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Rehabilitation exercises of different weights and their effect on increasing the range of motion and muscle strength of a joint after suffering a partial tear

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Abstract

Sports medicine is the centerand the basic field in monitoring the physical fitness of athletes and preventing them from injuries in addition to treating and rehabilitating, athletes who suffer from previous injuries. The sport medical concept provides suitable methods to estimate the athlete's health status after injury and the possibility of returning to play again. The importance of physical therapy has increased in the sports field because of its decisive effect in preserving the safety of the player and preventing recurrence of injury. In addition to accelerating the recovery from various injuries, as sports medicine works through therapeutic exercises to increase the player's functional abilities by using modern sports rehabilitation methods to rehabilitate The player to do the rated muscular effort that facilitates the neuromuscular communication, which leads to raising the efficiency of the nervous system's control in fine muscular work. Consequently, we find that the use of multiple applications of sports rehabilitation methods to increase the vitality of the affected tissues and urge them to use their potential energy to accelerate recovery from injury. In the research problem,the researcher considers that overload and insufficient warming up in training can be one of the main reasons for increasing the number of injuries in the joints and the orgasm of the athlete's body. Different types of rupture can act on physiological changes that may affect the work or function of the joint, which leads to the inability of the player to move properly and that, may affect the motor ranges of the joint.As well as,rupture affects muscle strength, and due to the lack of rehabilitation programs and treatment for the treatment of partial rupture of the knee joint, the researcher decided to prepare rehabilitative exercises in order to increase the flexibility and muscle strength of the affected joint.

Keywords: *rehabilitation, athletes, injuries*

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I. Introduction :

Research Importance:

1- Preparing rehabilitative exercises of different weights

2- Recognizing the effect of rehabilitating exercises with different weights on increasing the range of motion and muscle strength of the knee joint after suffering a partial tear

Research hypotheses:

There are no statistically significant differences between the results of the pre and post-tests in the range of motion and muscle strength of the knee joint in the research sample.

II. Research methodology and field procedures

2-1 Research methodology:

The researcher adopted the experimental method for its suitability in solving the problem.

The two researchers used the experimental method with one experimental group, using pre and post measurement.

2-2 Research sample:

The research sample was chosen by the deliberate method, where the researcher made an inventory of the 12 athletes with partial rupture of the knee joint who are in the treatment phase at Al-Kindi Teaching Hospital / Rusafa. The hospital administration obtained all the information related to the injured, and after contacting The player with the injured was excluded 2 due to their inability to adhere, then the researcher distributed a questionnaire to the injured in order to identify the type and severity of the tear in the knee joint. Through the answers, it was found that the injuries were of the type of partial tear, whose ages ranged from (18-21). Thus, such a number of the research sample.

2-3 Research tools

2-3-1 Qualifying exercises

After the researcher looked at the resources and research, the researcher prepared a set of rehabilitative exercises that suit the age of the injured as well as their physical ability, which presented to experts and specialists to express their opinion and observations. Fixed and moving as well as gradient in difficulty.

2-3-2 Research tests

After reviewing the sources and research, the researcher identified a number of tests that presented to those with experience and expertise, and the tests that obtained an agreement of 80% chosen. As explained below

First: the kinematics test

The mobility of the injured measured by a walking test on a device that responds to inclination for a continuous 6-minute period at the best level by the laboratory.With an emphasis on speed control and a zero degree incline. The distance travelledduring the time specified above recorded for all members of the sample, and the researcher conducted a procedure this test is done before and after rehabilitating exercises. (7:67)

Second: Visual symmetry test by bending and extending the affected joint

The researcher measured the degree of pain from the position of bending and extending the knee joint, by using a sheet that was divided into ten squares numbered from 1 to 10, starting from the left to the right side, and by performing the bending and stretching process, the laboratory was asked to determine the degree of pain by reference.The laboratory refers to the number, where the number 1 represents the lowest degree of pain and the number 10 the strongest degree of pain. The measurement was taken after the implementation of the rehabilitative exercises (8: 227)

Third: tests of the range of movement of the knee:

The researcher measured the extension and bending movement of the knee joint, which determined (180) degrees of extension, (140) degrees of bending before the start and end of the rehabilitative exercises. The researcher relied on the degree of normal and adult extension (180 degrees) as a standard score to determine the improvement of the flexibility of the knee joint, and the researcher used the gynometer to measure flexibility. (4: 418)

Third: Muscular strength tests using a dynamometer (3: 63)

The purpose of the test is to measure the quadriceps muscles

The front from the bending position:the test is performed from a sitting position on a 1 meter height bench. The injured leg is in a natural flexion position, then the ring connected to the device is installed on the affected leg from the ankle area with the device fixed tightly to the ground, after which the laboratory pulls the injured leg to the highest possible power and record the device reading. The background of the position lying on the ground with both legs stretched out, where the laboratory bends the injured leg towards the posterior muscle of the thigh. Three attempts are given and the best is calculated

2-4 The exploratory experience

The researcher conducted the exploratory study in the period (3/6/2019) on one of the players who have a partial tear on his knee. The player is one of the research community. The experiment targeted the following: Identify the obstacles that may appear and try to avoid them. Ensure the validity of the exercises and equipment used in the basic experiment, as well as make sure that the efficiency of the assisting work team and the identification of the time spent for the rehabilitative unit and the appropriateness of the rest period given between each exercise

2-5 The main experience:

After performing the pre-tests, in which all the conditions related to the tests were taken into account in terms of tools, devices and place. The rehabilitative exercises prepared by the researcher were applied, which included a set of exercises for the muscle groups and ligaments surrounding the knee joint and the number of units was 24 weeks, at a rate of three units per week at a time of 20 minutes. For each unit, the training unit included appropriate repetitions for the severity of the injury. The researcher also took into account the method of graduation from easy to difficult, as the exercises in the first rehabilitative units did not contain resistance. After the implementation of the rehabilitation program, the researcher conducted the post-tests on 5/12/2019 in the treatment room Natural and under the same conditions as the pre-tests.

2-6 Statistical treatments: The following statistical treatments were used:

The arithmetic mean, standard deviation. T-test and the percentage score

III. Presentation and discussion of the results.

After treating the results statistically and in order to find out the significance of the differences between the arithmetic meanings in the pre and post- tests of the variables under investigation. The researcher used the T-test. When comparing the calculated values with the tabular value under the degree of freedom (9), the level of significance (0.05) which amounted to (1.833). It turns out that the calculated value of (T) is greater than the tabular values, which confirms the presence of significant differences and in favour of the post-tests in all variables on the improvement of the level of the injured.

Table (1)

It shows the arithmetic mean, standard deviations, and the calculated and tabular T-test value in the kinematics and visual symmetry test.

Significatio n	Tabular T-Test	Calculate d T-Test	Std	A	Groups	Tests
Significant	1.833	4.65	14.54	250	Pre	Moving ability degree
			11.43	320	Post	

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Significant		**3.54**	**2.701**	**7.9**	**Pre**	**Bending the joint**	**Visual symmetry Degree) of pain**
			1.32	**6.01**	**Post**		
Significant		**2.87**	**3.68**	**7.45**	**Pre**	**Stretching the joint**	
			1.77	**5.66**	**Post**		

The researcher attributes the reason for the improvement in mobility in Table (1) to the improvement of the muscles of the knee joint. Where some specialists indicate that the reason for the improvement in the mobility may be due to the improvement of the efficiency of the muscles working on the knee joint in the leg and thigh. Improving the efficiency helps the ability to confronting mechanical stresses directed on the joint during movement, as muscle flexibility and ligament cohesion contribute to reducing motor limitation (6:56)

We also note from the same table the moral differences and in favor of the dimensional tests in visual symmetry, where the researcher attributes that development to the efficacy of guided rehabilitative exercises. (5:41)

Table (2)

Shows the arithmetic mean, standard deviations, and the calculated and tabular t value in the test of the range of motion of the knee joint

Significatio n	**Tabular T-Test**	**Calculated T-Test**	**Std**	**A**	**Groups**	**Tests**	
Significant	1.833	8.33	4.89	158	Pre	Stretching angle of the right knee	The motion range of the knee joint
			3.39	166	Post		
Significant		6.33	9.72	153	Pre	Right knee	

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			6.12	140	Post	bending angle	
Significant		5.44	3.20	172	Pre	Stretching angle of the left knee	
			1.14	178	Post		
Significant		4.89	5.72	155	Pre	Left knee bending angle	
			3.23	142	Post		

We also note from Table (2 and 3) that there are significant differences in favor of the lateral tests in the range of motion and muscle strength of the affected knee joint.

The researcher attributes results that the rehabilitative exercises that were used effectively affected the rehabilitation of the injured part, as the researcher took into account during its preparation the condition of the injured as well as the principle of difficulty gradient, which helped to calculate the efficiency of both flexibility and muscle strength.Mufti Ibrahim pointed out: ((Stretching exercises help prevent and reduce some pain, cramps, and muscle cramps). (4: 293). The Mufti also added that muscle pain can be eased or cured by practicing stretching exercises (4:294).

Table (3)

Shows the arithmetic mean, standard deviations, and the calculated and tabular t value in the muscle strength test.

Significatio n	**Tabula r T-Test**	**Calculat ed T-Test**	**Std**	**A**	**Groups**	**Muscle strength tests**
Significant	**1.833**	**5.87**	**3.65**	**12.22**	**Pre**	**Sitting Bending(kg)**
			1.99	**14.21**	**Post**	

Significant		**4.98**	**4.65**	**12.11**	**Pre**	**Sitting Stretching(Kg)**
			3.89	**13.98**	**Post**	
Significant		**2.67**	**5.26**	**11.32**	**Pre**	**Laying Bending(kg)**
			2.56	**14.77**	**Post**	

The researcher also believes that the rehabilitative exercises and the repetitions that were used on the members of the research sample led to the acquisition of the muscle groups that surround the injured joint by force.This is consistent with what Raad Jaber states that the variety of exercises used helps improve joint strength. (2:19). Also, Jamal Sabri asserts that in order to obtain positive gains in muscle strength, the training period or duration of training must be for 8 weeks (1:443). From the above, the researcher believes that the pain can be reduced or cured by practicing flexibility and muscle strength exercises.

IV. Conclusions and recommendations

4-1 Conclusions

1- The rehabilitative exercises with different resistances had a positive and effective role in increasing the mobility of the subjects of the research sample.

2- Rehabilitation exercises have had a positive and effective role in reducing pain in patients with partial tears in the case of joint extension and bending.

3- Rehabilitation exercises with different resistances help to increase the range of motion in the case of a muscle contraction of a partial tear.

4- Rehabilitation exercises with different resistance help to increase the muscle strength of the injured joint

5- The rehabilitative exercises that were prepared were appropriate and commensurate with the condition and level of the injured, and had an effective effect on all variables.

4-2 Recommendations

Approving the rehabilitative exercises prepared by the researcher in the physiotherapy centers

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