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The Effect of Using Physical Therapy and Forward and Backward Spinal Bending Exercises on the Treatment and Rehabilitation of Some Back Injuries from Swimming Practitioners

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ABSTRACT

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Modern sports medicine and therapeutic physical education mainly aim to prevent injuries and seek to reduce their incidence to the lowest possible level due to the increase in sports injuries. Despite the great developments that have included most aspects of life, especially in the medical fields, many interested people believe that these transformations are related to the employment of modern technologies and the change in human lifestyle, especially in the field of sports, where we have recently noticed the lack of movement of athletes for long periods without adhering to the right methods, taking into account the health and motor state of the body, and this exposes the athlete to a great risk of injury. Pushing those interested and experts in this field to equip modern rehabilitation methods suitable for the body. The use of water and ice in the treatment of injuries is one of the first methods used in the past because of its good effectiveness and zero cost, and with the development of the years, some various rehabilitation exercises suitable for all parts of the body have been used, and the purpose of which is to increase the ability of treatment and rehabilitation. In the past years, some physiotherapy devices and methods have been used.

There is a great development in the aspect of training and sports development, and there is also an increase in the level of training ability, as well as there is an increase in the high rates of injuries for the sports side, with a great development in modern science, and injuries have many causes, some of which are mild and need only natural treatment, and musculoskeletal injuries are considered to be very common and occur among athletes, and this is due to the fact that muscles and bones are the main tool implementing the requirements of sports performance, as it is one of the basic factors in human movement. An injury that has not been diagnosed in time may cause a long recovery period. The sports exercises used to rehabilitate and treat back and joint pain for swimmers have varied.

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1.1 Introduction and Importance of the Research:

Naturopathy is a modern medical specialty, but it uses natural ingredients of water, sun, and air as a treatment. It is also an advanced medical care to provide health needs to prevent acute motor dysfunction, and treatment is done without the need for surgery and without the use of drugs and medications by providing treatment programs to the patient, and physiotherapy contributes to the development of the treatment of patients by understanding the movement of the body, as it works to reduce the complications resulting and correct and alleviate the effects of disease, injury or disability, (Khalil 2010, p. 11).

As for cryotherapy, it works to stop bleeding and swelling because cooling causes the constriction of the blood vessels at the site of the injury, limits their expansion and reduces blood infiltration at the site of the injury, as cooling leads to a contraction in the blood vessels immediately after contact with the cold, which leads to a decrease in bleeding, followed by a noticeable expansion of the same blood vessels as a neurophysiological reflex effect, and accompanied by an increase in blood in the affected part of the body due to cryotherapy, with a good decrease in the level of pain, and it is observed in the degrees of harm. This is because it reduces the transmission of pain-carrying nerve signals to the brain and thus reduces the sensitivity of the pain-affected part. (Khalil 2010, p. 21)

The use of physical activities is of great importance in the treatment of back pain due to the beneficial properties of swimming and the use of aquatic medium is a method of treating individuals with muscle and bone weakness. Water therapy is also considered one of the methods used to relieve back pain, as the properties of water help reduce body weight, which relieves pressure on the joints, spine, and all bones and muscles in the body. (2009 Kujala)

Rehabilitation exercises: They are sports movements designed for special disease situations and the aim of treating and protecting the injured organ to return to normal or rehabilitate it to a better state, using the basic principles of sensory and motor work that work to affect the ability to meet muscles and nerves by choosing appropriate movements for the body (Ouijela, 2013).

The importance of researching the use of physiotherapy methods appropriate to the type of injury and to reduce pain and exacerbation of health problems, and to know the effect of using the spine forward and backward exercise in its contribution to the treatment of back injuries.

2.1. Research Problem:

1. Does physiotherapy and rehabilitation exercises affect the acceleration of the healing process of swimming practitioners and their return to sports activity as soon as possible**?**

2. Many people with a herniated disc or back pain, and with the recommendation of a specialist doctor, may perform **random exercises** such as walking in low water in the pool or irregular movements inside the pool to relieve pain. Is it suitable for injuries?

3.1 Research Objectives:

1. To know the effect of spinal bending exercises on relieving the level of pain and the speed of recovery in the research sample.

2. To know the effect of using various physiotherapy from spinal exercise on the rehabilitation of the injured body joints **, especially** the movement of the spine in swimmers.

3. Recognize the impact of diverse physiotherapy in the treatment of spinal injuries and how quickly they respond.

4.1 Research Force:

1. There are statistically significant differences between the results of the pre- and post-tests in favor of the post-test in the rehabilitation of spinal injuries of swimming practitioners.

2. Physiotherapy has a good positive effect that contributes to the rehabilitation of the movement of the spine and the affected organ in the sample.

5.1 Research Areas:

1. Human field: A group of (15) swimmers with back injuries, where the injury was diagnosed by health centers such as hospitals and clinics, and the degrees of injury were mild and moderate

2. Temporal Domain: (1/5/2025 to 31/7/2025).

3. Spatial Domain: Physiotherapy Unit at the Great Hungary General Hospital – Maysan Health Department.

6.1. Similar Studies:

1. Study (Powers et al. 2008)

Effects of a single session of posterior-to-anterior spinal mobilization and press-up exercise on pain response and lumbar spine extension in people with nonspecific low back pain

The aim of this study was to identify the immediate effect of exercises to activate the spine by moving it forward and backward and the use of push-ups for patients suffering from unspecified pain in the lower back, as well as to examine the immediate effect of these exercises on the extension of the affected area, which is the lumbar vertebrae of the group consisting of (30) individuals (19 females – 11 males) whose ages ranged from (18-45). The most important results of this study were that forward and backward spine movement exercises and push-ups have a positive effect on forward spinal flexibility and that these exercises have an effect on reducing the level of pain.

2. Study (Roche et al. 2007)

Comparison of a functional restoration program with active individual physical therapy for patients with chronic low back pain

This study aimed to compare functional recovery programs and active individual physiotherapy patients suffering from chronic lower back pain, as the research sample consisted of (132) patients, where the injured were placed in two groups, the first applied functional recovery

programs for (5) weeks at a rate of (20) hours per week, and the second applied a physiotherapy program that included some activities (3) Hours per week, data were collected through a trunk flexibility test, a test of the endurance of the holding and extensor back muscles, selection of pain degree, ability to perform individual activities, and general endurance, and the results showed that all results improved after receiving appropriate physiotherapy, and the improvement was better observed in the group undergoing the functional restoration program.

2. Research Procedures:

1.2. Research methodology: The experimental method was used

3.2. Research Population: The research sample was deliberately selected from swimming practitioners with minor injuries to the back, especially the spine, such as limitation of movement as a result of physical inactivity, simple slip or sciatica, where the injuries varied from mild to moderate. The research sample was (15) injured swimmers from Maysan Governorate and the injuries were diagnosed by specialized health centers such as hospitals and clinics, where the ages of the injured were (20-40) years. Rehabilitation exercise was used in The pre-test was then given a month-long rest with the application of the spine exercises in the forward and backward and the physiotherapy program mentioned in the supplement was also used. For the purpose of assisting in rapid response and treatment, the post-test was re-tested to see the results.

4.2. Research Tools: The following tools were used to apply the experiments to infected people**.**

1. Forward spine flexibility test. **2**. Backward spine flexibility test.

5.2. Main Experiment: The pre and post test of one group was used in the selection of the research sample of (15) patients, and **the pre-test** was used on (1/6/2025) in the physiotherapy unit at the Great Hungary Hospital – Maysan Health Department, as these exercises and the treatment used do not need a swimming pool to apply the experiment, where the exercises and therapeutic methods used can be applied in any suitable place, and the physiotherapy unit in the hospital was selected for the availability of physiotherapy devices with administrative staff. and specialized nursing with the presence of the injured in the right place to apply scientific experiments. The testers were advised to take a warm bath and perform warm-up and flexibility exercises before starting the treatment, with the water temperature not exceeding 28 degrees Celsius and not less than 25 degrees Celsius. Vital signs such as respiratory rate and heart rate were monitored during the tests.

1. Forward spine flexibility test.

The objective of the test: to test the forward flexibility of the spine of swimmers.

Test instrument: Gauge Scale Elasticity Box Device (centimeter units)

Test design: A cube box with dimensions of (12) inches approximately (40) cm fixed on its upper surface with a ruler.

Method of Performance: After the performer takes off the shoe from the long sitting position with his feet extended without flexion in the knee joint and adjacent to the device with the arms

extended, the box is fixed in front of the performer, and the measuring ruler is fixed away from the body of the laboratory, and the maximum extension of the arms is recorded.

Method of Registration: Calculation in Centimeters (Hassanein, 1995)

2. Backward spine flexibility test

Test Objective: Backward Flexibility Test

Test Instruments: Tape Measure

Method of Performance: From the prone position and fully extended the legs with their fixation and the seat fixed with the help of the colleague, the testator raises the torso high back to the farthest point possible, and the distance from ground level to the bottom of the chin is measured

Method of Registration: Calculation is done in centimeters (Hassanein, 1995)

As for **the post-test** , it was done on (1/7/2025) and the injured were rehabilitated for a full month from the pre-test, and some of the rehabilitative physiotherapy methods mentioned in Appendix No. (1) were used on the site of the injury to know the extent of the movement of the muscles and bones working in the body, and the previous tests were repeated, and the tangible results were higher than the cardiac test of the injured.

6.2. Statistical Methods:

3. WILCOXON Test
1. Arithmetic Mean
4. Statistical Portfolio (SPSS)
2. Standard Deviation

7.2. Physiotherapy methods used in rehabilitation:

1. Muscle stimulation: It is a treatment in which specific types of electrical energy with fields (electrical and magnetic) are used for the purpose of prevention and treatment, and for electrical therapy it has a thermal, mechanical, chemical and magnetic effect on the tissues. Each of the devices has its own way of working, and stimulation is defined as electrical charges that are used to activate the contraction of the muscles in a way similar to the natural contraction that occurs in the body, and these charges are among the most prominent Physiotherapy methods are used in the treatment of cases in which the muscle becomes unable to work, such as paralysis due to injury, and it is also used in cases of joint stabilization such as plastering of the injured person, where the muscle is exposed to atrophy and weakness and turns into fibers that are unable to contract and expand easily. One of **the most important benefits of muscle stimulation** is increased blood flow to the area to be treated. Reducing pain and swelling, stimulating wound healing, and motor muscle rehabilitation.

2. Movement Therapy Therapeutic or Rehabilitation Exercises:

Movement therapy is one of the important methods in the field of physical therapy, as it relies on the use of physical movements scientifically and systematically based on the principles of anatomy, physiology, and psychophysical education to achieve preventive and therapeutic goals. This type of treatment also aims to maintain the body's function and rehabilitate tissues before, after and during the injury. Movement therapy relies primarily on movement as a preventive means of treatment and rehabilitation. It is the most effective method used in physiotherapy, especially when it is applied in a precise systematic manner in proportion to the functional disorders of the body, and the compatibility of the work of the various tissues and systems in the body must be taken into account from the concepts and laws of movement to form therapeutic systems that achieve the required results to restore and renew motor functions, reach a pre-injury or disease state, and neutralize the complications of disability. One of the advantages of movement therapy is that it can be used for all ages, for different types of injuries, diseases, and deformities, for all types of body tissues, and at different stages. The purpose of therapeutic exercises is to return the injured part to its normal state whenever possible, and to reduce the distance from the playgrounds and return to them at the highest possible level of health. (Khalil 2010)

3. Presentation and discussion of the results:

The statistical test (Tests of Normality) has been applied to analyze the compatibility of the probability distribution of the studied variables with the normal distribution, and it is important to verify this statistical hypothesis as failure to achieve this hypothesis may lead to false results. Then non-parametric tests are applied in order to obtain accurate results, and the studied variables of the pre- and post-tests were tested and one of the non-parametric tests was used, which is the Wilcoxon testTo compare the studied variables between the pre- and post-tests, and to find out whether there is a difference between the two tests,

Table (1) shows the comparison between the results of the Wilcoxon test in the research variables

Morale	Sig	Z value	Deviation Standard	Arithmetic mean	Variables
Moral	0.002	3.06*	0.36	0.97	Forward spine flexibility - pre / cm
			0.98	4.85	Forward spine flexibility - dimensional / cm
Moral	0.006	2.79*	1.20	6.19	Flexibility of the backward spine - pre / cm
			0.79	8.39	Flexibility of the spine backwards - dimensional / cm

Table (1) shows the arithmetic media, standard deviations, and (Z) values calculated for the research variables in the pre- and post-tests, where the values of (Z) for the flexibility of the forward and backward spine reached (3).06) and (2.79) respectively in favor of the post-test and

at its significance level (0.002) and (0.006). These results are attributed to the effect of therapeutic exercises that contributed to the improvement of the level of spinal flexibility in both the anterior and posterior directions, in addition to the reduction in the level of pain after the use of therapeutic exercises, which contributed to the speed of recovery by increasing the speed of blood flow in the area of the injury as a type of treatment as a result of the medical movements used in the exercises with the new therapeutic devices and warm-up, and this was confirmed by Huang .et al. Therapeutic exercises, especially water exercises, reduce the load of the spine and are safer for post-operative patients. The treatment program improved the strength and stability of the trunk and significantly reduced pain, which is in line with the pain relief in the treatment group with previous studies on exercise. Hurwitz, et al. 2005) (Huang et al.2023)).

The most important part of physiotherapy is the use of paraffin wax, which is now considered one of the most common treatment methods in the treatment of injuries of various types and degrees. Including chronic cases, which are classified as mild and moderate. These injuries only cause pain when the affected area is exposed to pressure for long periods or as a result of intense exercise. Many clinical reports have shown the effectiveness of paraffin wax bath in dealing with a wide range of conditions. Mild sclerosis that affects the joints long after the injury. (2012.Randall.T.etal).

Wax helps to moisturize dry skin making it softer while the heat generated improves blood flow through the skin. This may help provide a sense of comfort and reduce tension in the area of the injury. In addition, hot wax therapy helps to activate the sweat gland, especially those directly related to nerves and muscles, (Kaye.and.Laby, 2013).

The use of paraffin wax contributes to relieving tension and pain intensity in the area of injury, as the feeling of pain during exercise leads to the search for positions that reduce the intensity of the pain during movement. A gradual decrease in the degree of pain was observed after the first two weeks of the rehabilitation phase. Significant improvement in the function of the affected areas was also recorded. Paraffin bath therapy is more effective when combined with therapeutic exercises, and studies have shown positive statistical results to support the use of paraffin wax with physical activity. (Members.OP.and.O 2004)

Pain is the body's way of alerting you to a problem. This is done through nerve signals released by the nerves. In addition, the body activates special enzymatic reactions to help it get through the injury phase. However, these reactions may become disruptive or ineffective if the injury persists for a long time or when damage builds up at the site of the injury. Even if the injury is of a moderate level, paraffin wax plays a role that contributes to raising the temperature of the affected area, widening blood vessels and enhancing the permeability of the skin surrounding the injury. The body also releases endorphins to the site of pain to relieve it, but the pain may persist if there is any obstruction in the way endorphins travel within the blood. This enzyme relies on the skin substrate, a layer that contains aqueous fluid between muscle tissue and skin, which can be accessed through tiny openings in the skin when the skin surrounding the affected area rises in temperature. The subcutaneous layer is heated which stimulates the basal gland in the brain to release more endorphins towards the pain site, in this process the pain is relieved. Paraffin wax

has an effective role in accelerating the response by raising heat and stimulating endorphins, making it an effective therapeutic method to reduce pain and improve the health status of the affected area, (Prentice.WE, 2011).

1.4. Conclusions:

1. The use of diverse physiotherapy has a positive effect on the rehabilitation of the injured swimmers.

2. The effectiveness of the therapeutic program used in the rehabilitation of minor muscular injuries of swimmers using physical therapy.

3. There has been an improvement in the range of movement of the injured, an improvement in the reduction of pain, and a development in the strength of the working muscles, which indicates the positive effect of the prepared rehabilitation method.

2.4. Recommendations:

1. Confirm the use of the physiotherapy approach that includes exercises and devices together in the preparation of appropriate treatment programs.

2. Dissemination of the proposed rehabilitation curriculum in treatment centers and physiotherapy units in hospitals and health institutions.

3. The injured swimmer and coach should pay attention to the injury and how it occurs in terms of treatment, the use of the necessary modern devices and means, and give it enough time to recover before returning to sports.

4. Paying attention to conducting more research to identify the effect of muscle stimulation and rehabilitation exercises in reducing the degree of pain and speeding up the rehabilitation of various sports injuries.

5. The need to prepare rehabilitation curricula for those injured with other injuries and in other sports games, and to activate the establishment of courses on the rehabilitation of injuries under the supervision of doctors and professors specialized in treatment and rehabilitation.

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Appendix No. (1) Sample of the Rehabilitation Physical Therapy Program for Swimming Practitioners prepared by the researcher

Time	Physiotherapy Devices
5 min	Use a paraffin wax bath. Apply the wax to the pain site for five seconds. Then leave to cool the wax The temperature of the wax is between (40-44) degrees.
3 min	Comfort

5 min	Using an Ultra Sound Wave The frequency used is (3 Mica Hz). The intensity used is between (0.5-1) watts cm
3 min	Comfort
5 min	Use the Shortwave Device. Wave). The frequency used is (100) Hz. The intensity used is (17) watt cm.