

The Impact of Rehabilitation Exercises on Cervical Spondylosis Among Employees

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Abstract

Rehabilitation exercises play a crucial role in rehabilitating injuries and have a direct impact on the flexibility of the spinal column and the muscle strength supporting it. To illustrate this impact, it is necessary to study these effects through rehabilitation exercises. Most employees, due to the nature of their continuous daily work, may be subjected to various strains and pressures that affect different body systems, leading to weakness and discomfort in some areas. Incorrect work and sleep habits contribute to these issues, compounded by prolonged hours spent sitting in front of a computer. All of these factors contribute to spinal pain and injuries, especially in the cervical vertebrae. The aim of this research is to develop rehabilitation exercises for employees suffering from cervical spondylosis. Additionally, it aims to understand the impact of these rehabilitation exercises on rehabilitating employees with cervical spondylosis. The researcher used an experimental approach, and the study sample consisted of eight individuals aged between 40-50 years, after being examined and diagnosed by a specialized physician. The researcher concluded that the application of rehabilitation exercises helps reduce the level of pain among the patients, demonstrating better outcomes compared to their peers who received traditional hospital-based rehabilitation exercises alone. The researcher recommends applying the results of this study when seeking to assist individuals with cervical spondylosis for better outcomes during treatment in hospitals. The rehabilitation protocol spanned six weeks, comprising an average of three rehabilitation sessions per week, totaling 18 sessions. These rehabilitation sessions were progressively tailored from lower to higher intensity over time, ranging between 15 to 30 minutes per session.

Keywords

Rehabilitation exercises, Spondylosis of the cervical spine.

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1. Introduction to the Research

1.1. *Introduction and Importance of the Research*

The scientific evolution witnessed in the world today is a significant sign of progress, culture, and creativity. This innovation requires a comprehensive and direct understanding of our surroundings, whether internal or external to the country. Consequently, the continuous and prolonged use of computers within government departments has become essential and necessary, affecting the spinal cord due to extended hours spent in front of the device. This sedentary lifestyle leads to spinal pains, affecting not only those working with computers but also individuals engaged in continuous home-based work and professions that require prolonged sitting, such as tailors, taxi or truck drivers, and athletes practicing high-intensity exercises. Neglecting or improperly addressing such pains can lead to unforeseen complications. Hence, it's crucial to consider the mechanical intervention due to the spinal movements, as the vertebral column represents a lever system. Therefore, studying its mechanics is essential to fortify the therapeutic outcomes.

Rehabilitation is a scientific profession primarily based on the study of sports medicine, with relevant medical and health courses focusing on the health conditions of the affected individuals. Rehabilitation encompasses physical, movement-related, and sports aspects and is sometimes referred to as physical therapy. Its main goal is to restore individuals' abilities and potentials to their pre-injury state. The rehabilitation program relies on functional and anatomical assessments of the affected part before treatment to determine the severity of the injury for optimal rehabilitation planning. Rehabilitative exercises are an essential part of this process, used to restore the affected area to its natural state without resorting to surgical procedures or medical drugs. The main objective of rehabilitation is to achieve the desired outcome by restoring the natural functions of the body after an injury, and reliance on rehabilitative exercises is an effective way to achieve this goal.

The health aspect in human life is of paramount importance and plays a significant role in life sustainability. Hence, modern medicine, sports sciences, and rehabilitation methods are focusing on comprehensive injury prevention. Given the importance of this aspect, several scientific specialties have emerged, such as medical and health sciences, diligently working to serve society and human health. Among these disciplines, rehabilitative exercises stand out as one of the principal methods relied upon by

rehabilitation specialists to enhance flexibility and muscle strength in the cervical spine area, serving as an effective means to rehabilitate various injuries and help individuals regain their normal functions as quickly as possible.

The importance of this study lies in reducing or alleviating these pains, as their presence leads to reduced concentration and productivity. Individuals might resort to pharmaceutical drugs, which can have negative effects. Moreover, performing incorrect movements by bending the spine or assuming positions believed to alleviate pain can result in further complications. Therefore, finding therapeutic exercises to alleviate the severity of pain rather than relying on medications is crucial.

1.2. Problem Statement

Studying the impact of rehabilitative exercises, especially for employees aged between 40 to 50 years suffering from cervical spondylosis, is important to understand the effects of these exercises on muscle function. These exercises play a vital role in accelerating the recovery process from acute injuries for performing different functional tasks. They enhance the body's biological reactions and speed within the human body. Recognizing these changes also aids in understanding the appropriate therapeutic and rehabilitative exercises for various injuries.

The research problem lies in the high prevalence of individuals suffering from cervical spondylosis due to various factors, including prolonged improper sitting, incorrect standing or lying positions, poor habits, and lack of physical activity. This led the researcher to attempt to find rehabilitative methods to shorten the rehabilitation process for individuals suffering from cervical spondylosis.

Hence, the researcher decided to delve into this experiment due to the fundamental importance of these exercises in releasing energy within the body on the one hand, and on the other hand, there is a lack of knowledge among some professionals about the relationship between exercises and the energy release required for optimal physical performance.

1.3. Research Objectives

- 1- Prepare rehabilitative exercises for cervical spondylosis in employees.
- 2- Identify the impact of rehabilitative exercises for cervical spondylosis in employees.

1.4. Research Hypothesis

There are statistically significant differences in the results of pre-test and post-test for the research sample individuals in favor of the post-test results.

1.5. Research Fields

1.5.1. *Human Field:* ()

1.5.2. *Time Field:* For the period from 25/9/2023 to 14/11/2023

1.5.3. *Spatial Field:* ()

2. Research Methodology and Field Procedures

2.1. Research Methodology

The nature of the phenomenon addressed by the researcher determines the methodology employed, as it serves as a means for exploring the truth. Scientific facts are established through research and investigation, hence the researcher relied on the experimental method due to its suitability and effectiveness. The experimental method is considered one of the fundamental approaches used in such research, aiming to obtain precise and reliable results. The researcher utilized the pre-test and post-test equivalent group design, considering its suitability to the nature of the studied problem.

2.2. Research Population and Sample

The process of selecting the sample in research represents one of the challenges faced by researchers in conducting studies, as the results heavily depend on this choice. The researcher bears the responsibility of choosing a sample that accurately represents the studied community, aiming to achieve precise and reliable results. In this context, the selection of the research sample relies on purposive sampling, where the sample is chosen freely based on its compatibility with the study's objectives (Dogan, 1998, p. 116).

Therefore, the researcher selected the study group from employees experiencing cervical spine problems, aged between 40-50 years. The sample was chosen from individuals regularly attending physiotherapy centers in the health institution in Al-Najaf Al-Ashraf province. The sample was purposively selected and consisted of 12 individuals facing this issue. Three participants were excluded from the experiment, resulting in the application of the experiment on a sample group of 8 individuals.

2.2.1. Homogeneity of the Research Sample

To determine the homogeneity of the research sample in some variables related to the study, the researcher extracted the coefficient of variance for each (age, height, weight), as illustrated in Table (1).

Table 1. shows the proportions of the study case

Variables	Measurement Unit	Mean	Avg.	Std. Deviation	Coefficient of Variance	Result
Hight	Centimeter	170.75	169	1.879	0.392	Proportionated
Body Mass	Kilogram	79.813	78.5	1.663	0.355	Proportionated
Age	Year	47.18	47	0.722	0.223	Proportionated

2.3. Research Tools and Data Collection Methods:

The researcher used several tools and methods for the research, as follows:

- HP computer device.
- Length and mass measurement device.
- Three video recording cameras.
- Floor mats.
- Phosphorescent adhesive tape.

2.3.1. Data Collection Methods:

- Arabic and foreign sources.
- Patient information form.
- Injury severity questionnaire.
- Internet information network.

2.4. Field Research Procedures:

Testing Muscle Strength of the Cervical Spine Muscles Using the EK3 200 Device:

- Specifications of the EK3 200 device:
 1. Measures muscle strength during muscle tension and relaxation via sensors.
 2. Holds an internationally recognized certificate.
 3. Stores information within the device.
 4. Measures tendon strength in the body.
 5. Measures each muscle separately and calculates muscle groups.
 6. Measures muscle strength in Newtons, kilograms, and pounds.
- The following measurements were taken:
 1. Muscle strength measured in a relaxed position on both sides (right - left).
 2. Muscle strength measured during rotation in both directions (right - left).

3. Muscle strength measured from a forward head position.
4. Muscle strength measured from a backward head position.

2.4.1. Exploratory Experiment:

The researcher conducted this experiment on Friday, September 29, 2023, involving two employees, aiming for precise results. Through this experiment, the researcher gained the following scientific benefits:

1. Verified the integrity of the devices and tools used.
2. Identified potential problems that might hinder the test execution and attempted to overcome negative obstacles while reinforcing positive aspects.
3. Prepared the appropriate work team.
4. Estimated the time required to perform the test and the experiment.
5. Estimated the duration for each individual rehabilitation unit.

2.4.2. Preliminary Tests:

The researcher, with the assistance of the specialized assistant team, conducted preliminary tests on Sunday, October 1, 2023, for the research sample at the Physical Therapy Hall in the Al-Najaf Al-Ashraf Teaching Hospital.

2.4.3. Rehabilitation Exercises:

Rehabilitation exercises were prepared after personal interviews with several sports medicine specialists to select exercises suitable for the studied neck muscles. These exercises aimed to enhance the neck muscles' strength and flexibility, expanding the range of motion and restoring natural movement in all directions. The exercises were applied from October 3, 2023, to November 10, 2023, on the research sample, following these details:

1. Rehabilitation duration: 6 weeks.
2. Number of rehabilitation units per week: three units.
3. Total number of rehabilitation units: 18 units.
4. Included suitable repetitions based on the injury severity.
5. Rehabilitation unit duration: ranged from 20 to 30 minutes.

2.4.4. Post-Test Assessments:

The researcher conducted post-test assessments on November 12, 2023, at 10:00 AM in the Physical Therapy Hall at the Al-Najaf Al-Ashraf Teaching Hospital, under the same conditions as the pre-test.

2.5. Statistical Methods:

The statistical software SPSS was used according to research procedures:

1. Mean calculation.
2. Median.
3. Standard deviation.
4. Coefficient of variation.
5. Standard error.
6. t-test.

3. Presentation and Discussion of Results

Presentation and Analysis of Pre- and Post-Test Results for the Experimental Group in Research Variables:

Table (2) illustrates the mean values, standard deviations, as well as the calculated t-value for the correlated samples. It also demonstrates the significance level of the test and the statistically significant differences between the pre-test and post-test for the experimental group in the studied factors.

Research Variables	Measurement Unit	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	t-value	Sig	Significance Type
Muscle Strength (Relaxed)	Net	7.12	2.034	9.15	1.801	5.101	0.011	Significant
Muscle Strength (Rotation)	Net	22.11	2.003	24.32	1.998	4.881	0.004	Significant
Muscle Strength (Forward)	Net	34.92	1.855	37.22	1.773	5.023	0.002	Significant
Muscle Strength (Backward)	Net	35.14	1.224	38.51	1.721	7.023	0.000	Significant

3.1. Discussion of Results

Through Table (2), which displays the mean values, standard deviations, and calculated t-value, it is evident that the muscle strength test in relaxation, rotation, front, and back positions showed statistically significant results between the pre-test and post-test, favoring the post-test. The researcher attributes this improvement and achieved superiority in the

afflicted individuals to the role played by rehabilitative exercises. The researcher emphasized the importance of pain level in designing these exercises, organizing their difficulty, aiming to promote safety while enhancing flexibility and strength. These exercises were introduced after understanding the physiological mechanism of muscle pain, such as Golgi tendon receptors, which act as inhibitory or warning sensors against muscle tissue damage.

The researcher confirmed that the aim wasn't to adapt to pain but to avoid and alleviate the patients' discomfort, as a means of regaining neck muscle flexibility and strength. The alleviation of pain in the experimental group confirmed the efficacy of this strategy adopted.

The pre-test evaluations indicated varying levels of muscle strength among the participants in different positions (relaxed, rotation, forward head, backward head). After the rehabilitation program, the post-test assessments revealed significant improvements in muscle strength across the evaluated positions. The rehabilitation exercises contributed positively to enhancing muscle strength, flexibility, and range of motion in the cervical muscles. There was a noticeable improvement in the ability of the participants to perform movements in all directions after the completion of the exercise program. Statistical analysis of the pre-test and post-test results demonstrated a statistically significant difference in muscle strength measurements. The improvements observed after the intervention program were significant, indicating the efficacy of the rehabilitation exercises in enhancing muscle strength in the cervical spine. Feedback from participants during and after the exercise program highlighted a positive experience, citing reduced discomfort and increased ease in performing daily activities. Observations made during the post-test assessments supported the subjective feedback, showing tangible improvements in muscle functionality and reduced stiffness. Statistical analyses, including mean calculations, standard deviations, t-tests, and other relevant measures, were employed to substantiate the significance of the observed improvements in muscle strength.

These results align with a study by (Dany et al., 2008) which affirmed that improvement in muscle strength of neck muscles led to an improvement in muscle tone, its range, and the arrival of cervical vertebrae movements to the normal range. It was established that the angle of head inclination forward or backward from the third cervical vertebra to the sixth has a significant impact on nerve compression in the case of cervical disc herniation due to the abnormal inclination angles of these vertebrae, indicating that the lack of balance in the strength of the spine muscles in the cervical and neck regions

and shoulders has an effect on the angles of vertebra inclination, leading to increased stress on the cervical intervertebral discs.

The researcher attributes the observed differences to the effectiveness of the rehabilitative exercises developed and implemented, which contributed to improving muscle strength due to individuals' commitment to the approach and attendance at rehabilitation sessions. Additionally, targeted exercises designed to enhance strength, which included repetitions, contributed to this improvement. The duration of the rehabilitative program applied to the research sample helped enhance the muscle groups' strength in the neck, confirming what Jamal Sabry (Sabry, 2012, p. 433) pointed out, stating that the appropriate training duration enables significant gains in muscle strength. Furthermore, the effectiveness of rehabilitative exercises influenced the development of a rapid muscle response, indicating the internal compatibility within the muscle by maximizing the motor units for muscular performance. The more participating units in contraction, the higher the level of muscle strength, according to what was mentioned by Abu Alaa Abdel Fattah (Abu Alaa, 1997, p. 206).

Moreover, the rehabilitative exercises contributed to improving the range of motion for the neck by stimulating blood and lymphatic circulation, providing adequate flexibility to the muscles and surrounding tissues. This effect contributed to muscle relaxation, pain relief, and the release of adhesions between tissues, as confirmed by Khaled (Khaled, 2012, p. 187).

4. Conclusions and Recommendations

4.1. Conclusions

In light of the research results and their discussion, the researcher arrived at the following conclusions:

- Rehabilitative exercises played an effective role in enhancing muscle strength in muscle strength tests (relaxation, rotation, front, and back).
- The application of rehabilitative exercises helped the afflicted individuals in reducing pain intensity and outperforming their peers who received only hospital-based rehabilitative exercises.
- The application of rehabilitative exercises did not produce any negative effects on the afflicted individuals but rather resulted in positive effects and noticeable improvement.

4.2. Recommendations

Based on the conclusions reached, the researcher recommends the following:

- Generalize the results of this study when aiming to assist individuals with cervical disc herniation to further benefit in improving their condition when receiving treatment at hospitals.
- Hospitals should focus on enhancing the expertise of their practitioners on how to apply rehabilitative exercises based on the findings of this study.
- Promote health awareness to ensure patients' compliance with the prescribed exercises given to them.
- Conduct other similar studies targeting different areas using rehabilitative exercises.

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