al, (1999), epinephrin level as a result of 60 min % 60 max VO₂ high intense exercise have been acquired. P. Markas., G.N. Koukoulis., G. Bourikas., et al, (2005). Physical Exercise Test has been applied to 2 groups who make from exercise and control group containing soldiers. The understandable increase in epinephrin levels after exercise and any differences between groups have been recorded in both groups.

I. Tabata., F. Ogita., M. Miyachi., (1991), when they put 6 cyclists through exercise until they become fatigue in the intensity of % 50 max VO₂, in the end of the exercise the understandable increase in serum cortisol levels has been determined and they have informed that long-dated exercise in the low intensity has increased the plasma cortisol concentration (M. Kjaer 1988). After they put 7 sportsmen and 7 sedentary groups

through cycle exercise in the intensity of %85 max VO₂, the understandable increase in serum cortisol levels has been observed and the increase in adrenal gland's secretion in experimentals has been shown because of the long-dated stability exercises.

W.S. Gozansky., J.S. Lynn., M.L. Laudenslager, (2005), when they put 10 female experimentals through 10 min.- exercise in the level of %90 maximal heartbeat, the understandable increase in the serum cortisol levels after exercise has been stated after exercise. M.S. Tremblay., H. Copeland., W. VanHelder., (2005) when they put 8 male experimentals through exercise in the treadmill and the intensity of %55 max VO₂, while the understandable increase in serum cortisol levels has not been seen in the 80. And 40. Min., in the 120. Min the understandable increase has been seen after exercise and they have recorded that long-dated run in the low intensity has increased cortisol levels. Especially, it has been informed that long-dated (exercises exceeding 2 hours) and exercise in the intensity of %60 max VO₂. Cortisol will increase plasma concentration very much.

L. Maimoum., J. Manetta., I. Couret., et al, (2006) when they put 7 male cyclists through 50 min cycle exercise, after exercise and after 15 minutes out of the exercise in the samples, immediately after exercise, the increase in cortisol level has been known in proportion to the values before exercise.

N. Kokalas., G. Tsalis., N. Tsigilis., (2004) when they put 6 orsmen through 3 different exercises (in the average intense interval exercise, long-dated stability exercise and power exercise) they have informed the understandable increase in cortisol level after long-dated stability exercise in proportion to other exercise types. In addition, while the small increase in cortisol has been observed as proportion to psychologic stress in the low and average grade exercises., it has been focused that this increase in the high intense and long-dated exercise has been seen very definitely (M. Ünal., 1998).

When the results of available researchs have been analyzed, after aerobic, anaerobic and power exercise, the increase in cortisol concentration has been observed and considering the types of exercise, the understandable increase in cortisol level has been observed as an expected result.

In this study, the increase in all groups has been recorded as a normal increase because 20 meter shuttle run test is the submaximal exercise type.

J.C. Thomas., F. Gail., K. Panagiota., (2003) when they put 32 male and female children in 10-11-year-old through 20 meter run, the understandable increase in the cortisol levels has been observed after exercise aGüneş(1998) and in the low intense exercise, there is no increase in cortisol levels or it decreases very much and when

the intensity of the exercise increases, the cortisol also increases. Especially, in the high intense exercise, there is definite increase in cortisol level (K. Karbek.,1990). The increase in the release of cortisol is paralel with the increase in the stres in the exercise. (R Güneş., 1995).W. Daly., C.A. Seegers., D.A. Rubin., (2005) when they put 22 male experimentals through the exercise in the treadmill and intensity of % 100 max VO₂ until they become fatigue, the understandable increase in cortisol levels (p<0.05) has been observed after exercise when observing their cortisol levels, after 30, 60, 90 min. And 24 hours out of exercise, this increase has contined until 30 mim. and later out of

exercise , the understandable decrease in cortisol level (p<0.05) has been determined after 24 hours out of excercise. Its reach to values has been determined. In our study after exercise , the increase has been similar with the values before exercise in the time of A24E as similar with these studies and only less increase in S group has been observed. Acquired findings in this study are important in terms of having similarity between it and literature findings substantially. In conclson, in this study , it can say that avarage intense and submaximal exercise has an important effect on serum epinephrin and cortisol levels.(p<0.05).

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