

## **The effect of special exercises with auxiliary means in the rehabilitation of partial rupture of the rectus femoris tendon in football players**

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### **Abstract**

The importance of studying this topic and finding the best rehabilitation methods for the injured and the fastest in returning them to the soccer fields, which constitutes an attempt to develop a rehabilitation curriculum using a set of physical exercises for auxiliary means, the aim of which is to heal the injury and try to avoid its occurrence in the future, as well as increase the awareness of the player and coach alike through understanding and knowledge of suspected injury and injuries to the rectus femoris muscle in particular and the mechanism of their occurrence and how to deal with them if they occur, as well as the correct diagnosis of the degree of injury and thus determining the physical exercises with appropriate aids for them to speed up the athlete's return to physical activity, and the problem of the research lies in that the specificity of the game of football and due to the nature of its requirements, which include different physical movements, as well as direct friction, and as a result, the possibility of different injuries increases. Through the researcher's direct observation of the game of football, he found that there is an obvious feebleness in the rectus femoris muscle of the players, as well as the recurrence of injuries to them. After tracing the basis of this problem, it was found that the bigger part of Injuries are mostly injuries in the early stages of a player's coaching life Football, which was not subject to a correct rehabilitation approach at the time, as statistics showed that "football is one of the activities that include many injuries related to the loco motor system, and that most of these injuries are to the lower extremity, specifically "injuries to the thigh, knee and ankle muscles" (U.S.A. Olympic committee, 2000) Therefore, the researchers decided to use special exercises with auxiliary means for the purpose of rehabilitating this injury, and the research itself aims to prepare special exercises with auxiliary means, and to recognize the effect of those exercises on the injury of the rectus femoris muscle on the research sample. Choosing the research sample in the intentional way who suffers from an injury in the rectus femoris joint and the researchers used the appropriate devices and tools for his research and conducting the exploratory experiment, pretests, applying special exercises and post-tests. In favor of the dimensional choices, this indicates

the effect of the special exercises, and the emergence of a positive effect in the tests used, which measure the level of rehabilitation for the affected muscle joint.

**Keywords:** Exercises, auxiliary, rehabilitation and rectus femoris.

## **Introduction**

Sport medicine occupies a great position among the various sports sciences as a result of the important role it plays in the rehabilitation and health aspect of athletes and non-athletes to return to the soccer fields as quickly as possible and live naturally away from the annoying pain resulting from those injuries that affect their working life, and there are many injuries that those players are exposed to, and injury is one of the main problems facing the process of progressing sports levels and moving it from one level to another.

The lack of knowledge of a group of players and coaches about the causes of injuries and how to avoid them often leads players to fall into mistakes that may be technical or tactical or poor organization in the training load or the lack of preparation of the internal and external organs of the body and the unwillingness of the skeletal system to accept the effort that falls on the athlete. It differs from many other sports activities in terms of the nature of the performance requirements in football, as it includes a complicated group of defense, attack, jump and jump movements. Scoring as well as “the competitive nature and what requires direct and repeated friction between the players during the match, which leads to an increase in the possibility of injury in different parts of the body, especially injuries to the lower extremity, and among these injuries to the rectus femoris muscle, the physical curricula currently used” depend on a set of exercises The unified physical for all cases without emphasizing the degree of injury and the correct diagnosis, and this naturally leads to a lack of complete recovery as well as the possibility of recurring injury, hence the importance of researching this topic and finding the best training methods by means of assistance for the injured and the fastest in returning them to the soccer fields, which constitutes an attempt to put these exercises.

The aim is to heal the injury and try to avoid its occurrence in the future, as well as to increase the awareness of the player and the coach alike through the understanding and knowledge of suspected injury and muscle injuries in particular, the mechanism of their occurrence and how to deal with them if they occur, as well as the correct diagnosis of the degree of injury and thus determining the suitable physical exercises for them to speed up the return of the injury and to practice physical activity, and the research problem lies in that sports injuries in the game of soccer It is one of the biggest main factors that cause players to stay away from the soccer fields and not engage in their sports activities and reach their real aim in achieving local, international and global achievements.

There was a correct and coordinated use of the muscles through the training units whenever the players moved away from the injury, and one of these injuries is the injury of the rectus femoris muscles and this injury occurs, which the researchers attribute to the players' lack of knowledge of the causes of the partial rupture of the thigh muscles, as well as the incorrect training curricula that generate high effort on The rectus femoris muscles and the lack of attention to treatment and rehabilitation after the injury occurred to return properly and achieve full recovery after the injury, so all of these reasons are a cause of injury to the players. Therefore, the researchers decided to organize physical exercises according to auxiliary means to rehabilitate the rectus femoris muscles affected by partial rupture and know the effect of these exercises on the muscle rectus femoris with simple partial tear for

soccer players As for the hypotheses of the research, there is the effect of exercises for auxiliary means in rehabilitating the rectus femoris muscle with partial rupture of football players. There are statistically significant differences in the effect of exercises for auxiliary means in rehabilitating the rectus femoris muscle with partial rupture of football players and in favor of the experimental group.

## **Research Methodology**

The nature of the problem determines the researcher to choose the appropriate program for this problem, so the researcher chose the experimental program by designing the experimental and control groups to outfit the nature and problem of the research (Laila El-Sayed Farhat; 78, 2005).

### ***Research community and its sample***

The community is the main focus in the researcher's work, and it is one of the main and important points in the field of scientific research. On this basis, the research community was identified with the players of the Baghdad governorate clubs for the first division football league for clubs (industry, civil defense, army, nationality (Al-Jinssia) , Al-Sleikh The number of their players registered with the Central Iraqi Football Association for the football season 2020/2021 is 125, and the field survey of players with partial rupture of the rectus femoris tendon was carried out by means of an information and detection form for the injury, which belongs to the players, which was prepared by researchers, As the research community was limited to the players with this injury from the players of those clubs during the period of the study, which amounted to (20) players with partial rupture of the rectus femoris tendon, (4) players were excluded for their lack of commitment in the rehabilitation program, so the number of the original sample in this study became (10) Players who were chosen in a deliberate way, and the opinions of the players were taken to volunteer to participate in this experiment, to form a percentage of (50%) of the original research community, divided into two groups, each group consisting of (5) players, an experimental group. Special exercises prepared by The researchers, and (5) players of a control group who applied the program prepared by the coach who had a recent injury were diagnosed with a simple partial tear of the rectus femoris muscle

### ***Research Tools***

For the purpose of collecting information and obtaining correct scientific facts, the researcher used many scientific tools, devices and means that enable him to obtain information and data.

#### ***First:*** Means of collecting information

- Arab and foreign sources and references.
- Note and the Information network

***Second:*** The equipment used in the research(A sensitive electronic device for measuring body length and Intensity, Casio stop watch (4) Chinese-made to measure the time for exercises and some tests, One (1) Japanese-made Samsung camera for photography and documentation, A bipolar (Myotrace 400) Bluetooth device (EMG) to measure the electrical signal of the muscle and send it to the American-made computer, A Chinese-made (HP) laptop device to record and store the electrical signal and conduct its necessary analyzes and A sensitive electronic device for measuring body length and Intensity.

**Third:** Tools used in the research (Shaving machines for hair removal located in the place of sticking the clips, plaster adhesive tape to install the pickups and wires on the player's body, Leather strap to install the EMG device, Fitness device.

### ***Tests used in the research***

**First:** The test of calcinations of legs

### ***Leg Lift Strength Test***

- Purpose of the test: To measure the strength of the muscles of the legs\*
- Device type: Life Fitness The total weight of the device is (111) kg\*
- Performance: The player raises the affected leg with the specified weight, one lift, and then we increase the weight and raise the leg again to see the muscle's ability to lift the largest possible weight.
- Recording: The maximum weight that a player can lift is recorded for one time
- Second: Electrical Measuring Gauge (EMG) used in the research

The researcher used a up to date device to record the electrical signal emanating from the muscles (Myotrace 400) that works with two channels, which consists of:

- A device for receiving and transmitting the signal through the Bluetooth signal, which weighs 370 g..
- An application program for the device (Noraxon Myotrace 400), as it is installed on the computer. Through this program, the (EMG) signal can be displayed and stored (the signal of each muscle separately). This program also contains the locations for placing the surface antennas for each muscle of the body, the front and surface. For each muscle of the body superficial, the (EMG) signal is random in nature, due to the nonstop change in the recruitment of the motor units and the signal enters a high-pass filter to remove noise from electric power lines and surrounding devices, as well as enters a low-pass filter to cut the signal to remove artificial movements emanating from the movement The wires of the device and the device itself, and that the (EMG) signal is a low signal, it needs to be augmented before it is stored, or it appears on the display, provided that it remains in the same shape when amplifying, there is no change in the shape or spectrum of the signal, and then the signal is treated properly. Here, the laptop can be used for this purpose. Note that there are several processors that are implemented on the raw signal before producing the final data. For example, the peak, average, and area under the curve indicators are extracted from the signal and these indicators are used in this research.

### ***Basic Experience***

Through the research procedures, the main experiment was represented by the pre-tests and the application of exercises for the assistance and the post-tests that were applied to the experimental and control groups.

### ***Field Research Procedures***

**Diagnosis of injury:** After reviewing, the researcher prepared an information and detection form for the injury, which pertains to players with partial rupture of the rectus femoris tendon, through the presence of the researcher in the players training places. Height and weight, after which the injury was diagnosed by a specialist doctor

### ***Pretests***

The pretests of the research sample were conducted on Tuesday 26/7/2022 in the presence of all members of the research sample, through which the tests under study were

conducted and the conditions accompanying the tests were established

### *The main experience*

After conducting the pretests, the researcher applied the exercises for the auxiliary means, taking in consideration the principle of gradual increase in intensity, as follows

1. The exercises were implemented for (6) weeks, with (3) units for each week.
2. Number of rehabilitating units (18) units
3. The program was implemented on Sunday 31/7/2022 and completed on Thursday 15/9/2022.

### *Post-tests*

After completing the main experiment, post-tests were conducted for the research sample on Tuesday 20/9/2022, and the researchers were eager to create the conditions and procedures used in the pretests.

### *Statistical processors*

The researcher used the spss statistical bag to extract the results of his research. (Ali Salloum Jawad; 2004, 22).

## **Results and discussions**

Presentation, analysis and discussion of the results of the test for the extension of the rectus femoris muscle for the pre and posttests of the experimental group

**Table 1.** Shows the results of the means, standard deviations, and the values of differences between the two tests, pre and post tests for the rectus femoris stretch test

Variables	Unit	Pretests		Post-tests		(t) value	Sig.
		Mean	STD.EV.	Mean	STD.EV.		
Front thigh muscle extension test KG	KG	45	3.2	60	2.25	4.76	0.001

The researchers attribute the result of the moral differences to the effect of special exercises laid down in a systematic and deliberate manner on the internal physiological variables of the muscles, which were obviously reflected in the apparent strength output from physical performance in the test of special physical abilities, which is an authentic indicator of the success of the training program and the studied period of its application (Muscle Strength Procedures Manual, 2011 ) The increase in the value of the number in the post-test represents the number of kilograms estimated to be lifted by projecting a force from the tested man. Here, the researcher attributes his results in a way that is appropriate and confirms what the previous results came from previous measurements in the amounts of the peaks of electrical activity in several places towards the height in the post test. (Ammar et al., 2018; Sandau & Granacher, 2020; Taresh, 2020).

Presentation, analysis and discussion of the results of the physical abilities of the pre and posttests of the control group

**Table 2.** Shows the results of the means, standard deviations, and the values of the differences between the pre and post tests for the rectus femoris stretch test.

Variables	Unit	Pretests		Post-tests		(t) value	Sig.
		Mean	STD.EV.	Mean	STD.EV.		
Front thigh muscle4 extension test KG	KG	41	2.12	43	2.11	1.021	0.211



Significant at error level less than or = 0.05

Here, the researcher attributes the result in a way that is appropriate and confirms what the previous results came with, as we find that the use of special exercises to rehabilitate the thigh muscles was more feasible than others because it was based on the method of diversification and modernity.

Presentation, analysis and discussion of the results of the electrical activity test for the right and left thigh muscles of the experimental group, with an intensity of 25% of the maximum contraction.

Presentation, analysis and discussion of the results of the statistical analysis of the pre and posttest of the experimental group of the right and left rectus femoris and of the electrical activity peak variable

**Table 3.** Shows the means, standard deviations, *t* value, and the level of significance in the peak electrical activity variable between the pre and posttests of the right and left rectus muscle.

Variables	Unit	Mean	STD.EV.	Mean diff.	STD. diff.	Standard Error	(t) value	df	Sig.
Pre top right straight	Microvolt	374.0000	14.7394						
post top right straight	Microvolt	386.6000	49.86281	32.600	7.602	3.400	9.588	4	0.001
Pre top left straight	Microvolt	388.2000	64.30163						
post top left straight	Microvolt	424.2000	45.20733	42.60	10.857	4.853	8.77	4	0.001

Significant at the level of significance less or = 0.05

The researcher attributes this to the effectiveness of special exercises, a clear indication of the improvement in the amounts of muscular strength for the research sample, as the process of developing muscular strength goes in the direction of mobilizing muscle fibers and more contractile units to reach high muscle strength (Ahmed, 2020) indicating that (continuous sports training works on The adaptation of the fibers to work within the work duty entrusted to the body), which at the same time is reflected in the electrical activity index with a clear and noticeable rise, as the cumulative increase for each systolic unit casts a shadow on the product of the total electrical activity, which is supported by (James et al., 2020) that the mechanism of muscular work It is subject to the principle of all or nothing, and here the nerve impulse plays a major role in the quantity and quality of muscle contraction, which can be trimmed through specific exercises.

Presentation, analysis and discussion of the results of the statistical analysis of the pre and posttest for the experimental group of the right and left rectus femoris and for the variable of average peaks

**Table 4.** Shows the means, standard deviations, *t* value and the level of significance in the variable mean of the peaks between the two tests, the right and left rectus muscle

Variables	Unit	Mean	STD.EV.	Mean diff.	STD. diff.	Standard Error	(t) value	df	Sig.
Pre medium right straight	Microvolt	281.8	53.807	25.80	6.72	3.00	9.588	4	0.001
Post medium right straight	Microvolt	256.0	52.971						
Pre medium left straight	Microvolt	246.2	24.692	11.60	1.51	.678	17.1	4	0.000
Post medium left straight	Microvolt	234.6	23.861						

Significant at the level of significance less or = 0.05

The researcher attributes this to the improvement of the functional status of the muscular system, which is represented by the performance of a motor duty characterized by balance (Gao et al., 2020), where he emphasized that (balance in muscular work falls under the influence of a number of internal and external factors, and among the internal factors is the harmony of muscular work) This is evident in the variable average peaks, which is an important indicator in determining the amounts of peaks produced at the level of work and motor duty entrusted to the target muscle group (Oakes, 1997) (all parts of the body and its tissues are included in the continuous and continuous work system of sequential motor duties) and it is worth noting here In spite of a clear increase in the electrical activity peak indicator in the previous table, the number of these peaks began to recede and decline, which gave a clear final indication that the test was in favor of the dimensional results and towards

Decreased values, and this could indicate an improvement in the level of the range of motion of the joint on which the target muscle of the research works, whereby (Payton, 2008) indicated that one of the most important determinants of the range of motion of the joint is the ligament tissues in addition to the strength of the surrounding muscles, and pain sensors should not be forgotten. present in the muscles.

Presentation, analysis and discussion of the results of the statistical analysis of the pre and posttest for the experimental group of the right and left rectus femoris and for the variable area under the curve

**Table 5.** Shows the means, standard deviations, *t* value, and the level of significance in the AUC variable between the pre and post tests for the right and left rectus muscle.

Significant at the level of significance less or = 0.05

Variables	Unit	Mean	STD.EV.	Mean diff.	STD. diff.	Standard Error	(t) value	df	Sig.
Pre region right straight	Microvolt	421.0	80.2	49.200	1.64	0.734	6.95	4	0.000
Post region right straight	Microvolt	470.2	80.8						
Pre region left straight	Microvolt	523.6	42.5	61.600	1.341	.600	10.6	4	0.000
Post region left straight	Microvolt	585.2	43.1						

Through the above results, the researcher himself finds that the results of the pre-test

for the experimental group were logical in line with what was applied in terms of special training and by innovative means. Positive (Exercise & Journal, 2021) (This indicator is an important determinant in judging the ability of the muscle to bear multiple burdens at changing times) and it can be said that this indicator is an integrative value for the continuation of electrical activity in its recorded values during the unit time, whose significance is the axis The sigmoid, which represents the duration of the activity intensity with its varying values during muscular performance, with different values of peak activity, but the continuation of muscular work under the weight of external burden represents a good response to the muscles under investigation in the field of muscular adaptation and work involved in the muscle group. It is worth mentioning that many previous studies (International Journal of Psychosocial, 2020) (Journal et al., 2020) (Ismaeel, n.d.) took to indicate that this indicator is a judgment on the ability of the muscle to resist fatigue or It bears heavy loads and therefore it goes in the direction of being considered as an indicator of your muscular endurance.

Presentation, analysis and discussion of the results of the electrical activity test of the right and left thigh muscles of the control group, with an intensity of 25% of the maximum contraction

**Table 6.** Shows the means, standard deviations, *t* value, and the level of significance in the peak electrical activity variable between the pre and posttests of the right and left rectus muscle.

Variables	Unit	Mean	STD.EV.	Mean diff.	STD. diff.	Standard Error	(t) value	df	Sig.
Pre top right straight	Microvolt	0.0000	714						
Post top right straight	Microvolt	0.600	9.86	22.600	5.302	3.400	1.088	4	0.461
Pre top left straight	Microvolt	367.2	34.303						
Post top left straight	Microvolt	354.200	25.203	32.60	3.057	4.85	0.177	4	0.781

Significant at the level of significance less or = 0.05

Presentation, analysis and discussion of the results of the statistical analysis of the pre and posttest for the control group of the right and left rectus femoris and for the average peaks variable

**Table 7.** Shows the means, standard deviations, *t* value and the level of significance in the variable mean of the peaks between the two tests, the right and left rectus muscle

Variables	Unit	Mean	STD.EV.	Mean diff.	STD. diff.	Standard Error	(t) value	df	Sig.
Pre medium right straight	Microvolt	261.8	23.807						
Post medium right straight	Microvolt	276.0	32.971	15.80	6.02	3.100	0.288	4	0.192
Pre medium left straight	Microvolt	286.2	14.692						
Post medium left straight	Microvolt	284.6	3.861	17.60	2.51	.6782	1.01	4	0.272

Significant at the level of significance less or = 0.05



Presentation, analysis and discussion of the results of the statistical analysis of the pre and posttest for the control group of the right and left rectus femoris and for the area under the curve variable

**Table 8.** Shows the means, standard deviations, *t* value, and the level of significance in the AUC variable between the pre and posttests of the right and left rectus muscle.

Variables	Unit	Mean	STD.EV.	Mean diff.	STD. diff.	Standard Error	(t) value	df	Sig.
Pre region right straight	Microvolt	523.0	90.2						
Post region right straight	Microvolt	535.2	90.8	29.200	1.24	0.7340	0.95	4	0.761
Pre region left straight	Microvolt	573.6	62.5						
Post region left straight	Microvolt	565.2	73.1	81.600	11.341	.6000	1.07	4	0.342

Significant at the level of significance less or = 0.05

The researcher attributes these moral differences between the pre and posttests to the effect of the quality of the exercises in developing the level of the players and returning them to their normal position after exposure to injury, especially since the quality of the injury often determines the quality and quality of the exercises. And the level of injury It was shown (Elliott, 1999) that injuries and their severity play a key role in two aspects, the first is determining the quality of the treatment method, and the second is the length of convalescence that the injury needs. The researcher finds that the development of muscle strength between the pre and posttests under the electrical activity peak indicator comes as a conclusive explanation for the players' return to their previous normal level. It is also necessary to discuss a number of research and studies that confirm that muscle strength is the result of an increase in the functional overlay between the Actin and the Myosin, forming bridge structures (Bartlett, 2014). The electrical activity increases and decreases according to the previous change (Schneck&Bronzino, 2002).

## Conclusion

In light of the objectives of the research and its hypotheses and within the limits of its samples , procedures and the results of the statistical treatment of the data collected in the tests (cardiac, dimensional and dimensional) for the variables under research, it was concluded that the special exercises have a positive effect in the rehabilitation of partial rupture of the rectus muscle among football players, and there are significant differences between the results of the tests The research (pre- and post-) in the results of partial rupture of the rectus muscle among football players, and the effect of the prepared program on the injury of the partial rupture in question was well in the two tests (pre and post), as it appears that there is a large variation in the results of improvement in the injuries under research in The above two tests, and based on the information and data provided in the context of the research and based on its conclusions, the researchers recommend to emphasize continuing to perform the exercises from time to time, ie, emphasizing the intermittent rest periods for the purpose of prevention and prevention of recurrence of injury.

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