EXCELLENCIA
INTERNATIONAL MULTI-DISCIPLINARY JOURNAL OF EDUCATION
Volume 02, Issue 12, 2024 ISSN (E): 2994-9521

Special Exercises (For the Final Stage) of Ankle Joint Rehabilitation and their Effect on Improving Muscle Strength and Dynamic Balance in Young Football Players

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Abstract:

Many scientific studies in the field of sports are concerned with the safety of players, whether in training or competition, and the search for accurate scientific methods and methods that reduce injury rates as much as possible. Football is the most widespread of injuries due to its specificity, as it involves repetitive performance such as jumping, running, and physical contact during fatigue. Which leads to obstructing players from reaching the highest levels, so all workers in this field must reduce and prevent sports injuries. The importance of the research lies in preparing special exercises that focus on the final stage of rehabilitation of the ankle joint, according to methods that improve the functional performance of injured football players. These exercises contribute to reducing the recurrence of the injury as much as possible, by studying some of the variables that are related to the injured player's return to the field. Again, such as the physical and motor variables, and the four jumps that are considered a criterion for the injured player's return to the field. The researcher took care that the exercises be special, that is, similar to what happens in a football match. The researcher believes that studying special exercises contributes to protecting the player from recurrence of the injury as much as possible. The problem with the research is that rehabilitating an injured ankle joint by returning to competition requires special directions and instructions, and that attention is usually in the early stages of rehabilitation, and often decreases when the player returns to the field, and this stage (the final stage) is often left to follow the advice of the team coach. Which cares more about healthy players than those recovering from injury. The objectives of the research are to prepare special exercises (for the final stage) and their impact on improving the functional performance of young football players, and to know the effect of special exercises on the physical and motor abilities in improving the functional performance of the ankle joint for young

football players. The researcher used the experimental method by designing one group with tests (pre-tests). (and dimensionality) to suit the problem to be solved. The researcher chose the research sample intentionally from players with ankle sprains who had completed the early stages of rehabilitation. Some injured players who violated the conditions of the research sample were excluded, as the research sample consisted of (6) injured players from youth clubs in the division (The first and second) in Dhi Qar Governorate, Among the most important conclusions reached by the Researcher are: The results of the pre- and post-tests for the experimental research sample showed a clear improvement in all the research variables (physical abilities, motor abilities, and the four jumps for the injured person to return to the field again and for the benefit of the post-tests For the recommendations, the most important of them was that the researcher emphasizes using special exercises prepared by the researcher to rehabilitate the ankle joint due to the positive effect shown by the research sample on the development of results.

Keywords: Special exercises, ankle joint injury, muscle strength and dynamic balance, football players.

Chapter One

1- Research definition

1-1 Introduction to the research and its importance

The injury rate varies from one sport to another, as it depends on the specificity of each game and the extent to which rehabilitation and prevention factors are provided in training and competition. One of the most common injuries to the lower extremities of players is ankle sprain, which is common in football and may reach 80% of ankle injuries, because the ankle is one of the most complex joints in the body, as the sprain affects the lateral ligaments. The recommendations for managing acute ankle sprains include rest, ice, elevation, immobilization, and some anti-inflammatory medications, in addition to physical therapy and exercise therapy. In addition, the rehabilitation of the injured person must be comprehensive, and not limited to stability and returning to the normal position, but rather extends to the range of motion, stretching and strengthening, as well as deep sense exercises and other variables related to the injured person's return to competition again. The exercises used by the researcher in the research topic focus on the final stage of the stages of rehabilitation and prevention of the ankle joint, which is one of the stages that gradually return the injured person to specialized sports activity, as the researcher converts the injured person from exercises that are performed by fixed devices to exercises, to exercises that require performance Motor tools and means, then after that developing the skill during complete recovery, “Exposing any part of the body to injury naturally leads to not moving that part for a period of time, and this leads to weakening the general functional efficiency of the injured part, and the best way to restore the functional efficiency of the injured part is rehabilitation exercises.”[1]

The importance of the research lies in preparing special exercises for the final stage of ankle joint rehabilitation according to scientific methods and techniques, to improve the functional efficiency of the ankle joint in terms of form, function and specialization for young football players. The researcher believes that rehabilitation exercises that enhance the variables related to the specificity of the game contribute effectively to the stability and protection of the joint from a second injury.

1-2 Research Problem

The current study is one of the studies that focus on the final stage of ankle joint rehabilitation, because this stage gradually returns the injured player to participate in the team's training units and then returns to the field again. The researcher, as a specialist in sports injury rehabilitation, noted

(1)Hans S., urs i.; Stretching and string thening exercises, New York, gcorg thieme inc., 1991,P.11

that medical care is high in the first stage of rehabilitation. Once the injured player reaches the final stage, the interest gradually decreases, without considering the complete readiness for the injured player to return to the field. The instructions and directions for returning to competition are weak when the injured player reaches the final stage. Ignoring this stage by rehabilitation specialists has made the coaches intervene in its rehabilitation, as it is their duty to focus on training healthy players more than those returning from injury. This wrong method of returning to the field causes many problems, including relapses and complications. Hence, the idea of research came in preparing special exercises that focus on the final stage, as the stage is dangerous and should be controlled by the rehabilitation specialist only. The researcher believes that the intervention of the specialist doctor and physical therapist in the rehabilitation of the final stage of rehabilitation stages causes many problems for the injured player, including the recurrence of the injury again, as this stage requires a special physical qualification.

1-3 Research objectives

1. Knowing the specific exercises for the final stage of ankle joint rehabilitation in muscle strength and their effect on improving functional performance in young football players.
2. Knowing the specific exercises for the final stage of ankle joint rehabilitation in dynamic balance and their effect on improving functional performance in young football players.

1-4 Research hypotheses

1- There are statistically significant differences between the pre- and post-tests in muscle strength, in favor of the post-test.

2- There are statistically significant differences between the pre- and post-tests in dynamic balance, in favor of the post-test.

1-5 Research Areas

1-5-1 Human domain: A sample of young football players from (premier and first division) clubs, numbering 6 players.

1-5-2 Time domain: For the period from 01/06/2022 to 08/12/2022.

1-5-3 Spatial domain: In gyms and youth and sports stadiums in Dhi Qar Governorate.

Chapter Two

2-1 Research methodology and field procedures

The researcher used the experimental method with a single-group design with a pre-test and post-test because it suits the nature of the problem to be solved.

2-2 Research community and sample

The sample selection must represent the community in a true way, as the research community was chosen intentionally, and their number is (15) injured players and young players from the (premier and first) division clubs in Dhi Qar Governorate, in the sports season (2023-2024) and their ages range from (17-18 years), and the number of sample members was (6) injured players who completed the first stages of rehabilitation, and (9) injured players who violated the conditions of the research sample were excluded, and in order for the sample to be homogeneous and confined within the natural curve, homogeneity was verified in terms of height, mass, age and training age.

Variables	Unit of measure	Arithmetic mean	Standard deviation	The mediator	Coefficient of skewness
height	poison	948,171	823.7	170	209.0
Mass	kg	198,62	758,10	57	292.1

the age	year	196,17	767.0	15	372.0
Training age	year	98.6	718.0	6	152.0

The values of the coefficient of skewness are between +-3, which indicates the homogeneity of the sample.

2-3 Methods, tools and devices used in the research:

2-3-1 Information collection methods

- Arabic and foreign sources and references
- Note
- Personal interviews
- Tests
- International Information Network (Internet)

2-3-2 Tools and devices used in the research

- Dynamometer
- Way Balance Dynamic Balance Meter
- A means of measuring dynamic elasticity
- rubber ropes
- tape measure
- Medical scale for measuring weight
- Stopwatch
- All kinds of signs

2-4 Tests used in the research

2-4-1 Foot dorsiflexion strength test (Farqad Atta Raouf, 2005)

The purpose of the test:Measuring the strength of the foot's dorsiflexion.

Necessary tools: Dynamometer

Test Description: Fixing the foot in the designated place with the braces prepared for this purpose. The injured person exits the long sitting position and the player fixes his foot with the brace used, then the test begins after the device is zeroed out.

Registration: The player performs the maximum bending of the foot back and indicates the kilogram on the device and records it as shown in Figure (1).

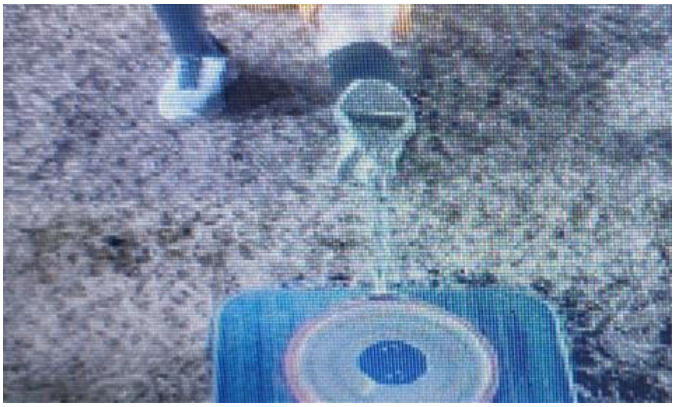

Figure (1) Foot dorsiflexion strength test

2-4-2 Plantar flexion strength test

The purpose of the test: Measuring the flexion strength of the foot.

Necessary tools: Dyno meter

Test Description: From the initial position, the player performs maximum flexion of the sole of the foot and reads the amount of force recorded on the dynamometer in kilograms, as shown in Figure (2).

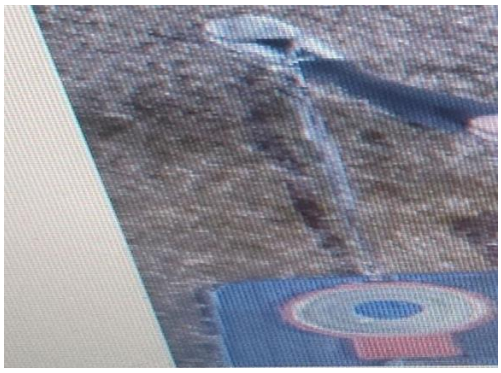

Figure (2) Plantar flexion strength test

2-4-3 Medial flexion strength test of the foot

The purpose of the test: Measurement of the medial flexion strength of the foot.

Necessary tools: Dyno meter

Test Description: From the initial position, the player performs maximum medial flexion of the foot and reads the amount of force recorded on the dynamometer in kilograms, as shown in Figure (3).

Figure (3) Test of the medial flexion strength of the foot

2-4-4 Lateral flexion strength test of the foot

The purpose of the test: Measurement of lateral flexion strength of the foot.

Necessary tools: Dyno meter

Test Description: From the initial position, the player performs maximum lateral flexion of the foot and reads the amount of force recorded on the dynamometer in kilograms, as shown in Figure (4).

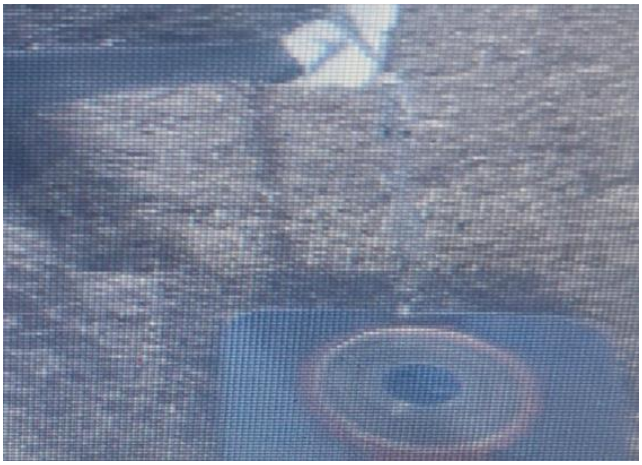

Figure (4) shows the test of lateral flexion strength of the foot.

2-4-5 Dynamic balance test on the affected ankle (Filipa**2010)**

- **Test name:** Dynamic stabilization on the injured ankle.
- **The purpose of the test:** Measurement of dynamic balance on the affected ankle.
- **Tools:** flat surface, tape measure.
- **How to perform:** This test is performed by placing the examined foot (the affected ankle foot) on the center point,As shown inThe following forms.
- The performer is asked to reach the farthest point by lightly touching the big toe of the other (free) foot, then returning this foot backwards while maintaining the balance of the injured ankle on the center point.
- The movement is performed in the forward direction.A) and the inner rear direction (B) and the external rear direction (CIn this direction, the free foot movement to perform the touch must be from behind the support foot, and the rest of the directions must be from in front of the support foot.
- The performer is allowed to practice performing each of the directions (6) times, followed by a (5) minute rest, then giving (3) attempts for each direction (and the average of the three attempts is taken, which indicates the balance value for that direction). He also starts from the forward direction and moves to the remaining directions without rest, with a clockwise rotation.
- It is required that the touch be done lightly and that the free foot not rest on the ground (i.e. not take any support on the free foot) and that the balance of the injured ankle be maintained on the axis. Any imbalance will cancel the attempt and the test will be repeated for each leg separately.
- **How to register:** The distance (cm) is calculated from the center to the maximum touch distance by the free foot along the drawn line and according to the required direction, noting that each of the lines drawn on the ground is divided into centimeters, as shown in Figure (5).



2-5 Main experiment

2-5-1 Pre-tests

Pre-tests were applied to the injured young players on consecutive dates, one after the other, as the date of each player's injury was different from the other, as the first injured person was on 1/10/2022 and the last injured person was on 6/2/2022.

2-5-2 Special rehabilitation exercises

The researcher prepared special rehabilitation exercises for the final stage of ankle joint rehabilitation. The researcher relied on Arab and foreign sources and references. The researcher also conducted personal interviews with experts and specialists about the steps of working with the method to rehabilitate the ankle joint. The rehabilitation exercises were applied to the research sample (one experimental group) after the injured player completed the first stages of rehabilitation. The special rehabilitation exercises took a period of (8) weeks, with (48) rehabilitation units, and were divided into (24) rehabilitation units in the iron hall, and (24) rehabilitation units in the stadium, according to the following order (hall, stadium, hall, stadium, hall, stadium, rest), meaning that the injured person takes a rehabilitation unit in the iron hall, followed on the second day by a rehabilitation unit in the stadium, and a day of negative rest. The time of the special rehabilitation unit is (45-85 minutes). The researcher himself supervised the follow-up of the injured. The researcher took into account the scientific foundations while applying the exercises, including the principle of gradual load. The exercises were implemented from easy to difficult and from simple to complex with gradual increase. By weight, the researcher took into account the ability that the injured person reaches during the implementation of the exercises, and the researcher divided his method into rehabilitation units in the hall and on the field.

Special rehabilitation units in the iron hall:

The researcher used in his method in the iron hall the treadmill for two periods before the rehabilitation unit with the aim of preparing to implement the exercises, and after the end of the rehabilitation unit with the aim of recovery, and the speed of the treadmill was varied from slow to medium and then fast, and the researcher used warm-up exercises after running as muscle stretching exercises, after which the injured person moves to the front and back exercises with fixed devices and light weights, according to the ability of the injured person, and after the time in the rehabilitation units passes, the injured person moves from the devices with fixed weights to free weights. In his last units, the researcher used weights together, with the aim of developing the motor abilities of the injured player, to improve sensory receptors and improve the reaction of the injured ankle joint, and the researcher used static and dynamic balance exercises in the hall using balance balls, as well as using jumping exercises of various types on the bench in the last week of the method, and the researcher used ice bags with the injured person after each rehabilitation unit to prevent blood infiltration in the injured area.

Special rehabilitation unit on the field:

The researcher used in his approach with the injured player on the field and in the first weeks, simple jogging around the field and then warming up and some muscle stretching exercises, in

addition to giving the injured player some contraction and expansion exercises for the muscles surrounding the ankle joint, and after the injured player's condition improved by acquiring the abilities that the injured player lost after the injury, the researcher used exercises to increase resistance on the ankle joint such as running straight for a certain distance back and forth and using all types of running from all directions, relying on the stability of the joint and the strength of the muscles surrounding it, and the researcher used zigzag exercises with the injured player with and without a ball, which is a good test of the movement of the ankle joint, and in the last weeks the researcher used a group of specialized and functional football exercises with the injured player to ensure the return of normal movement to the injured joint, and the researcher took care that the exercises were similar to playing situations, and the researcher used ice after the end of each rehabilitation unit.

The researcher sees The final stage of rehabilitation for the injured person is a gradual stage for the injured person to return to practicing specialized sports activities in the form of sports competitions. The injured party works to perform its function to a degree similar to less than the functional and motor capabilities of the healthy party, in addition to the psychological stability of the injured person.

Main objectives of specific rehabilitation exercises

- Developing muscle strength in the muscles surrounding the ankle joint.
- Improving some of the motor skills that the injured person lost (balance, flexibility).
- Gradually return to practicing specialized sports activities.

2-5-3 Post-tests

The researcher conducted the post-tests under the same conditions as the pre-tests for the period from 3/8/2022 to 10/14/2022.

2-6 Statistical processing

The researcher used the statistical bag program (spss)

3-7 Presentation, analysis and discussion of the results of the research variables (muscle strength, dynamic balance, dynamic flexibility)

3-7-1 Presentation and discussion of the results of the pre- and post-tests for the variable (muscle strength)

Table (2) Pre-test results-Dimensionality in physical variables (muscle strength) of the research sample

Test name	Unit of measure	Pre-tests		Post-tests		value (t) calculated	Significance level
		S	A	S	A		
foot dorsiflexion strength	degree	553,11	063,2	498,15	98.3	273.4	moral
plantar flexion force	degree	600,13	450.4	806.3	374.5	374.5	moral
Medial flexion strength of the foot	degree	398,11	317,2	558.3	157,12	157,12	moral
Lateral flexion strength of the foot	degree	498.8	047.3	134.1	894,40	894,40	moral

Table (2) shows the results of the pre-tests.-The dimension of the research sample in muscle strength tests showed that there were significant differences between the pre- and post-tests.

The researcher attributes this development to the special rehabilitation exercises followed by the researcher, as they had an effective impact through the players' commitment to continue and regularize the exercises. The scientific planning followed in implementing the special rehabilitation exercises is effective and efficient, as these exercises were prepared according to the components of the training load in terms of intensity, volume, and rest, in addition to the principles of training such as gradualness, repetition, and diversity. (Mohammed Reda Ibrahim) indicates that "all components of the training load increase with the advanced increase in the athlete, i.e. the higher the improvement in the level of the injured person, the higher the intensity in the components of the training load." The exercises prepared by the researcher in the iron hall contributed to an increase in the amount of muscle strength as a result of muscle contractions, in addition to the fact that these exercises target the player's actual need for game variables, for example, targeting muscle strength training for the legs due to the actual game of the injured person, and this was confirmed by (Abdul Ali Naseef and Qasim Hassan Hussein). "The benefit of muscle strength exercises is that they target the limbs with more motor influence than comprehensive exercises." The diversity in muscle strength exercises, whether in the hall or on the field, and the use of these exercises with many tools such as fixed weights and free weights, in addition to rubber ropes and large and small rubber elastic bands. The researcher took care to ensure that these exercises are standardized in terms of repetition and the level of the injured player's ability to carry out the load, as well as taking into account the gradual progression of the load from easy to difficult. This is confirmed by (Mufti Ibrahim) "The trainer's use of standardized exercises from easy to difficult increases the players' experience." The development in muscle strength in the injured has contributed to the development of the skill performance of the injured players while carrying out the exercises on the field, as it gave them high self-confidence to reach the highest levels. This was confirmed by (Qasim Hassan Hussein and Abdul Ali Naseef) "Good planning using appropriate methods ensures the advancement of the athletic level to reach high results."

The researcher sees Improving muscle strength contributes effectively and influentially to improving functional performance, especially when the development of muscle strength is similar to the player's actual need for it.

3-7-2 Presentation and discussion of the results of the pre- and post-tests for the variable (muscle strength)

Table (3) Pre-test results-Dimensionality in the variable (dynamic equilibrium) of the research sample

T	Tests	Unit of measure	Pre-test		Post-test		value(T) TheSoBy him	Significance level	Type of indication
			(-s)	(±A)	(-s)	(±A)			
dynamic equilibrium	In front of me	poison	80,87	1.64	83.75	1,28	3.87	0.006	moral
	Interior back	poison	90.25	1.83	94.87	0.640	5.62	0.000	moral
	External back	poison	83.62	1,18	86.75	1.03	5.38	0.001	moral

Table (2) shows the results of the pre-tests.-The dimension of the research sample in muscle strength tests showed that there were significant differences between the pre- and post-tests.

The researcher attributes this phase to the special rehabilitation exercises that were beneficial and influential in the balance variable, and the special exercises had an impact on controlling the body

parts to develop balance and stability, and this stability during the implementation of the exercises gave the injured person complete control of the body, and kept the player away as much as possible from a second injury, and this is what (Muwaffaq Asaad Mahmoud) confirmed: "Balance is one of the functions of the nervous system and plays an important role in the player's performance, including the game of football, and this is during performance on the ground or in the air." It is necessary to obtain the balance variable during movement, and the rehabilitation exercises in the hall contributed with the balance ball with or without the ball, and gradually from easy to difficult, this was reflected in the performance of the injured players on the field, "Improving the balance of the athlete contributes to his ability to improve his level of performance in many movements." The researcher confirms that dynamic balance exercises had an influential and effective role in the stability of the ankle joint, and the player's return to the field again, that the interest in the balance element in the studies came as a result of neglecting this element and limiting it to muscle strength and range of motion, so the researcher focused on this element in his study for the final stage From the stages of ankle joint rehabilitation, this is what Kevin et al confirmed in their study (2017) "Current rehabilitation programs are not based only on range of motion and muscle strength exercises, but it is possible to study other variables, including muscle balance, to provide a stimulus to the nervous system so that the athlete can regain dynamic stability in sports competition."

The researcher believes: The dynamic balance that a football player gains in special rehabilitation exercises, especially when the balance is during movement because it is difficult to control the body parts during the player's movement, which causes the ball to be lost quickly, is one of the preventive indicators that give the injured joint greater stability.

3-8 Conclusions and Recommendations

3-8-1 Conclusions

- The results of the pre- and post-test of the experimental research sample showed a clear improvement in the research variables (muscle strength and dynamic balance) in favor of the post-test.
- The special rehabilitation exercises for the experimental research sample have a role in improving the research variables (muscular strength and dynamic balance).
- One of the important causes of ankle joint pain is the lack of muscle strength and balance exercises in the preparation of training programs, thus facilitating the occurrence of injury.

3-8-2 Recommendations

- The researcher emphasizes the use of special rehabilitation exercises to rehabilitate the ankle joint in rehabilitation centers due to the positive effect shown by the research sample (one experimental group) in terms of development in the results.
- The researcher recommends studying dynamic balance in research and studies, as it is a preventive indicator, contributes to the stability of the joint, and is important in improving skills when the injured player returns to the field.
- The researcher recommends activating joint work between the College of Physical Education and Sports Sciences and the College of Medicine, by establishing treatment centers and holding specialized courses, in order to accelerate the return of injured players to competition again.

Arabic and foreign sources

Arabic sources:

- Muhammad Redha Ibrahim: Field Application and Methods of Theories and Sports Training, 1st ed., (Baghdad, Dar Al-Kutub and Al-Watha'iq, 2008).
- Abdul Ali Naseef, Qasim Hassan Hussein: Development of the prolongation, Alaa edition, Baghdad, 1979.
- Mufti Ibrahim: The Comprehensive Reference in Sports Training, (Cairo, Dar Al-Kitaba Publishing, n.d.).
- Qasim Hassan Hussein, Abdul Ali Naseef: Isometric Mental Training, (Dar Al Fikr Al Arabi, Cairo, 1979, p. 174.
- Muwaffaq Asaad Mahmoud: Basics of Sports Training, 1st ed., Baghdad, Dar Al Noor, 2011.
- Farqad Atta Raouf: (A comparative study between two proposed methods for rehabilitating soft tissue injuries of the ankle joint and their effect on some biomechanical variables: Unpublished PhD thesis, College of Physical Education, University of Baghdad, 2005.

Foreign sources:

1. kevin E Wilk, Christopher A. Arrgo: Rehabilitation Principles of the Anterior Cruciate Ligament Reconstructed Knee: Twelve Steps for Successful Progression and Return to Play. (2011).
2. Hans S., urs i.; Stretching and string thening exercises, New York, gcorg thieme inc., 1991,P.11.
3. Filipa: A. Neuromuscular training improves performance on the star excursion balance test in young female athletes. Journal of orthopedic & sports physical therapy, 40(9),2010.