

Training Program using critical speed exercises and their impact on some Physiological and Physical variables of handball Players during the Match

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Abstract: The study aims to design a training program using the critical speed and knowledge of their impact on some of the variables physical (endurance League respiratory) during the game's players handball and included a sample search on 20 Player of the players Handball Premier League has been divided into two groups, one trial with an average length of 173.8 cm and the average weight of 68.7 kg and an average age of 22.4 years and the other group officer an average of 22.3 years average height 173.5 cm and the average weight of 66.02 kg, the researcher used the experimental method using the experimental design of the two groups (Experimental / control) has been processing data using the statistical method (average - standard deviation - t-test- correlation coefficient) has completed the study results the following - ratio improved maximum oxygen consumption

in terms of improvement in the rate speed (m/ s) of the experimental group- an improvement in the physical measurements and physiological significantly in pulse comfort and effort and blood pressure and endurance League respiratory

Keywords: **Training-physiological-handball**

Introduction

Critical speed exercises are considered one of the most efficient methods as the Coaches can used them to develop the load rate and improve the ultimate limit of Oxygen Consumption, consequently get rid of oxygen debt and reduce the rate of Lactic acid accumulation, and delaying the appearance of fatigue leading to the improvement of results in matches especially during the last ten minutes of the match. The researcher through watching the analysis of numerous matches of the

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international Championships in Handball: World Cup 2011 and The Olympic Games in London 2012, he noticed that some handball matches have completely changed during the last ten minutes by reducing the score between the two teams or increasing the score in favor of the winner team during the last ten minutes with a rate different from the normal rate of the match.

Objective of the Research:

The Impact of suggested training program using critical speed exercises on the Physical and physiological performance of Handball players during the match.

Research Hypothesis:

There are significant differences between the pre-test and post-test means of critical speed rate during the last ten minutes of the match in favor of the post-test measures of Handball players.

Research Procedures and methods

Research Approach:

The researcher will use the experimental approach using experimental design of two groups (experimental and control) using the pre-test and post-test measures.

Research community: Twenty players of Assiut Petroleum Company registered at the Egyptian Handball federation in the season 2012/2013.

Research Sample: the sample will be (20) players intentionally selected from Assiut Petroleum Company registered at the Egyptian Handball federation in the season 2012/2013 after making some physical and physiological tests such as :length, weight, Age, Cooper Test, and The ultimate limit oxygen consumption.

Database collecting Tools

- Aqua trend to measure the rate of Lactic in Blood.
- Cooper Test to measure the ultimate rate of Oxygen Consumption.
- Medical weighting scale to measure weight using kg.
- Rest meter to measure the length.
- Stopwatch to calculate time of cooper Test used for measuring the ultimate rate of oxygen consumption for handball players at Assiut Petroleum Company.

Research procedures:

1. Determining the physiological variables required to be measured during

the last ten minutes of Handball matches at Assiut Petroleum Company.

2. Determining physical performance items required to be measured during the last ten minutes of Handball matches at Assiut Petroleum Company.

3. Determining critical speed level of Handball players at Assiut Cement Club.

4. Setting the suggested proposal of critical speed training for Handball players at Assiut Petroleum Company.

5. Applying the suggested training on Handball players at Assiut Petroleum Company.

6. Conducting Post-Test measures of physical and

Physiological variables on Handball players at Assiut Petroleum Company during the last ten minutes of the Match.

Statistical Methods:

The researcher used the following methods:

1- Arithmetic Mean- Standard deviation-median

2- T-Test

3- Percentage between the pre-test and post-test measures.

4- Correlation

The researcher has measured some variables that may affect the experimental variable such as: Age, Length, Weight, and Training period.

Table (1)

Distribution of research sample concerning descriptive variables of the research (S=20)

	Variables	Measurement Unit	Mean	Deviation	skewers
1	Age	year	22.2	1.22	0.56
2	Length	Cm	173.8	4.1	0.96
3	Weight	Kg	68.72	7.85	0.03
4	Training pe	year	16.31	1.86	0.40

Table.(1) pointed out that the values of Skewers coefficient were between (3±) indicating

sample well distribution concerning descriptive variables of the research.

Table (2)
Distribution of research sample concerning physical variables of the research (S=10).

Serial	Physical Variables	Measurement Unit	Experimental group (S=10)		Control group (S=10)		T-value	Significance
			Mean	Deviation	Mean	Deviation		
1	Palm pulse	Pulse	70.32	16.20	70.12	9.66	0.99	.922
2	Extension Blood Pleasure -Palm	Milliliter-Mercury	129.32	14.57	128.40	11.13	.497	.631
3	Extraction Blood Pleasure -Palm	Milliliter-Mercury	72.00	9.32	70.40	4.57	.511	.622
4	Running Distance-6 M	Meter	1450.00	133.2	1400.00	120.7	.062	.958
5	Pulse after Running	Pulse	165.19	10.2	164.7	9.4	.063	.149
6	Running Distance-12 M Cooper	Meter	2661.0	223.1	2610.32	192.6	.258	.801
7	Pulse after Cooper	Pulse	170.00	12.8	170.5	12.8	.72-	.932
8	Relative Vo2max	Milliliter-Kg-M						.8

Table (2) pointed out that the values of Skewers coefficient were between (3±) indicating sample well distribution concerning Physical variables of the research.

Research Time and place:

All research measurements were done during the period from 2/5/2013 to 30/6/2013 at

Assiut University Stadium, Faculty of physical Education.

Research Measurements:

1. Body Measurements include Length, and weight.
2. Physiological Measurements include the measure of the following:
 - Palm Pulse.

- Extraction and Extension Blood pressure via palm.

- Pulse after performing Physical effort of 6M running at the most speed.

- Pulse after performing Physical effort of 12M Running so as to measure Vo₂ max.

- Measuring the ultimate limit of Oxygen consumption via Cooper Test according to the test method.

3. Physical Measurements:

- Maximum speed running for 6Minutes in 400M racetrack.

- Running for 12Minutes in 400M racetrack and measuring the running space according to the applied method of Cooper Test.

4. Training Program

Agenda:

This method depends on the running of the player with his maximum speed that was measured before the beginning of this program via 6Minutes running as player running space will be measured during the allocated time (6 Min) provided that the player runs with his maximum speed. Then the amount of space will be used in the following arithmetic equations so as to

calculate the training burden that must be executed by the player as a weekly training beside the traditional training Program.

If the player runs 1500M in 6Minutes, we will calculate the distance of running during the second via the following equation:

Running during the second= running space (Meter) divided by the amount of time (second)

$$1500 / 360 = 4.167 \text{ M/S}$$

The player runs with his maximum speed (M/S) that was calculated via the previous equation for 30 Seconds then runs using 50% of his calculated speed for 30 Seconds thus Billat used the term (30/30S) as a method of training.

In order to do this, we use the following equations:

$$\begin{aligned} & \mathbf{100\% \text{ speed} = (\text{the result of} } \\ & \mathbf{\text{the previous equation} } \\ & \mathbf{* (\text{Time of 30s running}) =} \\ & \mathbf{125M.} \end{aligned}$$

$$\begin{aligned} & \mathbf{50\% \text{ speed} = (\text{the} } \\ & \mathbf{\text{result of the previous} } \\ & \mathbf{\text{equation}) / 2 = 63M.} \end{aligned}$$

After calculating Player running speed with a percentage of 100% and 50% ,signs will be put in the racetrack according to the spaces resulted from the

previous equations and the player must repeat running between the signs with a fixed speed to the extent that he cannot continue with the same speed, and by this we can calculate VO₂max as follows:

If the player executes the previous load training 6 times:

6 frequencies= (6 Minutes running distance) * 0.5=

Running distance= 1500 * 0.5=750M

Running Time using seconds=750 /4.167=180S, and

this refers to the load 100% and in addition to other 180 seconds will represent 50% of this load. Every two weeks a new measurement will be applied to determine the new 6 minutes running distance so as to calculate the distances (30/30S) as the old distance will be replaced with the new one as a result of the improvement of the player. This distance was calculated to all players four times during the eight weeks training program.

Table.(3)

revealed the significant differences and improvement rate of the experimental group between the pre-test and post-test measures of research variables (S=10).

Serial	Physical Variables	Pre-test (S=10)			Post-test (S=10)			T-value	Significance	Improvement Percentage %
		Mean	Deviation	Standard Error	Mean	Deviation	Standard Error			
1	Palm pulse	70.32	16.20	5.124	58.30	6.47	2.078	2.65*	0.031	18.37
2	Extension Blood Pleasure -Palm	129.32	14.57	4.607	119.0	7.82	2.63	3.14*	1.010	9.64
3	Extraction Blood Pleasure -Palm	72.00	9.32	2.94	66.10	9.42	2.79	2.12*	0.190	6.32
4	Running Distance- 6 M	1450.00	133.2	42.14	1538.5	117.48	36.52	8.98-*	0.000	16.03
5	Pulse after Running	165.19	10.2	3.93	159.00	13.32	4.17	2.41*	0.073	5.15
6	Running Distance- 12 M Cooper	2661.0	223.1	71.12	2883.0	221.41	63.71	7.34-*	0.000	7.25
7	Pulse after Cooper	170.00	12.8	4.35	159.00	13.43	3.94	9.13*	0.000	6.7
8	Relative Vo ₂ max	48.278	5.027	1.589	51.625	5.52	1.4241	6.49-*	0.000	9.87

T value with the significance of 0.005=۲.۲۶

Table No.(3) pointed out that there are significant differences between the pre-test and post-test measures of the Experimental Group in all Physical and Physiological variables of the research as the Calculated T is significant in

favor the post-test measure, and the value of improvement between the pre-test and post-test measures graded between 5.15% and 18.37% indicating the research sample greatly has been affected by the experimental program and the suggested speed exercises.

**Table (4)
revealed the significant differences and improvement rate of the control group between the pre-test and post-test measures of research variables (S=10).**

Serial	Physical Variable	Pre-test (S=10)			Post-test (S=10)			Improvement Percentage %	
		Mean	Deviati	Standard Error	Mean	Deviati	Standard Error		
1	Palm pulse	69.10	9.47	3.05	64.72	3.30	1.04	1.27*	7.24
2	Extension Blood Pleasure	128.10	10.61	3.57	124.5	11.51	3.63	51.26	3.22
3	Extraction Blood Pleasure	69.40	4.57	1.34	68.20	6.47	2.08	1.23*	4.75
4	Running Distance	1532.0	120.36	37.27	1494.3	109.52	34.31	6.16 ⁻²	3.36
5	Pulse after Running	165.00	10.018	3.231	162.7	10.35	3.27	0.174	0.19
6	Running Distance -12 M Cooper	2623.0	190.40	58.63	2715.4	194.20	61.41	7.89 ⁻²	2.59
7	Pulse after Cooper	169.40	11.82	4.04	167.2	12.62	3.99	1.93*	3.42
8	Relative Vo2max	45.76	4.11	1.33	49.38	4.34	1.3732	7.959	3.38

T value with the significance of 0.005=۲.۲۶

Table No.(4) pointed out that there are significant differences between the pre-test and post-test measures of the control Group in all Physical and Physiological variables of the research except the Pulse after Running 6 M, as the Calculated T is

significant in favor the post-test measure, and the value of improvement between the pre-test and post-test measures graded between 0.19% and 7.24% indicating the improvement rate of control group in the light of Traditional Training Program Impacts.

Table (5)

revealed the significant differences between the experimental group and the control group concerning the post-test measures of research variables (S=20).

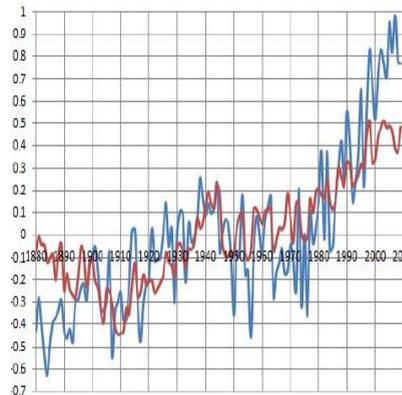
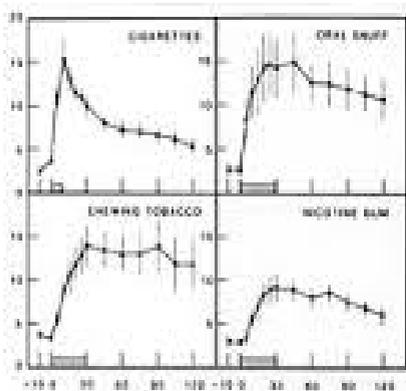
Serial	Physical Variables	Experimental Group			Control group			T-value	Improvement Percentage %
		Mean	Deviation	Standard Error	Mean	Deviation	Standard Error		
1	Palm pulse	58.50	6.57	2.078	65.30	3.30	1.04	2.468*	0.035
2	Extension Blood Pressure-Palm	118.60	8.32	2.63	123.60	11.51	3.63	1.966*	0.081
3	Extraction Blood Pressure-Palm	68.10	8.82	2.79	67.20	6.57	2.08	0.210	0.839
4	Running Distance	1540.5	115.48	36.52	1496.5	108.52	34.31	0.906*	0.389
5	Pulse after Running 6 M	160.00	13.19	4.17	160.70	10.35	3.77	0.203	0.844
6	Running Distance Cooper	2859.0	201.46	63.71	2714.0	194.20	61.41	1.897*	0.090
7	Pulse after Running 6 M	160.00	12.47	3.94	165.20	12.62	3.99	1.382*	0.200
8	Relative Vo2max	52.625	4.5035	1.4241	49.386	4.3423	1.3723	1.896*	0.91

T value with the significance of Physiological variables of the research but there are no significant differences in Extension Blood Pressure and the Pulse after Running 6 M, as the Calculated T is not significant.

Table (5) pointed out that there are significant differences between the post-test measures of the Experimental group and control Group in some Physical

the research but there are no significant differences in Extension Blood Pressure and the Pulse after Running 6 M, as the Calculated T is not significant.

F (2) Blood Pressure-Palm
F (1) Relative Vo2max



Results Discussion

Table No.(2) pointed out that Running time via suggested training method has improved in the experimental group as the difference between the Pre-test and Post-test measures amounted to 15.5% and sample running speed in Pre-test was 4.069M/S, then it improved to be 4.277M/S in the Post-Test measure, and this improvement affirmed that the player Physical level has improved and the time of running on the level of critical speed has increased, and this result was affirmed by Mohamed Qadri Bakri (2005) who mentioned that the increase of movement speed as a result of Energy increase so as to get the great efficiency and there will be high consumption of energy with the slowness of movement where the body limbs move and stop(3:124).

Table.(3) affirmed this result as improvement rate of Control group estimated as 2.36% as a result of changing running rate and speed that was 4.06m/s in Pre-test measure and was improved in post-test measure to 4.155M/S and this affirmed what we have

mentioned about performance speed and the reduce of efficiency. These results are consistent with the study of M. Garcin and V. Billat 2001 studying the relation between the appearing fatigue and the period of training continuity as it used the same method of Speed rate measurement as this method may be used to evaluate training density as an applied method beside the continuity of training may determine fatigue marked functions for normal individuals then fatigue will become a unique tool to set training programs (27).

The researcher attributed this result by indicating that speed depends on the anaerobic energy systems, thus training program must be designed in a way that permit to put enough load on the muscles so as to produce the chemical compound related to energy ATP using Anaerobic method. The experimental group greatly has been improved by getting benefit of Critical speed training (vVO₂ max) that has been applied as one dose per week in addition to the Traditional Training Program applied on the two

groups as this increase means the increase of muscle ability to produce energy (time vVO_2 max) consequently this has an impact on players performance efficiency such as the improvement of running distance via cooper test as the two groups were exposed to Cooper test as an index of endurance and at the same time as a tool for measuring the ultimate limit of Oxygen consumption which was one of the goals of study. The research results were not compatible with the results of Keskinen KI, Fenandes RJ2007, which indicted that there is a strong relation between Lactic threshold and the existence of negative relation between the pre-determined speed (vVO_2 max) and the space of flat body in addition to the relation between speed and time rate and breath variables(19)(20)(25) .

The variable of heart rate during rest has improved in the experimental group with a percentage of 17.37% and after fatigue with a percentage of 4.25% after running for 6 M, and 6.4% after 12M running using Cooper Test, and the improvement of Extraction and

Expansion Blood pressure with a percentage of 8.84% and 5.42% respectively.

The Results: Research results have affirmed that the use of Billat V Training method (30/30s) as a Training dose per week beside the traditional training program will lead to the following:

- Improvement of the player training state as the speed rate of experimental group has improved.
- Improvement of Oxygen Consumption ultimate limit for the experimental group.
- Improvement of 6M running suggested by Billat for the experimental group.
- Improvement of the physiological functions such as Palm pulse, and blood pressure of the experimental group.

Recommendations: the researcher recommends the following:

- Application of Billat training method (30/30 seconds) as a weekly training dose besides the actual training programs for the players.
- The application of frequent running on the ultimate limit of oxygen consumption as an index of the

player's ability to endure the greatest training loads.

- Application of Billat training method (30/30 seconds) on long distance players and the players of other sports.

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