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Huda Majid Rashid

Assistant Lecturer, General
Directorate of Education in
Kerbala, Ministry of Education,
Iraq

Bahaa Kaseb Abbas

Assistant Lecturer, General
Directorate of Education in
Kerbala, Ministry of Education,
Iraq

M Dheyaa M Ali Abdulhussein

Assistant Lecturer, General
Directorate of Education in
Kerbala, Ministry of Education,
Iraq

The effect of using paraffin wax and exercises to rehabilitating the rupture of muscles supporting the wrist joint for advanced handball players

**Huda Majid Rashid, Bahaa Kaseb Abbas and M Dheyaa M Ali
Abdulhussein**

Abstract

In the introduction to the research, the researchers pointed out the importance of sports medicine's contribution to protecting players from injuries that may become an obstacle to the player's progress. The problem of the research lies in the lack of research used in the rehabilitation of injuries to the muscles supporting the wrist joint for handball players and the lack of interest for some coaches and players with this injury. The researchers considered conducting an experimental study to rehabilitate the injuries of the muscles supporting the wrist joint for handball players, which includes rehabilitative means, the study aimed to (preparing a program using paraffin wax and exercises to rehabilitate the rupture of the muscles supporting the wrist joint), and the research hypothesis is (there is a positive effect of using paraffin wax and exercises in the rehabilitation of the torn muscle supporting the wrist joint, and the researchers used the experimental approach in the manner of equivalent groups with pre-posttest, while the research community included the advanced handball players in the Kerbala governorate clubs, and the research sample was (5) athletes. Where the group takes a paraffin wax program with qualifying exercises, and after conducting tribal tests to find out the extent of injury for each player, the program followed in order to reach the results through which the research objectives are achieved, the data was presented, analyzed, discussed and processed statistically using the non-parametric test, the most important of which is the Mann Whitney test and through the results, the researchers reached several conclusions, the most important of which (the results showed that there is an effectiveness in the rehabilitation program using paraffin wax to improve the range of motion and reduce the degrees of pain).

Keywords: Paraffin wax, rehabilitating, rupture

1. Introduction

The world is witnessing a development in various fields of sporting events, especially in the field of sports injuries, because it is the basis for protecting players in various games to preserve the great effort through training and not to lose it due to injury that may occur to players and stand as an obstacle in front of him in completing a march in the game he practices, to reach the achievements which it achieves, whether at the level of local, Asian or international tournaments and for various games, and after the developed countries of the world have developed great capabilities to raise the level of sports by advanced scientific methods through which the technical and physical capabilities of all players can be invested, which made them reach the highest levels, achieve achievements and obtain medals, and this did not come by chance, but came as a result of using modern scientific means and methods in training with the help of sciences related to sports activity, including medical sciences and rehabilitation methods.

Sports medicine has contributed to protecting players from injury, as stadium injuries may turn into negative psychological effects on the player that prevent the development of his achievement, and it is the responsibility of sports workers, including coaches, to protect players from injuries by strengthening the muscles that surround the joints used in specialized sports. As well as returning the players to the stadiums quickly and at the same previous level, and this is done by knowing the types of injuries, the causes of their occurrence and the best methods used to prevent them. And the lack of attention by players and coaches to the causes

Corresponding Author:

Huda Majid Rashid

Assistant Lecturer, General
Directorate of Education in
Kerbala, Ministry of Education,
Iraq

of injuries and how to avoid them may waste the entire effort by the player during training because of the injury to him.

The injury to the rupture of the muscles supporting the wrist joint is one of the sports injuries that occur frequently in handball players, and this injury may occur as a result of overloading in training, incorrect use of the joint, or excessive exercise without prior warm-up, which leads to increased pain, and may cause injury to the wrist joint of players to an extent that may prevent them from playing the game, so the importance of the research lies in developing a rehabilitation program for injuries of the muscles supporting the wrist joint of handball players for the purpose of preparing them well so that they can return to practicing their sports activities.

1.1. Research problem

Today, the game of handball occupies an important place in the sports field, as it has become practiced in all countries of the world, and this game has become a lot of fans because of the skills it contains, and that these skills, like other skills in other events, may suffer from obstacles that hinder its progress for the better, and among those obstacles are injuries sports, handball players are exposed to many injuries in the wrist joint as a result of overloading and repetitive use of the wrist, whether by passing, scoring or receiving the ball and beyond its range of motion or as a result of friction with the opponent and direct fall on the wrist of the hand, or it may be due to technical errors or poor organization In the training load or the lack of preparation of the internal body systems and the loss of coordination between the muscle groups involved in skills, which puts great pressure on the joint, which leads to a change in the range of motion and its path and causes injuries to the wrist joint. Due to the lack of interest of some coaches and players in these injuries, the researchers decided to contribute to the rehabilitation of injuries to the torn muscles supporting the wrist joint for handball players, in which rehabilitation methods are used using paraffin wax and exercises in order to speed recovery and return to training and competitions in a short period of time to become more likely to achieve advanced results It is a scientific attempt to develop solutions to this problem.

1.2 Research objective

- Preparing a program using paraffin wax and exercises to rehabilitate the rupture of the muscles supporting the wrist joint
- Recognizing the effect of the paraffin wax program and exercises in rehabilitating the rupture of the muscles supporting the wrist joint

1.3 Research hypothesis

There is a positive effect of the use of paraffin wax and exercises in the rehabilitation of the rupture of the muscles supporting the wrist joint.

1.4 Research fields

1.4.1 The human field: Advanced handball players with rupture of the muscles supporting the wrist joint in Kerbala governorate clubs.

1.4.2 Time field: from 1/12/2021 to 1/4/2022.

1.4.3 Spatial field: The closed hall (Al- shaheed Al- Hakeem).

2. Research methodology and field procedures

2.1 Research Methodology

The researchers used the experimental method in the style of equal groups of measurement (pre- and post-measurement) because it is commensurate with the nature of the research procedures. "Given that the experimental research is characterized by precision and control over the studied variables so that some of them cause an intentional change and control other variables, it is considered the only researcher's approach that explains the relationship precisely between the effect and the cause".(Allawi, Muhammad Hassan & Ratib, Osama Kamel,1999, p. 104) ^[1]

2.2 Community and sample research

The research community included athletes with wrist injuries in the handball game within the clubs of Karbala Governorate, which numbered (15) players. The injury was diagnosed by a physician specialized in rehabilitation and physiotherapy at Al-Hussein General Hospital in the holy city of Karbala, and accordingly, the sample was chosen by (5) players who had a rupture of the muscles supporting the wrist joint.

2.3 The means, tools and devices used in the research

It is the method, method, or mechanism that the researcher uses to collect data and evidence and the method of analyzing them, or it is the method of implementing the method and methodology chosen by the researcher.(Shea, Muhammad, 2008, p. 168) ^[2]

2.3.1 Research Methods

- Observation.
- Questionnaire.
- Testing and measuring.

2.3.2 Equipment and tools used

- Measuring range of motion for the wrist joint (joniometer).
- Paraffin wax.
- Sony camera.

2.4. Determine the search variables

2.4.1. Procedures for determining kinetic range

The range of motion of the wrist joint should be measured and determined until the appearance of pain, so the researchers used a goniometer, which by means of which the angle and degree of pain in the research sample were identified, and then determined by the degree of pain form as shown in Appendix (2).

2.4.1.1 Description of the tests used

First: Tests of the variable angles of the wrist joint

A. Forearm and palm up

- a) The position of the injured: The injured player grabs a pen and the elbow joint is at 90°.
- b) The arm is fixed: parallel to the ground.
- c) The axis of the device: the head of the joint of the third metacarpal bone, which is the axis of the device is in the direction of the third metacarpal bone.
- d) Arm movement: parallel to the pen.
- e) Movement: From the neutral position (the pen is perpendicular to the ground) the forearm rotates to the outer side (upwards, i.e. the palm of the hand is upwards).
Angle Ratio (0-90°).

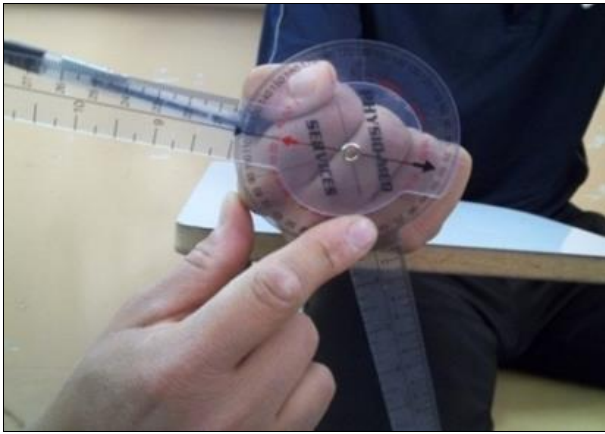


Fig 1: Shows the forearm and palm upwards.

B. Forearm and palm down

- The position of the injured: The injured player grasps a pen and the elbow joint is at an angle of 90° .
 - The arm is fixed: parallel to the ground.
 - The axis of the device: the head of the joint of the third metacarpal bone, which is the axis of the device is in the direction of the third metacarpal bone.
 - Arm movement: parallel to the pen.
 - Movement: From a neutral (natural) position, i.e. the pen is perpendicular to the ground, the forearm rotates to the body, i.e. the palm of the hand is down.
- Angle Ratio (0-80-85°).



Fig 2: Shows the forearm and palm down

C. Bend the wrist

- The position of the casualty: palms facing up and forearms on a table.
 - The arm is fixed: the long axis of the ulna.
 - Axis of the device: ulna protrusion.
 - Arm movement: the long axis of the fifth metacarpal junction.
 - Movement: the fingers are flat and relaxed, and the palm of the hand is moved towards the inside of the wrist.
- Angle Ratio (0 - 90°).

D. Wrist extension

- The position of the casualty: palms up and forearms on a table.
 - The arm is fixed: the long axis of the ulna.
 - Axis of the device: ulna protrusion.
 - Arm movement: the long axis of the fifth metacarpal joint.
 - Movement: the fingers are relaxed and extended, the wrist is extended by the movement of the back of the hand towards the back of the wrist.
- Angle Ratio (0 - 70°).

E. Curvature in the direction of the radius

- The position of the casualty: palms up and forearms on a table.
 - The arm is fixed: the metacarpal line on the forearm.
 - Axis of the device: above the largest carpal bone on the dorsal surface.
 - Arm movement: the long axis on the third metacarpal joint.
 - Movement: the thumb half with the hand, then the hand moves to the radial side.
- Angle rate (0- 20°).

F. Flexion in the direction of the ulna bone

- The position of the casualty: palms up and forearms on a table.
 - The arm is fixed: the metacarpal line on the forearm.
 - Axis of the device: above the largest carpal bone on the dorsal surface.
 - Arm movement: the long axis on the third metacarpal joint.
 - Movement: From the neutral position, we move the hand in the direction of the ulnar side.
- Angle rate (0- 30°).

2.5 Experimental experience

The exploratory experiment is one of the necessary measures that were adopted by the researchers before the main experiment in order to ensure the research tools and the adequacy and ability of the assistant work team to use the tools and devices, and to get rid of the obstacles that researchers may face during the implementation of the main experiment, Therefore, the researchers conducted an exploratory experiment on Thursday, 9/12/2021, on a sample of (2) injured and from the research sample on the handball field in the Al- Shaheed Al-Hakim Hall. Although the tests and measurements were codified and were included in previous Arab and local studies, the researchers sought to re-apply the tests and extract the scientific bases for them, as the tests were re-applied on Wednesday, 22/12/2021.

2.6 Main experience

2.6.1 Pre-test

The researchers carried out the pre-test on Tuesday, 31/12/2021, at five o'clock in the evening on the handball court in the Al- Shaheed Al-Hakim Hall, where the degree of pain was measured according to the movement of the joint through a form prepared for this purpose and as shown in Appendix (2).

2.6.2 Application of the program

Paraffin wax treatment with rehabilitative exercises

The researchers applied the treatment by paraffin wax to players with torn muscles supporting the wrist joint by immersing the wrist joint inside the wax. During that, the player is given rehabilitation exercises inside the wax for a period of (16 minutes) and once a day for a continuous 15 days, and the program that will be used is explained with attachment(3)

2.6.3 Post-tests

The researchers conducted post-tests on the individuals of the research sample on Saturday, 22/1/2022, on the special field in the handball game in the Al- Shaheed Al-Hakim Hall, taking into account the provision of the same spatial and temporal conditions and procedures in the pre-tests.

2.7 Statistical means

The researchers used the statistical bag (spss) for the social sciences to extract the.

- Median.
- Quartile deviation.
- Wilcoxon test.

3. The results are presented, analyzed and discussed

3.1 Presentation of the difference in pre and post-test for the members of the research sample.

For the purpose of achieving the second goal of the study (recognizing the effect of the paraffin wax program and exercises in the rehabilitation of torn muscles supporting the wrist joint), and after completing the implementation of field research procedures, which included pretests, as well as the application of the rehabilitation program and exercises, and the implementation of posttests for the variables investigated on the injured handball players, after obtaining the data, unpacking and processing it statistically to ensure that the

objectives of the research were determined and its hypotheses tested, the results were analyzed and discussed for all angles covered by the research, as the researchers sought to adopt the following contexts

3.1.1 Presenting, analyzing and discussing the results of the pre and post-test teams for the members of the paraffin wax and exercises group

In order for the researchers to be able to identify the difference between the pre and post-test of the members of the research sample, the researchers sought to treat the data of the pre and post-test statistically and extract the descriptive statistics indicators represented by the median and the quartile deviation of the data and the form of the investigated variables (angles), then he used the Wilcoxon test for the interrelated samples as a statistical means to achieve this the purpose, standing, and inferring the significance of the difference between the two tests, and Table (1) shows that

Table 1: It shows the values of the median, the quartile deviation, the calculated and tabular (Wolcoxon) values, and the significant significance of the pre and post-test of the paraffin wax group.

Variables	Measuring unit	Pre-test		Post-test		Wilcoxon value		Sig type
		Median	Quartile deviation	Median	Quartile deviation	Calculated	Tabular	
Forearm and palm up	Degree	49	7.3	78	8.71	-2.031	0	Sig
Forearm and palm down	Degree	62	5	73	5	-2.030		Sig
Wrist flexion	Degree	57	7.2	85	6.22	-2.039		Sig
Wrist extension	Degree	43	3.76	68	2.5	-2.034		Sig
Curvature towards the radius	Degree	15	2.4	19	2.3	-2.232		Sig
Curvature towards the ulna	Degree	15	3.72	23	2.5	-2.068		Sig

4. Discussion

By noting the table (1), it is shown that the value of the median and the Quartile deviations of the results of the pre and post-test of the research sample in the research variables (the forearm and palm up, forearm and palm down, wrist flexion, wrist flatness, curvature towards the radius bone, curvature in the direction of the ulna bone) were different and that there are differences in the degrees of the pre and post-test in favor of the post tests, because the values of the median and quartile deviation and for all tests are greater than the values of the median and quartile deviation of the pretest. When inferring about the significance of the difference, the researchers sought to extract a value for wilcoxon between the pre and post-test and for all the variables investigated, as it appears from the table that the calculated Wolcoxon value is smaller than its tabular value of (zero), which indicates that there is a difference between the pre and post-test. That there is a positive effect of the rehabilitation program and exercises in the post-test, the researchers attribute this change in the speed of recovery and rehabilitation to the injury due to the exercises that were given during the rehabilitation program, which increases the blood supply in the place of injury, as well as to the heat generated by the wax and the ability of the wax to retain heat for a relatively long time, which helps to increase the blood supply in the area of injury and thus helps reduce pain and recover from injury faster, and this is what (Polyvios and *et al*) confirmed, "A paraffin bath is useful in increasing blood circulation and relieving pain, and it prevents skin receptors from all stimuli except for the warmth of paraffin, and the hard layers of paraffin prevent heat leakage". (Polyvios and *et al*, 2016, p. 211) ^[3]

5. Conclusions and recommendations

5.1 Conclusions

1. The results showed that there is effectiveness in the rehabilitation program using paraffin wax and exercises to improve the range of motion and reduce pain degrees for handball players.
2. The prepared rehabilitation program has a positive effect to reduce the rehabilitation period, which was an average of (21 days) when applying the program compared to the rehabilitation period, which was an average of (8 weeks) for other qualifying programs and to ensure the speedy return of the players to their sports activity.

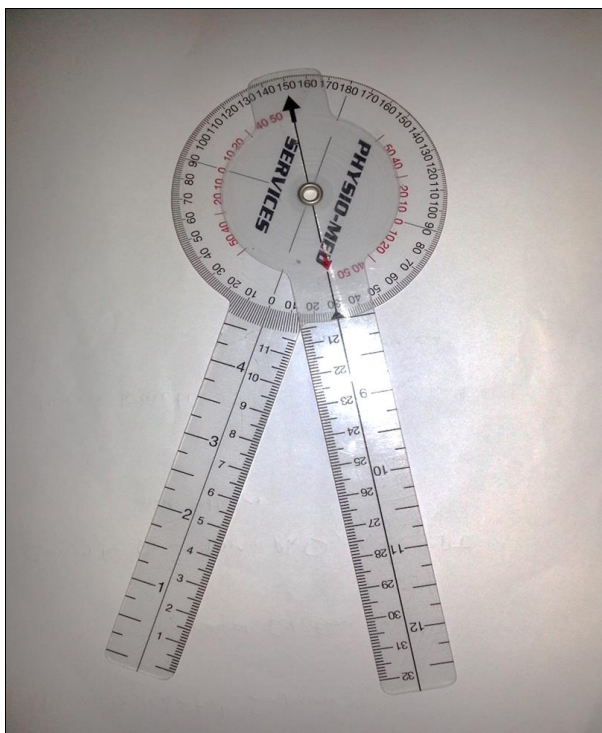
5.2 Recommendations

1. Conducting studies that include the rehabilitation program and the exercises used in the current study on other sports as well as on other joints of the body.
2. Adoption of the paraffin wax program in the treatment of modern injuries that occur to athletes.
3. The player should not participate while he is injured unless he is sure of his final recovery because this exposes him to a recurrence of the injury.

6. References

1. Allawi Muhammad Hassan, Ratib Osama Kamel Physical Education and Sports Psychology, Cairo, Arab Thought House, 1999.
2. Shea Muhammad. Methods of Thinking and Research Rules, 2nd Edition, Beirut, Glory of the University Foundation for Studies, Publishing and Distribution, 2008.
3. Polyvios Kyritsis, Erik Witvrouw, Philippe Landreau. return to the field for football soccer after ACL reconstruction, Aspetar, Doha, Qatar, 2016.

Appendix (1): Goniometer for measuring range of motion



Appendix 2: A questionnaire

N	Test	Angled joint movement	Measuring unit	Pre			Post		
				0	1	Pain angle	0	1	Pain angle
1	Forearm and palm up	0-90°	Degree						
2	Forearm and palm down	0-80-85°	Degree						
3	Wrist flexion	0-90°	Degree						
4	Wrist extension	0-70°	Degree						
5	Curvature towards the radius	0-20°	Degree						
6	Curvature towards the ulna	0-30°	Degree						

Appendix 3: Rehabilitation therapy program (paraffin wax and exercises)

Day	Wax use time	Exercises
First		Rest, ice, elevation and stabilization above heart level
Second		Rest, ice, elevation and stabilization above heart level
Third		Rest, ice, elevation and stabilization above heart level
Fourth		Rest, ice, elevation and stabilization above heart level
Fifth		Rest, ice, elevation and stabilization above heart level
Sixth		Rest, ice, elevation and stabilization above heart level
Seventh	16 second	Static resistance, joint tension
Eighth	16 second	Static resistance, joint tension
Ninth	16 second	Static resistance, joint tension
Tenth	16 second	Static resistance, joint tension
Eleventh	16 second	Static resistance, joint tension
Twelfth	16 second	Joint range of motion, static resistance
Thirteenth	16 second	Joint range of motion, static resistance
Fourteenth	16 second	Joint range of motion, static resistance
Fifteenth	16 second	Joint range of motion, static resistance
Sixteenth	16 second	Joint range of motion, static resistance
Seventeenth	16 second	Joint range of motion, static resistance
Eighteenth	16 second	Joint range of motion, static resistance
Nineteenth	16 second	Joint range of motion, static resistance
Twenty	16 second	Joint range of motion, static resistance
Twenty-first	16 second	Joint range of motion, static resistance