The effect of Preventive Exercises According to the Application of Muscle and Motion on the Development of the Most Important Physiological Variables Associated with High Load Injuries and Muscular Soreness in Handball Players

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Abstract

Handball has become practiced in the most countries of the world still suffer from obstacles that impede their development to achieve the better, and one of those obstacles is sports injury, researchers noticed the high incidence of sports injuries among handball players in recent sports seasons and the lack of interest of coaches in the physical preparation for the prevention of frequent injuries among handball players, The aims of the research were preparing preventive exercises according to the (muscle and motion) application, and identifying the effect of preventive exercises on the most important physiological variables associated with high load injuries and muscular soreness for handball players. Researchers used the experimental method to solve the problem of the research by implementation of the experimental design using pre-test and post-test. The research's community consisted of 20 players from the Karbala Sports Club, they were divided into two equal groups (experimental and control groups). The researchers carried out pre-tests for players who represent the research community, Preventive exercises applied with members of the experimental group for 8 weeks, 3 session per week, 24 training sessions, Post-tests were conducted for the experimental and control groups, After collecting the data, it was processed statistically using the statistical package SPSS, the researchers concluded that preventive exercises according to the application of MUSCLE and MOTION have a positive effect on developing the physiological variables associated with high load injuries and muscular soreness for handball plyers player.

Keywords: *Preventive exercises, MUSCLE and MOTION application, physiological variables, high load injuries, muscular soreness, handball players.*

Introduction

Handball has achieved an important and prominent position in the sports world, it has become practiced in the most countries of the world, as the game of handball includes many offensive and defensive skills [1], and these skills still suffer from obstacles that impede their development to achieve the better, and one of those obstacles is sports injury, for many reasons, the most important of which is the high effort exerted, the training loads that are not precisely regulated, the loss of coordination and compatibility between the muscular groups involved in the performance, which face resistances higher than their ability as a result of mechanical errors in the performance of skills, and it is one of the influencing factors [2] that occur biomechanical imbalance between the working muscular groups, which leads to change the range of motion and its path and cause the injury. Through the experience of researchers, they noticed the high incidence of sports injuries among handball players in recent sports seasons and the lack of interest of coaches in the physical preparation for the prevention of frequent injuries among handball players , the researchers believe that the reason of this problem is not giving suitable importance for the preventive exercises that participate directly In the skillful performance in line with the nature of its performance [3] in terms of physical and physiological

[1-6], so the researchers decided to search this problem by preparing preventive exercises and study their effects. The importance of the research represented in preparing preventive exercises according to the muscle and motion application in a scientific method, as the researchers see that they effect on the most important physiological variables associated with high load injuries and muscular soreness, which are directly share in the performance of handball matches. The aims of the research were preparing preventive exercises according to the (muscle and motion) application, and identifying the effect of preventive exercises on the most important physiological variables associated with high load injuries and muscular soreness for handball players.

Research Methodology

Researchers used the experimental method to solve the problem of the research by implementation of the experimental design using pre-test and post-test. The research's community consisted of 20 players from the Karbala Sports Club, they were divided into two equal groups (experimental and control groups). The researchers carried out pre-tests for players who represent the research community, included the following tests:

- **Measuring physiological variables:**

1- Measurement of the maximum oxygen consumption (VO2max): (5 : 486).

2- Lactic acid concentration: (4 : 27).

3- Scale of muscular soreness (2 : 154).

The level of muscular soreness was measured by using the McGill scale to assess a person's suffering from real pain, developed by Dr Melzack at McGill University. Translated into several languages. It was translated and prepared in Arabic by Prof. Dr. (Ahmad Yousif Miteb and Dr. Ahmad Shaker Kazem).

Preventive exercises applied with members of the experimental group for 8 weeks, 3 session per week, 24 training sessions. The purposes of training were keep players from injury with a lower level of muscular soreness. Post-tests were conducted for the experimental and control groups, and all the tests used the same conditions of pre-tests included the time and the place of tests and the test specifications. After collecting the data, it was processed statistically using the statistical package SPSS.

Results and Discussion

Table (1). Shows the Value of (t test) and the Significance Level and Kind between the Results of Both the Pre and Post Measurements for the Control Group

Variables	Units	Pre tests		Post tests		T	SIG	indicate
		Mean	Standard dev.	Mean	Standard dev.			
Lactic acid concentration	Mlm	12. 96	0.93	11.48	1.04	3.92	0.00	Moral
VO2max	ML	51.70	3.97	54.80	2.39	3.89	0.00	Moral
muscular soreness	Degree	39.70	2.16	37	3.23	3.85	0.00	Moral

Table (2). Shows the Value of (t test) and the Significance Level and Kind between the Results of Both the Pre and Post Measurements for the Experimental Group

Variables	Units	Pre tests		Post tests		T	SIG	indicate
		Mean	Standard dev.	Mean	Standard dev.			
Lactic acid concentration	Mlm	13.23	0.90	16.27	0.60		0.00	Moral
VO2max	ML	52.60	1.26	64.50	4.06		0.00	Moral
muscular soreness	Degree	40.10	4.12	27.80	2. 34		0.00	Moral

Table (3). Shows the Value of (t test) and the Significance Level and Kind between the Results of Post Measurements for the Experimental and Control Group

Variables	Units	Control group		Experimental group		T	SIG	indicate
		Mean	Standard dev.	Mean	Standard dev.			
Lactic acid concentration	Mlm	11.48	1.04	16.27	0.60	8.87	0.00	Moral
VO2max	ML	54.80	2.39	64.50	4.06	6.50	0.00	Moral
muscular soreness	Degree	37	3.23	27.80	2. 34	8.20	0.00	Moral

The researchers attribute the reason for the emergence of the moral differences due to the nature of the preventive exercises that were applied on the research sample, the training by using interval method of alternating intensity led to an increase in the burden on both the circulatory and respiratory system and this caused to develop the efficiency of the members of the experimental group, the researchers explain this as a result of the experimental group's response to the preventive exercises that were prepared and included combined exercises that led to an increase in the efficiency of the circulatory and respiratory system and an increase in the mitochondria (energy houses) within the muscle fibers, which was reflected in the ability of the muscles to consume oxygen from the blood. The physiological changes that occur in the body's systems come as a result of the rated physical effort that lasts for more than (8) weeks, these changes are responsible for increasing the muscle's ability to consume oxygen and produce aerobic energy (6 : 599). This is what the researchers did through prepared exercises according to the MUSCLE and MOTION program for the experimental research sample that had a role in the regularity of training, which led to an adaptation in the respiratory system and increase its efficiency, which was reflected in the ability of the muscular system to extract oxygen, which increased its ability to increase Consumption. as correlation of the pulse with the maximum in relation to the heart muscle and calculating the percentage of work according to the amount of oxygen consumed by the heart rate at the moment of the end of the effort, which reflects the specificity of cardiovascular and respiratory fitness (3 : 111). Through what was presented in Table (3), there are significant differences in the post-tests

between the two groups (control and experimental) in the concentration of lactic acid in the blood and in favor of the experimental group, and the researchers attribute these differences between the control and experimental groups due to the quality of the prepared exercises, And designed according to the method of interval training with alternating intensity, which is compatible with the two energy consumption systems for the handball game, depending on the scientific foundations of sports training and sports physiology, as these exercises were prepared according to the aerobic and anaerobic energy systems, and this helped the players to get rid of lactic acid rapidly. The concentration of lactic acid in the blood of well-trained athletes is lower compared to untrained or less effective training if they perform the same training load or effort (1 : 66). The researchers believe that the differences between the control and experimental groups were due to the quality of the exercises that they prepared and designed according to the method of alternating intensity interval training, which is compatible with the two energy consumption systems of the handball game depending on the scientific foundations of training and sports physiology. The researchers believe that an increase in the concentration of lactic acid in the blood immediately after the effort indicates an improvement in the efficiency of the anaerobic energy system, and a decrease in the concentration of lactic acid after an appropriate period of hospitalization indicates the efficiency and improvement of the lactic acid recovery system. Whereas, the concentration of lactic acid in the blood of well-trained athletes is lower compared to the non-trained or less effective training if they perform the same training load or effort (1 : 66).Through an observation of the arithmetic meanings in Table (3) of the level of muscular soreness for the two research groups, it is evident that there are significant differences between the two groups in favor of the experimental group, as the level of muscular soreness among the experimental group members decreased better than the control group. The increase in muscle cracks is accompanied by an increase in some chemicals in the body that stimulate the nerve receptors and the most important of these chemicals is prostaglandin, which is responsible for stimulating the nerve endings of the muscles, which gives us a sense of pain, contributing to the healing process when tissue is damaged or infected by activating the inflammatory reaction and causing pain and high temperature when tissue is exposed to any damage, white blood cells travel to that tissue, and prostaglandins are then synthesized in the same site to spark the healing process (8). Most of these proteins reduce the amount of substances produced by tissue inflammation by eliminating the source of inflammation as the damaged tissue parts separate, which leads to tissue regeneration (7 : 2169).

Conclusion

The researchers concluded that preventive exercises according to the application of MUSCLE and MOTION have a positive effect on developing the physiological variables associated with high load injuries and muscular soreness for handball players.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: "All experimental protocols were approved under the Faculty of Physical Education and Sports Sciences were carried out in accordance with approved guidelines".

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