

The effect of a rehabilitation program using the Bose (BOSU) Ball on the functional efficiency level in those with a torn cruciate ligament. After surgical ligament repair And normal knee rehabilitation "

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Introduction and research problem:

The practice of sports activities is a science that has its origins, goals, rules, and philosophy. Since the human being is an integral unit, physically, mentally, and psychologically, it is necessary to understand the nature of extension and preserve its safety, so care in the health and safety of players in all respects has become a subject of scholarly concern.

Rehabilitation is the restoration of the function or the preservation of the affected part so that the individual can perform his daily needs easily. Rehabilitation also works to restore the full function of the injured part after the injury and therefore it is different from the athletic rehabilitation in the degree and specificity. The rehabilitation of the patient or the normal injured depends on the extent of his ability to do the functions and the necessary burdens without disturbance, while the athletic rehabilitation aims to develop the level of functions of the affected organ to meet the requirements of a sports activity (1:35) (15:41).

Among the positives of kinetic therapy is its use for all ages, various types of injuries, diseases, and deformities, all types of body tissues at various stages. The kinetic therapy maintains the health and fitness of the patient, restores the flexibility of the joints and elasticity of muscle fibers, develops functional abilities and skills,

strengthens the working muscles and achieves educational and psychological goals with the effective participation of the injured in the treatment and this enhances his recovery, in addition to its positive psychological impact. (21:69) (23:32)

Therapeutic Exercise is a type of exercise that is given to improve the overall muscular performance of the body and to strengthen the muscles, bones, joints, and ligaments, which are therapeutic movements based on a scientific and planned basis that are described according to the condition of the injured in order to stimulate or restore the normal functions of the affected part or maintain its current position or increase its efficiency. The body interacts with it to rehabilitate the injured part, and often the choice of the type of exercise and the way it is performed depends on the goal of the treatment in addition to diagnosing the condition and treatment requirements. (4:7) (6:51)

An anterior cruciate ligament injury is one of the most serious injuries to the athlete's future. This is due to the importance of the cruciate ligament in maintaining the anterior stability of the joint in the sense that it prevents slipping forward to the shin bone on the thigh bone and also prevents the expansion of the knee joint. (8:57) (10:10)

There are some factors that lead to or help the cruciate ligament injury and all knee injuries such as weak surrounding muscles which affect the movement of the knee and the inconsistency of its movements. This may be the result of poor rehabilitation after long injuries and constant stress. This leads the knee joint or the muscles working on it to make involuntary movements in different directions, which sometimes results in different knee injuries. (9:41) (19:16)

Due to the difference in the causes of injury among athletes, especially in team games, such as the opponent's obstruction, the lack of suitability of the field, the player's strong hit with ground or the player's lack of mastery to properly perform the basic skills of the activity in addition to injuries related to the goalkeeper's performance where his skill and thus his preparation programs differ from the rest team members. (16:79)

There are many tools and assistive devices that have recently spread that can be used to help in developing the fitness elements of skills. Each of these tools has its own nature and impact. The assistive tools and devices are important and effective in the positive impact on training and good output. They raise the activity and enthusiasm of practitioners as well as they are effective teasers. In this sense, the researcher used one of the modern aids that she expected to raise the level of special fitness, which is the Bose Ball (24).

It is a training device that was invented by Dived Weak in 1999. It's called Bose (Bose Sides Utilized),

which means to use both sides and the trade name is Dynamo and its number Aslo45 Art. No.

The Bose Ball is a training device for balance, strength, ability and improvement of the heart and blood vessels. It is a hemisphere on a flat base with a diameter of 55 cm. It is used on both sides, whether the hemispherical or the flat face and equipped with two Resistance Ropes on the two sides of its base, its length is 60 cm, and at its maximum tension, its length becomes 120 cm, the equivalent weight of 7 kg (25).

Through what the researcher saw from the previous studies (2), (7), (13), (14) and the researcher worked in the field of exercises and rehabilitation of sports injuries, it was found that the use of Bose Ball is one of the devices that helps to reach the body balance. This is due to the constituent nature of that performance. Just as the cruciate ligament injury had a negative effect on the balance of the injured, it was important to find the best methods for developing the kinetic balance and stability of the injured, because balance is the primary driver in which the athletic rehabilitation process is based on. So the idea of this research came up with a program using Bose Ball exercises and identifying its effect on the level of functional efficiency of the torn cruciate ligament injured players.

Research objective

The research aims to identify the effect of using Bose Ball exercises on the level of functional efficiency in people with a torn cruciate ligament.

Research hypotheses

- There are statistically significant differences between the averages of the pre and post measurements in the level of functional efficiency in those with a torn cruciate ligament in the experimental research group.
- There are statistically significant differences between the averages of the pre and post measurements in the level of functional efficiency in those with torn cruciate ligament control research group.
- There are statistically significant differences between the two averages post measurements of both the experimental and control research groups in the level of functional efficiency of those with torn cruciate ligament and in favor of the experimental research group.

Some terms in the research

Bose Ball

It is a training device for balance, strength, ability, and improvement of the heart and blood vessels. It is a hemisphere on a flat base with a diameter of 55 cm. It is used on both sides, whether the hemispherical hemisphere or the flat face and equipped with two Resistance Ropes on the two sides of its base, its length is 60 cm, and at its maximum tension, its length becomes 120 cm, the equivalent weight of 7 kg (Operative Definition).

Research plan and procedures

Research Methodology

The researcher used the experimental method for the two groups, one is experimental and the other is control and the post, in order to

suit the nature of the research and to achieve its goals and hypotheses.

Research Society and Sample:

The research sample was chosen intentionally, whereby the researcher chose those who suffered from total torn anterior cruciate ligament, which led to knee surgery, then laparoscopic surgery was performed, and the participants in various sports in the Kuwaiti Arabi, Qadisiyah, Al-Sahel and Salmiya Sports Clubs in the State of Kuwait. The sample included 20 Injured players their ages ranged from (18) to (23). Four injured players were withdrawn as a prospective group to become the research sample (8) injured players as an experimental group (8) injured players as a control group, ensuring moderation of data in both (age - height - weight)

Conditions for selecting a sample

- It has been 4 weeks since the surgery was performed.
- The injured person has undergone a rehabilitation program to develop the level of the knee range of motion, a step prior to the proposed program using the Bose Ball device to develop the equilibrium stage.
- The injured person has passed the first stage of physiotherapy (fixation and preparation)
- The wound has healed.
- Ensuring the safety of the health condition to start performing the proposed rehabilitation exercises.
- The approval of the injured to participate and attend regularly to conduct the program

Table (1)
Statistical characterization of the research sample homogeneity N=20

| Test type | Test Name | Measurement Unit | arithmetic average | standard deviation \pm | mean | coefficient of torsion |
|--------------------|-------------------|------------------|--------------------|--------------------------|-------|------------------------|
| Basic measurements | Chronological age | Year | 21.52 | 9.56 | 21.00 | 1.25 |
| | Length | Cm | 176.37 | 8.71 | 178.0 | -0.56 |
| | Weight | Kg | 78.07 | 3.5 | 78.00 | 0.06 |

It is clear from Table (1) that the values of the torsional coefficients in the variables related to the specifications of under-consideration sample have been limited between (± 3)

and this indicates that the distributions are close to the moderation in all the tests, which indicates the homogeneity of the research sample.

-Equivalent research sample:

Table (2)
"The significance of the statistical differences between the control and experimental groups, in both the growth rates and the functional variables under consideration (N1=N2=8)

| Variables | Measurement Unit | experimental group (N=8) | | Control group (N=8) | | The calculated value of (T) | Statistical significance |
|--------------------------------------|------------------|--------------------------|----------|---------------------|----------|-----------------------------|--------------------------|
| | | \bar{x} | σ | \bar{x} | σ | | |
| knee joint range of motion | Cm | 70.66 | 0.21 | 70.44 | 0.17 | 0.21 | Not significant |
| Anterior balance | Degree | 7.61 | 0.21 | 7.55 | 0.18 | 0.74 | Not significant |
| posterior balance | Degree | 7.33 | 0.36 | 7.30 | 0.16 | 0.32 | Not significant |
| Left balance | Degree | 6.14 | 0.24 | 6.10 | 0.02 | 0.58 | Not significant |
| Right balance | Degree | 6.51 | 0.11 | 6.45 | 0.05 | 0.32 | Not significant |
| Muscles surrounding of leg muscles | Cm | 31.52 | 0.87 | 31.98 | 0.77 | 0.17 | Not significant |
| Muscles surrounding of thigh muscles | Cm | 36.52 | 0.62 | 36.68 | 0.64 | 0.63 | Not significant |

The value of (T) tabular at the level of significance (0.05) = 1.895

It is clear from Table (2) that there are no statistically significant differences between the control and experimental research groups in the functional variables of people with total torn cruciate ligament under consideration, as all the calculated (T) values are greater than the value of the (T) tabular at the level of significance (0.05) Which indicates their equivalence in those variables.

Data collection tools

The researcher used the following tools and devices to make the measurements for the study:

Data collection tools

A: Body measurements

- 1 - Height to the nearest cm.
- 2- Weight in kg.
- 3- The surrounding of the muscle above and below the injured knee by a centimeter.

B: Physical measurements:

- 1- The fixed muscular strength of the front and back thigh muscles.
- 2- The strength of the posterior leg muscles in terms of the muscles surrounding.
- 3- The motion range of the knee joint.
- 4 - Stable knee balance.

Devices and tools used in the research:

A: The used devices:

- 1- A standard medical scale for measuring the weight to the nearest kilogram.
- 2- A restameter to measure the length to the nearest centimeter.
- 3- A geniometer for measuring the motion range of the knee joint.
- 4 - The device for measuring the stable balance.
- 5- An argometer.

6- Two Bose Ball devices.

7 - Balance measurement: using a special device to measure (lateral balance left, right, back, and forward)

B: The tools used:

- 1 - Stopwatch to measure time and record the tests.
- 2- A tape measure to measure the muscles surrounding.
- 3- Multiple weights.
- 4 - Crushed ice bags.
- 5- Expert survey form.
- 6- The proposed rehabilitation program.

Exploratory studies

The researcher relied on the methods of implementing the rehabilitation program by using the Bose Ball device to develop the functional efficiency of those with torn cruciate ligament after performing the surgery, the research sample is based on the findings of the exploratory study conducted by him in the time period from 1/3/2019 to 7/3/2019 on a sample consisting of (4) injured persons from outside the main research sample.

The aim of the exploratory study:

- To know the suitability and validity of the places chosen for conducting tests and carrying out research.
- To know the suitability of the proposed rehabilitation exercises by using the Bose Ball device that will be used in the proposed program.
- To know the response of the research sample to conduct the tests, measurements, and rehabilitation exercises.
- Accuracy of conducting and carrying out examinations, measurements, rehabilitation exercises under consideration, and recording data.

- To know the difficulties that arise during the implementation of the examinations, measurements, and rehabilitation exercises under consideration and trying to overcome them when applying the proposed rehabilitation program units.

- To know the time it will take for each person to take the test and the total time for the measurements and the used rehabilitation exercises.

Exploratory study findings:

- Create the appropriate conditions for applying the tests so that the best results can be obtained.

-Efficiency, experience, and accuracy of assistants in measuring and recording results.

-The validity of the tools and devices used in the rehabilitation program using the proposed Bose Ball.

-Stabilization of the established system and progress in the proposed rehabilitation program.

Program building basis:

The researcher built the proposed program using the proposed Bose Ball. To achieve this, he reviewed several references that indicated the need to develop the characteristic of balance, flexibility, and flexibility (5) (8) (18) (19). After getting the experts' opinion, attached (1) that agreed on the most important basis for building the proposed program is the flexibility of the program and its acceptance of practical application and amendment, and the content of the program is commensurate with its objectives. Taking into account the principle of progression from easy to difficult and ready availability of used tools, and

taking into account security and safety factors.

General conditions that must be observed when implementing the program

- Warming up in order to stimulate blood circulation through general exercises, taking into account the calm and gradual rhythm.

- Giving some exercises for the joints near the place of injury and warm the muscles that work on them.

- Doing some developing exercises and regulating the breathing process (inhale and exhale) and improving pulmonary ventilation.

- Taking into account the psychological state of the injured and the importance of dialogue with them.

- Giving the appropriate exercises in the event of other organic diseases) taking into account the health condition in the event of other diseases such as heart and pressure ...)

- Progression from carrying out exercises from easy to difficult, from simple to complex.

- Avoiding fatigue, stress, and stopping immediately after fatigue occurs.

- Taking into account the balance in work among all parts of the body and not focusing on the injured knee.

The objectives of the therapy program:

- Restoring the basic functions of the injured knee joint.

- Restoring the basic functions of the muscles operating on the knee joint

- Returning the main functions of the rest of the body through training it during the program

- Improving overall physical condition (muscle strength and joints range of motion)
- Improving the psychological state of the injured person through the Recreational side of the program and permanent dialogue
- Relaxing and having fun while doing therapeutic exercises
- Reducing the risk of injury during the program

Steps to carry out the basic study:

Pre-measurement:

The pre-measurement of the research sample was applied in the unit of measurements and physical medicine of Sheikhan Al-Farsi Hospital, Department of Physical Therapy in the State of Kuwait. Conducting an electrical activity test for muscles, where the researcher took carefully the measurements by himself in the same conditions for all members of the sample from 28/3/2019: 29/3/2019.

Program implementation:

The basic study was conducted during the period from 1/4/2019 to

22/6/2019, and the duration of the proposed program took three months at the rate of (12) weeks (3) units per week, each unit time is 60 minutes or more. The rehabilitation was carried out in the unit of kinetic therapy and sports medicine in Sheikhan Al-Farsi Hospital.

Post-measurement:

The researcher conducted the post measurement in the functional tests and the electrical activity under consideration, after finishing the proposed program implementation of for each individual injured, in the period from 23/6/2019 to 24/6/2019, as was done in the pre-measurement.

Under-consideration statistical treatment:

- Arithmetic average.
- Standard deviation.
- Coefficient of torsion
- Pearsons correlation coefficient.
- Difference significance test.
- Percentage of change

Findings presenting and discussion

First: Presenting findings

Table (3)

Differences significance between pre and post measurement in the level of some functional variables among the injured in the experimental research group (N1=N2=8)

| Variables | Measure-ment Unit | Pre measurement | | Post measurement | | Difference between 2 means | Rate of recovery | Calculated value of (T) | Significance level |
|----------------------------|-------------------|-----------------|--------------|------------------|--------------|----------------------------|------------------|-------------------------|--------------------|
| | | \bar{X} | $\pm \sigma$ | \bar{X} | $\pm \sigma$ | | | | |
| knee joint range of motion | Cm | 70.66 | 0.21 | 161.25 | 0.62 | 90.59 | 128.20 % | 4.98 | significant |
| Anterior balance | Degree | 7.61 | 0.21 | 9.98 | 0.25 | 2.37 | 31.14 % | 4.17 | significant |
| posterior balance | Degree | 7.33 | 0.36 | 10.9 | 0.41 | 3.57 | 48.70 % | 4.21 | significant |
| Left balance | Degree | 6.14 | 0.24 | 9.78 | 0.27 | 3.64 | 59.28 % | 3.91 | significant |
| Right balance | Degree | 6.51 | 0.11 | 9.60 | 0.41 | 3.09 | 47.46 % | 3.71 | significant |

Follow Table (3)
Differences significance between pre and post measurement in the level of some functional variables among the injured in the experimental research group (N1=N2=8)

| Variables | Measure-ment Unit | Pre measurement | | Post measurement | | Difference between 2 means | Rate of recovery | Calculated value of (T) | Significance level |
|--------------------------------------|-------------------|-----------------|--------------|------------------|--------------|----------------------------|------------------|-------------------------|--------------------|
| | | \bar{X} | $\pm \sigma$ | \bar{X} | $\pm \sigma$ | | | | |
| Muscles surrounding of leg muscles | Cm | 31.52 | 0.87 | 38.21 | 0.98 | 6.69 | 21.22 % | 4.17 | significant |
| Muscles surrounding of thigh muscles | Cm | 36.52 | 0.62 | 45.98 | 0.14 | 9.46 | 25.90 % | 4.22 | significant |

The value of (T) tabular at the level of significance (0.05) = 1.895

It is clear from Table (3) that there are statistically significant differences between the averages of the pre and post measurements in the level of functional efficiency among the injured the experimental research sample.

Table (4)
Differences significance between pre and post measurement in the level of some functional variables among the injured in the control research group (N1=N2=8)

| Variables | Measure-ment Unit | Pre measurement | | Post measurement | | Difference between 2 means | Rate of recovery | Calculated value of (T) | Significance level |
|--------------------------------------|-------------------|-----------------|--------------|------------------|--------------|----------------------------|------------------|-------------------------|--------------------|
| | | \bar{X} | $\pm \sigma$ | \bar{X} | $\pm \sigma$ | | | | |
| knee joint range of motion | Cm | 70.44 | 0.17 | 101.32 | 0.52 | 30.88 | 43.83 % | 3.21 | significant |
| Anterior balance | Degree | 7.55 | 0.18 | 8.20 | 0.24 | 0.65 | 8.60 % | 2.61 | significant |
| posterior balance | Degree | 7.30 | 0.16 | 8.44 | 0.36 | 1.14 | 15.61 % | 2.14 | significant |
| Left balance | Degree | 6.10 | 0.02 | 7.15 | 0.51 | 1.05 | 17.21 % | 2.62 | significant |
| Right balance | Degree | 6.45 | 0.05 | 7.24 | 0.34 | 0.79 | 12.24 % | 2.74 | significant |
| Muscles surrounding of leg muscles | Cm | 31.98 | 0.77 | 33.98 | 0.31 | 2.00 | 6.253 % | 3.28 | significant |
| Muscles surrounding of thigh muscles | Cm | 36.68 | 0.64 | 39.52 | 0.18 | 2.84 | 7.740 % | 3.11 | significant |

The value of (T) tabular at the level of significance (0.05) = 1.895

It is clear from Table (4) that there are statistically significant differences between the averages of the

pre and post measurements in the level of functional efficiency among the injured the control research sample.

Table (5)

The significance of the differences between the two post measurements in the level of some functional variables among the injured in the experimental and control groups (N1=16)

| Variables | Measurement Unit | experimental group | | Control group | | Calculated value of (T) | Significance level |
|--------------------------------------|------------------|--------------------|--------------|---------------|--------------|-------------------------|--------------------|
| | | \bar{x} | $\pm \sigma$ | \bar{x} | $\pm \sigma$ | | |
| knee joint range of motion | Cm | 161.25 | 0.62 | 101.32 | 0.52 | 4.85 | significant |
| Anterior balance | Degree | 9.98 | 0.25 | 8.20 | 0.24 | 3.25 | significant |
| posterior balance | Degree | 10.9 | 0.41 | 8.44 | 0.36 | 3.14 | significant |
| Left balance | Degree | 9.78 | 0.27 | 7.15 | 0.51 | 3.12 | significant |
| Right balance | Degree | 9.60 | 0.41 | 7.24 | 0.34 | 3.25 | significant |
| Muscles surrounding of leg muscles | Cm | 38.21 | 0.98 | 33.98 | 0.31 | 4.62 | significant |
| Muscles surrounding of thigh muscles | Cm | 45.98 | 0.14 | 39.52 | 0.18 | 4.98 | significant |

The value of (T) tabular at the level of significance(0.05)= 1.782

It is clear from Table (5) that there are statistically significant differences between the two post measurements averages of the experimental and control groups in the level of some functional variables among the injured in the experimental and control groups

Discussing the findings

It is clear from Table No. (3) that there are statistically significant differences between the averages of the

pre and post measurements in the level of some functional variables among people with torn anterior cruciate ligament after surgery. The researcher attributes this improvement to the proposed program using Bose Ball exercises, which led to the occurred change in the level of the range of motion of the injured, the research sample, as a result of their exposure to the application of the proposed program, through which the group of

isometric exercises that work to flex and extend the knee joint in the last third part of the current range of motion within the rehabilitation program that was performed in the same direction of movement and is consistent with the nature of the kinetic performance of knee joint.

Stephan (2001) states that the balance may be affected by the injury and that one of the most important factors that help to cause knee injuries is a decrease in balance, especially in the transitional movement of the feet as the injured organ is less balanced due to the presence of the swelling and the severity of the injury. The static and dynamic balance exercises are important in getting rid of the swelling and pain and regaining the movement and strength of the joint. Therefore the static and dynamic balance exercises of the knee joint must be initiated in all directions, but without feeling pain. (22:98)

And that the foot is exposed to many injuries because it absorbs many of the shocks resulting from the effort intensity on the foot caused by sports movements such as running and jumping because the foot is the one that receives and distributes body weight during the dynamic transmission.(17:98)

The findings of this study are consistent with the study of both **Nermeen Samih (2012) (13) and Mohamed Kamal (2011) (11)** in that interest in balance exercises for injured joints is directly proportional to the speed of return to the normal state of the injured joint.

The researcher attributes the change in the balance level of the research sample injured people as a result of their exposure to the proposed program by relying on a set of balance exercises using the Bose Ball device, from leaps on one foot and on two feet that work to increase the stability of the knee joint within the therapy program that is performed in front, back and lateral movements and is consistent with the nature of the kinetic performance of the knee joint.

Ayman Awad (2012) states that a player who suffers from frequent knee joint sprain, suffers also from the inability to maintain balance for a long time. Therefore, his static and dynamic balance is weak. There are important factors for the instability of the joint, including muscle weakness, as well as defects of self-receptors which are affected by the injury, whether this injury is in the ligaments, the joint, or the muscles surrounding the joint. (3:65)

Abd al-Azim Al-Awdali (2004) indicates that nerve signals will not be transmitted to the nervous system to produce a strong reaction against the occurrence of any twisting again, in addition to that balance and standing on one foot requires the presence of inputs and a system for self-receptors, so it is natural that low self-inputs lead to defects in persistence. (8:52)

Therefore, attention should be paid to developing a characteristic of balance, as the weakness of the muscles surrounding the knee (the front femoral muscle and the posterior femoral muscle) leads to an imbalance and that the person who has a weak

balance is faster to injure the knee joint and they are characterized by several characteristics, including lack of the ability to maintain balance and, therefore, is susceptible to repeated knee joint injury, due to no sense of a stabilized knee. (20:65)

The findings of this study are consistent with the “**Talal Salem**” (2010) (5) study, which emphasized the importance of developing balance as an important element in prevention in general and rehabilitation in particular in knee joint injury.

Thus, the first hypothesis of the research, which states that - there are statistically significant differences between the pre and post measurements averages in the level of functional efficiency of those with torn cruciate ligament experimental group, has been achieved.

It is clear from Table No. (4) that there are statistically significant differences between the averages of the pre and post measurements in the level of some functional variables among those with torn anterior cruciate ligament after performing a surgical procedure in favor of the control group. The researcher attributes this improvement to the proposed traditional program applied to the control group, which contained general functional exercises to improve the range and balance without tools.

Muhyiddin Mustafa (2007) states that the increase in muscle size means an increase in muscle mass and its cross section. In fact, the increase in muscle surrounding is due to the increase in muscle fibers width that makes up the muscle. Muscle growth

and the increase is caused by physical training, especially through the use of weight training, which makes the muscle response to this load by making positive anatomical and functional changes that make it later able to adapt to this new situation. Research findings conducted on athletes and compared to non-athletes indicate that the fast muscle fibers in the quadriceps muscles, that the weightlifters have, are larger than non-athletes or endurance athletes by 45% (12:65).

The findings of this study are consistent with what **Dr. Talal Salem’s study (2010) (5)** indicated, in that water-athletic rehabilitation leads to an improvement in the level of muscle strength working on the joints after an injury. Thus the first hypothesis of the research that states that there are statistically significant differences between the averages of the pre and post measurements in some functional variables in those with knee joint change, the experimental research group.

Thus, the second hypothesis has been fulfilled, which states that there are statistically significant differences between the averages of the pre and post measurements in the level of functional efficiency in those with torn cruciate ligament research control group.

It is clear from Table (5) that there are statistically significant differences between the two post measurements averages of the experimental and control groups in the level of some functional variables among the injured in the experimental and control groups. The researcher

returns these differences to the use of the proposed rehabilitation program using the Bose Ball device on those with a torn anterior cruciate ligament.

Rehabilitation training is divided into **Passive Training**, which is the first stage of rehabilitation for the purpose of activating the injured organ and accompanied by using the physical therapy methods, **Assistive Training** where the therapist assists the injured in moving the injured part, **Free Active Training** which is a free training that leads in the direction of ground gravity and **Resistive Training** which is exercises performed by the injured for the purpose of strength using all kinds of resistors. Rehabilitative exercises are generally performed outside or inside the water (18: 35).

The findings of this study agree with **Muhyiddin Muhammad (2007)**: "Sports rehabilitation is an aid to the injured to restore functional ability in the shortest possible time by using physical therapy methods that are appropriate to the type and severity of the injury. The importance of rehabilitation exercises is due to two main goals: prevention of various sports injuries and return the player to the competition field with the same functional and physical efficiency that he had before the injury occurred and as quickly as possible. (18:12)

In this regard, both "**Amira Al-Baroudi**" (2013) (2), and "**Aisha Al-Fateh**" (2015) (7) agree that good planning for training programs with tools – Bose Ball - and codifying training loads in a scientific manner appropriate to the age and training

stage of the research sample helps in developing functional and physical capabilities.

Thus, the third hypothesis of the research has been fulfilled, which states that -there are statistically significant differences between the two post measurements averages of the experimental and control groups in the level of functional efficiency among the torn cruciate ligament injured and for the benefit of the experimental research group.

Conclusions

- The proposed program by using the Bose Ball device has improved the level of the range of motion of those with a torn anterior cruciate ligament injury.
- The proposed program by using the Bose Ball device has improved the balance level of those with a torn anterior cruciate ligament injury.
- The proposed program by using the Bose Ball device has improved the level of muscle surrounding of those with a torn anterior cruciate ligament injury.

Recommendations

- Use the proposed program by using the Bose Ball device because it has a positive impact on the level of functional efficiency of people with a torn anterior cruciate ligament injury.
- Extend the use of modern rehabilitative means because of its role in the speedy recovery of the injured to the fields.
- Hold training sessions to introduce the importance of using assistive tools (Bose Ball) to improve the functional efficiency of the injured people.

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