

Estimation of Integrity of the Vital Organs during Assessment of Cardio Vascular Endurance Test for Soccer Youngsters

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Abstract: Aim of the study was to estimation of integrity of the vital organs during assessment of cardio vascular endurance test for soccer youngsters, the researcher used the descriptive method due to the suitability of the nature of the study, (20) young soccer players were chosen from Port Fouad club under (15) years to participate in the study, the participants were subjected to (12) minutes cycling test, (5) ml blood were withdrawn from the veins before and after test to estimation of CPK, ALT, AST, cortisol and testosterone, beside measuring cardiac output, results indicated increased AST more than ALT and elevated CPK and cardiac output also increased cortisol after test indicated physical and mental stress and show how the person receives a particular blood as for testosterone it uses with exercise intensity, in conclusion the assessment of cardio vascular endurance test may be used for estimation of integrity of the vital organs namely the heart, the liver and the skeletal muscles for soccer youngsters, it is recommended to use cardio vascular endurance test for estimation of integrity of the vital organs of the body in different sports.

[Ahmed Dobai. **Estimation of Integrity of the Vital Organs during Assessment of Cardio Vascular Endurance Test for Soccer Youngsters.** *Nat Sci* 2018;16(4):105-108]. ISSN 1545-0740 (print); ISSN 2375-7167 (online). <http://www.sciencepub.net/nature>. 17. doi:[10.7537/marsnsj160418.17](https://doi.org/10.7537/marsnsj160418.17).

Key words: Vital organs - Cardio vascular endurance test- Soccer youngsters

1. Introduction and Research Problem

It is known that the biological age in the larger degree than the calendar, reflects the ontogenetic maturity of man, his physical state and nature of adaptive reactions.

The special features of teenage period are to a considerable extent determined by the activity of hypothalamic, Hypophyseal system which intermediates not only the intensifications of the activity of the glands of internal secretion, but also expresses reconstructions of the functioning of all physiological systems and organs of the body.

Wilmore and Costill (1997), Igor (2006) stated that in the age of boys of (14-15) years is noted a broad range of fluctuations of the biological age from complete maturity, in relation to vital organs from muscle, heart, liver. (24: 112), (13: 216).

Ganong (2000) reported that the output of the heart per unit time is the cardiac output, there are variations in cardiac output can be produced by changes in cardiac rate or stroke volume, and cardiac output is controlled by cardiac innervation, sympathetic stimulation increasing the rate and parasympathetic stimulation decreasing it, factors increasing cardiac output are anxiety, excitement, exercise, high environment temperature also hormones as epinephrine, while decreasing cardiac output may be included by heart disease. (6: 521).

Amany and Aber (2012) added that a key requirement of cardiovascular system in exercise is to deliver the required oxygen and nutrients to the

exercising muscles, so the muscles blood flow increases during exercise and the capillary density also increases in skeletal muscle as a result of chronic exercising. (2: 212).

Abou El-Ella (2003) reported that the regular exercise can lead to biological and anabolic changes in muscle fibers as an increase in enzymes as CPK, phosphofructokinase, PC (22%), glycogen (66%), mitochondrial density and volume. (1: 175).

Emad Abou Said (2005) stated that the physical act of each sport is linked to special physical abilities that affect the performance. (5: 86).

Kamal Darwish et al. (1998) added that the level of performance is affected by physiologic, morphologic and biologic factors, the trainer must be aware of the rationing of load to induce the positive effects on the players to reach the highest level. (14: 226).

The approach to the estimation of the level of the different vital organs of adolescents is very important, in this connection the expediency of studying the different vital organs of teenage of the same calendar age, who differ according to the degree of fitness stages.

The specific character of the teenage development period, which is characterized by individual differences and different fitness level causes the need for differentiated analysis of different enzymes and hormones of the adolescents of (14-15) years old, so as to reach a better understanding of their health which lead to a better fitness.

The aim of this study was to estimation of integrity of the vital organs during assessment of cardio vascular endurance test for soccer youngsters.

It is hypothesized that assessment of cardio vascular endurance test might be as estimator of integrity of the vital organs for soccer youngsters.

2. Research Procedures

Research method: The researcher used the descriptive method due to the suitability of the nature of the study.

Research sample: (23) young soccer players were chosen from Port Fouad club under (15) years to participate in the study, (20) players for the main study and (3) players for the pilot study.

Table (1) Research sample

The club	Main study	Pilot study
Port Fouad under (15) years	20 players	3 players

Sample homogeneity:

Table (2) Arithmetic mean, median, standard deviation, skewness in variables of age, height, weight and training experience. N=20

Variables	U of M	A. Mean	Median	S.D.	Skewness
Age	years	15.5	15.5	0.17	0.04
Height	Cm	170.9	170.5	2.11	0.59
Weight	Kg	64	64	1.32	-0.10
Training experience	Years	5.5	5	0.83	0.18

Table (2) reported that skewness were between (± 3) indicating homogeneity of the sample.

Data collection tools:

- **Height:** by using... Restameter.
- **Weight:** by using... Medical scale.
- **Cardiac output:** by using formula...

Cardiac output = milligrams of the dye x 60/conc. of dye in each mil. of blood x duration of curve in sec... (ml/min).

A small amount of indicator such as a dye is injected into a large vein, the concentration of the dye is recorded as the dye passes through the arteries and a curve is plotted composed of dye concentration in (mg/dl) in a given time, calculation of the concentration of dye in the arterial blood for the duration of the curve. (10: 245)

- **Physiological variables:** (5) ml blood were withdrawn from the veins before and after the cardiovascular endurance test to estimate... creatine phosphokinase enzyme CPK, alanine amino transferase enzyme ALT, aspartate amino transferase enzyme AST, cortisol hormone and testosterone hormone... by using... Elisa.

- All cardiac output measurements and blood samples were withdrawn by a specialist, laboratory measurements were conducted at... Allawah laboratory in Port Said.

Pilot study:

(3) young soccer players were the participants of the pilot study, they were from the same community out of the main sample, for period of (2) days before the study, the reason is to...

- Investigate the soundness of the equipment and tools.

- To know the problems this might face the study.

- Determine the best ways to perform measurements and record data.

Main study:

- The cardio vascular endurance test. (11:380)... by using ergometer cycle... (12) minutes cycling were performed on all the participants on 07/09/2015.

- Cardiac output measurements and (5) ml blood were withdrawn from the veins before and after the cardiovascular endurance test to estimate... creatine phosphokinase enzyme CPK, alanine amino transferase enzyme ALT, aspartate amino transferase enzyme AST, cortisol hormone and testosterone hormone.

Statistical data analysis:

Using (SPSS) including...

- Arithmetic mean.
- Median.
- Standard deviation.
- Skewness.
- Wilcoxon signed rank test.
- Rates of changes formula.

3. Results

See table(3) table(4).

4. Discussion

Table (3 & 4) indicated a significant increased concentration after the experiment in CPK, ALT, AST, cortisol and testosterone.

The researcher opinion denotes that the increased concentration of the parameters CPK, ALT, AST, cortisol and testosterone might be due to the stress exerted from the exercise experiment.

This results is in accordance with those of Hyatt and Clarkson (1998), Sabri Omar (2002), Nagiashalabi (2005), Keithkhalaf (2012), Crewther et al. (2013). (12: 17), (21: 19), (17: 11), (15: 113), (4:471).

Table (3 & 4) revealed a higher concentration in enzymes AST, ALT and CPK after exercise.

Table (3) reported a significant increased concentration for the post-experiment compared with the pre- experiment.

Table (4) reported rates of change between pre & post measurements in cardiac output, CPK, ALT, AST, cortisol and testosterone.

Table (3) Significance of differences between pre & post measurements in variables of the study N=20

Variables	U of M	N. Ranks		S. Ranks		(T) value		Sig
		-	+	-	+	Table	Calcu.	
Cardiac output	l/m	0	20	0	210	52	0	s
CPK	u/l	0	20	0	210	52	0	s
ALT	u/l	0	20	0	210	52	0	s
AST	u/l	0	20	0	210	52	0	s
Cortisol	mg/l	0	20	0	210	52	0	s
Testosterone	u/l	0	20	0	210	52	0	s

Table (4) Rates of change in variables of the study N=20

Variables	U of M	Pre- measurement	Post- measurement	The difference between means	Change Rates %
		M	M		
Cardiac output	l/m	5.26	27.8	22.54	428
CPK	u/l	123.9	155.7	31.8	26
ALT	u/l	14	37.6	23.6	168
AST	u/l	15.8	40.3	24.5	155
Cortisol	mg/l	63.5	118.6	55.1	87
Testosterone	u/l	566.1	733.2	167.1	29

Zubai (1989), Chatterjea and Shinde (2006), Yuval et al. (2007) reported that AST increased concentration in myocardial infarction, slight elevation in muscle diseases, acute liver disease, toxic liver cell necrosis, hemolytic anemia while ALT increased concentration in vital hepatitis and skeletal muscle disease, in case of CPK it increases of acute myocardial infarction, muscular dystrophies. (26: 92), (3: 563), (25: 25).

So, the three enzymes are marker of the vital activity of important organs like heart, liver and muscles.

Table (3 & 4) denotes the effect of exercise on both cortisol and testosterone, which indicate an anabolic effect.

This is in accordance with Rama and Swamy (1995), Chatterjea and Shinde (2006) that testosterone exert an anabolic effect on muscle tissue and are productive action. (18: 213), (3: 622).

Mason (2000), Guyton and Hall (2006), Ganong (2010) reported that creatine kinase catalyzes the intercom version of CP and ATP, the enzyme is present in almost all tissues heart, liver and muscle, amino transferase catalyze the transfer of an amino group from an alpha amino acid to an alpha keto acid, this transfer is necessary for amino acid metabolism, examples are alanine amino transferase ALT and

aspartate amino transferase AST the two enzymes are present in muscles and liver and can be used as markers of the soundness of the vital organs like muscles and liver. (16: 34), (9: 118), (7: 227).

Robergs and Roberts (2000) stated that cortisol and testosterone are steroid hormones that are useful in the biochemical assessment of exercising persons, they share a number of features that they are controlled in their production by the hypothalamus and they are secreted by the pituitary, they are also stemmed from one origin cholesterol and there concentrations of the brain with the adrenal glands and testes, measuring cortisol and testosterone is useful for assessment of exercise persons as it may aid in estimating mental and physical stress and how the person receives the loads, the exercise intensities and duration. (20: 316).

As for cortisol, its overall effect on protein metabolism is negative nitrogen balance as it is catabolic to spare glucose, it decrease glucose up take and glycolysis and increase lipolysis, FFA in plasma and decrease protein synthesis, increase protein break down and plasma amino acids, while cortisol action on liver is anabolic by increase gluconeogenesis, increase glycogen in liver and protein synthesis in liver, this means that cortisol exert a catabolic action on muscle and anabolic one on liver, as cortisol is very important

in sparing glucose and increase metabolism of fat and FFA in plasma.

Table (3 & 4) indicated cardiac output in soccer youngsters at rest to be (5.5) L/minute, the maximal cardiac output during exercise reach (28) L/minute, thus the soccer youngsters can increase cardiac output up to five folds the normal resting output.

From the data, it is clear that soccer youngsters can achieve maximum cardiac outputs due to the fact that the heart chambers of well-trained enlarge together with the heart mass, so not only do the skeletal muscles hypertrophy during training but the heart does also hypertrophy.

This result is in accordance with Guyton et al. (1973), Steele and Duke (2003), Spangenburg and Booth (2003), Glass (2003), Rennie et al. (2004). (10: 28), (23:39), (22: 413), (8: 87), (19:799).

So, due to the results and significance of the increased cardiac output and possible hypertrophy together with a larger stroke volume in case of soccer youngsters.

Thus, the assessment of cardiovascular endurance test as an example of exercise method and the related expression of cardiac output, heart rate and stroke volume might be a good method for estimation of integrity of the vital organs such as the heart, the liver and the skeletal muscles, this realize the hypothesis that assessment of cardio vascular endurance test might be as estimator of integrity of the vital organs for soccer youngsters.

Conclusion

The assessment of cardio vascular endurance test may be used for estimation of integrity of the vital organs namely the heart, the liver and the skeletal muscles for soccer youngsters.

Recommendation

It is recommended to use cardio vascular endurance test for estimation of integrity of the vital organs of the body in different sports.

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4/9/2018