

The Effect of Rehabilitative Exercises on the Efficiency of the Knee Joint for Female Students with Simple Rupture of the Lateral Collateral Ligament

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Abstract

The research problem lies in the presence of large numbers of female students with knee joint, especially in the effectiveness of rhythmic gymnastics because this event requires a high level of skillful performance because most of the skills need to move quickly, jump and change direction, and that the lack of strength in the muscles surrounding the knee joint exposes students to a lateral collateral ligament injury, and because these muscles are among the most important muscles that participate in motor performance and which bear a high rate of effort performed and this may lead to the occurrence of injury, and that the use of treatment with chemical analgesic drugs over long periods of time usually causes many side effects, so the researchers decided to use rehabilitating exercises that are of great benefit to such an injury to him, so rehabilitative exercises were used in the rehabilitation of the lateral collateral ligament injury of the knee joint, the research objectives to prepare rehabilitative exercises in the efficiency of the knee joint for female students with a simple tear of the lateral ligament. The researchers used the experimental method in the method of (one group) with the two pre and post-tests due to its suitability to the nature of the problem. The sample was chosen by the intentional method of (7) students with partial tearing of the lateral ligament of the knee joint based on a medical report from the specialist doctor, and after a medical examination and an (MRI). In light of the results reached by the researchers, the following conclusions came out:- The rehabilitative exercises have a positive effect in rehabilitating the partial tear of the lateral ligament for students with rhythmic gymnastics.

Key Words: Rehabilitation exercises, knee joint efficiency, simple rupture of the lateral collateral ligament.

Introduction

Exercise was used for treatment and rehabilitation, thus becoming one of the most important treatment requirements, therefore, the adoption of rehabilitative and therapeutic exercises that help in healing or avoiding injury, and researchers used (rehabilitative exercise therapy), whose main goal is to provide appropriate treatment for sports injuries and to rehabilitate the lateral ligament of the knee joint and strengthen the muscles in order to maintain joint flexibility and not atrophy of those muscles. Most of the students are exposed to various kinds of injuries, and these injuries stand in the way of the development of their levels, so we find that sports injuries are constantly increasing and this may be the reason for the lack of interest in warm-up, excessive training (very high repetitions, high intensity,

poor planning of training programs) so that it is not commensurate with the ability of students, falls and fatigue during the performance, the performance of movement in excess of the ability of the student, all these factors directly affect the effectiveness of your rhythmic gymnastics, because this activity requires a high level of skillful performance because most of the skills need to move quickly, jump and change direction and may lead to a sports injury, here comes the role of sports medicine in treating the injury, but the return of the student to performance again after the injury, in order to undergo a sports medical rehabilitation, as her return without undergoing rehabilitative exercises exposes her to a greater injury, therefore, rehabilitation and therapeutic exercises are generally considered the most effective means of returning injured students to the normal state

they were in before the injury. As there are indications that these exercises affect the student's body with many effects, including (restoring muscles and joints to their functional capabilities, returning them to work well ... etc.) (1). The urgent need to use modern means and techniques in physical therapy, including (rehabilitative) exercises, emerged. These exercises, in turn, increase muscle capacity and flexibility much faster, as these exercises develop flexibility, strength, endurance and balance. The knee joint is one of the important joints in the body, and knee injury has become a phenomenon that attracts attention and causes concern, especially with regard to the effectiveness of rhythmic gymnastics, this sensitive part that is used in its tactical significance is very clear during the performance, which leads to the student being injured in the knee joint, and about 99% of the knee joint injuries are minor, it may become a physical injury if the appropriate treatment is used at the appropriate time. Hence the importance of research in the use of rehabilitative exercise exercises to rehabilitate the partial tear in the lateral ligament of the knee joint for students with rhythmic gymnastics.

Research problem:

The research problem lies in the presence of large numbers of female students with knee joint, especially in the effectiveness of rhythmic gymnastics because this event requires a high level of skillful performance because most of the skills need to move quickly, jump and change direction.

Research objective :

The research objective is prepare rehabilitative exercises in the efficiency of the knee joint for female students with a simple tear of the lateral ligament.

Research fields:

The human field: Third stage students of the College of Physical Education and Sports Sciences - University of Kufa.

Time field: from 6/12/2020 to 2/3/2021.

Spatial field: Gymnastics classroom at the College of Physical Education and Sports Sciences / University of Kufa.

Research methodology and field procedures:

Research Methodology

The researchers used the experimental approach in the (one group) method with two pre and post- tests, due to its suitability to the nature of the problem

Community and sample research:

The research community consisted of (7) female students with partial rupture of the lateral ligament in the College of Physical Education and Sports Sciences / University of Kufa, the sample was deliberately chosen, and their number was (5) students out of (7) and the reason for that was their lack of commitment to the rehabilitative units and they were excluded and their number was (2), so the sample percentage became 71% of the original for those with a partial tear of the lateral ligament of the knee joint based on a medical report from the specialist(*), and after a medical examination and taking an (MRI) scan. And those who did not pass from their injury (1-2 months). The researchers homogenized the sample with variables (height, weight, age and degree of injury) and table (1) shows that.

Table (1) shows the homogeneity of the sample.

Measurements	Mean	Std. Deviation	Median	Skew ness
Length (cm)	173	5,449	170,800	0,514
Weight (kg)	60	3,162	61	1,186
Age (years)	19	0,547	18,600	0,609

The value of the skew ness is confined to ± 3 , and this indicates the homogeneity of the research sample.

Tests used:

Pain scale test:

The purpose of the test: To measure the degree of pain.

Tools used: Digital scale.

Method used: The injured lies face down, the researchers ask her to bend the injured leg from the knee to the injured woman to point to the face that when she feels pain, the facial expressions become the same expressions that the patient referred to, and from here the degree of pain is determined by the degrees under each expression.

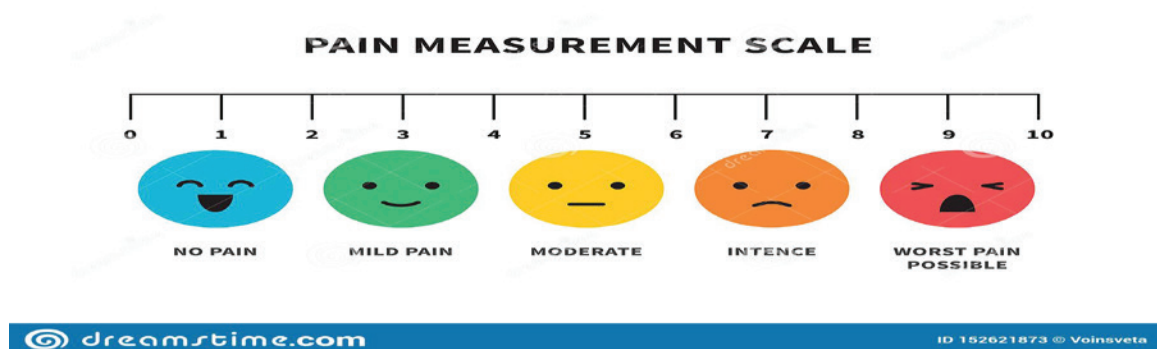


Figure (1) shows the digital pain scale.

Register: Researchers ask the patient to refer to each face using the words to describe the severity of the pain.

Notice: The pain score scale that the researchers used to measure the degree of pain is a digital ruler that contains five pictures of faces that express the intensity of pain, and each of these five expressions contains varying degrees of pain degrees, i.e. for each expression a specific degree of pain of these degrees is from (0-10), zero indicates no pain and ten indicates very severe pain.

Physical measurements: The researchers conducted pre-tests on the members of the research sample consisting of (5) students with partial tearing of the lateral ligament of the knee joint, on Sunday, 6-12-2020.

Measurement of muscle strength of the muscles operating on the knee joint ⁽²⁾:

Measuring the strength of the knee extensor muscles:

The purpose of the test: Measuring the strength of the muscles working on the knee joint from the front (quadriceps muscle).

Tools and devices used: Chair, dynamometer.

Test procedures: The student sits on the table in a comfortable position, and the dynamometer device is attached to the student's leg and is installed under the table behind the student, and she pulls the device with maximum force to the limits of pain.

Register: The student pulls out the device with maximum force, records the reading of the device, and the recording is done in kg. The student is given three attempts and the best attempt is recorded.

Measuring the strength of the knee flexors: ⁽³⁾

The purpose of the test: Measurement of muscle strength working on the knee joint from the back (posterior muscles).

Tools and devices used: Chair, dynamometer.

Test procedures: The student sits on the table in a comfortable position, and the dynamometer is attached to the student's leg and is fixed under the table in front of the student and she pulls the device with maximum force forward to the injured leg.

Register: The student pulls out the device with maximum force and records the reading of the device in kg. The student is given three attempts and the best attempt is recorded.

Motor range measurement: ⁽⁴⁾

Positive motor range measurement:

The purpose of the test: Measuring the range of motion of the affected knee joint without assistance.

Tools used: Goniometer device.

Test procedures: The injured stands in a normal position, so that the leg opening is according to shoulder width (resting on the healthy leg), the injured bends the affected knee to the maximum extent possible so that when the maximum degree of bending is reached, one of the researchers takes a goniometer to take the measurement by placing the fixed arm on the thigh and the center of the goniometer on the end of the knee joint and moving the other arm according to the bending of the leg.

Register: When applying the measurement, the researchers took a measurement of the maximum flexion angle (the range of motion) of the injured knee without assistance, and it was three attempts, the researchers took the best attempt, and there was a rest period between one attempt and another full minute.

Passive motor range measurement:

The purpose of the test: Measuring the range of motion of the affected knee joint with assistance.

Tools used: Goniometer device.

Test procedures: The injured woman lies and extends her legs on the surface of the ground, the injured bends the injured leg so that one of the researchers puts his hand on the injured leg to help her bend her knee to the maximum, provided that there is no pain.

Register: When applying the measurement, one of the researchers takes a measurement of the maximum flexion angle (the range of motion) of the affected knee with the help and it was three attempts and the researchers took the best attempt and there was a rest period between one attempt and another full minute.

The main experience:

After the sample was selected from the women with a partial tear of the lateral ligament of the knee joint from the College of Physical Education and Sports Sciences / University of Kufa and after the necessary medical examinations (clinical examination, magnetic resonance examination (MRI)), the main experiment was started on Tuesday, 8/12/2020, and the approach was applied curriculum rehabilitation.

Rehabilitation Unit: The researchers presented the exercises and qualification curriculum to the experts and specialists, and it was revised and modified to bring it out in its final form.

- The treatment was done using (rehabilitative exercises).
- Most of the rehabilitative exercises work to develop the muscles and tendons working on the knee joint to achieve the goal of the curriculum.
- The period of time for the rehabilitative unit is (12) weeks.
- The number of rehabilitation units is three units per week (Sunday, Tuesday and Thursday), so the total units are (36) rehabilitative units.
- The researchers took into account that the rehabilitative exercises were modern and of a different nature from the usual traditional exercises inside the treatment centers. The principle of gradual training was taken into account in giving exercises from easy to difficult and gradually increasing the stability time from (15 - 30 - 40 - 45) s for one situation, as well as increasing the repetitions.
- The time of the rehabilitative unit ranges from (20-30) minutes.
- The rehabilitation unit included a 10-minute warm-up for all parts of the body for the purpose of preparing the muscles.
- The intensity of the exercise depends on the patient that she does not feel pain during the performance.
- The researchers took into account that the exercises were modern, so he would explain the exercise

fully and pay attention to applying the exercise properly to ensure the safety of the injured person.

- Not continuing when performing exercises when the affected person feels pain or stress.
- The rehabilitation units ended on Monday 1/3/2021.

The post- tests were conducted on the research sample on Tuesday 2/3/2021 at 10 O'clock a.m. that is, after (12)weeks had passed since the start of the experiment, in the order of the same pre-tests, and in the same circumstances, and for each patient separately.

Presentation of results:

Table (2) Shows the mean and standard deviations of the pre and post- tests of the pain score variable.

Variables	Measuring unit	Pre -test		Post- test		Average ranks		Total ranks		Wilcoxon value	Sig level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation	Negative	Positive	Negative	Positive			
Flexing strength for the infected leg	Kg	14.600	3.113	25.800	4.449	0.00	3.00	0.00	15.00	2.022	0.041	Sig
Extensor strength of the infected leg	Kg	13.000	2.545	28.600	4.722	0.00	3.00	0.00	15.00	2.023	0.043	Sig
Positive motor range for the infected leg	degree	100.000	13.039	61.000	13.942	3.00	0.00	14.0	0.00	2.022	0.042	Sig
Passive motor range for the infected leg	degree	116.000	14.431	61.000	12.942	3.00	0.00	15.00	0.00	2.022	0.043	Sig
Pain degree	degree	8.700	1.095	2.400	1.673	3.00	0.00	15.00	0.00	2.042	0.041	Sig

Below the significance level (0.05) and the degree of freedom (4).

Table No. (2) shows the value of Wilcoxon (2,022) with a probability of error (0,041), which is less than the significance level of (0.05), and this means that there are statistically significant differences between the pre

and post-test for the variable of the strength of the thigh muscles flexion and in favor of the post test, as for the Wilcoxon value (2,023) with error probability (0,043), which is less than the significance level of (0.05), this means that there are statistically significant differences between the pre and post-test for the variable of extensor thigh muscle strength in favor of the post test. And the

Wilcoxon value is (2,022) with a probability of error (0,042), which is smaller than the level of significance of (05,0), and this means that there are statistically significant differences between the pre and post-test of the positive motor range variable in favor of the post test, as for the Wilcoxon value (2,022) with error probability (0,043), which is less than the significance level of (0.05), this means that there are statistically significant differences between the pre and post-test of the motor range variable in favor of the post test.

And table (2) shows us that the value of Wilcoxon is (2,042) with probability of error (041,0), which is less than the significance level of (0.05), and this means that there are statistically significant differences between the pre and post measurements of the variable degree of pain in favor of post-test.

Discuss the Results

Through the presentation and analysis of the results of the pre and post-tests of the variable (strength) of the research sample, it emerged that there are significant differences between the pre and post tests and in favor of the post-test, the researchers attribute the reason for these differences to the increase in strength for the tests through rehabilitative exercises that take place in the individual taking a certain position through slow movement in this position and gradually the ease and difficulty of the rehabilitative unit, it starts with seconds and reaches (60) seconds of steadiness and then returns to the initial position that has a great effect on resistance and with repeated (3-6) times, it will lead to the work of certain muscle groups and for a long period that leads to an increase in muscle strength in general, both (mcanada & lyndo huey) state that “rehabilitating exercises contribute to the rehabilitation of many sports injuries, the elimination of the outcome of the injury, and the return of the injured person to his health before the injury until the injured gradually regains his athletic level, thus achieving the goal of the rehabilitation program”⁽⁵⁾, through the presentation and analysis of the results of the pre and post tests for the variable (range of motion), it emerged that there are significant differences between the pre and post tests and in favor of the post-test, meaning that qualification gives an opportunity for good graduated work, it contributes to the growth of weak muscle groups, helps the patient to recover the

muscle tone lost due to injury, and helps to relax, and the patient is more receptive to performing rehabilitative exercises⁽⁶⁾.

Performing and adhering to rehabilitative exercises regularly and within certain repetitions and specific times makes the body more flexible and gives the muscles and joints a series of freedom of movement⁽⁷⁾. Also, “the best way to develop flexibility is to perform exercises with little force in order to sustain performance for an extended period of time to cause tissue adaptation events⁽⁸⁾.

By presenting and analyzing the results of the pre and post tests for the variable (pain scale) of the sample of the research, it emerged that there are significant differences between the pre and post tests and in favor of the post-test, “We can increase the benefits gained by doing rehabilitative exercises that try to correct the local imbalance when it is addressed by the movements that are implemented in many positions, the focus seeks to restore balance to the muscles concerned, as part of the process of softening all muscles of the body, and the thigh muscles should be strengthened, thus eliminating pain.

Conclusions

In light of the results reached by the researchers, they came out with the following conclusions: -

- Rehabilitation exercises have a positive effect on the rehabilitation of muscle strength and range of motion and the disappearance of the degree of pain for the partial rupture of the lateral ligament of the female students injured in rhythmic gymnastics.
- Significant differences appeared in the post-tests in the muscular strength of the muscles (extensor and contracting), the range of motion, and the degree of pain of the knee affected by a partial tear of the lateral collateral ligament of the research sample.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Faculty of Physical Education and Sports Sciences and all experiments were carried out

in accordance with approved guidelines.

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