The Effect of Relaxation using Ballet Skills on the Level of Sod Enzyme Activity as an Indicator for Free Radicals and other Physiological Variables

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This research aims to try to identify the level of SOD enzyme activity in the blood , lactic acid and pulse rate before and after the performance of the aerobic physical exertion directly and after a period of calm to the control group and the experimental group and the comparison between the two group, The researcher used the experimental approach to design measurement (tribal - dimensional) two sets officer and pilot, The selected sample Find the way intentional volunteer students from the first year of the Preparatory Faculty of Applied Medical Sciences Hafr Al-Batin University, Saudi Arabia, and who are between the ages of (17-19 years), and this academic year (2013-2014 AD). The number of respondents was (20) student, has been divided into two groups (control group, the experimental group), It was extracted the following results: Physical exertion aerobic lead to an increased level of activity of the enzyme SOD and the level of concentration of lactic acid in the blood and pulse rate immediately after the performance, Performance exercises calm, composed of some of the skills of ballet for half an hour after the performance of physical exertion positive effect on the speed of healing the body and not feel tired and the return of the body of its natural state prior performance.

Key words: physical exertion, SOD enzyme, lactic acid, pulse rate.

Introduction

It is undoubted that playing gymnastics causes physiological changes for the internal system of the body. The physiological adaption and the reactions of the body to do exercises is done by different types of body systems. Hence, the scientific training is strongly associated with the amount of gymnastic effects on the athletic status of the trainer. (Joseph et al, 2007).

The training load is an important factor in achieving the highest levels in athletic training .So, the research will highlight more information rather than training and body efforts. (Edward et al, 1997) (Jenkins and Goldfarb, 1993).

Despite of the role of oxygen in producing energy; it has some destructive effects which is the result of production of Oxygen Free Radicals. It is the most important thing in metabolism because muscles need for oxygen increases up to 10-20 times more than at the spare time. This huge increase is associated with anaerobic metabolism using oxygen causes increasing in Free Radicals as lost electrons. (Kanter, 1998).

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The partial fraction of O2 produces Free Radicals that has dangerous effects on tissues and biological organisms of the body. (Harris, 1992).

Some studies discussed the effects of Free Radicals on athletic performance. The gathering of these particles destroys the cells of the body which affects the level of body performance. Free Radicals also cause a delay in wellness after the training. They also increase the feeling of pain for several days. (Clarkson, 1995).

In this case, enzymes will protect the body from these dangerous effects because they help in producing a large amount of chemical reactions inside the body or outside it. (Armbruster, 1991)

Enzymes are useful factors that help in completing several chemical interactions in the body. They change the shape of the chemical interactions and convert them to products depending on the body's need without any change in its structure. (Henderson, 1992).

There are three types of anti- oxidant enzymes: Superoxide Dismutase, Glutathione and Catalase besides other materials that have the ability to kill the Free Radicals and protect textiles; like vitamins (A, C, H), Selenium Sault, and Beta-carotene.

SOD enzyme contains copper, zinc, and manganese. It protects from O2 Free Radicals, and treats the bad effects of radiation. SOD is founded widely in plants and animals. It also founded in the brain, lever, heart, and red blood cells (kidneys.Bovine et al, 1998).

Joseph said that recovery exercises after training reduce the movement of blood in the body and reduce the number of Free Radicals.(Joseph et al, 2007).

Depending on the previous studies, this research aims at helping the students of preparatory year at Applied Medical Sciences college of Hafar Al-Batin to dispose the Free Radicals of training via Ballet recovery exercises. Ballet is considered as one of the most important exercises whose movement varies between slow and quick. The researcher thinks that will help students to overcome the dangerous effects of Free Radicals and keep them healthy.

The purpose of the study was

- Recognizing the level of SOD in the blood before the training and directly after it, then after recovery for the control group.
- Recognizing the level of SOD in the blood before the training and directly after it, then after recovery for the experimental group.
- Comparing the results for the control group and experimental group before and after the training.

Research hypotheses:

- According to the level of SOD enzyme activity, there are many differences between the measurements before and after the training. The measurements of the control group after the training were upper than before it.
- According to the level of SOD enzyme activity, there are many differences between the measurements before and after the training. The measurements of the experimental group after the training were upper than before it.
- According to the level of SOD enzyme activity, there are many differences between the measurements before and after the training then after the recovery exercises. The experimental group achieved the highest.

Method

Participants

The researcher chooses a selective group of students at Applied Medical Sciences college of Hafar Al-Batin at KSA for the year (2013-2014). Their ages ranged from (17-19). The sample consists of 21 students divided into two equal groups: control and experimental. The two groups are homogeneous in terms of age, weight and heightens.

Table 1 shows means, standard deviation, and S.K for the sample variables average, weight, and height for the sample.

Table (1) Means, **Standard deviation, and S.K for the Sample Variables, age, weight, and heightN=21**

The variable	Measurement Unit	Means	Standard deviation	S.K
Age	Year	18.70	0.656	0.396
Weight	Kg	61.40	5.567	1.156
Height	Cm	162.60	3.346	1.370

According to the previous table, the S.K for the three variables ranged from (-3, +3) which is an evidence on the homogeneity of the sample.

Material and apparatus

- Measuring the height using Alrstamitr device.
- Measuring the weight using medical scale.
- Measuring the pulse rate using probing through the radial artery.
- A group of plastic sranj "Ameco" whose size is 3 cm besides disinfectants, cotton, and plaster.
- A group of glass tubes to put blood and heparin.
- A centrifugation to separate the blood contents.
- Ice box to put blood tubes in until moving them to the lab.
- A form for collecting student's data.

Procedure

Rationing the physical effort

The researcher revised all the studies that discussed athletic training. She chooses the running for 45 minutes in a moderate speed.

The suggested Ballet skills for recovery

The researcher chooses some ballet skills and applies them on experimental group as recovery exercises for 30 minutes. Attachment (1).

1. Steps before the experiment:

- The students gathered at 7:30 on Sunday 27\4\2014.
- Issues of blood were taken. Pulsate, and heights have been reordered.
- Each group of the students plays the research exercise for 15 minutes.
- The researcher measures pulsate average directly after the training, then an expert records the physiological measurements.

Applying Ballet Skills

The suggested recovery exercises were applied on the experimental group for 30 minutes while the control group was in a rest mode for 30 minutes.

Steps after the experiment:

Issues of blood were taken from the two groups, and pulse rate for each student was recorded.

Results

Analyzing variance among the three measurements (before exercise, after exercise, and after recovery).

Table 2 shows means, standard deviation, percentage, and the level of measurements change for the sample of control group.

Table (2) Standard Deviation, Percentage, and the Level of Measurements Change for the Sample of Control Group

Variable	Measurement unit	Before exercise		Directly after exercise		After recovery		% after the exercise	% 60 minutes after exercise	% after 60 minutes
		Means	SD	Means	SD	Means	SD			
SOD enzyme	IU\L	166.2	9.27	301.8	14.61	193.8	8.2	81.59	16.61	35.79
Lactic Acid	Mmol\ liter	1.42	0.12	4.53	0.41	1.51	0.31	219.1	6.34	66.67
pulse	Impulse\ minute	69.8	5.35	158.2	8.06	75	4.89	126.65	7.45	52.59

According to table (2), it is clear that means increases directly after completing the exercise, and then it decreases after recovery exercise, but it still higher than the measurement before exercise.

Table 3 shows analyzing variance among the three measurements (before exercise, after exercise, and after recovery) for control group.

Table (3) Analyzing Variance among the Three Measurements (Before Exercise, After Exercise, and After Recovery) for Control Group

Measurement	Measurement	The average	Chi-square	Error Probability	Indication
SOD enzyme	Before exercise	5.70	25.43	0.002	indicative
	Directly after exercise	25.50			
	After recovery	15.30			
Lactic Acid	Before exercise	8.30	20.67	0.001	indicative
	Directly after exercise	25.50			
	After recovery	12.70			
Pulse	Before exercise	8.10	21.14	0.001	indicative
	Directly after exercise	25.50			
	After recovery	12.90			

According to table (3), there are indicative differences among the three measurements for the sample in control group.

Table 4 shows Indication among Measurements in SOD Enzyme for the Control Group.

Table (4) Indication among Measurements in SOD Enzyme for the Control Group

Measurement	Directly after exercise			Before exercise		
	Average	z	P	Average	z	P
After recovery	15.50 50	-3.79	.001	5.70 15.30	-3.65	0.002
Directly after exercise				5.50 15.50	-3.79	0.001

According to table (4), there are indicative differences between the following measurements:

- The measurement after the exercise was higher than before it.
- The measurement after recovery was higher than before the exercise.
- The measurement directly after recovery was higher than directly after the exercise.

Table 5 shows Indication among measurements in Lactic acid for the control group.

Table (5) Indication among Measurements in Lactic Acid for the Control Group

Measurement	Directly after exercise			Before exercise		
	Average	z	P	Average	z	P
After recovery	15.50 5.50	-3.78	0.002	8.30 12.70	-1.67	0.095
Directly after exercise				5.50 15.50	*-3.79	0.0001

According to table (5), there are indicative differences among the measurements as following:

- The measurement directly after the exercise was higher than before it.
- The measurement directly after the exercise was higher than after recovery.

Table 6 shows Indication among Measurements in Pulse for the Control Group.

Table (6) Indication among Measurements in Pulse for the Control Group

Measurement	Directly after exercise			Before exercise		
	Average	z	P	Average	z	P
After recovery	15.50 5.50	-3.80 *	0.002	8.10 12.90	-1.85	0.064
Directly after exercise				5.50 15.50	*-3.80	0.001

According to table (6), there are indicative differences among the measurements as following:

- The measurement directly after the exercise was higher than before it.
- The measurement directly after the exercise was higher than after recovery.

Table 7 shows Standard Deviation, Percentage, and the level of Measurements Change for the Sample of Experimental Group

Table (7) Standard Deviation, Percentage, and the level of Measurements Change for the Sample of Experimental Group

Variable	Measurement unit	Before exercise		Directly after exercise		After recovery		% after exs	Per 60 minutes after exs	Per after 60 miutes
SOD enzyme	IU\L	172.60	17.03	278.01	31.20	173.75	7.19	61.12	0.67	-37.52
Lactic acid	Mmol\ liter	1.286	0.203	4.77	0.796	1.288	0.258	270.92	0.16	-73.00
Pulse	Pulsate\ minute	69.40	7.16	155.0	12.07	71 .20	3.36	123.34	2.59	-54.06

According to table (7) for the measurements directly after the exercise was higher than before it, whereas it is the same after recovery.

Table 8 shows Analyzing Variance among the Three Measurements (Before Exercise, After Exercise, and After Recovery) for Experimental Group.

Table (8) Analyzing Variance among the Three Measurements (Before Exercise, After Exercise, and After Recovery) for Experimental Group

Measurement	The groups	The average	Chi-square	Error Probability	Indication
SOD enzyme	Before exercise	10.70	19.413	0.0001	indicative
	Directly after exercise	25.50			
	After recovery	10.30			
Lactic Acid	Before exercise	11.20	19.529	0.0001	indicative
	Directly after exercise	25.50			
	After recovery	9.80			
Pulse	Before exercise	10.50	19.498	0.0002	indicative
	Directly after exercise	25.50			
	After recovery	10.50			

According to table (8), there are indicative differences among the three measurements for the sample in experimental group.

Table 9 shows Indication among Measurements in SOD Enzyme for the Experimental Group.

Table (9) Indication among Measurements in SOD Enzyme for the Experimental Group

Measurement	Directly after exercise			Before exercise		
	Average	z	P	Average	z	P
After recovery	15.50 5.50	-3.79*	0.002	10.70 10.30	-0.152	0.879
Directly after exercise				5.50 15.50	-3.78	0.002

According to table (9), there are indicative differences between the following measurements:

- The measurement directly after the exercise was higher than before it.
- The measurement after recovery was higher than directly after the exercise.

Table 10 shows Indication among Measurements in Lactic Acid for the Experimental Group

Table (10) Indication among Measurements in Lactic Acid for the Experimental Group

Measurement	Directly after exercise			Before exercise		
	Average	z	P	Average	z	P
After recovery	15.50 5.50	-3.79	0.001	11.20 9.80	-0.530	0.596
Directly after exercise				5.50 15.50	-3.79*	0.0000

According to table (10), there are indicative differences among the measurements as following:

- The measurement directly after the exercise was higher than before it.
- The measurement directly after the exercise was higher than after recovery.

Table 11 shows Indication among Measurements in Pulse for the Experimental Group.

Table (11) Indication among Measurements in Pulse for the Experimental Group

Measurement	Directly after exercise			Before exercise		
	Average	z	P	Average	z	P
After recovery	15.50 5.50	-3.80	0.002	10.50 10.50	0.000	1.000
Directly after exercise				5.50 15.50	-3.80*	0.0001

According to table (11), there are indicative differences among the measurements as following:

- The measurement directly after the exercise was higher than before it.
- The measurement directly after the exercise was higher than after recovery.

Table 12 shows Indication of Differences between Control and Experimental Group of the Sample before the Exercise.

Table (12) Indication of Differences between Control and Experimental Group of the Sample before the Exercise

Variable	The group	The average	Z	Error Probability	Indication
SOD enzyme	Control	08.70	-1.36	0.172	Non-Indicative
	Experimental	12.30			
Lactic Acid	Control	12.60	-1.59	0.111	Non-indicative
	Experimental	08.40			
Pulse	Control	10.30	-0.15	0.877	Non-indicative
	Experimental	10.70			

According to table (12), there are no indicative differences among the measurements before the exercise.

Table 13 shows Indication of Differences between Control and Experimental Group of the Sample Directly after the Exercise.

Table (13) Indication of Differences between Control and Experimental Group of the Sample Directly after the Exercise

Variable	The group	The average	Z	Error Probability	Indication
SOD enzyme	Control	12.70	-1.68	0.093	Non-indicative
	Experimental	08.30			
Lactic Acid	Control	09.90	-0.45	0.649	Non-indicative
	Experimental	11.10			
Pulse	Control	11.50	-0.76	0.447	Non-indicative
	Experimental	09.50			

According to table (12), there are no indicative differences among the measurements directly after the exercise.

Table 14 shows Indication of differences between Control and Experimental Group of the Sample after Recovery.

Table (14) Indication of differences between Control and Experimental Group of the Sample after Recovery

Variable	The group	The average	Z	Error Probability	Indication
SOD enzyme	Control	15.10	-3.49	0.001	indicative
	Experimental	05.90			
Lactic Acid	Control	13.50	-2.27	0.23	indicative
	Experimental	07.50			
Pulse	Control	12.80	-1.76	0.077	Non-indicative
	Experimental	08.20			

According to table (14), there are indicative differences among the measurements for the variables: SOD enzyme and lactic acid whereas there is no difference in the variable of pulse.

Discussion

Results for Control Group:

According to tables (2, 3, 4, 5 and 6), there are indicative differences among the measurements of variables before the exercise then directly after it and after recovery as following:

a) For SOD enzyme

There were indicative differences among the measurements. The measurement directly after the exercise and after recovery was higher than before it, and the measurement after recovery was higher than before exercise. Also, the measurement directly after the exercise was higher than after recovery.

The researcher thinks that the reason for the increasing of SOD enzyme activity is the high increase of free radicals which is the outcome of training. Sjoden studies and others (1990) confirm that free radicals are the main reason behind feeling pain and muscles splitting where free radicals increase because of blood impulsion with oxygen in the muscles. Also, the increase of metabolism leads to several bio chemical changes. The study proved that free radicals are scarce in normal case and anti- oxidant enzymes have the ability to confront them, whereas they lose this ability when free radicals increase and therefore the cells damaged. Jenkins and Goldfarb (1993) also approved that.

The researcher thinks that the increasing of free radicals in the body and without returning to the normal case is the major reason of the differences among measurements.

b) For Lactic acid

There were indicative differences among the measurements. The measurement directly after the exercise was higher than before it, and higher than after recovery.

The researcher thinks that Aerobic system is the main reason of increasing lactic acid concentration in blood directly after the exercise. This is also the same that Clarkson (1995), Ferry (1988) confirm. Whereas the measurement after recovery gives little time to get rid of lactic acid.

c) For Pulse

There were indicative differences among the measurements. The measurement directly after the exercise and after recovery was higher than before it.

The researcher thinks that the reason of pulse level increasing is that gymnastics causes the pulse to increase because of the blood push into muscles by the heart then returning to its normal level after training. This result is also the same that Edward T, (1997), Gellish RL, (2007) approved.

The measurement directly after the exercise was higher than after recovery, but it was not enough for returning to its normal level.

The previous results approved the first assumption of the study that there are indicative differences between the measurements before the exercise and after it in all the variables for the control group. The measurement directly after the exercise was higher.

Results for experimental group:

- Referring to the tables (7,8,9,1,11) , we can confirm that means levels for the measurements increased directly after the exercise, whereas they are the same after recovery exercises as following:

a) For SOD enzyme

There were indicative differences among the measurements where the measurement directly after the exercise was higher than before it, and also higher than after recovery. There were no indicative differences after recovery exercises.

The researcher thinks that the reason for the increasing of SOD enzyme level is the high increase of free radicals which is the result of training. Sauden studies and others (1990) confirm that physical exertion is the main reason behind increasing the amount of free radicals. " Jenkins, Goldfarb " (1993) also said that physical or chemical factors cause a pressure of oxidation in the body, then increase free radicals which cause the antioxidant to increase in a try to overcome them.

The researcher thinks that recovery exercises reduce the amount of free radicals in the body and help in returning it to the normal case. Joseph W (2007) approved so.

b) 2. for Lactic acid

There were indicative differences among the measurements. The measurement directly after the exercise was higher than before it, and also higher than after recovery.

The researcher thinks that Aerobic system is the main reason for the increasing of lactic acid concentration in blood directly after the exercise. This is also the same that FerryA, Duvallet M "(1988) confirm.

There were no indicative differences between the measurement before the exercise and that after recovery, because recovery exercises help the body to get rid of lactic acid and return to its normal case. Clarkson (1995) confirmed that recovery period from lactic acid decreases at rest mode. For this reason, relaxation exercises help circulation to get rid of lactic acid.

c) 3. for Pulse

There were indicative differences among the measurements. The measurement directly after the exercise was higher than before it, and also higher than after recovery.

The researcher thinks that the reason of pulse high level is, as Qiao D, (2006) said, is that gymnastics causes the pulse to increase because of the blood push into muscles by the heart then returning to its normal level after training. This result is also the same that Ramel A, K-H Wagner (2004) approved.

There were no indicative differences between the measurement before the exercise and after recovery, because recovery exercises for half an hour are not enough to bring pulse back to its normal level. Qiao D, (2006) said that simple exercises cause the pulse to return to its normal.

The previous discussion approved the second assumption that there are indicative differences in variables between the measurements before and after the exercise where the measurements directly after the exercise was higher for the experimental group.

Referring to the tables (12) and (13), there were no indicative differences in the measurement before exercise in all variables for both groups: control and experimental. The researcher thinks that the homogeneity of the sample is the reason behind that.

Referring to table (14), there were indicative differences among the measurements for all variables, where there were no indicative differences in pulse level, the researcher thinks that the reason behind the indicative differences in the variables between the groups is the recovery exercises which have a positive effect on experimental group.

The diversity of Ballet exercises was very useful in getting rid of the free radicals, because it took a long time which help in the student's recovery.

There were no indicative differences for the pulse level, because the students have 30 minutes to practice recovery exercises which cause the pulse to return to its normal level.

According to the previous display, the researcher approves the third assumption that there are many differences among the measurements before and after the training then after the recovery exercises in the level of SOD enzyme activity. The experimental group achieved the highest.

Conclusions and Applications

- Physical exertion aerobic causes increasing in SOD enzyme activity, lactic acid, and pulsates directly after the training.
- The rest period for half an hour is insufficient to dispose from the free radicals.
- Acting Ballet exercises for half an hour after training has a positive effect on the body. It helps in returning to its normal level.

Recommendations

- Depending on SOD enzyme as an indicator for increasing the free radicals.
- Practicing recovery exercises after training, especially ballet exercises, decreases the level of free radicals then reduces the level of oxidation.

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