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THE EFFECT OF REHABILITATIVE EXERCISES AND SOME PHYSIOTHERAPY DEVICES IN THE REHABILITATION OF TENNIS ELBOW INJURY ACCORDING TO THE RANGE OF MOTION, MUSCLE STRENGTH AND PAIN LEVEL OF THE INJURED PLAYERS

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ABSTRACT

The research aims to prepare rehabilitative exercises associated with some physiotherapy devices in the rehabilitation of tennis elbow injury in injured players, as well as to identify the effect of rehabilitative exercises and some physiotherapy devices in the rehabilitation of tennis elbow injury according to the motor range, muscle strength and pain level of the injured players. The researchers used the experimental design approach The experimental group with two experimental groups (equivalent groups) with a pre- and post-test, and it represents the research community with players with tennis elbow injury for ages (16-28 years) in activities (handball, volleyball, and racquet games) of (12), who were chosen by The two researchers represent the research community as "the part that represents the community of origin or the model in which the researcher conducts the entirety and focus of his work, so the researchers chose a sample of it in the intentional way because of the availability of the possibility of controlling its research variables more accurately than the rest of the other samples, as the research sample consisted of (10) players The injured players were divided randomly by drawing lots into two groups, with (5) injured players for each group, the first group 5 The injured players worked according to the method of electrical stimulation and therapeutic exercises. The second group consisted of 5 injured players who worked according to the method of ultrasound and therapeutic exercises. Rehabilitation of the injured tennis elbow. Rehabilitation exercises as well as physiotherapy methods had a complementary role in increasing the strength of the flexor muscles on the elbow joint of the injured research sample. The most prominent recommendations were an emphasis on the use of physiotherapy methods (electrical stimulation, ultrasound, and rehabilitative exercises) in Preparing rehabilitative curricula that aim to improve the injured muscles and joints, which leads to returning the injured member to its normal position before the injury occurred.

Keywords: rehabilitative exercises, physiotherapy equipment, rehabilitation, tennis elbow injury, pain level.

-Defining the Search

-Introduction to research and its importance

The scientific progress witnessed by the world at the present time is one of the most important main reasons for the progress and advancement of human life through deliberate and programmed scientific planning that contributes to the achievement of human goals, and this progress includes all sports sciences, including the science of sports injuries and rehabilitation. Studies related to the rehabilitation of injured players in the success of the rehabilitation process and then achieve the best results. Most of the scientific research has been directed towards studying the various applications of sports injuries science in the aspects of human life, because this science is of fundamental importance in developing rehabilitation methods, evaluating their methods, interpreting responses and functional adaptations that occur during and after sports rehabilitation, and in a way that contributes to improving the level of injured players. To play after an injury without doing rehabilitation is a big mistake. The return of the player and his continuation in the training or competitive curriculum will lead to doubling the injury, and the player may not feel pain even though the injury took a new form, and this leads to a chronic condition for recurrence of the injury. Most of the players are exposed to various sports injuries, which stand as an obstacle to the development and improvement of their levels. Therefore, we find that these injuries increase with the increasing requirements for sports through increasing their loads, which is expressed through the increase in repetitions with high stress due to poor planning of training programs and disproportionate components of the training load. With the ability of the athlete, all of which are factors that cause sports injuries and are called training errors. The tennis elbow joint is one of the joints that are prone to multiple different injuries, which is one of the common injuries to this joint, especially in events and games in which players use the palm joint frequently, since the function of the tennis elbow that It connects the forearm muscles on the outside of the elbow (to the lateral value of the humerus), and its medical treatment is either through surgical intervention according to the severity of the injury, or the use of drugs or physical therapy devices such as heat, radiation, or other devices, or rehabilitatively using therapeutic exercises, which can be expressed as a set of Fixed and dynamic movements according to the philosophy of a group of sciences such as sports medicine, anatomy, atheletic training and Measurement, testing and physiology are presented to the injured person in order to return the injured part to its normal position and to restore its functioning. Hence the importance of research in developing rehabilitative exercises and using some physiotherapy devices to rehabilitate players with tennis elbow injury, which would help in rehabilitating players from the injury that hinders them from performing their duties in their specialized sport, because of the importance of these exercises and natural devices in treating such an injury .

-Search Problem:

The injury of the tennis elbow and the suffering of the injured players in terms of pain and suffering represented in motor limitation and disability, and these pains increase in cases of flexion and extension of the elbow joint for any movement, especially since the players (volleyball, handball, and racquet games) use the arms in a very large way, and any weakness in the muscles of the arms and limitation in the range of motion that leads to an injury, and

that these players are exposed to tennis elbow injury as a result of excessive use of the elbow. By looking at the means of rehabilitation, the researchers found that the rehabilitation of this injury is often with therapeutic exercises using traditional methods. Through strengthening the muscles surrounding the joint by the method of gradual resistance training, as well as the use of some physiotherapy methods to reduce the period of rehabilitation from this injury, due to the effectiveness of these rehabilitative exercises and devices in rehabilitation through the desire of the injured to use them to get rid of the injury that he suffers from.

- Research Aims:

The Research Aims to:

1- Preparation of rehabilitative exercises associated with some physiotherapy devices in the rehabilitation of tennis elbow injury among injured players.

2- Identifying the effect of rehabilitative exercises and some physiotherapy devices in rehabilitating tennis elbow injury according to the range of motion, muscle strength and pain level of the injured players.

- Research Hypotheses:

1- There are statistically significant differences between the pre and post tests in the motor range tests, muscle strength and pain level among the injured players of the first experimental group (exercises + electrical stimulation).

2- There are statistically significant differences between the pre and post tests in the motor range tests, muscle strength and pain level among the injured players of the second experimental group (exercises + ultrasound therapy).

3- There are statistically significant differences between the post tests of the two experimental groups in tests of motor range, muscle strength and pain level of the injured players.

-Research Areas:

- The human field: a sample of athletes with tennis elbow in some team and individual games (handball, volleyball, and racket games) in Maysan Governorate.
- Time range: for the period from 16/5/2021 to 1/9/2021.

Spatial field: halls, stadiums and rehabilitation centers in sports clubs in Maysan Governorate.

-Research Methodology and Field Procedures:

- Research Methodology:

The researchers used the experimental approach with an experimental design with two experimental groups (equivalent groups) with a pre and post test, and because it is the appropriate way to solve the problem to prove its hypothesis.

-Research community and sample:

The research community is represented by players with tennis elbow injury for ages (16-28 years) who are (12), who were chosen by the researchers to represent the research community as "the part that represents the community of origin or the model in which the researcher

conducts the entirety and focus of his work" (Wajih Mahjoub : 2002: 164), so the researchers chose a sample of it by the intentional method because of the possibility of controlling its research variables more accurately than the rest of the other samples, as the research sample consisted of (10) injured players, and in order to control the research variables accompanying the course of the research experiment and to identify The validity of the sample and the distribution of the values of its variables in moderation. The two researchers found homogeneity for the research sample in terms of height, weight, age, training age, type of injury and severity of injury using the torsion coefficient. The results showed that the members of the research sample were distributed normally in the research variables, and then there were no abnormal values. ; As the values of the torsion coefficient were confined between (±1), which indicates the normal distribution of the sample, as shown in Table (1), in addition to that, the two researchers equalized the two groups using the (t. test) test for independent samples of the results of the pre-tests, so that the researchers could suggest the difference to The experimental factor, the experimental groups must be equivalent" (Raisan Khraibet: 1988: 99), and for the starting point to be the same for both groups, and the random results showed that the differences between the two groups through the (Sig) values for all study variables were greater than the approved significance level (0.05). This indicates that the two groups are equal. As shown in Table (2).

Table (1) shows the homogeneity of the research sample

variants	measruing unit	Arithmetic mean	Arithmetic mean	vein	torsion modulus
height	meter and its parts	172.12	5.45	170	0.734
weight	kg	69	4.29	67	0.491
the age	year	23	1.55	22	0.769
training age	Month	34.50	3.48	36	0.150
type of injury	Tennis elbow injury				
The severity of the injury	of the third degree				

Schedule (2)

Equivalence of the two experimental groups

Variables	Measure-ment	The first experimental group		The second experimental group		Calculated T	Statistical significance	Moral Connotation
		M	S	M	S			
Range of motion of the tennis joint	degree	37.40	5.177	37.00	5.292	0.121	0.907	No Moral
grip strength	Kg	36.60	6.877	37.20	6.261	0.144	0.889	No Moral
The degree of pain	degree	14.60	2.408	12.80	3.962	0.868	0.411	No Moral

Below the level of significance (0.05) and degrees of freedom (8)

The injured players were randomly divided into two groups, with (5) injured players for each group.

• The first group: 5 injured players worked according to the method of electrical stimulation and rehabilitative exercises.

• The second group: 5 injured players worked according to the ultrasound curriculum and rehabilitative exercises.

The researchers believe that the sample is homogeneous in the variables that have been agreed upon, and this is what helped the researcher to coordinate the work between the sample members and the auxiliary work team to implement the qualification curriculum.

-Methods of collecting information:

To achieve the objectives of the research and obtain accurate and correct results, the researchers used the following means and devices:

- Search Tools:

Arabic and foreign references and sources, testing and measurement, personal interviews, a form for recording the results of measurements, a form for recording the data of injured players, the assistant work team(*).

-Devices and tools used:

(1) Dell computer (Vietnamese origin), (1) Canon camera, (1) Goniometer for measuring range of motion, (1) Modified Goniometer for measuring pain, (1) 1), (1) Dynamometer for measuring muscle strength, (1) Ultrasonic Diathermy device, (1) German-made electrical stimulation device, (1/100) second digital stopwatch To measure the time of exercises (made in China), number (1), measuring tape. (1) electronic scale, finger tray, bench of various heights, supports

- Search procedures:

For the sake of accuracy in the work by counting the number of people with tennis elbow injury and identifying the reality of the physical and human aspects that represent the research tools scientifically, the researchers limited the available equipment and tools that can be used, as well as through the interviews that the researchers conducted with the doctors and assistants present, As well as interviews with the injured players and their acceptance of the idea

- Determine the measurements for the research:

After reviewing many scientific sources and references and previous studies in the field of sports rehabilitation, the research variables were chosen, which are compatible with the nature of the sample and the nature of the injury. The researchers reached the following measurements:

- Measurement of muscle strength.
- Measurement of range of motion.

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- Measuring the degree and severity of pain.

-Description of the measurements used in the research:

- Measuring grip strength (Kazem Jaber: 1997: 335)

The injured person grips the handle of the device, as the device records the reading of the test number, and he is given two attempts and the best grip is taken.

Purpose of the test: To measure the strength of the fist muscles (flexor muscles of the fingers).

Tools used: (Dynamometer).

Test conditions: The patient holds the device in the fist of the affected hand, and the arm is extended without any bending in the elbow joint, and is slightly away from the body.

Recording method: The injured person presses his fist on the dynamometer to try to produce the maximum possible force. Each injured person is given two attempts to score the best of them. Measurement unit: kg

- Measuring the motor range of the joint: (Hazaa Muhammad Hazaa: 209: 209)

Measurement purpose: to measure the angle of the joint.

Measurement procedures: The measurement is carried out using a gynometer, and it consists of a protractor with two arms, one of which is fixed in a parallel direction and adjacent to the fixed part of the member connected to the joint, and the other is a movable arm fixed in a parallel direction and adjacent to the movable part of the joint. And parallel to him, and the second arm of the device is fixed with adhesive tape parallel to the forearm so that the injured arm is extended at its maximum extension (180) degrees, then the injured person bends the elbow joint by bringing the forearm closer to the upper arm to record an angle that defines the joint.

Registration: The injured player is recorded as close as possible to the injured player in the corner.

- Measuring the degree and intensity of pain:

The purpose of the measurement: to measure the degree and intensity of pain in the elbow joint injury.

Measurement procedures: The patient bends the forearm towards the ulna (the normal flexion movement of the elbow joint) until he feels pain and the patient is unable to flex it further.

Recording: The therapist records the degree of pain by means of a modified gynecometer, graded from (3 to 18) after fixing the two arms of the device, one of which is fixed in a parallel direction and adjacent to the fixed part of the member connected to the joint, and the other is the movable arm fixed in a direction parallel and adjacent to the moving part of the joint, as for the intensity The pain in the affected arm is according to the following schedule:

Schedule (3) Shows the degrees of pain and the corresponding levels of pain intensity

The degree of pain	The severity of the pain
From 16 to 18	the pain is very severe
From 13 to 14	severe pain
From 10 to 12	strong pain
From 8 to 9	m average
From 5 to 7	simple pain
4	without pain

-Exploratory experience:

\The two researchers conducted an exploratory experiment on a sample of (2) athletes with tennis elbow on Sunday 6/6/2021, and its purpose was the following:

1- Checking the accuracy and safety of the devices and tools used.

2- The appropriateness of the measurements for the sample, and the knowledge of the difficulties facing the sample and the researcher during the application.

3- Calculating the time it takes for the different measurements when applied to benefit from that when conducting the main research experiment.

4- Training assistants on how to apply tests and how to record grades.

5- Taking into account the safety of the injured when performing the measurements.

- Pre- measurements:

The two researchers conducted pre-tests on a research sample of (10) people with tennis elbow, on Tuesday and Thursday corresponding to 6-10/6/2021 at exactly nine o'clock in the morning in the physical therapy hall in the College of Physical Education and Sports Sciences - University of Maysan, so he registered in The first day of the pre results of the measurements of height, weight, age and training age. On the second day, the results of measuring muscle strength, the angle of movement, the degree and intensity of pain were recorded, and the researchers gave a brief explanation on how to perform the measurements and their sequence. Climate) to be able to create similar or close conditions when conducting post-tests.

-The training method used:

The rehabilitative curriculum prepared by the two researchers included performing physical exercises for the rehabilitation of tennis elbow injury associated with physical therapy devices for the injured players, which lasted for (8) weeks, from Sunday 13/6/2021 until Thursday 5/8/2021, with (3) units. During the week for days (Sunday, Tuesday, Thursday), and the purpose of these exercises is to strengthen the muscles of the elbow joint as well as to increase the range of motion and try to return the range of movement to the normal range and in all directions of movement. Difficulty performing the exercises, and he started using rehabilitative exercises with light resistances, until he used physiotherapy devices such as an ultrasound device and an electrical stimulation device.

-Dimensional measurements:

After completing the implementation of the rehabilitative curriculum, dimensional measurements were taken on the research sample, the injured players, on Sunday and Monday corresponding to 8 and 9/8/2021 at exactly nine o'clock in the morning in the physical therapy hall in the College of Physical Education and Sports Sciences - University of Maysan, so the two researchers recorded the measurement results. related to muscular strength, measuring the angle of movement, and the degree and intensity of pain, and the researchers worked to provide the same conditions in terms of place, time, tools, method of implementation, and the work team that conducted the pre-tests.

-Statistical means:

The researchers used statistical methods in the ready-made program for the Statistical Package for Social Sciences (SPSS), version 23

-Presentation, analysis and discussion of the results

Presentation of the results of the arithmetic mean, standard deviations, and the value (t) of the motor range tests of the tennis joint, grip strength, and measurement of the degree and intensity of pain in the results of the pre and post tests of the electrical stimulation group with rehabilitative exercises) for the research sample

Table (4) It shows the arithmetic mean, standard deviations, and the value (t) for the experimental group (rehabilitation exercises - electrical stimulation) in the pre-post tests.

Variables	Measure-ment	pretest		post test		F	F e	Calculated T	Statistical significance	Moral Connotation
		M	S	M	S					
Range of motion of the tennis joint	degree	37.40	5.177	16.80	2.280	20.60	1.939	10.624	0.000	No Moral
grip strength	Kg	36..60	6.877	67.40	4.219	30.80	2.782	11.071	0.000	No Moral
The degree of pain	degree	14.60	2.408	6.00	1.581	8.600	1.208	7.117	0.002	No Moral

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

It is clear from Table No. (4) that there are significant differences between the pre and post tests in favor of the post tests in the tests under study in the first group that used rehabilitative exercises and electrical stimulation, where the rehabilitative exercises and electrical stimulation had a positive effect of reducing the angle of determination of the elbow joint, as the researchers believe that The reason for reducing the specificity is due to the vocabulary of the rehabilitation program proposed to the members of the first injured sample, and the curriculum contained a set of rehabilitative exercises that were used in several scientific, studied and varied ways that contributed to increasing the flexibility of the joint (the elbow), as well as the use of gradation and undulation in intensity that were prepared for the purpose of

rehabilitation during The duration of the implementation of the applicable rehabilitation program, which included rehabilitative exercises for extending and fully flexing the injured arm, as well as rolling the hand outward and inward, which led to an increase in the ability of the working muscles, which helped in the flexibility of the joint. As (Mukhtar Salem) points out, "Therapeutic exercises work to develop and improve muscle flexibility. (Mukhtar Salem: 1978: 129)

As for the variable of grip strength: it appeared to us a moral significance among the members of the research sample between the pre and post tests, and the researchers believe that the reason for the significant differences is due to the diversity of the exercises used during the implementation period of the rehabilitation program, as well as the use of different level exercises, as the researchers used difficulty levels The three during the qualifying unit (light, moderate, and medium), and according to the capabilities the three difficulty levels of the injured players, in addition to the stresses, repetitions, and performance time that commensurate with the difficulty of the qualifying unit, and also rest between repetitions, and rest between groups helped in the morale of the grip strength test. As for the variable level and severity of pain, the researchers see that there are significant differences between the pre and post tests in favor of the post tests in reducing the severity and level of pain, as the rehabilitative exercises and electrical stimulation had a positive effect in reducing the level of pain that the injured player was suffering from in the elbow joint, as the researchers believe that the reason for reducing The pain is due to the vocabulary of the rehabilitation program proposed to the injured sample, because the approach used the principle of gradation from easy to difficult. Therefore, these exercises contributed to reducing the level of pain. The rehabilitative exercises using the electrical stimulus are determined only by the organ to be stimulated, that is, by the percentage of the contribution of a group of motor nerve fibers that contribute to participating in the nerve stimulation, and thus leads to contraction in the muscle fibers in one muscle without contraction in others.

(Fadel and Amer: 2008: 85) indicates that "a diversification in the number of muscle and nerve fibers responsible for nerve stimulation and the frequency of this stimulation determines the level of muscle strength and muscle contraction (in terms of quantity). Likewise, the number of nerve fibers responsible for nerve stimulation and its frequency increases with increasing strength systole

Presentation of the results of the arithmetic mean, standard deviations, and the value (t) of the tests of the range of motion of the tennis joint, grip strength, and measurement of the degree and intensity of pain in the results of the pre and post tests of the experimental group (ultrasound with rehabilitation exercises)

Table (5) It shows the arithmetic mean, standard deviations, and the value of (t) for the experimental group (rehabilitation exercises - ultrasound) in the pre-post tests.

Variables	Measure-ment	pretest		post test		F	F e	Calculated T	Statistical significance	Moral Connotation
		M	S	M	S					
Range of motion of the tennis joint	degree	37.00	5.292	20.60	2.608	16.40	3.295	4.977	0.008	No Moral
grip strength	Kg	37.20	6.261	58.00	7.106	20.80	5.114	5.114	0.007	No Moral
The degree of pain	degree	12.80	3.962	4.20	0.447	8.60	4.558	4.558	0.010	No Moral

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

Table (5) shows that there are significant differences between the pre and post tests in favor of the post tests in the tests under study in the second group that used rehabilitative exercises and ultrasound, where the rehabilitative exercises and ultrasound had a significant role in de-limiting the elbow joint, as the researchers believe that the cause of The significant differences are due to the subjection of this group to the rehabilitative curriculum, which contributed to raising the body temperature, as well as the gradation in exercises using ultrasound and therapeutic exercises during the period of implementation of the rehabilitative curriculum. Stretching without resistance, then other exercises using resistance, then the researchers used flexibility exercises with resistance exercises, according to what is appropriate with the capabilities of the affected sample, which led to the recovery of the elbow joint to its natural state and he was able to exert greater muscle strength, as a result of removing pain from the muscles working on the elbow joint And the occurrence of a development in the muscular strength, and this was shown in the morale by the high rate of development in the strength of the fist of the injured hand. (Raisan indicated :1991: 299) to the fact that the neuromuscular system is the one that regulates the driving force through nervous excitation, and with training, the specific characteristics of nervous excitation can advance, which determine the effect of training.

Presenting the results of the arithmetic mean, standard deviations, and the value (t) of the motor range tests of the tennis joint, grip strength, and measuring the degree and intensity of pain in the results of the pre and post tests for the two groups, electrical stimulation with rehabilitative exercises - ultrasound and rehabilitative exercises) for the research sample

Table (6) It shows the arithmetic mean, standard deviations, and the value of (t) for the two experimental groups in the post-po

Variables	Measure-ment	The first experimental group		The second experimental group		Calculated T	Statistical significance	Moral Connotation
		M	S	M	S			
Range of motion of the tennis joint	degree	16.80	2.280	20.60	2.608	2.453	0.040	Moral
grip strength	Kg	67.40	4.219	58.00	7.106	2.453	0.035	Moral
The degree of pain	degree	6.00	1.581	4.20	0.447	2.449	0.040	Moral

Below the level of significance (0.05) and degrees of freedom (8)

Table (6) shows that there are significant differences between the pre and post tests in favor of the post tests in the tests under study in the two groups that used rehabilitative exercises and electrical stimulation, as well as the second group that used rehabilitative exercises and ultrasound. The researchers concluded that the curriculum developed the affected part in the two groups to different degrees This is normal because the requirements imposed on the muscle during training were carried out in an organized manner and with continuous development over time, as this is sufficient from the researchers' point of view for the events of functional adaptation. Mansour (2010) points out that the goal of building and developing muscle strength inevitably requires access to muscle adaptation first for strong and rapid contraction in order to stabilize the strength of the tendons and ligaments of the joint against the first impact force and the tensile force that is generated on the joint axis. Muscular strength necessarily leads to the development of the level of strength of the joint ligaments, which inevitably leads to a reduction in the possibility of joint injury, and this type of training shows the extent of the resistance of the muscle or the muscle group and the joint to indicators of fatigue, as most muscle and joint injuries occur during fatigue, and adds the need to realize the importance of exercise The muscle or the muscle group, as well as taking the degree of muscle contraction efficiency as a criterion for measuring the extent of muscle and joint development for the injured" (Mansour Jamil: 2021: 91). Stretching and flexion, as well as training with electrical stimulation, ultrasound, and therapeutic exercises, had an effect on restoring the attached joint to its normal state before the injury occurred. (Bakri: 2000: 75) indicates that what happens during work The central movable mechanism makes the muscle work on all angles of muscular action, but the amount of muscle tension differs in different angles, due to the number of participating muscle fibers. Also, the greater the resistance, the greater the muscle tension resulting from the participation of the largest number of muscle fibers. Continuation of training generates neurological adaptations, and these adaptations In the beginning, it is a neuromuscular compatibility, that is, the regulation of nerve impulses, and it may develop after a while to become cellular adaptations that lead to an increase in the size of the motor unit, and this makes the functional ability of the motor unit to innervate the largest number of muscle fibers or the possibility of recruiting the largest number of motor units, which results in an increase in Strength. Both Boulware and Byrd (Boulware al Byrd, 1993) indicate that physical activity can play a great role in relieving pain and in developing the function of affected joints. Bone density, along with the development of range of motion on the joints, and the individual's sense of good health. (Ayed Fadl: 1999: 28)

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1- The use of physiotherapy methods, electrical stimulation and ultrasound with rehabilitative exercises has a positive effect in rehabilitating the injured tennis elbow.

2- The rehabilitative exercises as well as the means of physiotherapy had a complementary role in increasing the strength of the flexor muscles on the elbow joint of the injured research sample.

3- An improvement and reduction in pain in the injured player's elbow joint, and this indicates the positive effect of the rehabilitative approach prepared by the two researchers.

Recommendations:

1- Emphasis on the use of physiotherapy methods (electrical stimulation, ultrasound, and rehabilitative exercises) in preparing rehabilitative curricula that aim to improve the affected muscles and joints, which leads to returning the injured member to its normal position before the injury occurred.

2- Emphasis on the use of physiotherapy methods such as stimulation and ultrasound in other injuries such as fractures to prevent muscular atrophy.

3- Carrying out seminars, lectures and continuous awareness on the importance of motor rehabilitation, whether by using physiotherapy methods or rehabilitative exercises, and avoiding taking chemical drugs and analgesics because of their side effects on body systems.

4- The player and coach should pay attention to the injury when it occurs in terms of treatment, and use the necessary means and give it enough time to recover before returning to the stadiums to avoid recurring and chronic injuries.

5- The need to prepare rehabilitative curricula for the injured in other games.

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