The Effect of Rehabilitative Exercises Using the (CRYO) Cooling Device and the Aqueous Medium on the Hamstring Injury According to the Range of Motion and Some Physical Abilities of the Handball Players

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Abstract

Rehabilitation exercises are one of the most common methods in rehabilitating injured players. These exercises lead to many effects on an athlete's body such as speeding up the drainage of blood pools, preventing hemorrhage, and accelerating the recovery of joints and their return to the internal joint.

Hamstring injury is considered as one of the injuries that occur in the game of handball .It also needs rehabilitation whether it is through exercise or by medical therapeutic means. Rehabilitation should depend on scientific ways in using suitable rehabilitation exercises. It also depends on the using of devices and tests in order to know the level of progress in the qualification .The researcher uses a rehabilitative curriculum . A proposal that includes a CRYO and intra-aqueous exercises to rehabilitate the knee-joint after an injury.

The study aims to prepare rehabilitative exercises by using CRYO device and aqueous medium in rehabilitative hamstring inflammation injury of the posterior hamstring handball players. It also aims to identify the effect of the rehabilitation approach in the hamstring injury for players of handball game. It aims to recognize the differences between the results of the pre-intermediate and post-tests of the variables.

The researcher used the experimental method and designed one experimental group of same size pre , intermediate . and post-term due to its suitability . The experiment depends on the application of the qualifying program CRYO .The researcher used the method of rehabilitative exercises within the aquatic environment . Measurements were repeated four weeks after the implementation of the program . And after four weeks it was conducted .

The results were treated statistically by using SPSS .The researcher reaches to certain conclusions : The rehabilitation program has a major role in increasing the range of motion and muscle strength for the players . The individuals of the research sample has a positive effect on the development and improvement of knee . CRYO program contributes in reducing pain and

eliminating swelling in injured players . The use of different stresses inside the water which positively affected the relief of pain resulting from the injury ..

Chapter 1

- 1 Definition of the research
- 1-2 Introduction and the importance of research:

Rehabilitation exercises in general and in the sports field in particular are considered one of the most influential means in the rehabilitation of injured players. There are indications that these rehabilitative exercises lead to many effects on the athlete's body, including the speed of the drainage of blood clusters and the prevention of internal bleeding in the joint in addition to the acceleration of the recovery of muscles and joints their functional potential and return them to work well. The knee joint is one of the joints exposed to various different injuries, including the hamstring inflammation in the posterior hamstring, which is one of the common injuries to this joint, especially in activities and games that need a quick stop or a sudden change of direction, as well as people who practice jumping sports since the hamstring function is a link between the knee cap (patella) and the leg. The importance of research is to develop exercises to rehabilitate the posterior hamstring infections by using cooling as a (CRYO) device and the water medium, which would rehabilitate the athlete from the injury that hinders him from performing his duties in his specialized sport due to the ease of these methods. In performance and in the desire that it does not lead to pain and to the risks of use as a result of excessive use.

The research problem discusses the back hamstring inflammation injury and the pain and suffering the injured player suffers is represented by limitation and disability, and these pains increase in cases of bending and extending the knee joint or for any movement. Through the researcher's perusal of the physiotherapy units, the researcher found that rehabilitation of the injury is often by therapeutic exercises using traditional methods such as weights, resistors, or ropes, for example, which are often unwanted by the injured who prefer the fastest, easiest and most recent method of rehabilitation such as cooling using a (CRYO) device and a water medium. Because it has a desire and a rehabilitative and psychological effect on the injured athlete, so the researcher decided to use it and develop rehabilitative exercises in a scientifically studied way to rehabilitate the injury by strengthening the muscles surrounding the knee joint in a manner of resistance training exercises with gradual intensity and reducing the duration of rehabilitation because of these cooling devices and aqueous medium in the effectiveness of rehabilitation as well as the desire of the injured player in using it for its juvenile. The objectives of the research are to prepare a rehabilitative curriculum using the (CRYO) cooling device and the water medium in rehabilitating the hamstring inflammatory posterior injury in players with handball, to identify the effect of the rehabilitation curriculum prepared using the cooling device (CRYO) and the water medium in the rehabilitation of hamstring inflammatory injury in the posterior hamstring in players Handball sufferers, identifying the differences between the results, pre-, intermediate and post-tests of the study variables (physical abilities and range of motion) for players with hamstring inflammation in the posterior hamstring with hand reel.

The fields of research

The human field: a sample of the Premier League and first-class players in the southern region of handball with hamstring inflammation in the posterior hamstring for the 2019-2020 sports season.

The temporal domain: for the period from 4/15/2020 until 4/10/2021.

Study sample: Rehabilitation centers, swimming pools and satisfied halls in clubs.

Chapter Two

- 2 Research Methodology and Field Procedures
- 2-1 Research Methodology

The researchers used the experimental method and designed one group of pre, middle and post measurements (1),

2-2 The research community and its sample:

In order to reach accurate scientific results, the researcher conducted a comprehensive field survey of all doctors and surgeons of orthopedic diseases, joints, fractures, and physiotherapy and rehabilitation centers in the governorates (Basra, Maysan, DhiQar, and Muthanna). As well as the clubs of the above governorates in a ball game hand and participation in the Iraqi League for the first class and first class for the sports season (2019-2020) for those aged (18-30), namely (Basra Municipality - Basra Oil - Zubair - Maysan Oil - Maysan - Tigris - Al Majar Al Kabeer - Al Maymouna - Ali Al Gharbi - QalaSaleh - Al Sukkar - Al Furat - Al Rifai - Al Nasr - Al Shatrah - Nasiriyah - Muthanna - Al Samawah - Salman) and for the period of time from 12/27/2020 until 1/8/2021,

The researcher selected the sample in an intentional manner. The sample included the players with a posterior hamstring inflammation injury (severe). The number of players with a posterior hamstring injury reached (14) injured, (2) of them were excluded due to the presence of other injuries besides the posterior hamstringitis injury, which is shoulder injuries. In addition, the total rupture of the ligaments of the joint, as well as the partial rupture of the inner ligament of the knee joint, thus the research sample constituted (71.42%) of the total number of injured players in the period of time to collect them and whose review of the specialized centers for medical rehabilitation and physiotherapy was confirmed in the governorates of Maysan, Basra and DhiQar, as well as doctors' clinics. And surgeons with specialization in those governorates, and thus the research sample reached (12) players with hamstring hamstring inflammation (severe) posterior hamstringitis, whose condition requires a rehabilitative approach to bring them back to practice the natural demise of the handball game again as they were before the injury occurred, and they were diagnosed with their injury. By the specialist and by means of the resonance ray, where it was installed

(1) Marwan Abdul Majeed Ibrahim: Methods and Methods of Scientific Research in Physical Education and Sports, 1st Edition, Amman, International Scientific House for Publishing and Distribution, 2006, pg 137.

The knee joint after a clinical examination for them, as well as confirming the type of injury through magnetic resonance imaging by fixation method for a period of (2-4) days. The ages of the players for the research sample ranged from (18-30) years who are among the ranks of the Premier League and First Class clubs In the handball game in the governorates of the southern region. To verify the homogeneity of the sample in some of the study variables related to the topic of the thesis in the morphological measurements (height - weight - age - training age) that have a clear effect on the validity and accuracy of the results, the researcher conducted the homogeneity of the research sample as well. In Table No. (1).

Table: 1 shows the arithmetic means, the median, the standard deviations, the values of the coefficient of variation and the torsion coefficient of the morphological variables that the researcher dealt with

coefficient of variation	coefficient of variation	standard deviation	Mean	arithmetic mean	unit of measure	Variables	No
0.352-	3.780	6.786	180.50	179.500	cm	¹ Height	1
0.071-	7.473	5.478	73.00	73.300	kg	Weight	2
0.040	14.022	3.169	23.00	22.600	year	age	3
0.000	8.325	0.666	8.00	8.000	year	Training age	4

In order to ensure the homogeneity of the members of the sample and the correctness of the distribution among its members, the researcher used the coefficient of variation and the torsion coefficient of the results of the field survey in measurements of (height, weight, age, training age). This means good distribution of the sample and its homogeneity, because the values of the coefficient of variation are confined to (3.780 - 22.841)% for the research sample, which is an acceptable value. Heterogeneous "(1). As for the torsion modulus values, they are limited to (-0.352 - 0.040).

Table:2 shows the arithmetic means, the median, the standard deviations, the values of the coefficient of variation and the torsion coefficient of the kinetic range of the variables addressed by the researcher.

coefficient of variation	coefficient of variation	standard deviation	mean	arithmetic mean	unit of measure	Variables	No
0.242	2.780	4.366	156.50	157.20	repeat	Knee tide	1

1.105	3.344	4.197	124.50	125.50	repeat	knee bending	2
1.170-	0.093	0.181	1.98	1.94	cm	Femoral muscular dystrophy	3

The coefficient of differences and the torsion coefficient were used as two statistical methods to treat the range of motion of the knee joint and measure the circumference of the thigh muscle atrophied with hamstring inflammation in the posterior due to the fact that the coefficient of difference did not exceed the degree (30). As well as the torsion coefficient whose values were limited to (3), so this reflects the homogeneity of the sample in that Variables.

Table:3 shows the mean arithmetic mean, standard deviations, values of the coefficient of variation and the torsion coefficient of the physical variables that were dealt with by the researcher

coefficient of variation	coefficient of variation	standard deviation	mean	arithmetic mean	unit of measure	Variables	No
0.994-	11.787	0.934	8.00	8.00	repeat	The distinctive strength of the speed of the two half-bearded men within 15 seconds	1
0.484	9.555	0.516	5.00	5.400	repetition	The characteristic strength of the speed of the two legs a full bear in 15 seconds	2
1.332	8.702	1.958	22.00	22.500	repeating	Endurance of strength for the two half-bearded men within one minute	3
0.000	6.794	1.155	17.00	17	repetition	bear the strength of the two men full bear within one minute	4
0.283-	12.917	0.707	5.47	5.51	sec	balance	5

The coefficient of variation and the torsion coefficient were used as two statistical methods to treat the physical abilities, and since the coefficient of variation did not exceed the degree (30), as well as the torsion coefficient whose values were confined to (-+ 3), this reflects the homogeneity of the sample in those variables.

2- Tests of physical variables

- 1- Examining the range of motion of the knee joint in case of extension (1)
- 2- Test the range of motion of the knee joint in the case of flexion (2)
- 3- Femoral muscular dystrophy measurement (3)
- 4- Examining the strength of the characteristic velocity of the leg muscles (4) (full-back) (from a standing position) within (15) seconds.
- 5- Examining the strength of the characteristic velocity of the leg muscles (5) (half-chested) (from a standing position) within (15) seconds
- 6- Examination of strength elongation of the leg muscles (6) (full supportive) (from a standing position) within (60) seconds.
- 7- Examining the strength of the leg muscles (7) (half-chested) (from a standing position) (60) seconds
- 8- Balance test (8)

(1) Ana'am Al-Najjar: A proposed rehabilitation program for the rehabilitation of acute injuries of the spine, College of Physical Education, University of Baghdad, 1996, pg. 67.

(2) An'am Al-Najjar: Previous source, pg. 67

(3) Manhole vasile, manholclacramioara, manhole marius. Possibi LTTES of Recover by mEAns of PhysloTherafterAnterlor cruciate Lig Ament plasty (keneth - jones) At Hand BALL player.

(4) Muhammad Matar Arak: Evaluation of some physical capabilities and skill and physiological abilities according to different physical classifications of soccer players, PhD thesis, College of Physical Education, University of Babylon, 2007, p.79.

(5) Muhammad Matar Arak: Previous source, pg. 79.

(6) Bastwissi Ahmed: Tests, Measurement, and the Principles of Statistics in the Mathematical Field, Dar Al-Fikr Al-Arabi, 1st Edition, Cairo, (1999), p. 115.

(7) Bastwissi Ahmed: The previous source, (1999), p. 115.

(8) Muhammad SubhiHassanein: Measurement and Evaluation, Part 1, Arab Thought House, Cairo, 3rd Edition, 1990, p. 445

2- The proposed rehabilitation approach (the main experiment)

The researcher prepared a proposed rehabilitation approach to develop some physical abilities, biochemical indicators and motion determinants of the knee joint affected by posterior hamstring tendinitis, depending on the sources, references, research and studies as well as the opinions of experts and specialists in the field of injuries and movement rehabilitation. As well as the result of the personal interviews conducted by the researcher with experts in this field, after obtaining the research sample from the players with hamstring tendinitis in the posterior handball game and through their examination by a clinically specialist physician, as well as the injury was determined by magnetic resonance imaging.

Players with fixed knee joint affected by bandage for a period of (2-4) days, the researcher implemented the proposed rehabilitation curriculum and applied it to the experimental research sample on the day 18 - 1 2021 until 15 - 3 2012, as the implementation of the rehabilitation curriculum took a period of (8). The rehabilitation curriculum included (24) rehabilitative units, at the rate of three rehabilitative units per week, and the duration of each rehabilitation unit ranged between (30-45) minutes, as the rehabilitation curriculum for the first two weeks contained (physical therapy devices), which is the cooling device (Cryo therapy)

As well as on a different and varied set of exercises that are appropriate for each stage of the rehabilitation stages. The researcher personally supervised their follow-up and made sure that they applied the exercises knowing that the implementation of the qualifying curriculum began after two days of the pre-tests, as the first phase begins for a period of (two weeks) in which it is used. The aforementioned device and the duration of the work of this device range from (5-10) minutes per session with (3) rehabilitative sessions per week with the use of isometric (moving) exercises and negative and positive flexibility exercises with the help of a physical therapist and balance exercises. The researcher took care of the gradual increase in the frequency of the exercise commensurate with the ability of injured players to benefit from the exercise. In the second stage, the researcher used water therapy exercises for a period of (six weeks), as water therapy is considered to have many benefits due to the properties that water possesses. Among the resistance exercises, it strengthens the muscles working on the knee joint without straining the joint. The researcher took care of the progression in exercises from easy to difficult.

2- - Dimensional tests:

After completing the application of the proposed qualification curriculum on the players with hamstring inflammation in the posterior hamstring, the researcher conducted the post tests and their tests were conducted for the period from Tuesday 3/16/2021. Players' pre-tests for the injured for their performance in the post-tests as follows: 1- Range of motion tests (extension of the knee joint, bending the knee joint), mediated by the genometer device. 2 - Measuring the atrophy of the posterior muscle with a tape measure 3 - Tests of muscle strength of the two legs (strength characterized by velocity, elongation of strength) 4- Test of the balance of the feet with a bench prepared for this measurement.

2- Statistical methods: The data were statistically processed and obtained by the researcher through the use of the statistical bag program (23 SPSS ver.).

Chapter Three

This chapter includes: Presentation, Analysis and Discussion of Results

3-1 Presentation, analysis and discussion of the results of the range of motion tests in the pre, mid and post measurement.

4-1-1 Presentation and analysis of the results of the motion range tests in the pre, middle and post measurements

Table:4 shows the value of the arithmetic mean, standard deviations, the lowest value and the highest value of the range of motion tests in the pre, middle and post measurement

Highest value	Lowest value	Standard deviation	Arithmetic mean	measure	Unit of measure	Processors Variables
164.00	152.00	4.366	157.20	Pre-		Extension
170.00	160.00	3.056	165.30	Average	degree	2
180.00	178.00	0.788	179.20	post	8	
134.00	121.00	4.196	125.50	Pre-		
140.00	130.00	2.869	134.70	Average	degree	flexion
145.00	143.00	0.788	144.20	post		
2.39	1.98	0.123	2.19	Pre-		Peripheral
2.23	1.77	0.142	2.00	Average		thigh muscle
2.13	1.54	0.181	1.94	post	cm	atrophy

Table :5 shows the average of ranks and Friedman value for the results of the range of motion tests in the pre, middle and post measurements.

the type of indication	The computed significanc e level	Friedman's value	the average of the ranks	measure	The unit of measure	Treatments Tests
			1	Pre-		Fytension
incorporeal	0.00	20.00	2	Average	_	LACIISION
			3	post	degree	
			1	Pre-		
incorporeal	0.00	2.00	2	Average	dograa	flexion
			3	post	uegree	
			2.95	Pre-		Femoral atrophy
incornoreal	0.00	18,167	1.90	Average		measurement
meorporear	0.00	10.107	1.15	post	cm	

Sample size = 10

Significance level = 0.05

1- Discussion of the dynamic range variable (tide): Through the findings of the researcher through tables (4,5) in the results of the three pre, middle and post measurements, the results showed the presence of significant differences in favor of the dimensional measurement of measuring the kinetic range in measuring the tide of the research sample, injured players. With

hamstring inflammation of the posterior hamstring in the pre and post test, the researcher attributes this increase in the motor range due to the use of the rehabilitative approach that the research sample was subjected to, and perhaps one of the most important reasons for this development is taking into account the motor ranges and strength similarly.

For the joint and a gradual natural movement through the development of exercises based on scientific foundations that suit the range of motion and strength and the nature of the muscles working on the joint and its mechanical effect in particular, and this is what confirmed

Accordingly (Sarih Al-Fadhli, 2004) that "the tissues of the body in general possess a unique ability in their ability to extreme expansion and contraction, which are thus affected by rehabilitative states if the athlete is exposed to a gradual increase in physical loads "(1).

2- Discussion of knee joint bending variable: through what has been presented to the results of the dimensional tests of the range of motion of the knee joint in bending movement (at the maximum range of motion) post-rehabilitation of the knee joint after suffering a posterior hamstring hamstring injury, which is shown in Table (4,5), Significant differences appeared after rehabilitation between the pre-, intermediate and post-tests in favor of the post-tests. The researcher attributes the difference in the post-tests to the use of cryotherapy by the Cryo system (in relieving pain, removing inflammation, reducing swelling and redness that resulted from injury and alerting the immune system to focus work in an area The injury also had an effective role in removing pain, so the affected research sample helped to relieve their pain, which would make them have better movement in order to practice rehabilitative exercises. The significance of the differences in measuring the kinetic bending of the knee joint in all its forms is due to the effect of rehabilitative exercises on each of the anatomical capabilities And physiological, as stretching exercises greatly increased the ability of tendons, ligaments, and muscles to maintain the mechanical movement of muscles, because Muscle flexibility stimulates the muscle to maintain its ability and protect itself (), "as the ability of these muscles depends to a large extent on the anatomical and physiological configuration of the individual."

3- Discussion of the thigh muscle atrophy variable: Through what was presented to the results of the post-tests of the range of motion of the knee joint in the measurement of the femoral atrophy variable post-rehabilitation of the knee joint after suffering from a posterior hamstring injury, which are shown in Table (4,5), significant differences appeared After qualifying between the pre, intermediate and post tests in favor of the post tests, the researcher attributes the difference in the post-tests to the use of cryotherapy by means of the Cryo device (in relieving pain, removing inflammation, and reducing the swelling and redness that resulted from the injury, since one of the physiological effects of the use of water exercises and rehabilitation of therapeutic cryotherapy) It is the developmental effect through the performance of exercises that improves blood circulation, which increases blood flow to the organs and the locomotive system on a regular basis, and this helps to increase the food that reaches them to compensate for the deficiency resulting from the injury, and this in turn will compensate for what was damaged by the affected tissue, i.e. the knee joint affected by tendinitis. Posterior knee and surrounding tissues,

Thus, increasing the range of motion of the knee joint, as well as the therapeutic water exercises restore the normal state of performance before the injury of posterior hamstring (1)

(1) SarihAbd al-Karim al-Fadhli: Lectures on PhD students, Baghdad, 2004

() Brain J. Sharkey: Fitness & Health, Human Kinetics, Fourth edition, London Sentlois, 1997, p. 388.

Table:6 shows the values of the arithmetic mean, the standard deviations, the lowest value and the highest value of the physical variables in the pre, mean and post measurement.

highest value	lowest value	standard deviation	arithmetic mean	measure	unit of measure	Processor Tests
9.00	6.00	0.942	8.00	pre		The powerhouse speed is
11.00	9.00	.7370	9.90	Average		half my DpnI in 15 seconds
14.00	11.00	1.054	13.00	post	Repeat	
6.00	5.00	0.516	5.40	pre		The powerhouse speed is
9.00	7.00	.7880	7.80	Average		half my DpnI in 15 seconds
11.00	9.00	.7880	9.80	post	Repeat	
27.00	20.00	1.957	22.50	pre		
28.00	26.00	.7370	26.90	Average		Treadmill strength is half-
40.00	30.00	2.936	37.20	post	Repeat	beardedWithin one minute
19.00	15.00	1.154	17.00	pre		
21.00	18.00	.9660	19.40	Average	Repeat	Tenderness of strength my bearWithin one minute
31.00	27.00	1.100	29.10	post		
6.57	4.22	.7510	5.51	pre		Delever
8.47	6.11	.7210	6.72	Average	Second	Balance
11.11	8.32	.8290	9.78	post		

 Abbas HussainObaid Al-Sultani: Sports Medicine and Athlete's Injuries, University of Babylon, 2013, p. 250 Table : 7 shows the average ranks and Friedman value for the results of physical abilities tests in pre, middle and post measurements

the type of indication	The computed level of significanc e	Friedman's value	the average of the ranks	measure	The unit of measure	Processors Tests
			1.05	pre		The powerhouse speed
		10.00	2.00	Average		is half my dunce in 15
incorporeal	0.00	19.00	2.95	post	Repeat	seconds
			1	pre		The powerhouse speed
incorporeal	0.00	20.00	2	Average		is half my DpnI in 15
			3	post	Repeat	seconds
			1.05	pre		Tenderness of strength
incorporeal	0.00	19.583	1.95	Average	Repeat	my bear
meorporeur			3.00	post		Within one minute
			1	pre	-	
incorporeal	0.00	20.00	2	Average	Repeat	Within one minute
			3	post		within one minute
			1	pre		Balance
incorporeal	0.00	20.00	2	Average	Sec	
			3	post		

Sample size = 10

Significance level = 0.05

Discussing the results of physical aptitude tests, the Friedman value, the mean difference in ranks between the consecutive tests, the standard error, and the significance level value (sig) in the pre, middle and post measurement

1- Discussion of the force variable characteristic of velocity (half Dibni 15 seconds)

The results that appeared in the presence of significant differences of statistically significant for a half-Dibni test for a test of strength characteristic of velocity (bending and extending the legs for a period of (15) seconds) in the results of the pre, intermediate and post tests and in favor of the post tests of the research sample. The researcher attributes these differences to that the accurate handling with the components of the training load in a scientific and thoughtful way, which led to the development of the distinctive strength and speed of the muscles of the legs among the individuals of the research sample. 1). As the method used in rehabilitative exercises that enabled the researcher to control the intensity of the exercise and rest between repetitions and the other,

and this is what the researcher implemented and indicated to him by Abu Al-Ela "is the repetition of a set of exercises with breaks and breaks and this rest depends on the intensity of the load used and the direction of its effect, whether to develop Aerobic or anaerobic action "(2).

2- Discussion of the force variable characteristic of speed (full Dibni for 15 seconds:

In light of the results obtained by the researcher from tables (6,7) in the presence of significant statistically significant differences for a strength test characteristic of velocity (full dB for 15 seconds) in the results of the pre, intermediate and post tests and in favor of the post tests of the research sample, the researcher attributes it to these differences. To the use of rehabilitative exercises within the water medium prepared by the researcher, which effectively contributed to the development of the characteristic strength of the speed of the two men, as it worked to increase the strength distinguished by speed, including an increase in the speed of muscle contraction as it is one of the things that develop this trait or physical ability. And as (Hare) pointed out, "There are two main ways to develop rapid strength, the first is by developing muscle strength and the second is by increasing the speed of muscle contraction."

3- Discussing the variable bear force half a dip within one minute

The results obtained by the researcher through tables (6,7) on the presence of significant statistically significant differences in the test of endurance of half-Dibni force within one minute for the pre, intermediate and post tests, and in favor of the post-tests of the research sample afflicted with a posterior hamstring inflammation. The differences came as a result of the application of rehabilitative exercises prepared within the aqueous environment by the researcher for the research sample, which had a role in developing muscles for the legs, "The application of physical programs may develop the muscle strength of individuals with motor deficits" (1), as the application of the infected sample. The back hamstrings of the standardized rehabilitation exercises according to the applied curriculum and under the supervision of the researcher for the researcher for the vocabulary of the rehabilitative units contributed to the creation of a set of functional adaptations appropriate for physical performance.

(1) Muhammad Hassan Allawi: The Science of Sports Training, Arab Thought House, Cairo, 1992, p. 78.

(2) Abu Al-Ela Ahmad Abdel Fattah: Physiology of Training and Sports, Arab Thought House for Printing and Publishing, 2008., p. 79.

(2) Hara (translation) Abd Ali Nassif: The Fundamentals of Sports Training, Higher Education Press, University of Mosul, 1990, p. 179.

4- Discussion: Test of variable length of force in one minute

The results obtained by the researcher in the presence of significant differences statistically significant for testing the elongation of force within one minute in the results of the pre, intermediate and post tests, and in favor of the post tests, and the researcher attributes that these

differences are the standardization of the training loads for rehabilitative exercises to withstand the strength prepared by the researcher that was appropriate The level of injury of the sample in size (time and frequency), which leads to reaching a state of stability in performance by raising the exercise load and the complexity of exercises in the rehabilitative units gradually over the period of time allocated to rehabilitative exercises,

5- Discuss the results of the test of the measurement variable balance.

If we look at tables (6,7), we will find that there are significant differences between the pre, intermediate and post tests, and in favor of the post-tests for this test, which measures the development in balance of the affected research sample, and the researcher attributes to this the significance of the differences in the results of the balance test to the prepared qualifying curriculum and its effectiveness. And its effect on the members of the research sample afflicted with posterior hamstringitis, as the qualifying curriculum contained tests and balance exercises within the aqueous environment to provide comfort, safety and the ability to control the body in different positions. These rehabilitative exercises varied between lateral walking exercises, walking on straight lines, as well as walking with specific steps, which provides different positions for walking inside the water with an emphasis on balance during movement. The researcher also used, within the prepared curriculum, exercises for lifting the leg up and to the side, relying on the injured leg in the water, and then standing with the change in directions, and exercises to bend and extend the knee into the water medium.

 SayedJumahKhamis Abu Draham: A study of some physical and psychological aspects of the physically disabled, PhD thesis, Faculty of Physical Education, Helwan University, 1981, p. 18.

4 - Conclusions and Recommendations

4-1 Conclusions

- 1- The rehabilitative curriculum has a major role in increasing the range of motion and the strength of the muscles working on the knee joint, which has achieved a good result in returning the injured players to their normal position before the injury occurred.
- 2- The rehabilitative exercises used within the aqueous environment by the members of the research sample had a positive effect on the development and improvement of (knee extension, knee bending) of the affected knee joint, as well as measuring the atrophy of the thigh muscle, muscle strength, and the balance between pre, intermediate and post tests for the research sample and for the post test.
- 3- The cooling device (Cryo) contributed to relieving pain and removing swelling in the injured players.
- 4- The rehabilitative exercises used inside the aqueous environment using different stresses inside the water that positively affected the relief of pain resulting from the injury, and this is what the rehabilitative exercises showed inside the pool.

4-2 Recommendations

- 1- Attention should be paid to physical therapy and movement rehabilitation, especially for modern equipment, and to build units for physiotherapy centers within sports clubs to avoid and prevent sports injuries.
- 2- Emphasizing the importance of using physical therapy devices before starting the therapeutic exercises and the rehabilitative approach, and for severe injuries.
- 3- The necessity to emphasize the use of moving and static exercises within the vocabulary of the rehabilitation curriculum, which depends on the anatomical and biomechanical foundations when preparing the rehabilitative curricula.

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