The Effect of Exercises by Metabolic Conditioning (MetCon) Style in Some Physiological Variables and the Speed Motor Response for Young Volleyball Players

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Abstract

Preparing exercises by Metabolic conditioning (MetCon) style for volleyball, and identify of the effect of (MetCon) exercises on some physiological variables and the speed motor response of young Volleyball players. researchers believe that it affects in some physiological variables and speed motor response that are directly involved in the performance of motor skills of Volleyball for young players. Through the experience of field researchers note there is a noticeable decrease in the performance of defensive skills In matches when the level of technical performance is very high or the game continues for longer periods of time, this decrease leads to a slow moving to take the right place while performing these skills, researchers believe that the reason for this is that these skills are not getting enough share from training in a way that suits the nature of its physical and physiological performance, so the researchers felt that they should go into this experiment by preparing exercises by style of metabolic conditioning (MetCon), the aim of it is to make a positive impact in some physiological variables and speed motor response for volleyball young players .

Keywords: *Metabolic conditioning, physiological variables, speed motor response.*

Introduction

There is no doubt that scientific research has become one of the most important necessities in our modern [1] society in reaching the highest levels for all aspects of life by identifying the different energies and abilities of human to try to achieve most benefit from scientific theories and their application to serve and develop the society, including the sports field [2], it may need a lot from sporting events to great time to get to high level of abilities and possibilities . One of the games that have become a lot of attention in recent times is the game of Volleyball, which is one of the most popular games in the world, Volleyball requires a great muscle ability to perform its skills, upon closer examination In the nature of performance we find that it requires high energy to perform the motor duty with force, speed and endurance, it requires from players when performing the skills and high [3] biomotor abilities. Given the multiplicity and diversity of training curricula used by coaches for clubs and teams, and the overlapping of these curricula with each other, the impact of each of them has become to address specific requirements in order to develop the level of players, one of the recent training style s has been the Metabolic conditioning (MetCon) style [4], which is one of the latest training style s that use high-strength training and short time, this is consistent with the nature and properties the game to create a state of functional adaptation, improve energy production systems, and improve the career, physical, and skill level of players.

Methodology

As for the research methodology and its field procedures, researchers used the experimental style to solve the problem of research, the research society was determined by the Kufa Club volleyball for youth , for the sports season 2019-2020, the number (12) players, and they were divided into two groups (experimental and control) in the simple random way (Lottery).

Research community and the sample:

The research community was determined by the youth Kufa sports Club for the sports season (2019-2020) and the number (12) players was chosen by the researcher in full for the experiment, they were

distributed equally to two groups in a random way (lottery), after that, the experimental group underwent a training that includes the use of exercises by Metabolic conditioning (MetCon) style, while the control group continued to use the trainer's regular training style .

Means and instruments used in research:

Means of data collection

- Arab and foreign sources and references.
- Personal interviews.
- Tests and measurements
- forms for recording test results for players.

More than consumption at rest time (EPOC), Heart rate after physical effort:

O2 deficit is measured and the amount of oxygen consumed during the recovery period (hospitalization) in excess of consumption during rest time (EPOC) precisely using device (Fitmat pro), where the player information is entered (Name, length, mass, and age) Before starting the measurement, also, clean the test mask by antiseptic, and connect the parts of the system with installing the heart rate belt on the chest and installing the signal receiver for the heart rate (Bluetooth) in the port assigned to the device, then (Wingate) test is performed on Physical effort bicycle Type (MONARK), where the mask for measuring (VO_2max) is placed on the player's face, after completing all the requirements for working the devices and after completing entering the required data into the device as well as the program for the physical effort bicycle, the test is started according to the conditions of the Wingate test, after completing the test, data will be recorded for the maximum oxygen consumption rate (VO_2max) from the (Fitmat pro) software, choose the recovery option)) from (Fitmat pro) device with the mask remaining on the player's face until O_2 consumption is reached, the rest time following the physical exertion, with the same mechanism, the test is performed twice.

Note: the (Fitmat pro) device during the voltage gives a reading of (vo2max) in units of milliliter / kg / minute.

Procedures (Wingate) test:

The necessary tools: Stopwatch, calculator, physical effort bicycle type (MONARK).

Style of performance: The test is performed using the stationary bicycle (MONARK) Swedish made, according to the following steps:

ü The examined mass is taken To the nearest correct Kilogram.

ü The data of the examiner is entered into the computer and the resistance is set according to the mass of the examiner, which is equivalent to 7.5% of his body mass.

ü Riding examined on a bike, the seat is adjusted according to his length so that there is a very slight flexion at the knee joint within (10º), then he adjusts the foot strap, the procedures are explained to the examiner, noting that stirring is performed upon receiving the signal.

ü The examiner performs a warm-up operation on the bike for a period of (3-4) minutes where the resistance is gradually placed according to the mass of the examiner before the end of the warm-up process, the examiner moves the bicycle wheel at full speed for a period of (3-5 seconds) and repeats this two to three times.

ü Lift the weight from the ballast basket, the examiner starts moving the bicycle wheel at the fastest possible speed with a speed of no less than (80) cycles for a period not exceeding three seconds Then the weight is lowered gently and at the same time the program start button is pressed to begin the measurement process the examiner continues to move the wheel for a period of (30) seconds, to be encouraged and urged to maintain the speed of rotation as possible.

Table (1). Shows the amount of oxygen consumption during the effort using a bicycle, physical effort at different abilities

bicycle resistance (kg)	Required O2(l / s)
0.5	0.6
1	0.9
1.5	1.2
2	1.5
2.5	1.8
3	2.1
3.5	2.4
4	2.8
4.5	3.1
5	3.5
5.5	3.8
6	4.2
6.5	4.6
7	5

We extract the required resistance through the following equation:

· **The resistance required for the player=** $\frac{\text{MASS The Playr} \times 7.5}{100}$

After extracting the required resistance, we extract the absolute consumed oxygen by converting the relative consumed oxygen (ml / kg / minute) to (liter / minute) through the following equation:

· **Absolute consumer oxygen=** $\frac{\text{Relative oxygen consumedgen} \times \text{MASS The Playr}}{1000}$

Then the O_2 Deficit is extracted by the following equation:

· O_2 Deficit = Required oxygen - Absolute consumer oxygen

As for the oxygen debt (EPOC) it is extracted through the following equation:

· Oxygen debt = Relative consumption oxygen – 3.5

ü The heart rate was extracted from the device directly

Nelson Test for a motor response:

The purpose of the test: Measuring the ability to respond and move quickly and accurately according to choice the catalyst.

Tools used:

1- Barrier-flat area with a length (20 m) and a

width (2 m) within three lines plan between the distance between the line and the other (6.40 m), length a Line in the middle (1 m), placed Volleyball hanging and falling to the ground on the two sides' lines , preferably, the test performance should be in the volleyball court.

1. Electronic stopwatch.

2. Measure tape.

Test administrators:

1- Recording : He calls the names first, and records the test performance time.

2- A timer: Giving start signal with timing.

Main Experiment Procedures:

Pre-tests:

Researchers applied the main experiment through applying tests and metrics to the research community, and pretest were conducted on Sunday 16/12/2019, where the physiological variables were measured and the motor response speed test.

The details of the exercises in the training curriculum were as follows:

1- The total number of training units that included the functional exercises (24) units, and the number of weekly training units that applied exercises is (3) units for a period of (8) weeks.

2- The time for functional training in one training unit is (20-25) minutes.

3- The purpose of exercises is to develop physiological variables and speed of motor response.

4- Consideration of labor exchange between muscle groups.

5- Planning the formations of exercises during the weekly and daily units are (1-2).

Post-tests:

The researchers, carried out the post-tests of the research community after the completion of the exercise. This was on Wednesday (19/2/2020) and in the same sequence of pre-test. the researchers took the same conditions as the pre-tests where sequence tests.

Statistical style s used:

The researchers used the statistical bag (spss) to analyze the research results, including: -

- Mean.
- STD.EV.
- T-test for independent samples.
- T test of the interrelated samples .

Discussion of results:

Table (2): Shows the mean, standard deviations, the calculated value of (t) of the interrelated samples, the level of the significance of the test and the significance of the difference for the pretest and posttests of the control group of the studying variables.

Variables	Measuring unit	Pre-test		Post-test		(t) value	Level of significance	Type of significance
		Mean	STD.EV.	Mean	STD. EV.			
Oxygen deficit	L / min	1.25	0.39	1.016	0.217	3.11	0.027	Sig.
Oxygen debt	L / min	32.1	3.183	35.616	2.503	9.216	0.000	Sig.
Heart rate after physical effort	Beats / min	179.33	1.032	182.5	1.048	5.27	0.003	Sig
Response speed	second	1.976	0.084	1.873	0.045	3.938	0.011	Sig

- View The results of the pre-tests and post-tests of the experimental group of the studying variables:

Table (3) : Shows the mean, the standard deviations, the calculated value of (t) of the interrelated samples, the level of the significance of the test and the significance of the difference for the pretest and posttests for the experimental group of studying variables .

Variables	Measuring unit	Pretest		Posttest		(t) value	Level of significance	Type of significance
		Mean	STD.EV.	Mean	STD.EV.			
Oxygen deficit	L / min	1.248	0.333	0.665	0.201	8.569	0.000	Sig.
Oxygen debt	L / min	32.5	2.98	38.933	2.324	8.975	0.000	Sig.
Heart rate after physical effort	Beats / min	178.833	0.952	184.333	0.816	14.03	0.000	Sig
Response speed	second	1.989	0.069	1.813	0.030	6.601	0.001	Sig

- View the results of tests (Posti. Posti) of the two groups control and experimental studying variables :

Variables	Measuring unit	Pretest		Posttest		(t) value	Level of significance	Type of significance
		Mean	STD.EV.	Mean	STD.EV.			
Oxygen deficit	L / min	1. 016	0. 217	0. 665	0. 201	2. 903	0. 016	Sig.
Oxygen debt	L / min	35. 616	2. 503	38. 933	2. 324	2. 378	0. 039	Sig.
Heart rate after physical effort	Beats / min	182.5	1.048	184.33	0.816	5.222	0. 000	Sig
Response speed	second	1. 873	0. 045	1. 813	0. 03	2. 699	0. 002	Sig

Table (4) :Shows the value of (t) calculated for independent samples and the level of the test and were significant differences between the results of the test (post-test) of the two groups control and experimental studying variables .

Discussion of the Results

The results presented in tables (2) and (3) for the physiological variables tests showed that there were significant differences between the pre and post tests and in favor of the post tests for the control and experimental groups, the researchers attribute the reason for this moral difference to the members of the control group, due to the exercises that were applied by style s and style s prepared by the trainer in his training units, as the repetitions performed by the members of the control group and the continuation of the training lead to the occurrence of functional adaptations in certain proportions, and these adaptations are the deficit, the oxygen debt and the heart rate,

As for the results presented in table (4), which show the preference of differences in favor of the experimental group in the post- tests, the researchers believe that the exercises that they prepared for the members of the experimental group that were applied by the metabolic style (MetCon), created adaptations of the body's functional systems this was due to exposure to physical and sub-extreme physical loads, most of which were crossed by the limits of the anaerobic threshold and work with insufficient oxygen , when performing a high-intensity work that exceeds the limits of the anaerobic threshold, we see that the rate of oxygen consumption increases gradually until it reaches the fatigue stage without a state of stability with the rate of oxygen consumption, as for after stopping the performance of the physical effort, we notice that the rate of oxygen does not return to the normal [6] limit (before performing the physical exertion) but rather requires a lengthy period of time that is Longer or shorter depending on the adaptive abilities of the athlete's body's equipment, this is what was changed by the training loads applied by the members of the experimental group, which contributed to a kind of muscle adaptation.

The researchers see the differences between the control and experimental groups for heart rate due to the quality of exercises, as they were built according to a scientific physiological nature, as the researchers prepared a large part of it in a way that is compatible with the lactic energy system, in order to be able to improve the chemical pathways for energy production, this has helped the players to make an improvement in the work of the functional systems, so we notice an increase in the percentage of heart rate for the members of the experimental group more than the members of the control group, also, the exercises were character by diversification, change and frequent repetitions, and this also led to a state of adaptation to the internal systems and continuous sports training increases the heart rate [7] .

The researchers also attributes the reason for the development of the members of the experimental group at the expense of the members of the control group in the speed of the motor response due to the nature of the exercises that helped to develop that ability because it was explosive in nature and changing from moment to moment as the speed of response depends on movements with an instant reaction and that the exercises prepared with the style of (MetCon) contributed significantly to the process of linking the response speed and the motor speed of the legs and technical skills, which is one of the requirements for the successful performance of these skills quickly and with utmost accuracy, the principle of diversification and change that the researcher used in addition to the continuous iterations and scientifically contributed greatly to the development of these two abilities, which depend on rapid and sudden movements, (Magill) confirmed this when he said "To diversify your workout experiences , organization and diversity in the movement will increase the experience for the players and increase the player's ability to perform the skill better.

Conclusions

Based on the research results reached within the limits of the research community, the following conclusions have been reached:

4- The exercises implemented by the experimental group by metabolic conditioning style (MetCon) helped to reduce the rate of oxygen deficiency and increase the proportion of oxygen debt.

5- The continuous training of exercises, which were applied in the Metabolic conditioning style

(MetCon), led to the adaptation of Cardiac muscle by increasing the concentration of heart rate.

6- The duration of the exercises, which were applied by metabolic conditioning style (MetCon) represented by the number of training units, was appropriate in creating adaptations that reflect the evolution of the experimental research group in the speed of the motor response.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the University of Kufa and all experiments were carried out in accordance with approved guidelines.

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