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## The effect of a rehabilitation curriculum inside and outside the water medium to development of muscular strength in the repetition of rupture of the anterior thigh muscle for football players

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### Abstract

The purpose of this paper is to preparing a rehabilitation curriculum inside and outside the watery medium to repeat the rupture of the anterior thigh muscle for football players, knowing the differences between the tribal and remote tests in the muscular strength for the repetition of the rupture of the anterior thigh muscle in football players. The researcher used the experimental method for its relevance to the nature of the problem to be solved, and it is an attempt to control all the variables and basic factors. The researcher chose the research sample by the intentional method, a sample of those with repeated ruptures of the anterior femoral muscle for football players and from the Dhi Qar Governorate football clubs, and their ages ranged between (15-29) years and with one experimental group for the tribal and remote measurements, and their number was (6). The injury was carried out by a group of specialized doctors through resonance and sonar devices. One of the most important results reached by the researcher is that: The Rehabilitation curriculum had a positive impact on the muscular strength of the anterior thigh muscle for football players, rehabilitation within the aqueous medium had a clear impact on the development of the variables investigated, and rehabilitation within the aquatic environment had a clear effect on improving the psychological state of the injured. One of the most important recommendations recommended by the researchers is that: The researcher recommends the necessity of using tests and exercises to rehabilitate the recurring anterior femoral muscle ruptures in football players and necessity of using the water medium to rehabilitate the recurrence of the rupture of the anterior femoral muscle for football players.

**Keywords:** Rehabilitation curriculum, muscular strength

### 1. Introduction

Repeated injury to the anterior femoral muscle in soccer players is one of the most common sports injuries in soccer and other games. Where "mentions that muscle injuries are among the most common injuries and occur among athletes, due to the fact that muscles are the main tool implementing performance requirements. Football muscle injuries are 40% of the total injuries" (Omar. 2004) <sup>[13]</sup>. Water training has increased interest in it recently, and physical therapy in water is important great during the period of therapeutic rehabilitation, and the physiological importance of water is that the water stimulates movement, due to the ease of movement of the joints, spine and affected muscles inside the water without feeling tired and pain, as the injured player, can move during the therapeutic rehabilitation in the water in an easy and more relaxed manner (Tucker. 1999) <sup>[11]</sup>. The importance of the research is a specialized attempt to identify the effect of exercises within the water medium for muscular strength in the rehabilitation of repeated ruptures of the anterior femoral muscle of football players.

### 1.2. Research problem

Through the researcher's work in the field of rehabilitation of sports injuries and physical fitness in some clubs in Dhi Qar Governorate - Iraq, the researcher noticed the large number of muscle injuries, including the recurrence of injury to the front thigh muscle of football players, due to lack of rehabilitation after the injury directly and in a scientific manner, in addition to not using the water medium because of it's from an effective role in the speed of recovery of muscle tears and not putting pressure on the muscles and joints, as well as the lack of exercises similar to performance in the last stage of rehabilitation, as well as not using physical exercises and not putting prevention exercises in the rehabilitation curriculum

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to not repeat the injury again and from these reasons the idea arose search.

### 1.3. Research objective

- Preparing a rehabilitation curriculum inside and outside the watery medium to repeat the rupture of the anterior thigh muscle for football players.
- Knowing the differences between the tribal and remote tests in the muscular strength for the repetition of the rupture of the anterior thigh muscle in football players.

### 1.4. Research hypotheses

- There are differences between the tribal and remote tests in the muscular strength in the repetition of ruptures of the anterior thigh muscle for football players.
- Knowing the differences between the tribal and remote tests in the physical characteristics in the repetition of ruptures of the anterior femoral muscle of football players.

### 1.5. Research fields

- Human field: Football players with repeated anterior femoral muscle ruptures, the ages ranged from (15-30) years of males in Dhi Qar Governorate - Iraq
- Time field: (5/11/2021) to (3/2/2021)
- Spatial field: Al-Zahra Clinic, Al-Hussein Teaching Hospital, Ministry of Youth and Sports stadiums / Dhi Qar - Iraq.

## 2. Research methodology and field procedures

### 2.1. Research Methodology

The researcher used the experimental method for its relevance to the nature of the problem to be solved, and it is an attempt to control all the variables and basic factors.

#### 2.1.1 Community and sample research

The researcher chose the research sample by the intentional method, a sample of those with repeated ruptures of the anterior femoral muscle for football players and from the Dhi Qar Governorate football clubs, and their ages ranged between (15-29) years and with one experimental group for the tribal and remote measurements, and their number was (6) the injury was carried out by a group of specialized doctors through resonance and sonar devices.

#### 2.1.2 Research tests and measurements

##### 2.1.2.1. Anterior quadriceps muscle strength test

###### Test name: Squat on the injured leg

- Purpose of the test: To measure the strength of the quadriceps muscle
- Description of the test: The victim stands on the injured leg with the arms extended to the side. Then the player leans on the injured leg and goes up and down on it.
- Registration: The injured player is given three attempts, and the best attempt is taken by repetition. (Kyritsis *et al.* 2015) [5].

##### 2.1.2.2 Strength test lengthening of the anterior biceps muscle heads

- Purpose of the test: To measure the length of the force of the anterior femoral muscle
- Equipment and tools used: (football field, stopwatch, whistle, registration form, pen)

- Performance description: After a good warm-up, from a standing position, the injured player bends and extends the legs as much as possible.
- Registration: The player is given three attempts and the best attempt/time is taken. (Abdul-Jabbar and Ahmed. 1984) [9].

##### 2.1.2.3. The injured legs speed strength

###### Test name: legs Strength Test

- Purpose of the test: To measure the rapid strength of the injured leg.
- Tools used: (an area with a length of (35 m), and a width of (1 m) signs, a stopwatch, a registration form, a whistle, a pen)
- Test description: The player performs a full-body warm-up. In addition, we put the poles with a length of (25 m), and when the whistle is heard, the player jumps on the injured leg from the starting line to the finish line.
- Registration: The injured gives three attempts to the injured leg and the best attempt is taken in time (Brain Mackenzie. 2005) [3].

##### 2.1.2.4. Agility

###### Test name: star

- Purpose of the test: agility.
- Equipment and tools: (whistle, signs, registration form, pen, football field).
- Description of the performance: The player stands in the starting line, runs from the first person, which is 10 meters away, then runs towards the second person at an angle of 45 degrees, and then returns and repeats the performance to the angle of 90, then to the angle of 135, then to the angle of 145 for both sides. The performance is applied to both sides.
- Registration: The player is given three attempts and the best attempt (Sermer *et al.* 2021) [2] is taken.

##### 2.1.2.5. Anaerobic ability test 30 Seconds

###### Test name (30) seconds anaerobic ability

- Purpose of the test: To measure anaerobic capacity
- Equipment and tools used: (tape measure, whistle, small pitch, registration form)
- Description of the test: The test distance is determined, which is 40 cm. The patient stands next to the line and when he hears the whistle, he jumps with the injured leg to the right and left while crossing the line and repeats the performance until fatigue
- Registration: Two attempts are given and the best attempt is taken, and the number of jumps within 30 seconds is calculated (Gustavsson *et al.* 2006) [4].

## 2.2. Physical program

The first phase of the rehabilitation of the femoral muscle rupture began immediately after the injury using fixed muscle training inside the home. The goal of this phase was to get rid of the pain and swelling that occurred as a result of the injury. The first phase of rehabilitation took 14 days, with a training session per day. The researcher also used physical therapy devices with the help of a Physiotherapist, where the number of sessions was 8 sessions during the first phase in physiotherapy devices, while the fixed muscle contraction exercises were 12 rehabilitation sessions. We moved to the second stage inside the water medium, using

the muscular contraction exercises in the swimming pool, with 5 qualifying sessions per week. The second phase lasted 6 weeks and consisted of 30 rehabilitation sessions. The researcher also used some tools in the aquatic environment. The researcher also used muscle strength training inside the hall, with 3 sessions per week, and there were 18 training sessions in which the researcher used muscular mobile training. We moved to the third and final stage of training on the field to develop physical fitness. The researcher used aerobic physical training, and then moved on to the more intense exercises, which are rapid strength

training and the use of direction change, stopping and rotation exercises, and all cases of play that occur in the match. The researcher added prevention exercises in the part the last of the training, to prevent the injury from recurring a second time, as the number of training units in the third stage reached 30 training units. The researcher also used the qualifying curriculum to improve anaerobic capacity by using high-intensity training, and the method of ability training. The researcher also used plyometric exercises.

### 3. Results and Discussion

**Table 1:** Shows the difference of the means, its standard deviation, and the calculated t-value between the pre and post-tests for the variables investigated.

Variables	Measuring unit	Pre-test		Post-test		difference mean	T value calculated	Sig level	Sig type
		Mean	standard deviation	Mean	standard deviation				
Agility	Time	17.97	0.524	12.56	0.281	5.41	19.299	0.000	sig
anaerobic ability	Repetition	30.223	2.422	69.333	5.680	- 39.11	22.517	0.000	sig
Anterior muscle strength	Repetition	3.654	0.623	9.781	2.358	- 6.127	17.345	0.000	sig
Strength speed	Time	12.37	1.075	8.306	0.352	4.064	10.201	0.000	sig
Strength lengthening	Time	20.666	2.760	50.288	5.113	- 29.622	9.840	0.000	sig

## 4. Discussing

### 4.1. Discussing the physical variable agility

Through the results of Table (1), the researcher attributes the reasons for the significant differences between the results of the pre and post-test of the physical variable (agility) and in favor of the post-test of the research sample members to the effect of the qualifying program, which contained a set of various exercises in the curriculum, agility was trained in the style or character what happens in the match, which was high and fast, and this was confirmed "that agility exercises are high-speed exercises with a continuous change of direction without the ball and without using the skill and tactical aspect and its impact is focused on the physiological aspect of the player and the development of the circulatory, respiratory and muscular system and agility in particular ". (Bannai. 2017) <sup>[10]</sup>.

The researcher also attributes the development of agility to the use of Psycho exercises, sudden change, quick stopping and rotation, in addition to jumping exercises, which led to the development of physical variables in the research.

### 4.2. Discussion of the physical variable anaerobic ability

Through the results of Table (1), the researcher attributes the reasons for the significant differences between the results of the pre and post-test for the physical variable (anaerobic ability) and in favor of the post-test for the members of the research sample to the effect of the rehabilitation program, which contained a set of various exercises aimed at developing the anaerobic ability of the injured players, and that at high intensity within the first phosphate system in a short time, and this was confirmed " that the development of ability comes through high-intensity training within the first phosphate system". (Tudor *et al.* 2019) <sup>[12]</sup>.

### 4.3. Discussion of the variable Strength lengthening for the two legs

Through the results of Table (1), the researcher attributes the reasons for the significant differences between the results of the pre-and post-test for the physical variable (Strength lengthening for the two legs) and in favor of the post-test for the members of the research sample to the

effect of the qualifying program, which contained a set of various exercises aimed at developing Strength lengthening by giving high repetitions with light weights inside the hall " states that strength endurance training leads to improving muscle endurance to repeat the outstanding performance in speed, especially the muscles of the legs, through a high level of endurance". (Al-Busati. 2016) <sup>[11]</sup>.

### 4.4. Discussing muscular strength and speed strength

Through the results of Table (1), the researcher attributes the reasons for the significant differences between the results of the pre and post-test for the physical variable (strength and speed strength) and in favor of the post-test for the members of the research sample to the effect of the rehabilitation program, which contained a set of various exercises aimed at developing the muscular strength of the front thigh muscles And that through exercises within the watery medium, which had a clear role in strengthening the muscles, ligaments and tendons, without putting pressure on the muscles and joints. The researcher also used a set of three training methods in the qualifying curriculum, which are the static muscular training method, the mobile muscular contraction training method, and the mixed muscular contraction training method. states that "the method of static muscle training leads to strengthening the muscles, ligaments and tendons, without putting pressure on the muscles and joints" (Davies. 2014) <sup>[8]</sup>. Asserts, "The increase in muscle strength leads to an increase in the size of the muscle fibre according to the longitudinal division of muscle strength, and then the degree of muscle endurance increases. Also, as a result of training and rehabilitating the muscles, the amount of blood going to the muscles increases as a result of the widening of their blood vessels and with the continuation of training, their size and functional strength increase and therefore resistance to fatigue increases, which confirms the increase in its endurance and the increase in its load, and the expansion of blood vessels in the trained muscles is not only during the performance of rehabilitation exercises only but remains for a certain period, because the amount of blood in the trained muscles is ten times the amount in the untrained muscles. Exercises in the water medium raise the strength and level of physical

fitness, which increases the level of nutrition for the muscles (Tarfa. 2004) <sup>[6]</sup>. In addition, the researcher used plyometric exercises of light, medium and high intensity based on what was mentioned by the American College of Sports Medicine (2012), "which divided plyometric exercises into three levels in terms of intensity, which are light intensity, medium intensity and high intensity" (Ratamess. 2012) <sup>[7]</sup>.

## 5. Conclusions and Recommendations

### 5.1. Conclusions

According to the objectives, hypotheses and results of the research, the researcher concluded the following:

- The Rehabilitation curriculum had a positive impact on the muscular strength of the anterior thigh muscle for football players
- Rehabilitation within the aqueous medium had a clear impact on the development of the variables investigated
- Rehabilitation within the aquatic environment had a clear effect on improving the psychological state of the injured.

### 5.2. Recommendations

According to the objectives, hypotheses and results of the research, the researcher recommends the following:

- The researcher recommends the necessity of using tests and exercises to rehabilitate the recurring anterior femoral muscle ruptures in football players.
- Necessity of using the water medium to rehabilitate the recurrence of the rupture of the anterior femoral muscle for football players.
- Conducting more research and scientific studies on how to set standards for returning to competition.

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