EFFECT OF USING THE EXERCISES OF (ALTRA G ANTI-GRAVITY TREADMILL) IN THE REHABILITATION OF CRUCIATE LIGAMENT INJURY AND SOME PHYSICAL AND MOTOR VARIABLES FOR PLAYERS AGED (18-25) YEARS.

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The study aimed to:

1. Preparing exercises accompanied by (Altra G Anti-Gravity Treadmill) to rehabilitate cruciate ligament injury for players aged (18-25) years old.

2.Identify the effect of those exercises to rehabilitate the cruciate ligament injury for players aged (18-25) years.

3.The sample is from the injured who attend the (Rehabilitation and Physiotherapy Center of Al-Rafidain College) form different periods, due to the difficulty of finding the appropriate sample at the same time and working with each patient individually, from (11/25/2020) to (15/2/ 2021), During that period, the number of the postoperative acute anterior cruciate ligament injuries was 16 patient .

The researcher chose the sample by the intentional method, as it consisted of (12) postoperative patients with the severe anterior cruciate ligament, The researcher excluded a number of the sample members who had other, more severe injuries, and the choice fell on the sample consisting of (12) postoperative injured with severe anterior cruciate ligament, the age of the research sample ranged between (18-25) yearsold.

The researcher personally supervised the follow-up of the research sample and verify their application to the use of the device and the therapeutic and rehabilitative means and the rehabilitative exercises suggested by the researcher, And she collected the sample members who had the injury within a period of time not exceeding (3) months (from the date of the injury), and then she included the sample in the research experiment after diagnosing the injury from the specialized doctors and surgeons, and (4) other injured were excluded who were not Under the appropriate conditions for the search.

The conclusions were:

1.The exercises applied on the device had a positive effect on improving the patient's condition without negatively affecting the patient's health status.

2. The device was very suitable for the cases where the injury is in the lower part, and this gave greater support to the search topic.

3.The patients felt the comfort and safety of the exercises as a result of their application on the anti-gravity device.

4.Strength and flexibility exercises helped the patients to have confidence in themselves and the determination to perform the rehabilitation units.

The most important recommendations were:

1-The researcher recommends the necessity of taking care of the rehabilitation units supported by the appropriate equipment for the injury.
2-The necessity of introducing a variety of exercises to cover the benefit of the injury and to strengthen the capabilities necessary for its recovery.

Keywords: rehabilitation / device / antigravity / cruciate ligament.

I. INTRODUCTION TO RESEARCH:

1-1 Introduction and importance of research:
Athletes all over the world suffer types of injuries, and they vary in severity and the damage associated with that injury from the side complications that may affect the condition of the injured psychologically and physically and prevent him from performing exercises correctly and properly. Therefore, scientists and manufacturers have developed many devices that help solve the problem of inability to move and do with exercises.

Sports injuries are sports-related accidents, so almost no athlete’s body during his career is free of any injury, whether severe, moderate or weak. These injuries need different periods of time to treat them correctly, but there are some injuries that hinder the work of early treatment because they need a relative recovery and full ability of movement or pressure on the injured part and moving it, and this is sometimes dangerous for injury, as it may cause harm to the injury and the injured person, and therefore the injured may be unable to perform exercises faster, which causes a significant delay in the event of his recovery and this causes professional damage to the players and therefore modern science is directed For treatment and rehabilitation, it is necessary to rely on modern devices that will contribute to the rehabilitation of the injured faster and better than before, through the use of devices that raise the weight of the injured relatively, and thus it becomes possible to perform multiple exercises for the injured without affecting his injury or stopping of giving him exercises for fear of the weight imposed On the injured member, then here it is possible to prepare various exercises accompanied by the device and exercises suitable for the injury, and thus we get a set of appropriate exercises in general.

Among the foregoing, lies the importance of the research through the application of rehabilitation exercises accompanying the anti-gravity device and treatment of cruciate ligament injury for injured players from the age of (18-25) years.

1-2 Research Problem:
Sports in general contain many problems that await researchers and knowledgeable people to solve. Perhaps the biggest problems of sports are injuries that occur to athletes as a result of strong exercises or intense competition, but what concerns our problem specifically is the lack of using devices that help athletes to rehabilitate faster and better by reducing the burden of weight Imposed on the affected member, including severe cruciate ligament injury.

1-3 Research Goals:
1-Preparation of exercises accompanied by a device (Altra G Anti-Gravity Treadmill) to rehabilitate the cruciate ligament injury for players aged (18-25) years.
2-To identify the effect of those exercises on rehabilitating the cruciate ligament injury for players aged (18-25) years.

1-4 Research hypotheses:
1- The statistically significant differences between the pre and post test for the experimental and control groups.
2-The Statistically significant differences between the post tests of the experimental and control groups.
3-The statistically significant differences between the post-tests and between the experimental and control groups and in favor of the experimental group.

1-5 Research areas:
1-5-1 The human field: a sample of athletes with a severe cruciate ligament injury that is, after performing the surgery, at the age of (18-25) years.
II. RESEARCH METHODOLOGY AND FIELD PROCEDURES:

2-1 Research Methodology:
To reach scientific and objective facts, it is necessary to choose the appropriate approach to the research, so the researcher chose the experimental method, because it is the most appropriate method for solving the research problem, the experimental method is defined as “the method that is based on direct and realistic dealing with various phenomena, and is based on two main pillars, namely observation and experiment of all kinds.

2-2 Research community and sample:
The selection of the research community and its sample is one of the important matters in any scientific research, as the correct selection of the research sample is one of the important pillars and factors in the success of the researcher’s work as he applies the steps or vocabulary of his research in practice.

The researcher collected the sample members of the injured who attend the Rehabilitation and Physiotherapy Center of Al-Rafidain College for different periods, due to the difficulty of finding the appropriate sample at the same time and working with each injured individual, from the period (25/11/2020) until (25/1/2021), and the number of the post-operation severe anterior cruciate ligament injuries, during that period, reached 16.

The researcher chose the sample by the intentional method, as it consisted of (12) post-operative patients with severe anterior cruciate ligament.

The researcher excluded a number of the sample members who had other, more severe injuries, and the choice fell on the sample consisting of (12) post-operative injured with severe anterior cruciate ligament, the ages of the research sample ranged between (18-25) years.

And the researcher personally supervised to follow up the research sample and verify their application on the device and the therapeutic and rehabilitation methods and exercises suggested by the researcher, and collected the sample members who had the injury within a period of time not exceeding (3) months (from the date of their injury).

Then, she included the sample in the research experiment after diagnosing the injury from specialized doctors and surgeons, and excluded (4) other patients who were not within the appropriate conditions for research, and selected (4) of them for exploratory experiments who are from the main group, and thus the sample constitutes (62%) of the total of the injured in the period of time to collect them, and whose review is proven (Al-Rafidain College, Medical Rehabilitation Center and Physiotherapy).

2-2-1 Experimental Design:
Based on the characteristics of the research sample, the researcher used the experimental design with the equivalent groups method (2: p. 116), as the researcher divided the research sample into two equal experimental and control groups with (6) injured for each group and this was done by lottery, in addition to the researcher conducting experiments survey on (4) of the injured.

2-2-2 Analysis of the work of the research sample:
Experimental Group:
Subject to the practice of using device (Altra G Anti-Gravity Treadmill) with curative and rehabilitative means, as well as the proposed rehabilitation exercises.

Control Group:
Subject to practicing the Rehabilitation curriculum only for the health center.

For the purpose of verifying the homogeneity and equivalence of the sample members and the validity of the normal distribution among its members, the researcher used the arithmetic mean, standard deviation and skew coefficient of the results of the field survey in the measurements (age, mass, length and tests used), as shown in Tables No. (1) and (2).

| Table 1 |

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The Homogeneity of the Research Sample

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mediator</th>
<th>Standard Deviation</th>
<th>Arithmetic Mean</th>
<th>Measuring Unit</th>
<th>Torsion Modulus ±3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>22</td>
<td>2,733</td>
<td>22,531</td>
<td>Year</td>
<td>0.601</td>
</tr>
<tr>
<td>Mass</td>
<td>65</td>
<td>2,653</td>
<td>65,654</td>
<td>Kg</td>
<td>0.894</td>
</tr>
<tr>
<td>Length</td>
<td>173</td>
<td>4,231</td>
<td>173,643</td>
<td>CM</td>
<td>0.419</td>
</tr>
</tbody>
</table>

Injury Degree: Cruciate ligament severe after surgery

Table 2
Statistical parameters between the two groups in the research variables for the pre-test

<table>
<thead>
<tr>
<th>Indication</th>
<th>SIG</th>
<th>Calculate(T) value</th>
<th>Pre-test Control</th>
<th>pre-trial test</th>
<th>Measurement degree</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>±B ER Am</td>
<td>± I I AM</td>
<td></td>
<td>joint flexib</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AM</td>
<td>ility</td>
</tr>
<tr>
<td>random</td>
<td>0.388</td>
<td>0.904</td>
<td>0.837 7.2</td>
<td>0.83 7.8</td>
<td>Degree</td>
<td>knee flexio</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n</td>
</tr>
<tr>
<td>random</td>
<td>0.850</td>
<td>0.194</td>
<td>3.16 123</td>
<td>1.3 121.2</td>
<td>Degree</td>
<td>knee extension</td>
</tr>
<tr>
<td>random</td>
<td>0.496</td>
<td>0.707</td>
<td>1.14 162.6</td>
<td>1.34 163.6</td>
<td>Degree</td>
<td></td>
</tr>
</tbody>
</table>

2-3 Means of collecting information, devices and tools used in research:-

To achieve the field research procedures, the researcher used the means of collecting information through which he can collect data as follows:

2-3-1 Means of collecting information:-

- Arab and foreign sources and references.
- Survey forms for the opinions of experts and specialists.
- The internet.
- Personal interviews.

2-3-2 Equipment and tools used in research:-

The researcher used many devices and tools to help her carry out the research experiment, physical and motor examinations and tests and the rehabilitation and psychological exercises to reach a solution to the research problem, which are as follows:

- Altra G Anti-Gravity Treadmill device.

Device components:

The device consists of several parts fused together to perform the duty of lifting and movement on the device, namely:

1- an Italian-made runner MTC climb device. The device measures speed, distance, time and heart rate. The dimensions of the jogging place are (120) cm in length and (60) cm in width, with a speed of up to (19) kilometers per hour, and a capacity of (3) horsepower. It has a tilt angle of (15) degrees and contains a device to measure the heart rate while jogging.

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2- Elastic shorts to wear under the belt and have a zipper and are made of a material that prevents air permeability.

3- A closed, balloon-like air chamber that is inflated with air from the device's pneumatic actuator.

4- The systems associated with the device are multiple, namely:

A- The system of raising the percentage of the reduced weight and up to approximately (80%) of the body weight.

B- Running speed on the device.

C- The angle of inclination is up to (15) degrees.

- Roll.

- Rubber bands.

- Metal tape measures to measure length.

- The Italian-made medical weighing scale (person-peas).

- Japanese-made Casio electronic stopwatch (1).

- Medical bed.

- Towels (3)

2-4 Specifying Research variables:

To determine the physical variables, the researcher presented a questionnaire form for the physical variables that can be developed through the rehabilitative exercises set for the post-operative severe anterior cruciate ligament and the muscles surrounding it and the various devices and tools included in these exercises suitable for the study in question.

The researcher used the law of percentages to know the percentage of agreement, and he took the percentage (80%) or more.

2-4-1 Filtering the tests used in the research:

After reviewing the sources concerned with tests and measurement, the researcher chose a number of tests for the anterior cruciate ligament, and the physical variables that enjoy a high degree of honesty, stability and objectivity.

These tests were presented to the experts and specialists, to solicit their opinions about the nomination of what they deem appropriate from the special and valid tests for measuring the variables under study.

The researcher used the percentage law to know the percentage of agreement, and he took the percentage (80%) or more.

2-4-2 Measurements and tests used in the research:

2-4-2-1 Knee joint range of motion tests:

2-4-2-1-1 Test range of motion of the knee joint in the case of the starching:

The purpose of the test: To measure the range of motion of the affected knee joint in a state of stretching.

Tools used: genome meter device, bench for the patient to lie down.

Description of the test method:

The person taking the measurement stands next to the laboratory (the injured) while he is lying on the bench, and the genome meter is placed on one of the affected sides forward, and the moving arm of the device moves with the mediastinal axial line of the injured leg and the other remains fixed in its first position, and the angle.
between the arms of the device reads Geno meter, which represents the extension angle of the knee joint affected by meniscus injury.

**Record:** The genomic index refers to the laboratory measurement of the range of motion of the affected knee joint in degrees.

2-4-2-1-2 A test of the range of motion of the knee joint in case of flexion:

**Purpose of the test:** To measure the range of motion of the injured knee joint in case of flexion.

**Instruments used:** genome device, bench for the patient to lie down.

**Description of the test method:**
The measurer stands next to the injured while he is lying on the bench, then asks the patient to bend the leg (the injured joint) inward, and the moving arm moves with the movement of the joint inward and parallel to the longitudinal mediastinal line of the injured leg with the other arm remaining fixed on its first position, and the angle between The two arms of the device represent the flexion angle of the affected knee joint

**Record:** The genomic index refers to the laboratory measurement of the range of motion of the affected knee joint in degrees.

2-4-2-2 The speed-distinguishing strength test for the legs (half squat) (from a standing position) (15 seconds) (9: p. 79):-

**The purpose of the test:** To measure the speed characteristic of the muscles of the legs.

**Instruments used:** electronic stopwatch, whistle.

**Method of performance:** From a standing position, bend and extend the legs (half squats) and count the number in (15) seconds

The recording counts the number of times the legs are bent and extended (half squats) during (15 seconds).

2-4-3 The Exploratory Experiment: -

The exploratory experiment is a practical training for the researcher to find out for himself the negatives and positives that he encounters during the test in order to avoid them (11: p. 52).

From this point of view and to find the best way to complete the field research procedures and in order to identify the means and tests used and their validity, as well as the rehabilitation exercises and the stresses for each exercise, the number of repetitions, the number of sets, rest and duration between repetitions and totals and for their importance the exploratory experiments were conducted as follows:-

- **Exploratory experience of tests, tools and equipment:**-
The researcher conducted a first exploratory experiment on Tuesday, November 24, 2020 on (4) of those with severe anterior cruciate ligament after the operation, who are members of the sample, but not among the individuals who undergo rehabilitation, exercises and the mechanism of the experiment aimed at:

1- Validation of medical and laboratory equipment used under study.

2- Taking the tests.

3- Processing and errors that appear in the course of the work of the main experiment.

- **The exploratory experiment on the vocabulary of the proposed rehabilitation exercises:**-
The researcher conducted the exploratory experiment on the same sample on which the previous experiment was conducted on 25/11/2020 on Wednesday, and the purpose of that is the following:-

1- Knowing the time taken for the rehabilitation unit and the time of each exercise.

2- The obstacles encountered in conducting the rehabilitation unit.

3- Appropriateness of the exercises used in the unit.
4- The patient's ability to perform exercises and the appropriate intensity for him.

4-4-2 Pre-test trials:

After she identified the individuals of the research sample, the researcher conducted the pre-tests over several periods, due to the difficulty of finding the sample in a close period of time.

The first period of the experimental group was from Thursday, November 26, 2020 at ten in the morning, and the test was conducted on (4) patients with post-operative severe anterior cruciate ligament injury.

Moreover, the second pre-test on Sunday, on 29/11/2020 at ten in the morning, on (4) patients with post-operative severe anterior cruciate ligament injury, as well as the third pre-test on Thursday, on 12/12/2020 (4) Infected patients who share the same injury variants. Thus, the period during which the researcher conducted the pre-tests on the affected sample becomes from the period 26/11/2020 until 2/12/2020 at ten o’clock in the morning due to the lack of finding the required sample easily or what suits the research variables.

2-4-5 Rehabilitation exercises (The main experience):

The researcher prepared rehabilitation exercises using therapeutic means to rehabilitate the post-operative severe anterior cruciate ligament and some of the physical characteristics of the injured (flexibility, motor range, maximum strength) based on sources, references, research and previous Arab and foreign studies, as well as the opinions of experts and specialists in the interviews she conducted with them.

The researcher supervised the rehabilitation exercises using the device and the rehabilitation and therapeutic methods that she developed and applied to the experimental group of the injured in the Specialized Physiotherapy Center for Treatment with Modern Devices, the rehabilitation exercises took a period of (8) week.

The Rehabilitation exercises for the experimental group included (24) rehabilitation units of (3) units per week, and several exercises were applied using rehabilitation methods and without them, and the number of exercises was (22) exercises, the duration of each Rehabilitation unit as a whole ranges between (30-40 minutes). Knowing that the start of carrying out the exercises after conducting the medical examinations and instructing the competent doctor to conduct a special rehabilitation procedure for each injured and then start carrying out the rehabilitation exercises for the injured.

2-4-6 Post-tests trials:

After completing the application of the experiment on the experimental and control group, the tests were conducted over different periods, which are on Sunday, Tuesday and Thursday corresponding to 13-14-15/2/2021, the researcher adopted the same sequence and procedures that she performed in the pre-tests for her performance in the post-tests.

2-5 Statistical methods:

To process the data obtained by the researcher, a computer according to the statistical program (SPSS VER 20) processed the data.

III. VIEWING AND DISCUSSING SEARCH RESULTS:

3-1 Viewing the experimental group results:

Table (3)

The values of arithmetic means, standard deviations, and (T) value calculated for the experimental group between the pre and post tests in the research variables.
3-1-2 View the results of the control group:-

Table (4)
The values of the arithmetic means, standard deviations, and the calculated (T) value for the control group for the two tests, pre- and post-tests in the research variables.

<table>
<thead>
<tr>
<th>Research variables</th>
<th>Indication of differences</th>
<th>Indication level</th>
<th>Calculated (T) value</th>
<th>Standard deviation</th>
<th>Arithmetical mean</th>
<th>Measurement</th>
<th>Research variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant</td>
<td>0.000</td>
<td>13.8</td>
<td>1.09</td>
<td>6.8</td>
<td>0.83</td>
<td>7.8</td>
<td>Reps Pre</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Quick Strength Test (half squat)</td>
</tr>
<tr>
<td>Significant</td>
<td>0.000</td>
<td>14.15</td>
<td>1.51</td>
<td>9.6</td>
<td>1.14</td>
<td>163.6</td>
<td>Degree Pre</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

*Significant at error level>(0.05)
3-1-3 Presentation of the results of the experimental and control groups for the post-test.

Table (5)
The values of the arithmetic means, standard deviations, and the calculated (T) value between the experimental and control groups in the post-tests of the research variables.

<table>
<thead>
<tr>
<th>Research variables</th>
<th>Indication of difference</th>
<th>Indication level</th>
<th>Calculated (T) value</th>
<th>Standard deviation</th>
<th>Arithmetical mean</th>
<th>Degree</th>
<th>Experimental group</th>
<th>Reps</th>
<th>Control group</th>
<th>Reps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Strength Test (half squat)</td>
<td>Significant</td>
<td>0.000</td>
<td>5.97</td>
<td>0.54</td>
<td>17.4</td>
<td>Reps</td>
<td>Experimental group</td>
<td>0.89</td>
<td>Control group</td>
<td>14.6</td>
</tr>
<tr>
<td>Test range of motion of the joint</td>
<td>Significant</td>
<td>0.000</td>
<td>5.66</td>
<td>0.83</td>
<td>176.2</td>
<td>Degree</td>
<td>Experimental group</td>
<td>0.83</td>
<td>Control group</td>
<td>173.2</td>
</tr>
<tr>
<td>(extinction)</td>
<td>Significant</td>
<td>0.000</td>
<td>5.01</td>
<td>1.012</td>
<td>143</td>
<td>Degree</td>
<td>Experimental group</td>
<td>1.14</td>
<td>Control group</td>
<td>139.6</td>
</tr>
</tbody>
</table>

*Significant at error level>(0.05)

3-2 Research results Discussion:-

By looking at the tables (3-4-5), we notice the significant differences between the two experimental control groups and in favor of the experimental group, and the researcher attributes this development to exercises and the Altra G Anti-Gravity Treadmill device that was used to treat cruciate ligament injured. The researcher focused on the suggested exercises for the injured, as they were appropriate for their condition, and the difficulty ranged with the exercises given to them until the patient was returned to his normal stats before the injury. Among these exercises were flexibility and strength of all kinds, as studying the case of injury and knowing the appropriate exercises for it is one of the necessities of scientific research and physiotherapy that the exercises are appropriate to the severity and duration of the injury and the surrounding collateral damage.

Therefore, the strength exercises are the basis for treating injuries. Exercises that increase muscle strength help to move the joint, and thus the flexibility of the joint can be increased through the application of special flexibility exercises. Therefore, increasing muscle strength is an essential matter after injury, and this is consistent with what was indicated by (Brook & Fahey), when they affirmed that " The muscle increases in strength, and its size when it gives contractions near the maximum, and if the muscle load is not increased, its strength cannot develop and it cannot be enlarged" (12: p404).
Also, the exercises used by the researcher include increasing weights during the rehabilitation exercises, as (Mohammed Adel Rushdi) states that “the rehabilitative treatment program for (ACL & PCL) if it included weight bearing, joint stabilization and muscle training using isometric exercises, isokinetic, proved that the methods of such rehabilitation can yield positive increases in muscular strength” (8: p. 48).

Flexibility exercises are among the necessary exercises for the post-injury joint, as they will restore the stretching and flexion condition of the affected member to its normal position after treatment, as the calcifications that affect the knee joint after a cruciate ligament injury will impede the range of motion of the joint and therefore, it will be difficult for the joint to move normally and therefore it is needed to special exercises to move the joint and return it to its normal state before injury.

So, the process of introducing flexibility exercises in the first units of physical therapy leads to a significant improvement in the state of the flexibility of the joint and the muscles surrounding it. (Qassim Hassan Quoting Antonow) “Increasing the number of repetitions during the training unit requires focusing on the strength and speed of muscle recovery to its natural shape, which helps to increase its stretch” (6: p. 335).

This is in line with what (Matvev) stated that “the growth of flexibility is achieved in more than ten training units, i.e. its integration is sufficient to use (10-8) weeks in order to reach the important part of the possibility of growth of motor capacity related to improving muscle stretch” (7: 246).

Also, working to increase the range of motion makes working on physical therapy better than “increasing the range of motion means an improvement in the elasticity of the muscles and ligaments surrounding the joint, as well as an improvement in neuromuscular work in controlling the work of the sensors responsible for providing sensory information to the brain about this range” (14: p. 185).

Therefore, work on rehabilitating the injured must be thoughtful and with correct goals. The purpose of the rehabilitation exercises is to return the injured member to its normal position in terms of strength and flexibility. “Rehabilitation exercises achieve several purposes, including improving the articular range of motion” (10: p. 157).

As for the exercises that were applied to the device, these exercises varied to suit the beginning of the gradual difficulty in performing the exercises, by lifting a greater percentage of the weight in the first Rehabilitation units. The device raises in multiple proportions and reaches (80%) of the patient’s weight, that is, the device is very suitable for people with injuries who need to raise their weight in order to exercise more easily.

“The regulated exercises mediated by the devices, the resistance is equal in all stages of movement, and this exercises has a great role in the speed of recovery, raising the physical efficiency and restoring some muscular abilities. The resistance and speed can be controlled, which helps in raising the functional level of all muscle fibers” (: p. 212).

Since the raising the efficiency of muscle, work leads to an increase in muscle strength and an increase in the strength of the knee joint. “The ligaments and muscles and their tendons affect the stability of the joint through the cohesion of the end of the articular bones with each other. Strong ligaments and muscles increase the stability of the joint” (4: p. 205).

The exercises that are applied by specialized devices to reduce weight are safe exercises for the ligament at a stage in which the feeling of tensile strength is lost, and this stage needs special therapeutic methods that preserve the safety of the affected organ from complications during the exercises. This is confirmed by studies that reducing weight by means of assistive devices affects stress and pulse rate through “reducing stress when reducing gravity and affecting the reduction in pulse rate during exercise” (13: p. 284).

Therefore, maintaining and improving the positive injury situation is due to the exercises applied to the device, especially the walking exercises on the moving walk by reducing weight, as it helped to accustom the injured athlete to movement and walking normally. "These exercises are used after joint surgeries in the lower extremities, and it is considered one of the initial training in physical therapy" (3: p. 221).

IV. Conclusions and Recommendations:-

4-1 Conclusions:-

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1- The exercises applied to the device have a positive effect on improving the patient's condition without compromising the patient's health status negatively.

2- The device was very suitable for cases where the injury is in the lower part, and this gave greater support to the search position.

3- The patients felt comfortable and safe for the exercises as a result of applying them to the anti-gravity device.

4- Strength and flexibility exercises have helped the patients to have confidence in themselves and the determination to perform the rehabilitation units.

4-2 Recommendations:-

1- The researcher recommends the need to take care of the rehabilitation units supported by the appropriate equipment for the injury.

2- The need for the introduction of a variety of exercises to surround the benefit of injury and strengthen the necessary capacity to heal.

3- Conducting similar research on lower back injuries, fractures, and others.

Resources:-


3. Samia Khalil Muhammad; Physiotherapy methods and techniques, University of Baghdad, College of Education for Girls, 2010.


http://digitalcommons.usu.edu/gradreports/284.


Explanation of the exercises used in the Rehabilitation units:-

1.- From a lying position on the floor, bend the uninjured knee, and place a roll-shaped pillow below the knee.

-We contract the front thigh muscles and then push back towards the pillow towards the floor, holding for 5 seconds.
2. - From a lying position, place a rolled-up towel or a small pillow under the knee joint of the injured leg and the weight is tied over the foot joint, the height of the pillow is 15-20 cm.

- We lift the heel off the ground by tightening the knee joint.

- Stability while keeping the knee straight (5 sec).

- Slowly lower the heel to the initial position.

3.- From a lying position on the ground with the unaffected knee bent and the foot on the ground, the weight is fixed above the leg at the beginning of the thigh above the knee of the injured leg.

- Slowly we contract the thigh muscles and then raise the leg off the ground about 30-40 cm off the ground and then hold for 3 seconds.

- Relax the thigh muscles and then slowly lower the leg to the floor.

4.- From lying on the chest on the pillow, the feet are straight.

- Tighten the muscles of the thigh and seat of the (injured) leg, then raise it up to the back and then hold it (3 seconds) while maintaining the straightness of the leg.

- Land slowly, then rest.

5.- From a lying position on the side with the injured leg up, bend the other leg for balance.

- We raise the injured leg up from 30-45 cm, and then hold for 3 seconds.

- Land slowly, then rest.

6.- From a lying position on the side opposite the injured leg, bend the other knee and place the foot behind the injured leg on the floor.

- We raise the injured leg up while maintaining its straightness and then hold for 3 seconds.

- Then we return the leg to the ground quietly and take a rest.

7.- From lying position on the chest pad and the bottom of the pelvis and both legs are straighten.

- Slowly bend the injured knee at an angle of 45-60 degrees, and then hold for 3 seconds. Slowly return to the starting position and then rest.

8. Jogging on the device by raising certain proportions of the body for different durations according to the difficulty of the session.

(The first rehabilitation unit for the first week)
(Unit goal)
Rehabilitation of the working muscles surrounding the knee joint and the restoration of the range of motion of the joint

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<th>Total unit time (41, 20) minutes</th>
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Thursday, December 3, 2020