

The impact of a rehabilitation program on the partial tear of the internal knee joint's ligament for athletes

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Abstract

The researcher touched on the subject of sports injuries and the rapid development in training methods and training curricula that are commensurate with the digital achievements achieved, which negatively reflected on the health and safety of the athlete, who bears the responsibility of high-intensity physical effort and high training loads, as well as the development of the technical and tactical aspect in various sports activities, which requires the player to change rapidly in performance and then physical and motor abilities commensurate with this development.

Keywords: Rehabilitation program, partial tear and internal knee.

Introduction

Despite the scientific advancement in all fields of knowledge, this has been reflected in the sports field with more safety and security for players, as well as the development of multiple procedures as a goal to prevent players from suffering from sports injuries, the rates still show in many sports the seriousness of the injuries associated with sports activity, which necessitates additional research and studies in the field of sports injuries.¹

Due to the scientific progress in the field of rehabilitation and physical therapy, there is a deficiency in giving rehabilitation programs for sports injuries that accompany physical and physical therapy in the treatment of some sports injuries, as well as the lack of studies that dealt with the injury of the longitudinal partial disintegration of the inner layer of cartilage in the knee joint, since this injury leads to dysfunction in the performance of the knee joint and severe pain in the player and preventing him from standing and playing the game, especially football, which needs high physical qualities and physiological efficiency. And functional qualifies him to play the game.

Research Objectives:

1. Preparing a rehabilitation program in partial disintegration of the internal joint capsule of the knee for athletes.
2. Identify the effect of the rehabilitation program on the partial disintegration of the internal joint capsule of the knee for athletes.

Research Hypotheses:

- The rehabilitation program has a positive impact on the partial disintegration of the internal joint capsule of the knee for athletes.

Research Methodology

The researcher employed the experimental approach by first creating a group with multiple measurements that followed the nature of the issue.

Research sample

Deliberately selected from the research community by (10) only injured with partial destruction of the middle internal ligation of the right and left knee joint representing the clubs of Babylon and Kifl and students of the University of Babylon, as the researcher excluded (5) for several reasons (3) of them were infected with a compound injury including cruciate ligaments with rupture and (2) underwent surgical intervention.

Devices and tools used in research:

- Magnetic resonance.
- Dynamometer to measure muscle strength.
- To assess the degree to which a motion is limited, the junometer is used.
- Guardspace device.
- Tape measure, linen type.
- Medical Scale.
- Parallel keel.
- Stopwatch Type (Sony).
- Mobile Camera (iPhone 15 Pro)
- Observation.
- Testing and measurement.
- Questionnaire.

A detailed account of the measurements and experiments mentioned in the study:

First: - Measuring the level of pain when the joint moves:²

The level of pain is measured through a pre-prepared form, but the researcher added some modifications and has been presented to a group of sports medicine specialists and experts, rehabilitation, testing and measurement.

The researcher presented the pain measurement form to a group of specialized medical experts at Hilla Teaching Hospital and the Wounded Rehabilitation Center, and the experts determined the validity of the test for measurement.

The researcher applied the test to the research sample of (10) injured and the results were recorded in order to extract the test's impartiality covered by the research.

All experts agreed to the validity of the standardized pain measurement form and the percentage of stability and objectivity was as in the following table:

Table 1. Shows the scientific parameters of the test to measure the level of pain when the knee joint moves

t	Audition	Coefficient of stability	Objectivity coefficient
1	Measuring the level of pain when the knee joint moves	0.97	0.97

The level of pain is measured by the device Algonomiter, which records continuously degrees of changes that occur in the angles of the joint during the stage of different movement, and this device is designed within a circle consisting of 360 degrees when measuring the arm of the moving goniometer is placed on the leg and in the position of the right angle of the joint and the reading is taken according to the degree of pain in the maximum bend of the joint and the increase in the angle and

approaching 180 degrees indicates the difference between the readings in the range of movement of the joint.

Second: Measuring the ranges of motion of the knee joint:³

The knee joint is bent at each angle, ranging from zero degrees to 180 degrees, once the device is positioned on the exterior of the joint.

Devices and tools used in treatment and rehabilitation:

*** Goniometer :**

It is a measure that measures the flexibility of the knee using (360 degrees) of the goniometer and also measures the active positive movements of the knee as well as its negative movements and if the injured person is in a sitting position from a stretching position measures the expansion and flexibility of each leg The natural movements of the knee joint are approximately (5 to 135 degrees) of flexibility and Figure (16) shows the goniometer.

Exploratory Experience:

Exploratory experiments are crucial in scientific study because they yield accurate and trustworthy results—that is, "a miniature experiment similar to the basic real experiment."

As the researcher conducted the exploratory experiment on 19/6/2023, which falls on Wednesday and Thursday, 20/6/2023, regarding a group of five injured individuals at the Wounded Rehabilitation Center and Marjan Hospital in the center of Babylon Governorate, where the aim of this experiment was to identify the obstacles that may accompany the conduct of tests and work to avoid and overcome them, if any, as well as to know the sufficient number of members of the assistant work team and train them on tests.

Test Validity:

The researcher presented the tests proposed for the purpose of using them in his research to a group of experts doctors and specialists in rehabilitation, physical therapy and training and experts identified the most important tests that achieve the goal for which they were developed and their suitability for the subject of research and thus has proven the sincerity of the test.⁴

Test Stability:

The researcher applied the tests to the research sample, numbering (20) injured on 19/6/2023, and stability in the test means that the test achieves the same results or is close to them if it is reapplied to the same individuals under the same conditions more than once.

Then the researcher chose the research sample deliberately and their number reached (10) injured and conducted tests on them and then the results of the tests were recorded for the injured in order to extract the objectivity of the tests covered by the research and table (3) shows the coefficients of stability and objectivity of the intended tests.⁵

Objectivity of the test:

As for what distinguishes the test high objectivity, objectivity means "the lack of difference of estimators in judging something or a particular topic.

The tests used in the research must also be easy, clear, understandable and far from interpretation, which facilitates clarity in the instructions in terms of managing the test and giving the grade and then leads to making the test have high objectivity.

Table 2. Shows the coefficients of stability and objectivity of the tests that will be subjected to the sample members of the injured

t	auditions	Coefficient of stability	Objectivity coefficient
1	Measuring the level of pain when the joint moves	0.88	0.85
2	Joint circumference measurement	0.89	0.88
3	Calf muscle circumference measurement	0.88	0.86
4	Measurement of quadriceps circumference	0.87	0.85
5	Measuring range of motion of the joint	0.85	0.85

Initial test (pre-):

The research sample's pre-tests were held at the Wounded Rehabilitation Center in the Babylon Governorate's center on Monday, 24/6/2023 at ten a.m. The researcher made every effort to ensure that the necessary conditions were set up for the tests (location, equipment, supplies, implementation strategy, and support staff) so that the research sample could be used for the post-test.

Qualifying Program:

The researcher prepared a rehabilitation program for the injured (members of the research sample in one group) Appendix (8) Considering the tools, machinery, resources, and capacities available that help in continuing work in the implementation of the proposed rehabilitation program in order to achieve access to the stage of recovery or lessen the effects of the damage on the wounded.

As the period of implementation of the program was for the period from 26/6/2023 to 26/10/2023, equivalent to (16) weeks, and the number of rehabilitation units reached (48) units, equivalent to (3) units per week, and the duration of one unit (120 minutes) is carried out using therapeutic exercises and special devices for injury rehabilitation, and the total total was (96) hours.

The researcher conducted the pre-tests on Monday, 24/6/2023, and after a period of two months of pre-tests on 25/8/2023, the researcher conducted the intermediate tests for the research sample, which numbered (8) weeks, with a number of units (24) units and an average of (3) units per week, and the researcher divided the sample of the injured (10) on several rooms in the Wounded Rehabilitation Center, and each injured person performs treatment with a different device or exercises to another injured person within the sample at the same time with the help of the assistant work team and according to the program The prepared rehabilitation and the time of treatment with the device or rehabilitation exercises prepared in the rehabilitation program and according to the days of the week and the number of units.

The program included rehabilitation exercises using ladders and guards, as well as exercise rollers, a fixed bike, a treadmill, the use of weights with different resistances, and the use of the medical ball in rehabilitation. Marjan recovered, and the performance was a little severe at the beginning of the rehabilitation and then the gradation in the intensity of performance, where the Wardessps device was used without resistances at first, then the use of weights from half a kilogram to 20 kg, and the use of the stationary bike without resistance, i.e. unscrewing the operating roller and running the movement with continuity in each rehabilitation unit and the use of the moving treadmill at different times graded in intensity. As for the devices, the laser device has been used in (5 rehabilitation units), while the rest of the devices use electrical stimulation Faradak for many times in rehabilitation as it leads to

strengthening the quadriceps muscle and calf muscle, as well as ultrasound waves and heat.

Telemetry of the research group:

After the completion of the implementation of the program, the post-tests of the experimental research sample were conducted on (10/26/2023) at precisely ten in the morning, with the assistance of the work team, while considering the stability of the geographical and temporal settings, means, and instruments for the pre-test.

Results and discussions

- Analysis and presentation of the findings from the research variables' pre- and post-tests:

Table 3. Establishment of the mean and standard deviation of the test of measuring the circumference of the knee joint before and after the research sample with partial longitudinal rupture of the internal ligament of the knee joint and the calculated Wolcoxon value and its statistical significance

Variables surveyed	Pre-test		Post-Test		Z value	Significance level	Significance of differences
	mean	Standard deviation	mean	Standard deviation			
Knee joint circumference measurement	37.971 poison	1.181	35.351 poison	1.701	-2.828	0.005	Moral

The statistical indicators of the knee joint circumference measurements from the pre- and post-tests are displayed in table (3). By extracting the calculated Wolcoxon value of (-2.828), the results demonstrated that the post-test's mean was less than the pre-test's mean and standard deviation, while the pre-test's standard deviation was higher than the post-test's. This demonstrated the significance of the changes and in favor of the post-test when compared to the level of significance of (0.005), demonstrating the beneficial effects of the rehabilitation program in measuring the knee joint's circumference.

The researcher explains this discrepancy by pointing to the impact of the rehabilitation program in the treatment of fluids in the knee joint through diagnosis has been eliminated in the post-test, which led to the small size of the circumference of the knee joint compared to the pre-test, which indicated the moral effect and in favor of the post-test.⁶

This was confirmed by Jamal Sabri (2012) (when the muscles contract completely energy is released and the body will not be prepared to use that heat as part of this energy is released in the form of heat, which is directed towards the protection energy and some of it goes to heat the tissues and the rest of them waste through the skin, the more rubber muscle the less likely twisting or rupture).⁷

- **Analysis and presentation of the pre- and post-test results to measure the ranges of motion of the knee joint and discussed:**

Table 4. Establishment of the mean and standard deviation of the test to measure the knee joint ranges of motion prior to and following the study sample's partial longitudinal rupture of the knee joint's ligament, as well as the computed value of Wolcoxon and its statistical significance

Variables surveyed	Pre-test		Post-Test		Z value	Significance level	Significance of differences
	mean	Standard deviation	mean	Standard deviation			
Assessing the knee joint's range of motion	1.140	6.992	1.80	0.00	-2.859	0.004	Moral

The results of the test to measure the ranges of motion of the knee joint as in Table (4) showed that the value of the mean of the post-test amounted to (1.80), which is greater than the mean of the pre-test of (1.44) and the standard deviation of the pre-test of (6.992) appeared greater than the standard deviation of the post-test of (0.00). And by extracting the calculated Wolcoxon value of (-2.859) Compared with the significance level of (0.004), This demonstrates the effect's importance, indicating that the rehabilitation program improves the post-test results and measures the knee joint's range of motion. The researcher explains this by removing the gypsum, using static exercises, and using a shortwave therapy device, which reduces muscle contractions and spasms. It also confirms that the knee joint's range of motion is between 180 and 190 degrees, so the injured person can enjoy the joint's full range of motion after the test.⁸

- **Presentation and analysis of the results of pre- and post-tests to measure the degree of pain and discussed:**

Table 5. The mean and standard deviation of the test to measure the degree of pain before and after the research sample with partial longitudinal rupture of the medial meniscus of the knee joint and the calculated Wolcoxon value and its statistical significance

Variables surveyed	Pre-test		Post-Test		Z value	Significance level	Significance of differences
	mean	Standard deviation	mean	Standard deviation			
Measuring the degree of pain	4.550	1.117	0.000	0.000	-2.848	0.004	Moral

In the light of the extracted data and as shown in Table (5), it appeared that the value of the mean of the post-test of (0.000) is less than the value of the mean of the pre-test of (4.550) and the value of the standard deviation of the post-test of (0.000) is less than the value of the standard deviation of the pre-test of (1.117) and by extracting the calculated Wolcoxon value of (-2.848) And compared with the level of significance of (0.004) showed that there is a significant significance in the differences according to the indicators of statistical significance and in favor of the post-test because the lower the degree of pain indicates that the rehabilitation program has a positive impact in measuring the degree of pain.⁹

Pain occurs as a result of a simple rupture with very little damage to the continuity of the ligaments, and it is possible that the athlete will suffer from some

pain during the sports performance, but this type of injury does not hinder the movement of the athlete significantly and the ligaments are not weak, but they suffer from just a weak pain that the athlete feels during the performance and is treated by pulling on the site to protect the injury from multiplying.¹⁰

This is what the researcher has done through the use of splints in the first week of the rehabilitation program and the preservation of the joint from the aggravation of the injury in being a simple.¹¹

Conclusions:

1. The rehabilitation program has a positive impact on the rehabilitation of the partial medial rupture of the knee joint for football players among the injured research sample.
2. The rehabilitation program has a positive impact on the level of (the range of motion of the knee joint, the strength of the circumference of the quadriceps muscle, the strength of the muscles of the legs, the circumference of the knee joint, the degree of pain of the knee joint).
3. The rehabilitation program led to inflation and building a strong muscle for the thigh muscles as a result of rehabilitation and the use of resistors of different weights.

Recommendations:

1. Using the rehabilitation program on different samples of team games for the injured in hospitals and universities.
2. The use of physiotherapy and rehabilitation methods when diagnosing an injury that does not need surgical intervention before it becomes a chronic injury and the condition develops further.
3. The use of more modern therapeutic devices in physical therapy and rehabilitation commensurate with the type of injury over time

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