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Mustafa Zuhair Siham

General Directorate of Education
in Najaf, Ministry of Education,
Iraq

Effectiveness of a rehabilitation program using stretching exercises and aquatic environment in relieving lower back pain and spinal muscle flexibility among handball players in Najaf al-Ashraf clubs

Mustafa Zuhair Siham

Abstract

The purpose of this paper is to identify the effect of a rehabilitation program that includes stretching exercises and aquatic exercises on reducing lower back pain and improving spinal muscle flexibility among handball players in Najaf clubs. This pain is a result of the physical stress they experience during training and matches. The researcher adopted the experimental method, as it is suitable for the nature of the problem. A sample of handball players suffering from lower back pain was selected and divided into two groups: an experimental group that underwent the rehabilitation program, and a control group that continued their regular training. The rehabilitation program included a series of stretching exercises aimed at lengthening the lumbar and lower back muscles, in addition to specific aquatic exercises to reduce stress on the joints and increase mobility with minimal pain. Pre- and post-tests were conducted to measure pain levels and spinal flexibility using appropriate medical and physical assessments.

Keywords: Stretching exercises, aquatic environment

Introduction

The scientific advancements the world is witnessing today are a major factor in improving the quality of human life, through well-considered scientific planning that contributes to achieving human goals. This progress has encompassed all fields of science, including sports physiology and rehabilitation. Scientific studies and research related to the rehabilitation of chronic diseases have contributed to the success of rehabilitation processes, leading to optimal results. Scientific research has focused on exploring the diverse applications of sports physiology in various aspects of human life, given the importance of this science in developing and evaluating rehabilitation methods, as well as interpreting the physiological responses and adaptations that occur during and after sports rehabilitation. This contributes to improving the quality of life for patients, as understanding the physiological changes that occur in the respiratory system is vital for revealing the physiological effects and responses resulting from the implementation of rehabilitation programs.

Rehabilitative exercises, both generally and specifically in the sports field, are among the most effective means of rehabilitating injured individuals. Studies indicate that these exercises lead to a range of positive effects on the athlete's body, such as accelerating the elimination of blood clots and reducing the occurrence of internal bleeding in the joints. In addition, these exercises contribute to accelerating the recovery of muscles and joints to their vital functions, helping them return to efficient operation.

Handball is a highly competitive team sport that demands significant physical exertion. It is characterized by rapid and varied movements, such as running, jumping, sudden stops, twisting, and physical contact between players. This makes players susceptible to various injuries, especially in the spine and lower back, due to repetitive strain and poor mechanics during play.

The lower back is one of the most injury-prone areas among handball players, due to its pivotal role in maintaining balance and stability during play, particularly when executing

Corresponding Author:

Mustafa Zuhair Siham

General Directorate of Education
in Najaf, Ministry of Education,
Iraq

offensive and defensive skills. These injuries often affect performance levels and lead to player absence from training and matches, necessitating the search for effective and safe rehabilitation methods that contribute to pain relief and improved mobility.

This highlights the importance of using stretching exercises to improve muscle flexibility and alleviate muscle tension. Furthermore, aquatic exercises provide a suitable environment to reduce the mechanical load on the spine during training, thus accelerating the rehabilitation process. This research aims to highlight the effectiveness of a rehabilitation program combining these two approaches in treating lower back pain and improving spinal muscle flexibility among handball players in Najaf Al-Ashraf clubs.

Research Problem

Many handball players, especially at the competitive level, suffer from recurring lower back pain due to the high physical demands and the strenuous, repetitive movements required by the game, such as jumping, powerful throws, and frequent bending. This pain is a common injury that negatively impacts athletic performance and, in some cases, may lead to temporary or permanent suspension from training and competition. Despite using traditional treatment and rehabilitation methods, many players do not achieve complete recovery or adequately regain spinal muscle flexibility. This necessitates the development of more effective rehabilitation programs that combine modern and safe techniques, such as stretching exercises and aquatic therapy.

Hence, the research problem arises in the following question: Does the rehabilitation program using stretching exercises and aquatic environment have an effective impact on relieving lower back pain and improving the flexibility of the spinal muscles among handball players in Najaf Al-Ashraf clubs?

Research objective

- Developing a rehabilitation program using stretching exercises and an aquatic environment to alleviate lower back pain and improve spinal muscle flexibility among handball players in Najaf Al-Ashraf clubs.
- Identifying the effect of a rehabilitation program using stretching exercises and an aquatic environment on alleviating lower back pain and improving spinal muscle flexibility among handball players in Najaf Al-Ashraf clubs.

Research Hypothesis

- There is a positive effect of the rehabilitation program using stretching exercises and an aquatic environment on alleviating lower back pain and improving spinal muscle flexibility among handball players in Najaf Al-Ashraf clubs.

Research fields

- **Human field:** Handball clubs in Najaf Al-Ashraf Governorate
- **Time field:** (10/3/2025) to (2/5/2025)

- **Spatial field:** Al-Tadhamun Sports Club Hall

Research methodology and field procedures

Research Methodology

To achieve scientific and objective results, it is necessary to select a methodology that suits the nature of the research. Therefore, the researcher adopted the experimental method and designed the study using a single group employing pre- and post-testing, given its suitability to the nature of the problem he sought to solve. The experimental method is based on experimentation and field testing, utilizing observation and supported by the use of modern scientific instruments, tools, and equipment. The primary objective of using this method is to discover the causal relationships that may lead to the influence of one or more of the variables in question. (Marwan: 2006, p. 137)^[9].

Community and sample research

The research population consisted of handball players officially registered with clubs in the Najaf Governorate, namely: (Najaf Sports Club, Naft Al-Wasat Club, Al-Tadhamon Club, and Al-Kufa Club). These players participate in local championships and are subjected to high training loads and intense competitions that demand significant physical exertion, making them susceptible to common injuries, especially in the lower back.

The research sample was purposive, selected from among the players of these clubs. It consisted of eight players suffering from mild to moderate lower back pain, as determined by medical diagnosis and initial interviews. The players were distributed among the clubs as follows:

- **Najaf Club:** 2 players
- **Middle Euphrates Club:** 2 players
- **Al-Tadhamon Club:** 2 players
- **Al-Kufa Club:** 2 players

The researcher used a single-group pre-test/post-test design to measure the research variables. The entire sample underwent the proposed rehabilitation program, which included stretching exercises and aquatic exercises. Pre-tests were conducted to measure pain levels and spinal muscle flexibility. These same tests were then repeated after the completion of the rehabilitation program (post-test) for comparison and analysis of differences.

Sample Homogeneity: To ensure the homogeneity of the sample in certain study variables related to morphological measurements (height, mass, chronological age, training age, injury severity, and injury type), the researcher performed homogeneity testing of the research sample for these variables.

Table 1: shows the homogeneity of the research sample in terms of morphological variables, degree of injury, and type of injury

No.	Variables	Measuring unit	Mean	Mean	Std. Deviations	Skewness
1	Height	Cm	179.6	180.50	6.722	3.680
2	Mass	Kg	73.3	73.00	5.478	7.473
3	Chronological Age	Year	21.6	23.00	3.169	14.022
4	Training Age	Year	4.5	4.2	0.669	7.343
5	Injury Severity	Grade 3 injury				
6	Type of Injury	Lower back pain				

Data Collection Methods

- Arabic and foreign sources.
- Observation and experimentation.
- Diagnostic tests, physical assessment, and measurement.
- Interviews.
- Internet.

Equipment Used in the Research

- Canon camera.
- Goniometer for measuring spinal flexibility.
- American-made dynamometer for measuring back muscle strength.
- CDs.
- One Dell laptop.
- Medical bed.
- Adhesive markers.
- Weights (1 kg, 2 kg), medicine balls (1 kg), resistance bands.

Field Procedures of the Research

Description of Tests

First: Torso Flexion Test from a Standing Position (Bastawisi, 1999, p. 86)^[4]

Purpose of the test: To measure the flexibility of the torso and thighs during forward flexion movements.

Equipment required: A 100 cm graduated ruler, and a flat bench, chair, or table capable of supporting the person's weight without any vibration.

Description of the test: The ruler is fixed to the edge of the bench or table so that its center is above the edge and the other half is below it. The subject stands on the edge of the bench or table with their feet on either side of the ruler. From this position, the subject slowly flexes their torso downwards as far as possible, ensuring that their fingers are level with the ruler.

Guidelines

1. The knees should not be bent during the test.
2. The subject has two attempts; the better one is recorded.
3. The torso flexion should be performed slowly.
4. The subject should hold the position for two seconds at the point of flexion. Recording: The participant is given two attempts, and the best attempt is recorded.

Second: Torso flexion test from back a standing position (Hassanin, 2004)

Purpose of the test: To assess spinal flexibility.

Required equipment: A belt made of leather or fabric, and a measuring tape.

Performance: The participant begins the test by standing facing a wall with the pelvis stabilized using the belt, then flexes their torso backward as far as possible.

Guidelines:

1. The feet must remain stationary.
2. Each participant is allowed two attempts, and the better result is recorded.
3. The participant must hold the position at the maximum flexion for two seconds.

Recording Method: The distance between the chin and the wall is measured using the measuring tape, and the result is recorded in centimeters.

Third: Lateral Spinal Flexion Test (Al-Najjar, 2001)^[3]

(For both the right and left sides). This test aims to measure the spine's ability to flex laterally. Required Equipment:

Inclinometer (Koniometer).

Procedure

The patient stands upright and then bends to one side. The koniometer is positioned between the fifth lumbar vertebra and the first sacral vertebra. One arm is held still while the other is moved parallel to the lateral curvature of the spine.

Recording: After the patient has held the bent position for two seconds, the number of degrees between the arms is read using a protractor to measure the degree of inclination.

Exploratory Experiment

The researcher conducted an exploratory experiment related to the designed rehabilitation exercises at the Al-Tadhamon Sports Club in Najaf Governorate on Wednesday, March 12, 2025, at 11:00 AM. This experiment aimed to study the exercises used within the rehabilitation units on two injured players from the research sample who suffer from lower back pain. The experiment focused on evaluating the effectiveness of the rehabilitation exercises prepared by the researcher to achieve specific goals. Pre-tests:

After selecting the research sample of players suffering from lower back pain, on whom the rehabilitation exercises would be applied to help them recover and return to playing the game, the researcher conducted pre-tests related to the sample. This took place on Friday, March 14, 2025.

Main Experiment

The researcher designed and organized a set of rehabilitation exercises based on his personal experience and supported his work with several scientific sources. He also conducted interviews with specialists in the field of sports rehabilitation and handball to guide the preparation process. The application of these exercises to the experimental group began during the period from March 15, 2025, to April 26, 2025, the program included stretching, strength, and flexibility exercises using assistive devices, as well as aquatic conditioning exercises. The researcher carefully adjusted the intensity, number of repetitions, and rest periods to meet the players' needs. Furthermore, the researcher developed these exercises to suit the players' physical characteristics, drawing on specialized references in sports injuries and rehabilitation to ensure the exercises were appropriate and effectively achieved the rehabilitation program's objectives.

- The researcher ensured that the rehabilitation exercises were innovative and completely different from the traditional exercises used in treatment centers. Aquatic conditioning exercises were also incorporated.
- The program consisted of six weeks.
- The researcher ensured that there were three units per week, for a total of eighteen units in the rehabilitation program.
- The principle of progressively increasing the difficulty of the exercises was followed.

Post-tests

After implementing the rehabilitation program using stretching and aquatic conditioning exercises with players suffering from lower back pain, the researcher conducted post-tests on Monday. Dated April 28, 2024. The researcher used the same sequence and procedures as in the pre-tests and intermediate tests to ensure consistency in performance during the post-tests.

Statistical Methods: The data obtained by the researcher was statistically processed using the SPSS version 23.

Results and Discussion

Presentation and discussion of the results of the pre- and post-tests for the experimental group

Table 2: shows the results of the tests for the experimental research group

Variables	Measuring unit	Pre-test		Post-test		T value calculated	Level Sig	Type Sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Torso Flexion Test from a Standing Position	Cm	16.8	0.885	21.12	0.991	7.117	0.001	Sig
Torso flexion test from back a standing position	Cm	15.12	1.065	22.3	0.845	5.044	0.002	Sig
Lateral Spinal Flexion Test	Repetition	9.1	1.434	13.8	1.119	4.556	0.000	Sig

Discussion of Results

Table (2) shows significant differences at the 0.05 significance level between the pre- and post-test mean scores for the same experimental group in flexibility tests involving forward flexion, backward flexion, and lateral flexion. The post-test scores were higher, and the researcher attributes this to the rehabilitation exercises using stretching and aquatic environments. These exercises, which included joint flexibility and muscle stretching, were developed by the researcher and proved effective in improving spinal flexibility in handball players. This was confirmed by (Hamdan, & Abdul-Razzaq, 2001)^[5], who stated that stretching exercises increase the range of motion of the joints needed by the player to perform the required movements

The researcher believes that stretching exercises played a significant role in alleviating and eliminating pain in the spinal muscles. Abu Al-Ala Ahmed Abdel-Fattah and Ahmed Nasr El-Din Sayed also noted the positive impact of these exercises on general health. Bob Anderson, who explained that a simple solution to reducing work-related stress pain and repetitive strain injuries lies in adopting stretching exercises that take only a few minutes, also supports this view. To achieve this, training should focus on strengthening and improving the flexibility of the most vulnerable areas to avoid pain resulting from injury. (Abu Al-Ala & Nasr Al-Ain, 2003; Jerri, *et al.*, 2024)^[1,7]

Scientific research and practical experience have shown that muscle stretching exercises, especially slow stretching, are effective in reducing muscle pain both during and immediately after exercise. This is due to their role in immediately relieving muscle spasms upon execution, in addition to keeping muscles stretched for a specific period of time. (Al-Hakim, 2004)^[2]

The researcher believes that the use of therapeutic methods and rehabilitation exercises has significantly contributed to improving the flexibility of joints, ligaments, and muscles. It is well known that limited range of motion in joints is one of the first symptoms to appear after sports injuries. Therefore, exercises that utilize aquatic environments have proven effective in increasing muscle elasticity and joint flexibility. Sources indicate that aquatic exercises not only enhance flexibility but also significantly contribute to developing muscle strength. (Madloul *et al.*, 2025)^[8]

Conclusion and Recommendations

Conclusion

- The rehabilitation program demonstrated clear effectiveness in alleviating lower back pain among handball players in Najaf Al-Ashraf clubs.
- The use of stretching exercises in an aquatic environment significantly improved spinal muscle flexibility.
- Integrating exercises in water reduced pressure on the vertebrae and facilitated exercise performance without

excessive strain.

- The rehabilitation program enhanced the motor and functional performance of injured players.

Recommendations

- The proposed rehabilitation program should be implemented periodically in sports clubs.
- Aquatic exercises and stretching should be included in prevention and treatment programs for common lower back injuries.
- Qualified physical therapists should be provided to implement such programs within sports teams.
- Conduct future studies to expand the program's impact to different age groups or other sports.

References

1. Abu Al-Ala AAF, Nasr Al-Ain A. Physiology of Physical Fitness (Cairo: Dar Al-Fikr Al-Arabi) 2003.
2. Al-Hakim AS. Tests and Measurement: (Baghdad, National Library) 2004.
3. Al-Najjar EMG. The Impact of Training Programs on the Rehabilitation of Patients with Chronic Lower Back Pain, PhD Dissertation, University of Baghdad, College of Physical Education, Al-Jadriya 2001.
4. Bastawisi A. Foundations and Theories of Sports Training, Cairo, Arab Thought House 1999.
5. Hamdan SA, Abdul-Razzaq N. Physical Fitness and Health, 1st ed. (Amman: Dar Wael Publishing) 2001.
6. Hassanin MS. Measurement and Evaluation in Physical Education and Sports, 6th ed.: (Cairo, Arab Thought House for Printing and Publishing) 2004.
7. Jerri ZA, Radhi MN, Oleiwi AH. The Effect of Smit-Style Training on the CPK Enzyme, Kinetic Response Speed, and Accuracy of the Blocking Skill for Young Volleyball Players. International Journal of Disabilities Sports and Health Sciences, 7(Special Issue 2): The Second International Scientific Conference: Sports for Health and Sustainable Development, (SHSD, 2024)), 288-299 2024.
8. Madloul HR, Karim GM, Radhi MN, Hashoush BAKH. Evaluation of the level of knowledge of offensive formations of young volleyball players in Iraq. Retos2025;68:1311-1318.
9. Marwan AI. Methods and Approaches of Scientific Research in Physical Education and Sports, 1st ed., Amman, International Scientific Publishing and Distribution House 2006.
10. Saleh HH, Radhi MN, Abdullah AW. The effect of combined high-intensity interval training exercises on some of the technical skills and endurance of performance for advanced futsal players. Indian Journal of Forensic Medicine & Toxicology. 2021; 15(3); 1309-1317.