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## The effect of a rehabilitation approach using pilates exercises to relieving pain and stiffness of the spine

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### Abstract

The research aims to prepare a rehabilitation curriculum using Pilates exercises that is appropriate to the research sample. And knowing the effect of Pilates exercises on inflammation and stiffness of the spine in the research sample. The sample was selected from (10) women with spinal inflammation who suffer from spinal pain. Then the researcher prepared a rehabilitation curriculum using Pilates exercises that lasted for a period of (12) weeks, with (3) units per week. Pre- and post-tests were conducted and treated statistically. The most important conclusions emerged for the researcher: that Pilates exercises have great effectiveness in developing muscle strength and the range of motion of the spine. The recommendations included the necessity of diagnosing the injury by a doctor before starting work, and the necessity of using Pilates exercises for those suffering from pain or arthritis, as it brings great benefit to those affected.

**Keywords:** Rehabilitation, pilates, range of motion

### Introduction

Due to the development in technology and its use in all fields of life, which has led to the emergence of sedentary diseases, due to the majority of people staying away from activity and exercise, and the majority of people tending to work at desks, being busy with computers and mobile phones, and spending most of their time sitting without movement, many diseases and various injuries have appeared in most people. Young people are not limited to the elderly only.

In our research, we focused on inflammation and stiffness of the spine, which is one of the most common medical problems in the world. It affects people of all ages, as inflammation and stiffness of the spine has more than one condition, some of which appear as a natural result of using wrong habits while working, and some of which appear suddenly and disappear, only to appear and return later. There are also chronic types that gradually worsen over time. There are factors that contribute to the occurrence and development of this condition (obesity, heredity, aging, lack of exercise, and not consuming milk and its products, eggs, fruits, vegetables, and fish. (Al-Mulla, 2007) <sup>[1]</sup>.

The reason why inflammation in the muscles causes a stiff back is that when inflammation occurs in these muscles, the muscle cannot contract properly and its flexibility decreases, which causes a stiff back. Sitting incorrectly or sleeping incorrectly: Sitting incorrectly, especially the arched back position, results in strong tension in the muscles and tendons, and if this position is repeated, it causes stiffness in the back. (Jawad, 2017) <sup>[11]</sup>.

Physical activity is one of the means of prevention against most diseases, especially inflammation of the spine, and exercising reduces resorting to medical and chemical drugs that leave side effects on the one hand and are high in cost on the other hand. (Al-Zoubi, 2006) <sup>[5]</sup>.

A person strives to gain health after suffering from the problems of illness, so it is necessary to provide him with interesting and enjoyable exercises that raise the level of strength and flexibility and thus get rid of arthritis. This treatment is at a lower cost and without side effects.

Pilates exercises are a group of physical movements that achieve muscular balance between opposing groups and are accompanied by breathing patterns. Its effect is not limited to the physical aspect, but rather goes beyond that to rehabilitate all body injuries.

It is performed on a mat and does not require tools. Its principles are applied, which are (focus, control, breathing, Centralization, flow, performance control. (Mohammed and Ibrahim, 2018)<sup>[1]</sup>.

Hence the importance of research into choosing exercises specifically to rehabilitate spinal stiffness, get rid of pain, and rehabilitate the spine to its former state. It is known and widely circulated in our Arab societies that spinal stiffness occurs in the elderly. The area most susceptible to pain is the spine, since the spine is the basis of human movement. The prevailing belief is that with age and increased use, it is exposed to injury, but what we saw through the statistics of the records of Al-Hussein Teaching Hospital in Muthanna, it became clear that the majority of women suffer from back pain. This is due to development and technology, sitting for very long periods in front of the TV, computer or mobile, sitting in the wrong way, frequent climbing of stairs, and the difficulty of living, which has led to most women doing work with great effort, which leads to the occurrence of such pain, and they always resort to taking painkillers that do not change the pain. The condition of the disease is only an alleviation of pain, but it has its harmful effects and causes side complications, therefore, the two researchers decided to engage in a field experiment by developing a therapeutic approach using Pilates exercises that help rehabilitate injuries by speeding up the flow of oxygenated blood and increasing the strength and flexibility of the body, which may improve their performance and movements and thus perform their daily work better. This is through preparing a rehabilitation

curriculum using exercises. Pilates is relevant to the research sample and its effect on inflammation and stiffness of the spine.

### Methods

The researcher used the one-group experimental approach, and the sample was selected from (10) women with spinal inflammation visiting the Hussein Teaching Hospital, aged (35-45) years, who suffer from spinal pain, after an examination was conducted by the specialist doctor. An E.S.R analysis was performed and an X-ray was taken for each selected patient.

### Measures used in the research

**First:** Testing the severity and type of pain: The clinical test was carried out by specialized doctors, and then a form was prepared showing the severity of the pain for the patient, as it is necessary to know the type and severity of the injury. It became clear by distributing this form to the sample that they were of the same degree of pain, as the two researchers deliberately selected the sample. Of the same degree of pain, which is the moderate degree, because there are two other degrees, which are light intensity, which do not require this program, but rather simple advice, and the highest degree of pain, which is the one in which the sample is unable to perform the movement desired by the researcher, and this is what the researcher does not hope for in terms of bad progress in the case of The patient (McCaffery and Beebe, 1993). The form indicates the severity and type of pain.

**Table 1:** Shows the percentage of pain intensity:

Intensity of pain	Pain rate	Situation Interpretation
Slight pain	1-3	Annoying pain that slightly interferes with daily activity
Moderate intensity Pain	4-6	Pain that significantly interferes with daily activity
Severe pain	7-10	Unable to perform daily activity

Second: Testing the strength of the back muscles (Hassanin, 1995)

**Purpose of the test:** Testing the strength of the back muscles.

- **Unit of measurement: (kg).**
- **Necessary tools:** dynamometer, registration form.
- **Method of performance:** The injured person stands and pulls the chain upward with both arms only once, and the result is recorded by the watch in the device based on what the device recorded.
- **Register:** measuring the strength of the back muscles, reading the recorded result in (kilograms)

- **Tools used:** measuring tape - results recording form.
- **Description of the performance:** from the prone position on the stomach with the arms placed behind the back. Then the laboratory raises the torso up and back as much as possible. The distance is measured from the ground to the cavity above the sternum. The distance between them is the flexibility to extend the torso back.
- **Register:** Register the best attempt out of (2-3) attempts, and the calculation is done in centimetres.

**Third:** Spinal range of motion tests (Abdel Hamid, 2016)

#### 1. Standing torso flexion test.

- **Purpose of the test:** To measure the range of motion of the spine
- **Tools used:** A wooden box with a height of (50) cm, a measuring ruler with a height of (1) m
- **Description of performance:** From a standing position on the box, bend the torso downward while extending the arms downward, and point on the measuring ruler to determine the degree at the edge of the fingers after holding the position on that number.
- **Register:** Register the best attempt out of (2-3) attempts, and the calculation is done in centimetres.

#### 2. Backward torso extension test:

- **Purpose of the test:** to measure the range of motion of the spine

**Fourth: Laboratory tests:** The E.S.R test, which represents the rate of red blood cell sedimentation, which is a high percentage for other types of arthritis, was conducted in the Al-Hussein Blood Analysis Laboratory at Al-Hussein Teaching Hospital, and the analysis was performed by specialists, and the benefit of this test is to ensure The type of inflammation for the case under investigation, and the sample was emphasized by the necessity of abstaining from food for at least 6 hours before drawing blood, according to the instructions of the specialist doctor.

**Pre-tests:** The researcher conducted tests on the research sample on Saturday, 1/7/2023, at Yarmouk Teaching Hospital at ten o'clock in the morning, under the supervision of medical staff.

**The main experiment:** The researcher prepared a therapeutic approach using Pilates exercises. The application of the curriculum began on Sunday, 2/7/2023, and ended on Wednesday, 13/9/2023. It continued for a period of (12)

weeks, at a rate of (3) units per week (Sunday, Tuesday, Thursday), and at a time of (20) minutes per treatment unit. It is a first-level Pilates exercise (for beginners) or known for its use for rehabilitation. After preparing the exercises, the researcher presented them to specialists in treatment and rehabilitation and their suitability for the sample, as the performance of one exercise was performed slowly with inhalation and exhalation until the muscles surrounding the spine reached their full range. The progression (from easy to difficult) was taken into account in giving the exercises and repetitions, from low to high from low. A rest was given between one exercise and another for a period of (10 seconds).

#### Exercises used in the therapeutic approach:

1. Lie on your back with your knees bent and raise your hips and lower them slowly (inhaling and exhaling).
2. Stand, then extend the spine forward with the hand and hold still (30 seconds) (repeat the exercise backwards).
3. Lying down, bending the knees, keeping the feet on the ground, and twisting the knees to the right and left alternately (10)
4. Lying on the back with the arms crossed behind the head, bending and extending the leg, touching the elbow of the opposite arm to the bent leg alternately, once to the right, then to the left.
5. Lying down, bending the left leg and the extended foot, and pulling the knee while it is bent to the chest more and more stable, then alternating the performance on the second leg (50 seconds)
6. Lateral leaning on the elbow of the hand and bending the knee (90 AH). Raising and lowering the hip with every

inhalation and every exhalation lowering. The exercise works on both sides.

7. Lying down, placing the palms under the hips, raise and lower the legs very slowly, inhaling when raising and exhaling when lowering.
8. Lie down, holding the knees and pulling them to the chest and staying (20 seconds)
9. Lying down, bending the legs with bilateral extension of the legs. Raising the arms high as far as they can reach, inhaling and exhaling slowly when returning to the initial position.
10. Lying on the back with the head and shoulders raised and the legs slightly raised. Bend the leg and pull it with the arms alternately, once to the right, then to the left.
11. Lying down and raising the legs on a barrier or support, then opening the legs in succession or vice versa (15 reps)
12. Lie down, bend the knees, and raise the head and shoulders so that the chin reaches the chest (15 seconds)
13. Lie on your back and bend your right knee. Place the left foot over the right knee and pull the left knee inwards and hold in succession (20 seconds)
14. Prone, the right arm is raised while the left leg is raised. The raising and lowering are done alternately.
15. Lying down, raising the head and shoulders off the ground, legs raised at a 45 degree angle, bending the leg and pulling it with the arms towards the chest, once with the right leg and once with the left leg.

**Posttests:** After completing the remedial curriculum, posttests were conducted on Saturday, 16/9/2023.

#### Show results

**Table 1:** Shows the arithmetic means, standard deviations, and t value for the strength of the back muscles and the range of motion of the spine.

Variables	Pre-test		Post-test		t value	Sig level	Sig type	
	Mean	Std. Deviation	Mean	Std. Deviation				
Back muscle strength	41.7	5.618	65.1	8.672	11.031	0.000	Sig	
Range of motion of the spine	Front	19.9	11.980	22.6	6.896	7.011	0.000	Sig
	Back	20.6	19.259	24.9	11.518	8.452	0.000	Sig

Below the degree of freedom (9) and the level of significance (0.05)

**Table 2:** Shows the arithmetic means, standard deviations, and (t) value for the pain score and E.S.R analysis for the research sample.

Variables	Pre-test		Post-test		t value	Sig level	Sig type
	Mean	Std. Deviation	Mean	Std. Deviation			
Pain Degree	3.6	1.577	7.6	1.577	13.416	0.000	Sig
E.S.R analysis	22	2.828	11.1	2.469	7.775	0.000	Sig

Below the degree of freedom (9) and the level of significance (0.05).

#### Discussion

From Table No. (1), we notice that there are significant differences between the pre- and post-tests, in favor of the post-test. The researcher attributes the reason for the development in the strength of the back muscles to the fact that the effect of Pilates exercises on them was clear, as the progression of the exercises, their intensity, stopping, movement, and stability within the exercise, in addition to the rhythm of breathing, had an impact. Directly in the strength of the back muscles, as "Pilates exercises for beginners are considered one of the best exercises used to rehabilitate sports injuries and posture deviations to relieve pain, as they have the ability to increase blood flow and oxygen to the working muscles and increase the level of strength and lengthening of the body's muscles. (Mohammed and Ibrahim, 2018)<sup>[1]</sup>.

As for the spinal range of motion test, significant differences appeared in favor of the motor test, as the range of motion developed significantly after the spine was defined and stiff. It became more flexible and easy to move, and the pains disappeared during movement. This is due to the Pilates exercises having a direct effect on the spine and back muscles. Most Pilates exercises are stretching exercises that are performed slowly and steadily and work to bring the joints to their maximum range of motion, and this was confirmed by (Ralf Meier, 2006)<sup>[10]</sup>. The latter stated that Pilates exercises "are a series of stretching exercises that can be performed on a small area of floor and with minimal equipment." Karon (2001) also stated, "Through continuous practice of Pilates exercises, we can reach the highest level of muscle lengthening, as well as increase the ability of the joints to

move freely and with apparent flexibility without tension or injury” .

From Table No. (2), we notice that there are significant differences between the pre- and post-tests, in favor of the post-test. The researcher attributes the reason for this to the therapeutic approach prepared by the researcher for Pilates exercises, as if Pilates exercises relieve pain, this is consistent with (Salama, 1994) <sup>[3]</sup> that “stretching and flexibility exercises make you feel better.” The individual feels comfortable and relieves the pain that the individual suffers from” . Pilates exercises, in all their forms, “are an important part that people with joint pain look forward to, and these pains cannot be alleviated except by practicing proper and appropriate exercises” (Hender and Kinnick, 2000) <sup>[4]</sup>.

As for the results of the E.S.R analysis, it became clear that the results were in favor of the post-tests, which proves that the therapeutic approach prepared by the researcher was useful in achieving the severity of the inflammation occurring in the spine. This is due to the development of the back muscles, the range of motion of the spine, and continuous movement during exercises that led to the relief of stiffness. In the joint, the pain disappeared, and the percentage was achieved by E.S.R analysis, as it was positive in favor of the research sample.

## Conclusions and recommendations

### Conclusions

- Pilates exercises are very effective in developing the strength of the back muscles and the range of motion of the spine.
- Pilates exercises helped increase the flow of oxygenated blood and thus relieve pain in the spine.
- The study proved that the E.S.R analysis changed its level to the normal level thanks to the development of strength, flexibility, and movement as a result of Pilates exercises, and it benefits the research sample.

### Recommendations

- The necessity of diagnosing the injury by a doctor before starting work.
- The necessity of using Pilates exercises for those suffering from pain or inflammation of the spine, as it has great benefits for those affected.
- Conducting studies and research related to Pilates exercises on various injuries to produce positive results that benefit rehabilitation and physical therapy centers.
- It is necessary for physical therapy centers to adopt such studies and apply them to patients with such injuries.

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