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ORIGINAL ARTICLE

The Effect of RAST Anaerobic Test on Creatine Phosphokinase and Lactate Dehydrogenase Enzymes in Active and Non- active Females

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ABSTRACT

The purpose of this study was to investigate the effect of RAST anaerobic test on CPK and LDH enzymes in active and non - active females. This research was performed through Quasi-experimental method. Statistical sample included 10 athlete and 10 non-athlete female students from ALzahra University who were selected randomly. Blood samples were collected from subjects before and immediately after exercise. Physical activity consisted of performance of the anaerobic RAST test with maximal effort of 85%-95% subjects׳ heart rate reserved. At the end data was analyzed through mixed factorial and multivariate test. The findings of the study indicated: There was a significant increase in levels of LDH and CPK enzyme between active and non – active female students after exercise. There was no significant difference between active and inactive female students in terms of CK and LDH enzymes activity.

Key words: CPK, LDH enzyme, RAST test, active and non-active females.

Introduction

In recent years the numbers of enzymes which have been utilized for diagnosis of diseases have increased rapidly and their application has got complicated. Impairments in body cause changes in enzyme system and other tissues. By identifying these changes, the impairments can be diagnosed and cured. Among these enzymes those related to energy systems in tissues and muscles like Creatine phosphokinase (CPK) and lactate dehydrogenase (LDH) are of great concern [1, 7].

Lactate dehydrogenase is known as the main enzyme in diagnosis of cardiac diseases. Additionally the level of this enzyme increases in hepatic and renal diseases and heart infarction [8].

Measurement of Creatine Kinase activity is a more sensitive factor in diagnosis of muscular diseases, myocardium infarction and cardio vascular and spinal events compared with other tests. Generally any kind of trauma to muscle like contusion, surgery, physical training and even fracture can increase the level of CPK which can remain for weeks and more [10].

On the other hand physical activity brings about augmentation of enzyme activity especially CPK and LDH. Short term and strenuous physical activity raises the level of serum enzymes. The more intensive exercise, the more increasing of enzyme activity compared to less intensive exercises. If physical activity is associated with muscular damages, the amount of enzyme secretion into the blood increases [3, 6]. Klapsinca et.al (2001) reported that increment of LDH and CPK was much higher in trained individual than those of untrained subjects after 300 meter swimming [4]. Kong (2002) examined the changes of LDH and CPK enzymes following 100 meter swimming in male and female subjects and stated there was a significant difference in LDH and CPK concentration after 100 meter swimming in terms of gender [5]. Since these two enzymes are considered as non – functional enzymes of plasma and have no identified physiologic function in blood, increasing their level beyond natural level in plasma, may indicate increment of tissues degeneration or destruction. Hence measuring the level of non – functional enzymes in plasma can provide diagnostic information and clinical prognosis for researchers [2].

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Methodology:

This study was quasi – experimental in nature. Statistical population included Al – Zahra university students. Statistical sample involved 10 active and 10 inactive female students with age mean 23.1$\pm$ 1.58 (M$\pm SD$) years and height mean 161 $\pm$6.56 cms, selected through purposive random sampling method. Blood sampling was conducted twice before and immediately after exercise. Activity involved RAST anaerobic test with subject's optimal maximum effort and 85% to 95% heart rate reserve. In this test the participants performed shuttle run 6 times in 35 meters distance at an even level as rapidly as possible with 10 seconds rest between each set. The heart rate both during rest time and after conducting the test was measured using pulse meters.

Independent variables were LDH and CPK enzymes and dependent variable was RAST anaerobic test. The data was analyzed at two levels: descriptive statistics including mean, median, standard deviation, skewness and standard error and inferential statistics involving mixed factorial test, multivariate analysis of variance and Kolmogrov – smirnov test for normal distribution of scores. The hypotheses were tested by use of t – test, too. The minimum significance level in testing hypotheses and accepted statistical power were considered 0.05 and 0.80 respectively.

Results:

1) There was a significant increase in level of LDH enzyme between active and non – active female students after exercise [($P<0.05$), Table 1].

2) The first row of the table shows blood LDH has increased following one session of strenuous exercise and the difference of this variable prior and following exercise is significant ($P<0.05$). Second row of the table indicates no interactional influences between LDH before and after exercise in active and non active females. ($P>0.05$). There was a significant increase in level of CPK enzyme between active and non – active female students after exercise ($P<0.05$).

Table 1: Results of multivariate ANOVA (Wilk's Lambda) for active and non-active females LDH mean before and after one strenuous short term exercise session.

Test	Value	F	P-Value	Practical significance	Statistical Power
LDH	0.743	6.24	0.022	0.257	0.657
LDH× Groups (exp & con)	0.972	0.526	0.478	0.028	0.972

Table 2: Results of multivariate ANOVA (Wilk's Lambda) for active and non-active females CPK mean before and after one strenuous short term exercise session.

Test	Value	F	P-Value		Statistical Power
CPK	0.127	123.81	0.000	0.873	1
CPK× GROUPS (exp & con)	0.945	1.48	0.320	0.055	0.163

3) There was no significant difference between active and non active female students in terms of LDH enzymes activity, although LDH mean of non active subjects was higher than active ones.

Table3 indicates that there is no significant difference between LDH mean before and after exercise in active women, but this difference is significant in inactive subjects. This table also shows that following one strenuous short term exercise session inactive women's blood LDH increases significantly. Table 4 indicates blood LDH mean has no significant difference either before or after exercise session both in active and non active women. This implies that the effect of one strenuous short term exercise session on mean of blood LDH has no relationship with being active or inactive in women.

Table 3: Pair wise comparison of LDH mean before and after one strenuous short term exercise session in active and non-active females.

Comparison of Dependent Groups	Means Difference	t	df	P
LDH before and after exercise in active females	-22.50	1.08	18	0.306
LDH before and after exercise in non-active females	-40.90	2.80	11.40	0.021

Table 4: Pair wise comparison of active and non-active females LDH mean before and following one strenuous short term exercise session.

Comparison of Independent Groups	Leven's Test		t	df	P	Means Difference
	F	p				
LDH Pre test	0.227	0.640	1.17	18	0.256	33.70
LDH Post test	13.75	0.002	2.03	11.40	0.066	52.10

4) There was no significant difference between active and non active female students in terms of CPK enzymes activity, although CPK mean of active subjects was higher than non active ones.

Table5 indicates that there is significant difference between CPK mean before and after exercise in active and inactive women. This table shows that following one strenuous short term exercise session women's (active and inactive) blood CPK increases significantly. Table 6 indicates blood CPK mean has no significant difference either before or after exercise session both in active and non active women. This implies that the effect of one strenuous short term exercise session on mean of blood CPK has no relationship with being active or inactive in women.

Table 5: Pair wise comparison of CPK mean before and after one strenuous short term exercise session in active and non-active females.

Comparison of Dependent Groups	Means Difference	t	df	P
CPK before and after exercise in active females	-9.88	8.90	9	0.000
CPK before and after exercise in non-active females	-8.22	6.90	9	0.000

Table 6: Pair wise comparison of active and non-active females CPK mean before and following one strenuous short term exercise session.

Comparison of Independent Groups	Leven's Test		t	df	P	Means Difference
	F	p				
CPK Pre test	2.65	0.121	0.783	18	0.444	-9.22
CPK Post test	2.04	0.170	0.872	18	0.359	-10.88

Discussion and conclusion:

According to the results of the present study there was a significant difference in levels of CPK and LDH enzymes following strenuous exercise session. There is the possibility that increase of plasma proteins like CPK, LDH, myoglobin, connective lipoproteins and troponin 2 or myosin large cycle in muscle cell due to their secretion from the cell into intercellular liquid, is an indicator of complicated mechanism of cellular damages. Variation or difference in LDH and CPK concentration following exercise may imply the difference in levels of these two enzymes in covering cell membrane of skeletal muscles fibers, damages of different types of fibers or biologic half- life of these enzymes in plasma [9]. This result was consistent with the results of other researches. However it was not in consistency with the results of studies conducted by Mettiver et.al (1999) and Thomas Soung (1990). Jung Yungham (2002) and Klapcinska (2001) reported higher increment of mentioned enzymes in untrained people compared with trained individuals and suggested that one reason for this observation could be lack of adaptation to exercise in untrained individuals [5.6]. The result of the present study acknowledges the result of Klapcinska´ s study (2001), because LDH mean in untrained people was higher than that of trained individuals both prior and following exercise. Regarding CPK enzyme, since CPK mean in active subjects was higher than its mean in inactive individuals, both before and after selected exercise the present study did not agree with the finding of Klapcinska´ s study. This result was in consistency with that of Griftlus study that suggested CPK activity in active group was twice as less active group[4]. Furthermore researches have shown CPK and LDH activity in sprint runners were much higher than that of untrained individuals gained optimal adaptations in glycolitic process [9].

Finally as the subjects in different studies have been from various categories siome consideration must be taken into account.Perhabs more increment of CPK in active group is because of optimum adaptation in glcolitics systems and more increase of LDH in inactive group may be attributed to lack of adequate adaptation to exercise in these individuals. Ultimately it can be concluded that physical activity brings about optimal adaptation in individuals and will contribute in decreasing cardio vascular risk factors.

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