Proximus Journal of Sports Science and Physical Education
Volume 2, Issue 8, August 2025
https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

The effect of preventive aquatic exercises in strengthening the ligaments and muscles working on the spine for office workers aged (35-40) years

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Abstract
The world is currently witnessing a vast development in all fields and aspects, including the sports field which is witnessing a qualitative leap thanks to the utilization of research, which necessitated attention to therapeutic sports movement, whether by using modern theoretical and applied sports sciences or modern scientific and technical means in creating advanced therapeutic and rehabilitation methods, far from surgical intervention in the rehabilitation of injuries of all kinds . It is also used to treat pain and to remove muscle spasms by using it in all its forms: solid (ice), liquid (water at all temperatures), and gaseous (steam)
The lumbar vertebrae are an area of the spine that is most susceptible to injury. They contain five vertebrae (called the lumbar vertebrae) that include ligaments, bones, and muscles together. All these things provide the opportunity to damage the lumbar vertebrae, and the researcher aimed to prepare preventive water exercises to strengthen the ligaments and muscles working on the spine for those who work in office jobs at the ages of (35-40) years
researcher concluded that the preventive water exercises prepared by the researcher had a great effect in developing the strength of the ligaments of the lumbar region , and that applying the exercises to the injured did not leave any negative effects on them, but rather they obtained positive effects and improvement
Keywords: Water-based preventive exercises - Ligaments and muscles - Office workers

1- Introduction to the research

Introduction and importance of the research

The world is currently witnessing a wide development in all fields and aspects, including the sports field, which is witnessing a qualitative leap thanks to the benefit of research, which required attention to therapeutic sports movement, whether by using modern theoretical and applied sports sciences or modern scientific and technical means in creating advanced therapeutic and rehabilitation methods that are far from .surgical intervention in the rehabilitation of injuries of various types (5:181)
Rehabilitation is considered a fundamental axes in the treatment of many injuries because it aims to eliminate the functional states of the injured part by addressing the manifestations of weakness in the muscles, ligaments and joints. Rehabilitation aims to compensate the individual for the lost physical and motor elements and bring him to the maximum level of his natural state by using appropriate physiotherapy, which uses natural factors such as heating and electrical means, massage and aquatic rehabilitation exercises, which is considered a method of physiotherapy because water is characterized by its ease of changing from one form to another and transmitting heat and cold to the human body in addition to its ability to absorb and leak heat (1:17). It is also used to treat pain and to relieve muscle spasms by using it in all its forms: solid (ice), liquid (water at .all temperatures) and gaseous (steam)
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Research problem 2-1

The lumbar vertebrae are an area of the spine that is most susceptible to injury. They contain five vertebrae (called the lumbar vertebrae) that include ligaments, bones, and muscles together. They allow a large range

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,of movement, but they are highly susceptible to injury. Incorrect posture, type of work, sleeping on a chair incorrect sleeping method, twisting, or muscle strain, all of these things provide the opportunity to damage the lumbar vertebrae. Therefore, the researcher decided to develop preventive exercises to strengthen the .ligaments surrounding these vertebrae

Research objectives 3-1
exercises Preventive Water in strengthening Ligaments and muscles The worker on The Preparing -1 . backbone of office workers aged (35-40) years
Exercises Preventive Water in strengthening Ligaments and muscles The worker On Identify the impact -2 the backbone of office workers Ages (35-40) years

Research hypotheses 3-1
There are statistically significant differences between the pre- and post-tests in strengthening the ligaments **-1** .and muscles working on the spine for office workers aged (35-40) years

Research areas 4-1
.Human field: A sample of office workers aged 35-40 years 1-5-1
Time frame: 9/1/2022 to 11/1/2022 2-5-1
Teachers ' Center for Physical Therapy in Baghdad

Methodology Search and Its procedures Field -2
Curriculum Search 1-2
The researcher used the single-group experimental method because it is suitable for the nature and variables of the research and because it is the appropriate way to solve the problem and observe and interpret the .resulting changes. Experimentation searches for the cause and how it occurs
community and sample Search 2-2

The researcher deliberately selected the sample from office workers aged between 35-40 years, totaling 15 :men. They were examined by the medical staff at the teachers' center. Nine of them were excluded due to
The distance of the center from their place of residence -1
Some people's commitment to work -2
.They were not within the age range of the research sample -3
Thus, the number of sample members was 6, with whom the research experiment was agreed upon, and they .were homogenized to begin the research project
Table 1. (Sample homogeneity)

The mediator	standard deviation	arithmetic mean	variable
37	8.6	37	the age
80	15.3	80.5	the weight
172	25.44	172.12	height

Means and devices and Tools used 3-2
Means collection Information 1-3-2

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Arabic and foreign sources -
Personal interviews -
Survey form -
Tests-

Devices and tools 2-3-2
Force sensor -
*Kenova program for measuring angles -
MRI
Medical scale
Measuring tape -
) camera Type -Sony (

procedures Search Field 4-2
After the researcher surveyed the teachers , she found that the Teachers' Center for Rehabilitation and Physical Therapy was the most appropriate for conducting field research procedures, as all the special capabilities were available, and the two researchers implemented the necessary procedures to facilitate the .task

Determination Tests 1-4-2
When selecting research variables and determining their tests, it must be taken into account that they achieve the objective goals and are able to measure the various variables required to be measured in the research sample. Therefore, the researcher developed the tests and measurements used in the research, relying on the opinions of experts, theoretical studies, and scientific sources. These are standardized tests and measurements and are among the most important means used in scientific research. The tests that achieved an agreement .rate of (75%) were chosen, and the other tests were neglected

:Tests 2-4-2

:Measuring the range of motion using the Kenova program and according to the following positions (2:74) -1
From the forward trunk bend position -
From the position of backward trunk bend -
From the right trunk bend position -
From the position of bending the trunk to the left -

:Measuring muscle strength using a sensor and according to the following positions (3:65) -2
from situation drape trunk Forward -
from situation drape trunk back -
from situation drape trunk To the right -
from situation drape trunk To the left -

) Measuring the level of pain using the visual analogue scale -3VAS .(

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The experiment exploratory 2-4-2
researcher conducted a pilot experiment on 8/29/2021 on a sample of infected people, numbering (8) who are outside the research sample, for the purpose of knowing the progress of the tests and the purpose of this :experiment

-1 .The suitability of the exercises designed for the research sample
-2 .Knowing the importance of tests
-3 .Identifying the time for performing the qualifying exercises for the examinees
-4 .Knowing the extent to which the rehabilitation curriculum is appropriate to the sample's ability level

Pre-tests 5-2
researcher conducted pre-tests agreed upon by experts and specialists, specific to the research variables, on .at (10) in the morning in the physical therapy hall at the Teachers' Center in Baghdad 1-9-2 202

Qualification Curriculum 6-2
:The researcher conducted the field experiment on 2022-9-2 and the experiment included

- The curriculum consists of 8 weeks and includes exercises prepared by the researcher and approved .by experts
- *The rehabilitation units are (2) units per week, i.e. 16 rehabilitation units
- .The exercises were given in a gradual manner, from easy to difficult
- researcher was keen to conduct rehabilitation exercises on the research sample members at the .appropriate time
- Rest periods between repetitions and sets
-

Post-tests 7-2
After completing 8 weeks for the injured, the researcher conducted the post-tests on 11/2/2020 at the Teachers Center for Physical Therapy in Baghdad at 10:00 a.m. under the same conditions in which she conducted the .pre-tests

Statistical methods 8-2
) researcher verified the results of their study using the statistical packageSPSS) version 26 (V) where the , percentage value, arithmetic mean and standard deviation were calculated.

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.Analyzing and discussing the research results -3

Table 1

Shows the arithmetic means, standard deviations, and the tabular and calculated t-value for the dynamic range .variable for the research sample

significance	T value		The distant		tribal		Variables	T
	Tabular	The calculated	A	S	A	S		
moral	2.56	2.68	1 9.57	65.34	1.43 4	87.45	Bend the trunk forward	**-1**
moral	2.56	3.76	. 13,34	88,97	27.56	96.22	Extend the trunk backward	**-2**
moral	2.56	6.22	12.43	36.76	16.47	46.32	Bend the trunk to the right	**-3**
moral	2.56	4.90	11:09	43.98	13.87	49.87	Bend the trunk to the left	**-4**

Table (2)

muscle Shows the arithmetic means, standard deviations, and the tabular and calculated t-value for the .for the research sample strength variable

significance	T value		The distant		tribal		Variables	T
	Tabular	The calculated	A	S	A	S		
moral	2.56	3.08	1.01	7.8	1.43	5.2	Bend the trunk forward	**-1**
moral	2.56	2.77	1.12	8.21	0.56	6.1	Extend the trunk backward	**-2**
moral	2.56	2.90	0.94	7.14	0.62	5.6	Bend the trunk to the right	**-3**
moral	2.56	4.03	1.89	7.29	0.51	5.4	Bend the trunk to the left	**-4**

Table 2

Shows the arithmetic means, standard deviations, and the tabular and calculated t-value for the visual .symmetry variable for the research sample

significance	T value	The distant	tribal	Variables	T

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	Tabular	The calculated	A	S	A	S		
moral	2.57	3.08	1.02	7.9	1.44	5.1	Head bend forward	**-1**
moral	2.57	2.78	1.13	8.22	0.58	6.2	Head back	**-2**

Discussion of results

Through Tables (1), (2) , (3) for the variables of range of motion and muscle strength, Visual symmetry: We find that the differences appeared significant between the pre- and post-tests in favor of the post-test . The researcher attributes the significant differences to the rehabilitation program followed in alleviating pain and improving the range of motion and muscle strength , and that the exercises helped the spinal muscles to increase their contractile efficiency, which led to the continued effectiveness of the exercises to improve in the post-tests. He points out that the rehabilitation exercises used help in activating the receptors in the muscles adjacent to the deep spine, and this was confirmed by (Hamdi Ahmed, 2006) (1:98). The proposed rehabilitation exercises also helped in improving the range of motion of the spine, as they lead to activating blood and lymphatic circulation and giving sufficient flexibility to the muscles and tissues surrounding the ,spine, which helped in relaxing the muscles, alleviating pain and loosening adhesions between the tissues which increases blood flow to them and increases the sensitivity of muscle fibers to stimulation, as this helps in getting rid of the tension and chronic contraction of the muscles surrounding the lumbar vertebrae , which . is the basis of the injury, and this was confirmed by (Khaled Mohammed, 2012) (2 :187)

Conclusion -4

According to the research objectives, procedures, and processing results of the data collected in the pre- and :post-tests, the following conclusions were reached

1- preventive water exercises prepared by the researcher were very effective in strengthening the ligaments. For the lumbar region
2- Applying exercises to the injured did not leave any negative effects on them, but rather they .obtained positive effects and improvement

:The researchers recommended the following

1- .preventive exercises prepared by the researcher to prevent spinal pain
2- The necessity of educating trainers and specialists in the sports field to pay attention to preventive exercises and allocate a portion of the training unit to these exercises on an ongoing basis to reduce .the occurrence of injuries
3- .Conduct similar studies targeting other parts using preventive exercises
4- .Conduct similar studies on other age groups

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Appendices

Rehabilitation Unit

Illustrative image	Comfort	stability	Groups	repetition	Exercises	N
	30 seconds	3 seconds	3	5	From a standing position inside the aquarium ,m walk forward.	1
	30 seconds	3th	3	5	From a standing position inside the aquarium ,m walk backwa. rd	2
	30 seconds	3th	3	5	From a standing position in the water ,basin extend one leg	3

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					upwards. at a right angle	
	30 seconds	3th	3	5	From a standing position in the ,pool extend your arms over the surface of the pool and push .up	4
	30 seconds	5th	3	7	From a standing position inside the ,pelvistry to walk by pushing one leg forward.	5

) .Appendix No2 (

An illustrative image of the Kinovea device inoperation

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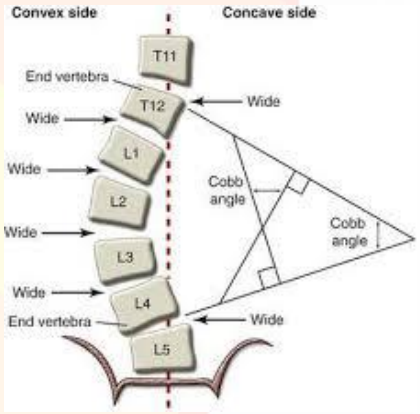

) .Appendix No3 (
Pain assessment form

FIGURE 10-1 | Rating Scales for Pain Measurement

Visual Analog Scale:
Mark a point on the line to show how strong your pain is

no pain — worst pain imaginable

Box Scale:
Rate the level of your pain by circling one number on the scale, where 0 means "no pain" and 10 means "worst pain imaginable"

1	2	3	4	5	6	7	8	9	10

Verbal Rating Scale:
Circle the phrase that best describes your pain

Not Painful Slightly Painful Moderately Painful Very Painful Extremely Painful