GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 11, Issue 06, June (2023)

THE EFFECT OF EXERCISES ACCOMPANIED BY SOME PHYSIOTHERAPY METHODS (PROPOSED AND MANUFACTURED) IN IMPROVING THE RANGE OF MOTION OF THE KNEE JOINT AFFECTED BY THE COMPLETE CUTTING OF THE ANTERIOR CRUCIATE LIGAMENT

Ahmed Samir Dawood
Dr. Shymaa Ridha Ali Al -Araji
Al-Mustansiriya University / College of Basic Education/
Department of Physical Education and Sports Sciences
towboyt.edbs@uomustansiriyah.edu.iqnalraqy254@gmail.com

ABSTRACT

The research aims to prepare rehabilitative exercises using suggested exercises that are easy to implement and use some of the various means manufactured and proposed to improve the range of motion of the knee joint for players with complete severing of the anterior cruciate ligament after surgical intervention, as well as using easy therapeutic methods, which are ultrasound and electrotherapy (Gal-Faradic - Tens) and infrared radiation, which is one of the natural means, so the researcher decided to research all of the mentioned methods together to identify the extent of their impact on the rehabilitation of the anterior cruciate ligament and the return of the injured athlete to his activity in the shortest possible time. The researcher used the experimental method using the (one group) method with two pre and post tests due to its suitability to the nature of the problem. The sample was chosen by the intentional method, which consisted of (3) players with complete severing of the anterior cruciate ligament after surgical intervention, based on a medical report from the specialist doctor. The main experiment (qualifying curriculum) was conducted for (12) weeks and (3) days per week, and after obtaining the data as a result of the tests and measurements, it was processed according to the statistical bag (SPSS) to analyze the results and included statistical tables that were scientifically discussed based on the presentation and analysis and based on To Arab and foreign sources, as well as previous studies.

In the light of the findings, the researcher came out with the following conclusions: that the prepared approach has a positive effect in improving the range of motion of the knee joint after the surgical intervention of the anterior cruciate ligament, and that the use of exercises and the proposed and manufactured physiotherapy methods has a great effectiveness in improving the range of motion, also that the use of exercises and means The manufacturer did not leave any negative effects on the sample, but they obtained positive effects and rapid improvement.

Keywords: physiotherapy methods (proposed and manufactured), range of motion, knee joint

1-1 Introduction to the research and its importance:

Sports injury is one of the areas of sports medicine, which is one of the modern medical specialties and has a special role in the sports field because of its unique advantages in terms of the absence of side complications for any of its methods, whether water, electrical or kinetic. Departments of sports medicine in completing the treatment of athletes after injury or surgical intervention and developed rehabilitative exercises for the injured on sound scientific basis.

One of the most common sports injuries is the knee joint, as it is considered one of the most vulnerable parts of the body, and this may be due to the anatomical characteristics of this joint, despite the factors surrounding the fixation of ligaments and muscles, and that the injury of the anterior cruciate ligament is one of the very serious injuries that occurs frequently among athletes. Mechanism (mechanism of the occurrence of injury) is represented in the sudden roll (rotation) outside the tibia while moving it forward straight in the knee joint and describes the acute phase (immediately after the injury) with bloody bleeding, in the cavity of the knee joint and the tissues adjacent to the joint and pain along the inner and outer slit (hole) as well as In the area of fatty bodies (such as fat bodies and collateral ligaments), where movement in the joint is limited and painful, and it is also accompanied by instability of the affected knee joint. (1: 2006: 34) The knee joint is considered the most complex joint of the body, because its anatomical structure determines its function, as it is responsible for many different movements, which place a burden on this joint and continuously expose it to injury, so that the knee injury represents about 70% of the injuries that occur. Infecting athletes in stadiums.

The importance of the research lies in the preparation of proposed exercises that are easy to implement and the use of some of the various means manufactured and proposed such as (medicine balls, rubber bands, a special box and a factory with special measurements, gelatinous pieces, an inclined wooden platform manufactured with special measurements, portable weights, a balance field manufactured with special measurements) with the aim of Rehabilitation and improvement of the functional efficiency of the knee joint for players with complete severing of the anterior cruciate ligament after surgical intervention, as well as the use of easy therapeutic methods, which are ultrasound, electrotherapy (Gal-Faradic-Tens) and infrared rays, which are considered natural means. The aforementioned means together to identify the extent of their impact on the rehabilitation of the anterior cruciate ligament and the return of the injured athlete to his activity in the shortest possible time.

1-2 Research problem:

One of the problems that the athlete faces, which poses a threat to the athlete's future, is the injury to the anterior cruciate ligament, and the suffering of the injured person from pain and swelling of the affected area, movement limitation, inability to walk, and treachery of the knee during the performance of any movement, and the pain increases in cases of flexion and extension of the knee joint for any movement And after the researcher conducted a field and statistical study to prepare the injured in the Rehabilitation and Physiotherapy Center in the Department of Sports Medicine in the Ministry of Youth and Sports in Baghdad, and the researcher being an employee practicing the profession of physiotherapy in this center, as well as working as a physiotherapist in the International Medical Center and because of his long experience in rehabilitation Sports injuries, there is a high rate compared to the rest of the other injuries in the knee, which is considered one of the common injuries, and through the researcher's observation of the weakness of the therapeutic aspect of the therapeutic exercises accompanying the medical devices because they lack modernity, and the lack of spread of the culture of various and innovative methods of rehabilitation that include exercises and therapeutic means, which leads to The deterioration of the condition of the injured person and his failure to restore the full function of the affected part, and depriving him from practicing

his sporting activity temporarily or permanently, especially since the knee joint is the most complex joint of the body. Therefore, the researcher sought to solve this problem by developing exercises with a variety of methods proposed, manufactured, and accompanying the motivational devices chosen in a scientific way. Studied to rehabilitate the injury of the anterior cruciate ligament by completely cutting it after the surgical intervention and to improve the functional efficiency of the injured by strengthening the muscles surrounding the joints and the desire of the patient to use them because of their novelty. The researcher tried to conduct this research to prove that practicing exercises in a variety of ways, which are characterized by modernity, in addition to the stimulus devices chosen scientifically, have an effect on relieving knee pain and working to increase the range of motion of the knee joint in order to rehabilitate the anterior cruciate ligament, which the researcher decided to study this problem and find ways to return them. quickly as close as possible to their normal condition before the injury.

1-3 research objectives

1. Preparing rehabilitative exercises using some of the suggested and manufactured physiotherapy methods to improve the degree of pain and range of motion of the knee joint after surgical intervention for players with complete severing of the anterior cruciate ligament.
2. Knowing the effect of the proposed exercises using some of the suggested and manufactured physiotherapy methods and stimulatory devices in improving the range of motion of the knee joint and the degree of pain.

1-4 Imposing the search:

1- There are statistically significant differences between the pre and post tests in the degree of pain and the motor range of the research sample.

1-5 areas of research:

1-5-1 Human Domain: The human field included a group of athletes with complete severing of the anterior cruciate ligament of the knee after the operation, between the ages of (23-26) years, the number of which was (3) injured.

1-5-2 Temporal domain: The study procedures took place from 6/12/2022 AD until 29/9/2022

1-5-3 Spatial Domain: Department of Sports Medicine and Physiotherapy at the Ministry of Youth and Sports in Baghdad.

2 Research methodology and field procedures:

2-1 Research Methodology:

The researcher used the experimental method using the (one group) method with two pre and post tests due to its suitability to the nature of the problem.

2-2 The research community and its sample:

The research sample was chosen by the intentional method from the players with complete severing of the anterior cruciate ligament of the knee joint after the surgical intervention from males attending the physiotherapy department in the Department of Sports Medicine in the Ministry of Youth and Sports. Specializing in joints and bones) and using the latest diagnostic methods such as magnetic resonance imaging (MRI). Their number was (3) with one

experimental group subject to the rehabilitation curriculum proposed by the researcher, and their ages ranged between (23-26) years. The researcher conducted homogenization of the sample with variables (height, weight, age, rest before rehabilitation, degree of injury, duration of rehabilitation) and as Shown in Table. (1)

Table. (1) shows the homogeneity of the research sample

variants	measruing unit	Arithmetic mean	Standard deviation	Median	Torsion coefficient
height	meter and its parts	177	6.752	176	0.327
the weight	kg	73.333	7.607	70	0.834
the age	year	24.667	1.366	25	0.523
rest before rehabilitation	the days	8	4.979	7	0.845
degree of injury	All of the sample had undergone surgical intervention for the purpose of replacing the injured ligament				
Qualification period	12 weeks				

2-3 The means of collecting information, devices and tools used in the research:

In order to achieve the research objectives and obtain accurate and correct results, the researcher used the following means and devices:

- Arabic and foreign references and sources.
- Testing and measurement.
- Personal interviews.
- A form for recording the results of measurements and tests.
- Injured athlete's data registration form: It is a data registration form for each case and includes data (age - height - weight).
- Auxiliary work team.
- Computer type (LG) (Korean origin), number (1).
- Printer type (Canon) model (MF4410), number (1).
- (1) iPhone 11 Pro Max.
- (1) Goniometer to measure the range of motion.
- Visual symmetry scale (to measure the degree of pain).
- A digital electronic wrist watch for measuring the time of exercises, type (Casio) (Japanese industry), number (1).
- A medical scale for measuring weight.
- Measuring tape included in centimeters.
- Infrared device (I-R)
- Electrical stimulation device (Tens - Galvanic - Faradic).
- Ultrasound device.
- Cryotherapy device.

- Weights starting from half a kilo to 2 kilos, whether dumbbells or fixed on the leg, number (3) of each type.
- Medical roll number (3).
- Large medicine ball number (3).
- Small medicine ball (3).
- Medicine ball weighing (2 kg).
- A piece of gelatin.
- Compressed mat number (3).
- Medical dams number (3).
- Medical staircase.
- Rubber bands (Band Thera) (German industry), open and looped, number (6).
- Parallel device.
- A wooden box manufactured with special measurements.
- Slanted wooden plank manufactured with special measurements.
- A spring device with a certain resistance.

2-4 Field Research Procedures:

For the sake of accuracy in the work, by counting the number of patients with total severing of the anterior cruciate ligament after performing the surgical intervention, returning to rehabilitate the injury, and identifying the reality of the physical and human aspects, which represent the proposed and manufactured research tools. The researcher provided the equipment and tools necessary for the research sample from within the Department of Sports Medicine and Physiotherapy such as electrical stimulation devices, ultrasound devices, infrared devices, and cryotherapy devices, and some of them were equipped from outside the proposed center and manufactured to serve the research sample, in addition to the interviews that were conducted The researcher is with the injured and the extent of their acceptance of the idea of researching the rehabilitation of the injury and their desire to implement the rehabilitation program.

Then the following tests were chosen:

2-4-1 Tests of range of motion by using a goniometer:

Stretching and bending test: (2: 2004: 127)

Test name: range of motion tests (extension and flexion).

The purpose of the measurement: to measure the flexibility of the knee joint.

The tools used: a goniometer.

Performance description:

From the lying position on the medical bed with the legs outstretched, and at the signal, the patient extends the affected knee joint to the point of pain, after which the researcher places the goniometer on the joint to calculate the angle of extension.

Figure (1) shows the method of measuring the range of motion from the supine position of the injured knee joint in the case of extension

From the lying position on the medical bed with the legs outstretched, and at the signal, the patient performs the flexion process of the affected knee joint to the point of pain, after which the researcher calculates the flexion angle.

Figure (2) shows the method of measuring the range of motion from the supine position of the affected knee joint in the case of flexion

Recording: The degree of flexion and extension angle is calculated as a maximum for the joint.

2-4-2 Pain level test (visual analogy): (6: 1990: 22)

Test name: visual symmetry.

The purpose of the measurement: to measure the degree and intensity of pain after the surgical intervention of the complete cutting of the anterior cruciate ligament of the knee joint.

Tools used: (paper, pen).

Description of the measurement: A paper is presented to the injured person divided into ten squares numbered from (1) to (10) and starts from left to right, and that each square has a performance time of (5) seconds, meaning that after the end of (5) seconds he moves to the next square, And it is required to determine the degree of pain that is felt while performing the movement of the affected part in the position that is determined.

Recording: The degree of pain felt by the injured person when moving the injured part to the maximum possible range of motion is recorded, and the degree (10) is considered one of the maximum pain that the injured person cannot bear.

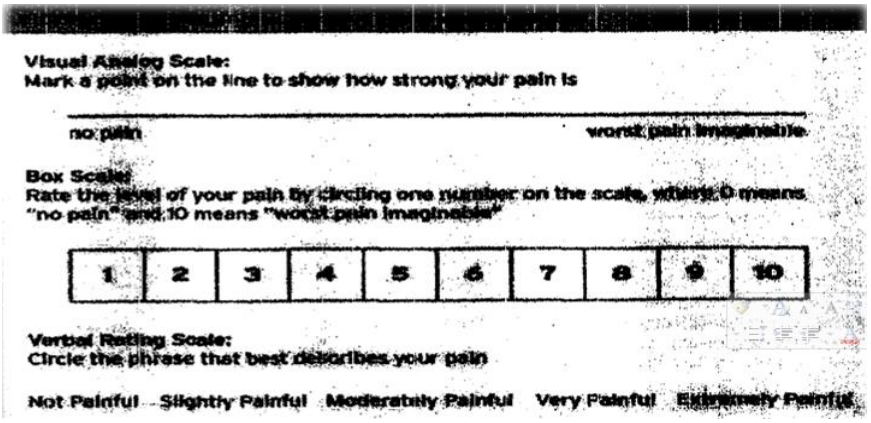

Figure (3)

The scale plate shows the degree of pain level

Where the degree of pain is tested with (3) conditions developed by the researcher after consulting the specialist doctor:

1. From lying down, raise the leg up.
2. Bend the affected knee joint from sitting.
3. Pulling the insteps of the feet inward with a rubber band.

2-5 Exploratory experience:

In order to reach accurate results, the researcher conducted the exploratory experiment on Sunday 12/6/2022 AD at exactly ten o'clock in the morning in the Department of Sports Medicine and Physiotherapy on the basic sample consisting of (3) players before conducting the main experiment.

Wajih Mahjoub stated that the exploratory experiment is a small experiment similar to the basic real experiment. (5: 2001: 82)

1. Identify the problems that the researcher may face in his main experiment.
2. Identifying the time required for the qualifying units and knowing the extent to which the curriculum is appropriate to the capabilities of the sample.
3. Knowledge of the assisting work team on the nature of the tests and recording the results.
4. The validity of the devices and tools used.
5. Knowing the suitability of the tests for the research sample.

2-6 Pre-Tests:

The researcher conducted Pre-tests on the members of the research sample consisting of (3) players with a complete rupture of the anterior cruciate ligament of the knee joint after they performed surgical intervention with the assistant work team (*) on one day on Thursday corresponding to16/6/2022 AD at ten o'clock. Morning in the Department of Sports Medicine in the Ministry of Youth and Sports / Baghdad. The researcher installed all the variables related to the tests, such as place, time, the method of implementing the test, and the devices

themselves used in order to control as much as possible the creation of similar conditions when conducting the post-tests.

2-7 The main experiment (applying the curriculum):

After the sample was selected from players with complete severing of the anterior cruciate ligament after surgical intervention from my workplace in the Department of Sports Medicine and Physiotherapy, and after conducting the necessary medical examinations (clinical examination and magnetic resonance examination (M.R.I), the main experiment began on Sunday 19 /6/ 2022 at exactly nine o'clock in the morning and the application of the rehabilitation curriculum, as the rehabilitation exercises took a period of (12) weeks, at the rate of (3) units per week, and became (36) rehabilitation units, and the duration of each rehabilitation unit ranged between (31-61 minutes), knowing The implementation of the rehabilitation curriculum for the injured person was carried out after a directive from the specialist doctor to conduct rehabilitation after the operation, whereby the patient was able to move his injured leg and complete the medical examinations to ensure the safety of the surgical operation, and then proceed with rehabilitation by giving the doctor permission to the injured person and instructing him to go towards his own rehabilitation procedure, which was completed At the researchers workplace in the Department of Sports Medicine and Physiotherapy in the Ministry of Youth and Sports.

2-8 The proposed rehabilitation units by various means and motivational devices:

The researcher prepared rehabilitative exercises and accompanying some of the proposed and manufactured physiotherapy methods to rehabilitate athletes with complete severing of the anterior cruciate ligament of the knee joint after surgical intervention and ligament replacement to improve the functional efficiency of the knee joint, relying on Arab and foreign sources, references, research and studies, as well as the opinions of experts and specialists as a result of interviews. The personality that the researcher conducted with them, and after dialogue with them about the nature of the content of the proposed rehabilitative exercises and the means manufactured and proposed by the researcher and how they are beneficial to the injured part. A rehabilitative unit, and the treatment sessions are three days per week, and the duration of each rehabilitative unit ranges from (31-61 minutes) with times. The researcher also took into account the stresses of the exercises used as well as the intensity of the entire rehabilitation unit. The researcher also used in his rehabilitation approach rubber bands, spring devices, a wooden box with special sizes, an inclined balance board made of wood, a balance field, an infrared (I.R) device, and an electrical stimulation device (Tens - Galvanic - Faradic) and an ultrasound device (Ultrasound) and a cryotherapy device, and weights starting from half a kilo to 2 kilos, whether dumbbells or fixed on the leg, a medical roller, a large medicine ball, a small medicine ball, a medicine ball weighing (2 kg) and a piece Gelatin, a compressed mat, a medical bed, and a medical staircase. The rehabilitative curriculum for (complete rupture of the anterior cruciate ligament of the knee joint) was started in the Department of Sports Medicine and Physiotherapy at the headquarters of the Ministry of Youth and Sports on Sunday, 19/6/2022 AD, at ten o'clock in the morning. Until Thursday, corresponding to 29/9/2022

2-9 Post-tests:

After the implementation of the qualifying units by the research sample, the researcher conducted the post-tests. The tests were carried out for the research sample on Tuesday, 4/10/2022 AD, at exactly nine o'clock in the morning in the Department of Sports Medicine. The researcher adopted the same sequence and procedures that he conducted in the pre-tests.

2-10 Statistical means:

The researcher adopted the statistical package (SPSS) to extract the statistical results.

3- Presentation, analysis and discussion of the results:

3-1 Presenting and analyzing the results of the pre and post tests of the research sample in tests range of motion:

Table (2) It shows the arithmetic mean, standard deviations, average and sum of ranks, and Wilcoxon value for the research sample for the pre and post tests for the motor range test.

variants	measruing unit	Pre-test		post-test		Rank average cation	Total ranks cation	Wilcoxon value	probability value	statistical significance
		M	S	M	S					
Knee extension	degree	165.00	4.472	178.33	2.582	3.50	21.00	2.271	0.023	Moral
Knee flexion	degree	72.67	2.251	15.00	4.472	3.50	21.00	2.220	0.026	Moral

Below the level of significance (0.05) and degrees of freedom (2).

Through Table (2), which shows the arithmetic mean, standard deviations, average and sum of ranks, and the Wilcoxon value of the pre and post tests of the research sample in the motor range tests, statistically significant differences appeared between the pre and post test of the knee extension and flexion test in favor of the post test as shown in.

3-2 Discussing the results of the pre and post tests of the research sample in tests range of motion:

Table (2) shows the statistical significance in measuring the angle of the motor range of knee extension and the motor range of knee flexion that they were all indicative, and the probability value (sig) was smaller than the level of significance (0.05), and when the probability value was smaller than the level of significance, this indicated the significance of the differences Between the pre and post measurements of the research sample in favor of the post tests.

The researcher attributes the emergence of these results in increasing the range of motion to the development of muscle strength, tendons and ligaments as a result of rehabilitative exercises accompanied by some of the proposed and manufactured physiotherapy methods. And the extroversion that surrounds the joint that increases the opening of the angles, which depends on the elastic property of the muscles, as the exercises work in conjunction with the various methods proposed and manufactured to increase the range of motion during movement

and increase the lengthening of the muscles working on the knee joint, which is reflected in the increase in the angles of the knee joint and the range of motion of the joint in a sample The research is the result of the exercises applied in the qualifying units prepared by the researcher. And Nahed pointed out, "The rehabilitative exercises achieve several purposes, including improving the range of motion in the articulation" (3: 2011: 157).

As Neriman and others point out, "flexibility improves through correct stretching exercises, and stretching in its simple sense means increasing the length of the muscle away from its center by an equal amount on both sides. (4: 1997: 19)

3-3 Presentation and analysis of the results of the pre and post tests of the research sample in the visual symmetry scale tests (to measure the degree of pain):

Table. (3) Shows the arithmetic means, standard deviations, mean, sum of ranks, and Wilcoxon value of the research sample for pre and post tests to measure the degree of pain

variants	measruing unit	Pre-test		post-test		Rank average cation	Total ranks cation	Wilcoxon value	probability value	statistical significance
		M	S	M	S					
First situation	degree	3.67	1.033	10.00	0.000	3.50	21.00	2.271	0.023	Moral
The second situation	degree	3.00	0.894	10.00	0.000	3.50	21.00	2.220	0.026	Moral
Third situation	degree	2.33	0.516	10.00	0.000	3.50	21.00	2.271	0.023	Moral

Below the level of significance (0.05) and degrees of freedom (2).

Through Table (3), which shows the arithmetic mean, standard deviations, mean, sum of ranks, and the Wilcoxon value of the pre and post tests of the research sample in measuring the degree of pain, statistically significant differences appeared between the pre and post test to measure the degree of pain in favor of the post test.

3-4 Discussing the results of the pre and post tests of the research sample in the visual symmetry scale tests (to measure the degree of pain):

It is noted from Table. (2) and Figure No. (1) of the visual symmetry scale (to measure the degree of pain) that there are significant differences between the results of the pre and post tests and in favor of the post test of the research sample. It is also noted that the degree of pain decreased significantly.

The researcher attributes the reason for this to the use of exercises accompanied by some means of physical therapy (proposed and manufactured) from electrical stimulation devices, which the researcher used with various wave frequencies and took three frequencies from them, which are divided into three types, which are (T.E.N.S - Gal-Faradic-Ultra sound) and their use is direct and It has a positive effect on the skin as well as reaching the deep tissues that help to recover from injury faster. These frequencies that the researcher used are very important in stimulating the muscles as well as the nerves. He also used heat therapy through the use of (I.R) that increases blood flow in the affected area and thus Nutrients reach it, which will help speed up recovery and reduce pain, and the researcher used cryotherapy, which reduces

swelling in the injury area in the early stages of applying the curriculum, which will be used after completing the rehabilitation unit.

As (Sami'a Khalil Muhammad) mentioned, that it is one of the ancient treatments, as it was used by the Chinese 3500 years ago and is widely used in the treatment of sports and non-sports injuries, by using ice (shaved or cubes) or cold liquids (bags or compresses) or direct cold water on Areas of the body with the aim of relieving pain (because it slows the delivery of sensory nerve impulses that cause pain, stops bleeding and swelling (because cold causes constriction of blood vessels at the site of injury, limits their expansion, and slows down localized dropsy. (6: 2007: 41)

Note that when the player suffers from a complete rupture of the anterior cruciate ligament, complications occur, including weakness in the nervous stimulation, and thus the muscles lose their function, which leads to a lack of movement in the joint. Therapeutic exercises of a gradual nature from easy to difficult with modern means manufactured by the researcher in a scientific manner and special measurements, which are (wooden box - inclined board - balance field) that accelerate and save effort and time in the process of rehabilitating the injured player, which has an interesting nature that makes the injured continues to rehabilitate and move away from boredom. These exercises had a positive effect in improving the range of motion and muscle strength of the muscles working on the knee joint, which in turn worked to reduce the degree of pain suffered by the injured after the surgical intervention and the repair of the anterior cruciate ligament and the return to the exercise of his activity like or nearly condition before the injury.

The researcher also attributes the decrease in the degree of pain to the use of the proposed exercises with a variety of means, which leads to improving the work of the muscles, and then reduces the degree of feeling pain during movement. The decrease in the degree of pain is an indicator of recovery, as with its decrease, the patient can perform movements with motor ranges close to normal, and its presence indicates There is a defect, as "pain is what prevents the muscles from performing effectively and in coordination, and it can be a sign of potential damage" (7: 2007: 20).

Any improvement in the muscle strength or range of motion of the knee joint leads to pain relief, and this is confirmed by (Macken Zie) by saying, "The exercises must be performed carefully to include the level that prevents the occurrence of pain, especially in the first stage of performance" (9: 1989: 339).

The researcher believes that the role of exercises, accompanied by some of the proposed and manufactured physiotherapy methods used according to a gradual image, has effectively affected the improvement of the functional efficiency of the knee joint for players with complete severing of the anterior cruciate ligament.

4- Conclusions and recommendations

4-1 Conclusions:

In light of the findings, the researcher came out with the following conclusions:

1. The prepared approach has a positive effect on the rehabilitation of the knee joint after the surgical intervention of the anterior cruciate ligament.

2. The use of exercises and the proposed and manufactured physiotherapy methods have great effectiveness in improving the degree of pain and the range of motion.
3. The use of exercises and manufactured means did not leave any negative effects on the sample, but they obtained positive effects and a rapid improvement.

4-2 Recommendations:

In light of the conclusions reached by the researcher, the following recommendations were made:

1. The need to use the proposed rehabilitative exercises related to the curriculum, as it showed improvement in the rehabilitation of the injury of the complete severing of the anterior cruciate ligament after the surgical intervention of the research sample members.
2. The necessity of diversifying the use of means of rehabilitation of sports injuries in physiotherapy centers.
3. Developing medical units or physical rehabilitation centers in all clubs in order to maintain the safety of athletes.
4. The need to use the manufactured means of the curriculum because of their great importance in rehabilitating the injury of the complete severing of the anterior cruciate ligament after the surgical intervention of the research sample members.
5. Emphasis on spreading health awareness among athletes to prevent them from various injuries that occur in stadiums.
6. The need to set up specialized courses in sports medicine and rehabilitation given by professors who specialize in this field.
7. Ensure that athletes undergo periodic medical examinations.
8. Emphasis on developing the strength of the muscles and ligaments working on the knee joint for all athletes before entering any match.
9. Emphasizing that the playgrounds are made of natural grass and it is forbidden to play on artificial turf to prevent injury.
10. Emphasis on strength exercises in the training curricula for coaches to keep players away from the risk of sports injury.
11. Conducting more research in the field of using physiotherapy devices and therapeutic exercises associated with various methods (proposed and manufactured) on other injuries to see their impact.

SOURCES

1. Iqbal Rasmi Muhammad and Muhammad Amjad Sweidan: Mathematical Anatomy, Cairo, Dar Al-Fajr for Publishing and Distribution, 2006 AD, p. 34.
2. Ali Salloum Jawad Al-Hakim: Tests, Measurement and Statistics in the Mathematical Field, Al-Qadisiyah University, College of Physical Education, 2004 AD, p. 127.
3. Nahid Ahmed Abdel-Rahim: Rehabilitation exercises for the cultivation of stature, 1st edition, (Amman, Dar Al-Fikr Al-Arabi Publishers and Distributors, 2011 AD), p. 157.
4. Nariman Mohamed Abdel-Khatib and others: muscular stretching, 1st edition, (Cairo, Al-Kitab Center for Publishing, 1997 AD), p. 19.
5. Wajih Mahjoub: Fundamentals of Scientific Research and Its Methods, 1st Edition, (Amman, Dar Al-Manhaj, 2001 AD), p.82.

6. Samia Khalil Muhammad: Techniques and means of physical therapy and rehabilitation of athletes, Baghdad, Dar Al-Hurriya for printing and publishing, 2007 AD, p. 41.
7. Ahmed Fawzi Al-Mulla: Treatment of pain and anesthesia in medical research, Alexandria University, Egypt, 2007 AD, p. 20.
8. Dr. Mary Ellen We Wers M.E and Lowe NK,Acritical review of visual analoge scales in measurement of clinical phenomena ,res nurs health , 1990 ,p22.
9. Macken Zie , R :Treat .yourown Back of the poetic physical therapy product ,1989 ,p339.

Accessory (1)

EXERCISES USED

1. From the supine position, we stretch the back muscles of the leg and thigh, and the knee is extended. We extend the left arm by holding the insteps of the foot and pulling it inward and holding for a while.
2. From the supine position, we place a medical roller under the affected knee joint, while tightening the front thigh muscles and stability.
3. From the supine position, we place a medical roller under the ankle joint with the leg extended and stability.
4. From the supine position, the injured person pulls the heel of his injured foot inward with both hands at an angle of 90 degrees and stretches with repetitions.
5. From the supine position, the injured person pulls the injured kneecap up by tightening the front thigh muscles, pressing the joint towards the bottom, combing the foot forward, and steadfastness.
6. From the supine position with the injured leg outstretched, the patient flexes and extends the foot joint with repetition.
7. From a sitting position on the medical bed with the injured leg outstretched, and with the help of the therapist, he moves the soap in different directions, right, left, up and down, with repetition.