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The effect of plyometric exercises on the start of free swimming in terms of indicators of electrical activity of the muscles of the legs

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Abstract
At the present time, the world has witnessed great scientific and technical progress in the application of modern scientific and technological foundations in the field of sports, which contributed to raising the scientific level in general and the level of sports in particular, and this was evident in many sports, including swimming, which witnessed a development in performance and level of achievement. This is due to the positive employment of many sciences such as physiology, anatomy, training, and others. And the Free swimming is one of the important types of water sports that exploit the water medium as a means to move through it through the movements of the arms, legs, trunk and breathing, in order to improve human efficiency. It is also important from the physical and functional aspect. The study aimed to identify the values of some indicators of the nervous system under study and the level of achievement of the research sample Among these variables are the indicators of the electrical activity associated with muscle groups contributing to the performance of the beginning stage of swimming, and the researcher hypothesized that there are statistically significant differences between the two tests, the pre and post tests, in the values of the indicators of the nervous system under study and the level of achievement and in favor of the post test for the research sample. The researcher used the experimental method on 5 of the Adhamiya Youth Club swimmers, and after analyzing and treating the values of the studied functional indicators for the research sample, the researcher reached several conclusions, including that the values of the indicators are under study and through the results in the post test. Their employment status during the training year.

Keywords: *plyometric exercises, free swimming, electrical activity, muscles*

Introduction

The development of the level of training status for players depends directly on the physical and functional preparation of the body's organs, and this is of great importance in reaching the best sporting achievements, as the levels reached by many world champions are a form of imagination, especially the free swimming champions and records recorded in races Swimming of all kinds after the progress that took place in the sciences related to the sports field, especially the science of sports training and training physiology Swimming competitions are interesting competitions for the player and the spectator, and the 100m freestyle competition that requires a large amount of muscular strength associated with speed (strength distinguished by speed) and also requires the player to have complete control over performance and physical ability and to possess some functional and special physical attributes. Freestyle swimming is one of the most important sports for the human body Which requires from its practitioners high physical strength and complex technical skills, and that this requires proper planning using the

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correct scientific rules in the science of sports training, training physiology and other sciences. It must be accompanied by organizational and training programs to develop and prepare the athlete physically and functionally in the best picture.

The importance of the research lies in the interest in swimming races in Iraq, including the 100m freestyle swimming for young people Therefore, scientific methods must be adopted in training and the need to use appropriate methods to explore the physical and functional capabilities inherent in the player's body, represented by strength and the level of muscular activity of the two men during sports training, as well as providing the requirements for muscular work. The problem of the research was revealed through observation and follow-up of the researcher and to see what the world uses in terms of ways, means and exercises in training swimmers, especially the 100m freestyle athletes, so I tried this on the research sample to know the level of electrical activity of the two men during the starting phase of free swimming and its relationship to the physical aspect And the level of achievement through the values of indicators of the nervous system and their improvement first, and thus the development of the level of achievement secondly. Accordingly, the researcher aspires to find appropriate exercises for the research sample in training to raise the functional and physical level and to improve the level of achievement for the research sample.

The study aimed to identify the values of some indicators of nervous activity of the muscles of the legs and the level of achievement of the research sample under study, as well as to identify the effect of special exercises on these indicators and the level of achievement of the research sample. as imposing The researcher found that there are statistically significant differences between the pre and post tests in the values of the nervous system indicators of the target muscles and the level of achievement and in favor of the post test for the research sample under study.

The human field consisted of a group of young swimmers who represented the Adhamiya Sports Club for free swimming, which numbered 5 swimmers, and the research period was from 26/4/2019

Until August 15, 2019 in the Baghdad swimming pool

2- Research Methodology and Procedures:

2-1 Research Methodology: The researcher used the experimental method with a pre-, inter- and post-test for one group to suit the nature of the research problem

2-2 Research sample: The selection of the sample is the basic thing for the researcher's work, as it is one of the basic matters in scientific research. On this basis, the sample was chosen from a swimmer, and the total sample number was (7) runners who were chosen by the intentional method. The researcher chose (5) swimmers from among them for the purpose of the study and tests. One of the total sample was excluded after a week due to non-compliance with the training, and one of them was subjected to the exploratory experiment.

2-3 Research tools and devices and means of collecting information

- HP p4 portable calculator.
- EMG. Electromagnetic Device
- Italian device for measuring height and weight.
- Electronic stopwatch.

- High speed camera

- Arab and foreign sources and references.
- The World Wide Web of Information (Internet).
- Personal interviews.

2-4 Research Procedures:

2-4-1 determining the variables studied in the research:

According to his experience in the field, the researcher determined the most important functional and physical indicators Under study, which is related to the activity of

swimmers, and that of the nervous system, in agreement with the coach concerned with training for free swimming.

2-4-2 The exploratory experience:

The researcher conducted an exploratory experiment at five o'clock in the afternoon on Friday, corresponding to

(26/4/2019) due to the importance of this experiment in order to obtain accurate results,

And he conducted it on a swimmer from outside the research sample under study and from the research community itself, and tested them on the use of the Fitmate Pro To find out closely the obstacles or problems that may arise in the stages of conducting the test, as well as to ensure their safety when applying the tests.

2-4-3 determining the search tests:

1 - The name of the test: EMG (muscle mapping):

The objective of the test: To measure the electrical activity of the muscles of the legs

Performance method:

Placing the surface antennas and installing the (EMG) device:

Electrodes were placed on the rectus femoris muscle of the right and left leg, and two superficial electrodes were placed on the lateral twin muscle of the right and left leg. On a good (EMG) signal, the electrodes were attached to the top of the middle of the muscle, and an additional one was placed near the rectus femoris muscle of one of the legs, working to remove the electrical electrode that the body picked up from the periphery, and it was called the ground pickup. Around the waist, an EMG device was installed. Around the player's waist, specifically in the lower back above the hips, by means of a special belt that keeps the device from falling while giving freedom of movement and without any impact on the player's motor path while performing the crushing skill of volleyball

EMG) device works to receive the electrical signal of the muscle through the wires connecting it with the surface antennas installed above the muscles, and this device sends the signal in the form of a remote (Bluetooth) signal to the receiver connected to a personal computer (Laptop).

► The purpose of the test:

Recording the peak of the electrical activity of the lateral and rectus femoris muscle of the two legs in the approach phase with the crushing hitting in volleyball, As the signal of each of the four muscles was converted and described separately and for the three steps, the highest peak of the electrical activity of the muscles was extracted and converted into data that could be

Dealing with it statistically and this is done through imaging and matching the player's movement with the signal generated by the four muscles during the performance of the skill of crushing hitting with volleyball, and Figure (15) shows the EMG device and surface pickups.

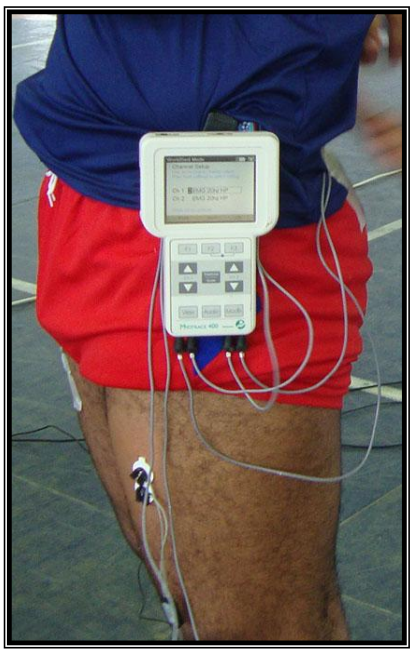

Figure (1) EMG device and surface pickups

2 -The 100m freestyle achievement test:
The purpose of the test: To test the level of achievement for the 100m freestyle swimming for men.
Equipment: 50-meter Olympic swimming pool with legal measurements, stopwatch.
Performance Specifications:
The tester stands on the edge of the pool at the start of the race and performs a 100m swim to the end (50m back and forth.(
Recording: The recorder records the time of each swimmer.
5-2The main experience:
1-2.5Pretest:
After the preparations made by the researcher, including recording and recording information about the research sample such as age, height and weight, The tribal tests of the research sample were carried out in the laboratory and the sports pool in Baghdad. The tribal test was carried out at exactly four o'clock in the evening on Thursday and Friday , .2019/5/3-2The functional tests (the electrical activity of the two men) and the level of achievement were carried out in two days, respectively. for the studied sample.
2-5-2Special exercises:
The researcher, in agreement with the trainer, used a set of special exercises that depend mainly on the weight of the training, especially the exercises of the starting stage, which is the process of using weights added to the trunk and legs divided for each exercise for the members of the research sample Gradually increasing the weights, starting from the weight of a quarter of a kilogram (250 g) for each man, or adding weights to the swimmer's torso through the special vest for carrying the added weights, as they are distributed and arranged according to the training units during the 12-week research study period, according to the table.
-test of the research indicators:
The post-test of the research sample was conducted after 12 weeks (3 months) from the date of the pre-test and after training within the prepared program, and the sample was subject to the prepared training curriculum. The post-test was carried out at exactly four o'clock in the evening also on Saturday, corresponding to
(2019/8/15)Baghdad University laboratory and Baghdad swimming pool, with the same procedures that were followed in the pre-test.

The results or data extracted from the device (EMG) used and the physical test of achievement were collected and unpacked and arranged for the purpose of statistical treatment.

6-2Statistical means:

The researchers relied on the statistical package SPSS, using parameter statistics to address the results of the values of the studied functional indicators under consideration.

3 -Presentation and discussion of the results:

1-3Display the arithmetic means and standard deviations of the values of the functional indicators for the research sample.

Table (1)

It shows the mean values, standard deviations, median, and torsion coefficient of the peak electrical activity of the rectus femoris and lateral twin muscles for the starting phase of swimming.

T	selbairaV	gniursaem tinu	citemhtirA naem	dradnats noitaived	rotaideM	weks suludom
1	sutcer siromef	tlovorcim	71.150	25,631	57.950	1.246
2	laretal suetulg	tlovorcim	201.917	116.733	163.600	0.854

Table (2)

It shows the means, standard deviations, and the calculated e value for the peak electrical activity of the rectus femora's and lateral twin muscles in the starting phase.

tset eht	elbairaV s	niursaem tinu g	itemhtirA naem c	radnats d	T. ulav	orrE r	noitacidni
labirt	sutcer siromef	tlovorcim	61.150	25,631	0.042	.9380	acifingisni tn
noisnemid la	sutcer siromef		65.145	21,365			
labirt	laretal suetulg	tlovorcim	201.917	116.733	.2210	0.674	acifingisni tn
noisnemid la	laretal suetulg		204.254	121.542			

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3) elbaT)

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tset eht	elbairaV s	niursaem tinu g	itemhtirA naem c	radnats d	T. ulav	orrE r	noitacidni
labirt	sutcer siromef	tlovorcim	56.2	5.94	0.854	0.014	larom
noisnemid la	sutcer siromef		45.22	6.15			
labirt	laretal suetulg	tlovorcim	50.3	5.1	0.652	0.154	acifingisni tn
noisnemid la	laretal suetulg		51.7	4.24			

Table (4)
Shows the means, standard deviations and the calculated T- value of the rectus femoris and lateral twin muscles at the start of the contraction time index

tset eht	lbairaV se	gniursaem tinu	temhtirA naem ci	radnats d	T. ulav	orrE r	noitacidni
labirt	sutcer siromef		84.33	1.88			
noisnemid la	sutcer siromef	nocesillim sd	85.25	1.98	0.52 4	0.20 1	acifingisni tn
labirt	laretal suetulg	nocesillim sd	7777.99	1.64			
noisnemid la	laretal suetulg		7123	1.94	0.65 1	0.01 5	larom

Discuss the results:
By observing the values of the indicators shown in the previous tables, we find that the effect of the special exercises used was reflected in the test results for those muscles. In the indicators of summit, area and time, there were significant differences between some of the results of the pre and post tests, including in Table (3) in the area under the curve indicator The researcher attributes the reason for this to the improvement of muscular work and making it tend towards increasing the output of muscular strength at the beginning of the moment, as the thrust of the force improves as a result of the increase in energy in the thigh muscle, which is confirmed by the wave planning of the target muscles.
Also, the exercises used, especially explosive in nature, crystallized in the development of muscle work according to the stages that require exerting the highest strength with the involvement of the largest number of muscles that contribute to achieving the economy in the effort exerted to generate the required amount of force in the performance of the starting stage and in the least time and this happens by employing the largest number Possible motor units to assist the swimmer in concentrating the force within the performance requirements during the launch.
And this happened in the indicator of the time of contraction in Table (5) for the lateral twin muscle, as it was found that there was a significant significance between the pre and post test in the values of this indicator.
This indicates the effectiveness of the exercises used for the research sample during the study period.
Table (5(
shows the arithmetic means, standard deviations and the calculated T value for the achievement level indicator for swimming 100 m for the research sample.

selbairaV	gniursaem tinu	citemhtirA naem	dradnats noitaived	T. eulav detaluclac	rorrE etar	noitacidni
tseterp	dnoces a	69.11	21.338			
tset tsop	dnoces a	63.12	26.232	0.048	0.042	larom

Discussion of Table (5):

Through the results in the table above, which is related to the achievement variable in swimming 100 m for the sample of the research, as it was found that there is a significant statistical significance between the pre-test and the post-test of the research sample, and this indicates an improvement in the level of achievement after the period of performing the exercises set by the researcher in cooperation with the trainer to improve the performance of the starting phase of the sample Thoughtful Research

Conclusion

Through the results obtained by the researcher through statistical treatments of the data, he reached several conclusions, which are:-

1- Special exercises (special strength) have a clear effect on improving the work of the muscles of the legs through the results of the indicators under study in the post tests.

There is a clear development and improvement of the area under the curve index and the time of contraction in the post test.

There is an effect of the exercises used on improving the level of completion of 100m free swimming for the research sample.

Recommendations:

In light of the findings, the researcher recommends the following:

- The use of special strength exercises in the starting phase and its functional measurement in swimming training due to the positive results achieved by these exercises.
- The necessity of using periodic functional tests and measurements by trainers to predict the effectiveness of the training curriculum used on swimmers and the level of achievement.

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