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Ice massage and some rehabilitative exercises to rehabilitate a shoulder joint tear of injured athletes

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Abstract

The importance of the research was to prepare rehabilitation exercises with the use of (ice massage) to rehabilitate the torn deltoid muscle injury in athletes, as well as to identify the effect of these exercises on the torn deltoid muscle injury in athletes. While the problem of the research was the following question (Do rehabilitative exercises combined with ice massage have a role in treating the deltoid muscle of the shoulder joint and gradually returning the muscle to what it was before the injury?). While the objectives of the research were to prepare rehabilitation exercises with the use of (ice massage) to rehabilitate the torn deltoid muscle injury in athletes, and to learn about the effect of these exercises on the torn deltoid muscle injury in athletes. The researcher concluded that ice massage, along with rehabilitative exercises and the use of an EMS device, contributed to the rehabilitation and treatment of the shoulder joint. Both experimental groups showed development and improvement in maximum strength and range of motion of the shoulder joint after applying the prepared curriculum. Thus, the researcher recommends the need to pay attention to warming up before starting to perform, as well as the need to treat the injury and massage it with ice the moment it occurs to speed up the healing process to get rid of pain, swelling, and damaged cells, and then practice rehabilitative exercises.

Keywords: Ice massage, rehabilitative exercises

1. Introduction

The number of sports injuries has increased significantly and noticeably recently. As a result of the high effort in sports activities that require the performance of different sports movements with high and medium intensity, as well as the performance of sudden and strong movements during various playing and training situations, with the coincidence of some reasons such as the playing field surfaces, as well as neglect in warming up, such as flexibility exercises or warming up with force, which is a major factor in developing strength. Muscles, joints and surrounding ligaments, these factors together lead to recurrent and chronic injuries. On the other hand, sudden stress on a specific part of the body, which may be more than the tissues can bear, is what leads to injury. Excessive physical pressure is considered a cause of injury and may occur in a fleeting moment. It is usually the result of an error in application or an unexpected accident, or it may arise as a result of repeated injury to the same place, which leads to serious injury if it continues to occur.

Hence the need to use modern means and techniques to treat and rehabilitate sports injuries and rehabilitate the injured faster and better. The nature of sports is to perform with maximum effort during competition or training, making some of its players more vulnerable to injury. As a result of research, scrutiny, and review of previous studies, as well as scientific study, the researcher found that studying shoulder injury is one of the important matters that must be studied carefully and seriously. Shoulder injury is one of the important and complex injuries that have many causes, including the player's neglect of a good warm-up, as well as the tools used in training. How to apply the exercises in the training unit: Friction while playing.

1.1 Research problem

The research problem lies in answering the following questions

Do rehabilitative exercises, combined with ice massage, have a role in treating the deltoid muscle of the shoulder joint and gradually returning the muscle to what it was before the

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injury?

1.2 Research objectives

1. Preparing rehabilitation exercises using (ice massage) to rehabilitate a torn deltoid muscle injury in athletes.
2. Identify the effect of rehabilitation exercises with the use of ice massage on deltoid muscle tears in athletes.

1.3 Research hypotheses

There are statistically significant differences between the pre- and post-tests, in favor of the post-test in qualifying athletes for a torn deltoid muscle.

1.4 Research fields

1.4.1. Human field: Players with a torn deltoid muscle.

1.4.2. Time field: From 1-2-2023 to 31-7-2023.

1.4.3. Spatial field: Sports halls, stadiums, and Al-Hussein Teaching Hospital/Physical Therapy Department in Diwaniyah.

2. Research methodology and field procedures

2.1. Research Methodology

The method is the method followed by the researcher in studying the problem for the purpose of discovering the truth. One of the first steps that the researcher takes when carrying out the research is to choose the method that suits the nature of the research problem. Accordingly, the researcher used the

experimental method by designing the two experimental groups in order to suit the nature of the research problem.

2.2. Community and sample research

The researcher identified his research population, which consisted of players with rupture of the deltoid muscle for various sporting events from clubs in Diwaniyah Governorate, who numbered (8) injured. These players were obtained by distributing questionnaire forms to the coaches and players of those clubs, as well as to specialized clinics, consultations, and private and governmental physical therapy centers. In a random manner, this sample was divided into two experimental groups, with (4) injured people for each group. The first experimental group, in which the muscle was rehabilitated through rehabilitation exercises with the use of an (EMS) device, and the second experimental group, in which the muscle was rehabilitated during rehabilitation exercises with ice massage.

2.2.1 Sample homogeneity

Homogeneity was carried out in order to prevent influences that could affect the research's findings due to the individual differences present in the injured players and to obtain a single and equal level for the sample in the variables examined, which are thought to be influential in the experiment and which must be controlled. Tables (1) (2)) demonstrate this.

Table 1: Shows the homogeneity of the members of the first experimental group:

Variables	Measuring unit	Mean	Std. Deviation	Median	Skew ness	Sig type
Maximum strength	Kg	4.25	1.708	4.50	-0.753	Homogeneous
Forward bend	Degree	119.25	2.217	119.00	0.482	
Tide back	Degree	20.25	2.754	20.50	-0.323	
Keep away	Degree	118.75	2.986	119.00	-0.423	
Rounding	Degree	15.25	3.304	15.00	0.229	
Rotate inward	Degree	90.25	4.113	90.50	-0.356	
Rotate out	Degree	42.25	9.430	40.50	0.958	

Table 2: Shows the homogeneity of the members of the second experimental group:

Variables	Measuring unit	Mean	Std. Deviation	Median	Skew ness	Sig type
Maximum strength	Kg	3.75	0.957	3.50	0.855	Homogeneous
Forward bend	Degree	119.00	4.690	118.50	0.543	
Tide back	Degree	20.75	2.217	21.00	-0.482	
Keep away	Degree	119.50	2.646	119.00	0.864	
Rounding	Degree	15.75	1.708	15.50	0.753	
Rotate inward	Degree	89.75	6.702	90.50	-0.615	
Rotate out	Degree	41.50	10.279	40.50	0.574	

We note from Tables (1) and (2) that the sample members of the first and second experimental groups were homogeneous in the tests, as the skewness coefficient for the values was limited to (± 1), as ((Whenever this value is zero or close to that, it indicates that there is homogeneity. Stronger) (Wadiah Yassin Al-Tikriti: 1999, p. 178) ^[14]

2.3 Methods, devices and tools used in the research

Research tools are "the means by which the researcher can collect data and solve his problem to achieve the research objectives, regardless of the tools, including data, samples, and devices" (Wajih Mahjoub: 1988: 133) ^[12].

2.3.1 Means of collecting information

- Data dump form.
- Arab and foreign sources and references.
- Personal interviews.

- Note.

2.3.2 Devices and tools used in the research

- Weights of different weights from (1 kg - 25 kg).
- 2 rubber ropes.
- Medical examination bed.
- Electronic stop watch.
- EMS device.
- Medicine balls of different weights.

2.4 Diagnosis of the injury

The infection is diagnosed by a specialist doctor through a clinical examination, where a special form is prepared for each patient, and among the clinical signs observed during the examination are:

1. Severe pain in the affected area, especially when moving the arm.

2. Pain when raising the arm upwards.
3. There is redness in the affected area.
4. An increase in the temperature of the affected area as a result of bleeding.

Then an X-ray is taken, because such an injury may lead to a tear in the area of origin in breaking a piece of bone. After that, an A-R-M ray is taken. It has an effective role in the accurate diagnosis process, and through clinical examination and X-ray, the injury was determined to be of the (Moderate) type, which is not severe.



2.5 Physical therapy methods used

2.5.1 Device (EMS)

The researcher used an electrical stimulation (EMS) device (JR-309A).

Device description

There is a keyboard on the device and a group of buttons on both sides, including the buttons on the right side

- The button (from the top on the right side) is used to increase and decrease frequencies.
- The (Press) button is used for regular pulses.
- The Rub button is used to massage the muscle.
- The Vibrate button is used for high and fast pulses.
- The (Thump) button is used for continuous pulses.
- The (+) button is used to increase the time.
- The button (—) is used to decrease the time

As for the group of buttons on the left side

- The Shoulder button is used when stimulating the shoulder muscles.
- The Waist button is used when stimulating the abdominal muscles.
- The Joint button is used when stimulating any ligament in the body.
- The Hand & Foot button is used to stimulate the hand and foot muscles.
- The (Leg) button is used when stimulating the leg muscles.
- The (Repeat) button: This button is used when we want to re-stimulate the muscle again with the same programming that was established. This button is used frequently after rest and repetition.

Method of work

The tapes are placed on the muscles to be stimulated, such that they are placed on the origin of the muscle, its antrum, and on each side. The electrical stimulation (EMS) begins according to the intensity and time specified in the rehabilitation curriculum.

2.5.2 Massage with ice

Ice bags were used, as the bags contain a powder that is transformed by shaking and pressure into a liquid inside the

nylon bag at a very low temperature. It is placed on the shoulder according to the time specified in the rehabilitation curriculum.

2.6 Determine the research variables and their tests

After reviewing the sources and previous research, it was agreed with the supervisor on the variables that the researcher would need, which were:

- Maximum strength.
- Shoulder joint range of motion (basic movements).

First - describe the strength test of the deltoid muscle of the shoulder joint

Test objective: to measure the strength of the deltoid muscle.

Tools: Dumbbells of different weights (1-20) kg, a bench, a whistle, and ropes.

Performance specifications: The athlete sits upright on the bench with the chest area tied to limit his movement during the performance. The injured person carries a certain weight and performs a forward movement.

Registration the degree: The highest weight that the injured person can lift to the point of feeling pain through the movement (stretching forward).

Second - An explanation of the test used to gauge the shoulder joint's range of motion (basic movements)

The test aim: To gauge the shoulder joint's range of motion during the fundamental six motions.

Tools used: Angle.

Description of the test: In order to quantify the range of motion of six distinct motions, the affected individual does the test, which were as follows:

- Forward bending, the normal range is from (0 - 180) degrees.
- Extending backwards, the normal range is (45 - 0) degrees.
- Dimensions normal range from (0 - 180) degrees.
- The normal range approximates from (0-45) degrees.
- Inward rotation, the normal range is (0 - 180) degrees.
- External rotation, the normal range is from (0 - 180) degrees.

Registration: The degree of angles of the movements is recorded in the player's form as he performs these movements to the maximum range of motion that the joint can reach, stopping when he feels pain.

2.7 Main experiment

2.7.1 Pre-test

The researcher conducted the pre-test in the strength test and the range of motion test for members of the research sample consisting of two groups during the period 19/2/2023 - 22/6/2023, as the tests were carried out for each player individually, and all tests were at exactly ten thirty in the morning. In the (Physical Therapy Hall) at Al-Diwaniyah Teaching Hospital, the researcher deliberately fixed the conditions related to the pre-test in terms of time, place, tools used, method of implementation, and the supporting work team in order to provide the same conditions in the post-test. The players were tested with (the muscular strength test - Motor range test).

2.7.2 Qualifying program

The rehabilitation exercises were applied on 2/2/2023 until 9/7/2023, as the recovery of injured players was not in one period, as the rehabilitation exercises were applied with the use of the (EMS) device on the first experimental group, while the second experimental group applied the rehabilitation exercises with the use of ice massage. The prepared exercises were applied in the physical therapy unit at Al-Diwaniyah Teaching Hospital. The researcher intended to include the following components of the rehabilitative

exercises:

- The application of the rehabilitation program took (6) weeks, at a rate of (3) units per week, and was applied on days (Sunday - Tuesday - Thursday), bringing the total number of rehabilitation units to (18) units.
- The first and second weeks of the first experimental group included EMS device sessions only, without the use of rehabilitation exercises. Thus, the number of EMS device sessions reached (6) sessions.

Table 3: Shows the rehabilitation program for the EMS device for the first group:

Week	Session number	Session duration	Wave type	Wave shape	Wave intensity
First	First	10 min	1.8 superficial	Choppy	Medium
	Second	10 min	1.8 superficial	Choppy	Medium
	Third	10 min	1.8 superficial	Choppy	Medium
Second	Fourth	10 min	1.8 superficial	Choppy	Medium
	Fifth	10 min	1.8 superficial	Choppy	Medium
	Sixth	10 min	1.8 superficial	Choppy	Medium

The first and second weeks of the second experimental group included ice massage sessions only, without the use of rehabilitation exercises. Thus, the number of ice massage sessions reached (6).

Table 4: Shows the rehabilitation program for ice massage for the second group:

Week	Session number	Session duration
First	First	12 min
	Second	12 min
	Third	12 min
Second	Fourth	6 min
	Fifth	6 min
	Sixth	6 min

- The rehabilitation exercises were applied from the third week to the sixth week, for a period of four weeks, as the number of rehabilitation units reached (12) units.
- The researcher took into account the principle of diversity in rehabilitation exercises.
- The researcher took into account the fluctuation in the distribution of intensity between weeks, units, and rehabilitation exercises, as the fluctuation was (1:1).
- Rehabilitation exercises were applied at an intensity of (30-90%).
- The intensity was extracted 100% for each exercise and for each player separately, noting that the weights ranged from body weight 1 kg - 50 kg.
- The researcher took into account the progression from easy to difficult in the exercises.
- The nature of these exercises was with and without weight, with rubber ropes and different weights.

- At the beginning of the training units, exercises were performed with body weight, then weights were added to ensure the correct technique in the exercise.
- The rehabilitation units were applied by the researcher to the two experimental groups in the main section and immediately after the warm-up so that the player could have a level of physical readiness and neuromuscular compatibility to achieve the goal of the proposed exercises.

2.7.3 Post-test

After completing the implementation of the rehabilitation program, the researcher conducted the post-test on the players of the two experimental groups, which numbered (8) injured players. The researcher conducted the post-test for the first injured person on Sunday 19/3/2023 - and on 31/7/2023, which is the date of completion of the post-tests for the last one. He was injured. This was at exactly 10:30 in the morning in the (Physical Treatment Hall) at Al-Diwaniyah Teaching Hospital, taking into account the time and place conditions and the methods used in the pre-test. The players were tested with (the muscular strength test - the range of motion test).

2.8 Statistical methods used in the research: The researcher used the statistical package (SPSS) to obtain data.

3. Presentation, analysis and discussion of the results

3.1 Presenting, analyzing and discussing the results of the pre- and post-tests for the first experimental group

3.1.1 Presentation and analysis of the results of the muscular strength test for the first experimental group

Table 5: Shows the differences between the pre- and post-tests in the muscular strength test for the first experimental group:

Test	Measurement units	Pre-test		Post-test		T value	Sig level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation			
Muscular strength	Kg	4.25	1.708	15.00	2.160	6.317	0.008	Sig

3.1.2 Presentation and analysis of the results of the motor range test for the first experimental group

Table 6: Shows the differences between the pre- and post-tests of the motor range test for the first experimental group:

Test	Measurement units	Pre-test		Post-test		T value	Sig level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation			
Forward bend	Degree	119.25	2.217	179.25	1.50	33.717	0.000	Sig
Tide back	Degree	20.25	2.754	43.00	2.160	10.851	0.002	Sig

Keep away	Degree	118.75	2.986	177.25	1.258	35.277	0.000	Sig
Rounding	Degree	15.25	3.304	44.25	0.957	19.702	0.000	Sig
Rotate inward	Degree	90.25	4.113	179.00	1.414	35.559	0.000	Sig
Rotate out	Degree	42.25	9.430	178.75	2.50	30.333	0.000	Sig

3.1.3 Discussion of the results of the first experimental group

We note from Tables (5) and (6) that the results achieved for the maximum strength and range of motion tests for the first experimental group achieved significant differences in favor of the post-test. The researcher attributes the development that occurred to the effectiveness of the electrical stimulation sessions in addition to the rehabilitative exercises.

In applying the curriculum for this group, the researcher relied on sessions using the (EMS) device in an ideal way through organizing between the operation of the device and the use of exercises, despite the fact that treatment using the (EMS) device is one of the modern rehabilitation methods that works on rehabilitation according to the type of injury without any operations. Surgery, in addition to providing the treatment technique with the (EMS) device, which is a radical treatment for the pathological problem and not just relief for the symptoms of the disease only (Scientific studies have proven that treatment with the low-level (EMS) device involves applying coherent low-light energy to the lesions, stimulating healing and alleviating pain and injuries, the rehabilitative exercises used by the researcher are also important in developing the level of strength, as well as improving the range of motion of the basic movements of the shoulder after the injury, as the level of motor performance of the muscles working on the shoulder joint was raised through them, and through follow-up and progression of exercises from easy to difficult, the injured were able to quickly return to normal. Practicing their specialty and practicing normal daily life activities). (Abu Al-Ala Abdel Fattah, 2004, p. 63) ^[1].

Thus, therapeutic exercises for rehabilitation offer both medical and psychological care. One of the things that rehabilitation programmes do is giving the wounded individual the motivation to seek treatment by enabling them to execute many daily actions with confidence and power in their affected joints and muscles. Those interested in the affairs of therapeutic physical exercises after physical injury consider flexibility exercises to be among the essential factors important for maintaining the individual's health and increasing the flexibility of the body's joints, including the shoulder joint, which plays an important role in body movements. Therefore, rehabilitative therapeutic physical exercises have worked to reduce the limitation of movement of the shoulder joint after injury. And increase its flexibility. The researcher also attributes the advantage of physical exercises to the fact that the program clearly gave the specificity of the shoulder joint, as the exercises were developed on this basis, given that we know that the shoulder joint is characterized by free movements and in different directions, and that the researcher took these movements into account while developing the program so that it is consistent with the nature of the movement of the joint, as well as The interaction and organization between the use of the EMS device and rehabilitation exercises had an effective effect in speeding up the recovery of the injured.

3.2 Presenting, analyzing and discussing the results of the pre- and post-tests for the second experimental group

3.2.1 Display and analyze the results of the muscular strength test for the second experimental group

Table 7: Shows the differences between the pre- and post-tests in the muscular strength test for the second experimental group:

Test	Measurement units	Pre-test		Post-test		T value	Sig level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation			
Muscular strength	Kg	3.75	0.957	9.75	1.708	6.000	0.009	Sig

3.2.2 Presentation and analysis of the results of the motor range test for the second experimental group

Table 8: Shows the differences between the pre- and post-tests of the motor range test for the second experimental group:

Test	Measurement units	Pre-test		Post-test		T value	Sig level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation			
Forward bend	Degree	119.00	4.690	175.25	1.258	20.921	0.000	Sig
Tide back	Degree	20.75	2.217	37.75	1.50	11.549	0.001	Sig
Keep away	Degree	119.50	2.646	173.25	1.708	26.667	0.000	Sig
Rounding	Degree	15.75	1.708	40.00	1.826	13.857	0.001	Sig
Rotate inward	Degree	89.75	6.702	174.25	1.708	22.225	0.000	Sig
Rotate out	Degree	41.50	10.279	172.75	1.893	21.856	0.000	Sig

3.2.3 Discussion of the results of the second experimental group

We note from Tables (7) and (8) that the results achieved for the maximum strength and range of motion tests for the second experimental group achieved differences with significant significance and in favor of the post-test. The researcher attributes the development that occurred to the effectiveness of rehabilitation with ice compresses that were used in the first and second weeks in addition To rehabilitative exercises, ice compresses are used before performing therapeutic exercises to relieve the pain resulting from movement as a result of organizing tissues after they are

destroyed. This leads to improving the range of motion and strength in the affected joints, as rehabilitation exercises led to the activation of muscles, tendons and ligaments after there was a lack of movement, and use as a result of injury, and treatment with rehabilitative exercises helps stimulate the muscle and return it to its normal position, as the recovery rate is rapid. It uses exercises to increase speed, quality and strength, and is given to relieve pain. It is clear from this that the use of rehabilitation exercise therapy gave better results when compared to treatment methods, which led to a noticeable improvement in the flexion movement of the experimental group. The affected muscle also obtained a

sufficient amount of strength and flexibility, which in turn led to an improvement in the angle of the joint, as the joint’s mobility increases as the flexibility in the muscle working on that joint increases.

Also, “obtaining a sufficient amount of flexibility for the muscles, tendons, and ligaments of a particular joint or group of joints in a particular movement or activity depends on the amount and intensity of exercises performed in a wide range of motion, as well as the degree of previously acquired flexibility of the individual.”

The exercises that he used had a role in developing the angle of the shoulder area for each of the movements, as well as following the undulations in the load during one week was

one of the important factors that accelerated the improvement through the intensity and volume used, which led to good and noticeable growth in the area that was exposed to the injury, as the “Every increase in the training load through intensity and volume is matched by an increase in the practical ability of the organic systems to ensure their growth and development”.

3.3 Presentation, analysis and discussion of the results of the post-test for the two experimental groups

3.3.1 Display and analyze the results of the muscular strength test for the two experimental groups in the post-test

Table 9: Shows the differences in the posttest between the two experimental groups in the muscular strength test:

Test	Measurement units	Experimental (1)		Experimental (2)		T value	Sig level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation			
Muscular strength	Kg	15.00	2.160	9.75	1.708	5.250	0.009	Sig

3.3.2 Presenting and analyzing the results of the motor range test for the two experimental groups in the post-test

Table 10: Shows the differences in the posttest between the two experimental groups in the motor range test:

Test	Measurement units	Experimental (1)		Experimental (2)		T value	Sig level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation			
Forward bend	Degree	179.25	1.50	175.25	1.258	4.086	0.006	Sig
Tide back	Degree	43.00	2.160	37.75	1.50	3.992	0.007	Sig
Keep away	Degree	177.25	1.258	173.25	1.708	3.771	0.009	Sig
Rounding	Degree	44.25	0.957	40.00	1.826	4.123	0.006	Sig
Rotate inward	Degree	179.00	1.414	174.25	1.708	4.284	0.005	Sig
Rotate out	Degree	178.75	2.50	172.75	1.893	3.827	0.009	Sig

4. Discussion of the results of the post-test for the two experimental groups

We note from Tables (9) and (10) that the results achieved for maximum strength and range of motion tests in the post-test between the first and second experimental groups, as the results indicated the superiority of the first experimental group, which used treatment with an EMS device and rehabilitation exercises, over the members of the second experimental group, which I used ice massage therapy and rehabilitative exercises, and the results were superior to the maximum strength results as well as the results of the basic movements of the range of motion of the shoulder joint.

The results obtained by the researcher in the post-test and for the first experimental and second experimental groups in the variable of strength as well as the range of motion showed an improvement in it. The researcher attributes this improvement to the physical therapy devices used in the physical therapy center, which are (EMS) and (ice massage), as these worked Precise means at the beginning of the rehabilitation approach to get rid of damaged cells, as well as ensuring good blood supply to the affected area due to its chemical, dynamic and thermal effects.

It affects the flow of cell components from their walls and raises the rate of protein synthesis, which leads to the treatment of damaged tissue that has been exposed to injury, which leads to the amount of blood reaching the affected area being sufficient. (Thus, it reduces inflammation by increasing the amount of white blood cells.) (Fouad Al-Samarrai and Hashim Al-Samarrai, 2020, p. 221) [10] Which led to an improvement in strength and range of motion, but in a way that is not comparable to the first experimental group because the exercises used by the experimental group were developed in a way that is compatible with the muscles working on the spinal regions in general and the lumbar region in particular.

The researcher attributes this development to the fact that the low-power (EMS) device helped relieve pain and speed up the healing process, which had a significant impact in increasing the effectiveness of the shoulder joint’s work, which resulted in a noticeable increase in the amount of muscle strength of the deltoid muscle working on the shoulder joint. Rehabilitation exercises also led to a noticeable development in the range of motion and muscular strength of the deltoid muscle, as the use of special exercises in the type of specialized activity leads to an increase in muscular strength by a greater percentage than its counterparts.

The increased development in the range of motion variables and muscle strength of the working deltoid muscle is the result of the researcher’s use of various programs, as the first and second weeks included programs for the low-power (EMS) device that focused primarily on the deltoid muscle, especially the affected part, because of its importance in preventing the occurrence of Injury, as the ability of the waves in the (EMS) device is low in power and its effectiveness in influencing the body’s systems, which is characterized by its effective work interconnected with special exercises, which showed good results in the research variables studied.

Therefore, when referring to the strength variable, we find that the program gained significance when combining the two special programs (Low-power EMS) and special exercises. This correlation in muscular strength helps to develop this trait in a proportional manner.

EMS devices work through the thermal oscillations they produce as they penetrate the tissues to reach the area of injury, where they work to relax the affected area and stretch the tendon of the muscle, i.e. the origin, which increases the range of motion of the joint on which the injured muscle works, as these waves have a high ability to be absorbed. At

the interfaces of tissues and optionally absorbed at the periosteum, it is therefore used to treat tendons and muscles, which increases the range of motion” (Samia Khalil, 2010, p. 74) [6].

The researcher also attributes that practicing rehabilitative exercises after using devices or physical therapy methods led to the affected part returning to its normal position before the injury occurred, which was matched by a significant increase in flexibility and muscle strength, and this was confirmed by Aed and Aref (That physical activity can have a great effect). It helps in relieving pain and developing the function of affected joints, as physical activity works to strengthen muscles and tissues, increase flexibility in joints, improve a particular condition, and increase bone density, in addition to developing the range of motion in the joints and the individual’s feeling of good health.

Also, exercises help in the possibility of developing joint flexibility using positive and negative flexibility exercises”

The researcher attributes the reason for this development in general to the nature of the proposed rehabilitation program to rehabilitate the muscles surrounding the lumbar region, which relied on increasing the gradual range of motion to perform exercises that lead to improving flexibility, as well as by increasing the number of repetitions in each training unit during the duration of the program’s implementation. The quantity and quality of exercises done across a wide range of motion determines how flexible the muscles, tendons, and ligaments of a certain joint or set of joints are during a given action or sporting event.

Rehabilitation exercises also helped eliminate motor limitations. The flexibility and strength they gain for the joints, ligaments and muscles, and in the event of lack of training, the cartilage tissues lose their elasticity as they become rigid and contractile (Jamil Hanna, 1998, p. 12) [5]. This shortens the range of motion in the joint, reducing the muscle’s efficiency and also causing some muscle injuries.

5. Conclusions and recommendations

5.1. Conclusions

1. The EMS device, as well as ice massage, along with rehabilitative exercises, contributed to the rehabilitation and treatment of the shoulder joint.
2. Both experimental groups showed development and improvement in maximum strength and range of motion of the shoulder joint after applying the prepared curriculum.
3. The first experimental group, which used the EMS device in rehabilitation during the first and second weeks, showed clear superiority over the members of the second experimental group, which used ice massage in rehabilitation during the first and second weeks.
4. The first experimental group that used rehabilitation with the EMS device was more responsive to treatment and thus showed faster improvement than the second experimental group.
5. The rehabilitation exercises prepared by the researcher contributed to improving muscle flexibility and muscle strength and thus led to a clear improvement in the range of motion in the basic movements of the shoulder joint.

5.2 Recommendations

1. It is necessary to pay attention to warming up before starting to perform, especially for the muscles that serve the skill.
2. The player must perform strength exercises to strengthen

the muscles of the shoulder joint in order to reduce the chance of injury.

3. The necessity of treating the injury the moment it occurs. This leads to accelerating the healing process by using physical therapy devices according to the type of injury, as well as developing appropriate and scientifically well-studied therapeutic exercises based on the intensity and extent of their impact on the affected area.
4. It is necessary to use the EMS device at the beginning of such an injury to get rid of the pain, tumor, and damaged cells, and then practice rehabilitative exercises.
5. It is necessary to use ice massage at the beginning of such an injury to get rid of the pain, tumor, and damaged cells, and then practice rehabilitative exercises.

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