

## The effectiveness of a rehabilitation program to improve the neck muscles strength for patients with cervical vertebrae syndrome

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### Introduction:

"Muhammad Qadri Bakri and Siham Al-Sayed Al-Ghamry" (2011) and "Muhammad Adel Rushdi" (2003) indicate that rehabilitative exercises are the main axis and the common factor in treating injuries, and it is one of the important and basic natural means in the field of integrated treatment to get rid of pain, and the rehabilitation program depends on Exercises of various kinds, by developing a program commensurate with the type of injury in order to raise functional efficiency as soon as possible.

The use of Proprioceptive Neuromuscular Facilitation is a major part of the rehabilitation program to restore muscular and nervous efficiency and work to relax the muscles and improve the level of electrical and muscular activity in them. This type of exercise aims to reach the muscles to the highest possible level of flexibility, lengthening and relaxation, which helps to Building a style for consistent movement

Neck pain is one of the most common pain that many people complain about it, which occurs as a result of weak neck muscles, as well as wrong daily habits such as sitting for long term in front of the computer and other reasons, which are accompanied by some symptoms, which make the patient need to get rid of these pain early Before complications occur ( **ali ben mohammed ali 2009**).

(Talat Naheed, et al. 2006) that injuries to the cervical region are many and varied, including simple and severe injuries caused by lack of movement or excessive increase, which lead to a feeling of pain as a result

of muscle contractures and muscle stress. To avoid the occurrence of complications of this injury, an appropriate treatment program must be developed to avoid cervical herniated disc.

(Iqbal Rasmi 2009) confirmed that the pain in the cervical region is caused by a defect in the mechanical system represented in the body taking wrong positions such as continuing to sit and fixing the neck in one direction, sleeping in the wrong way or moving the head with a sudden strong movement and nervous stress, and these reasons lead to The back muscles contract and the vertebrae compress from the back, which affects the flexibility of the joints between the vertebrae, and here pain appears when moving the neck, causing pressure on the nerves feeding for the arms.

Through the work of researchers in the field of kinetic rehabilitation as specialists in injuries and kinesthetic rehabilitation, they have noticed in recent years the phenomenon of the spread of cervical vertebrae pain among a large segment of society in general, and women in particular, in light of the technology that has been developed, and the change in living methods and daily motor duties that have occurred. It has become limited. With age, the thickness of the joint cartilage decreases, erodes and movement becomes painful. Flexibility decreases, which hinders the functional level of the cervical vertebrae and leads to an exacerbation of the pain level from mild to severe and the occurrence of complications that occur with cervical vertebrae syndrome and chronic pain, which prompted researchers to try to address this problem. By designing a kinetic rehabilitation program using some different rehabilitative exercises and manual massage to work on getting rid of cervical pain, restoring range of motion, muscular strength and functional efficiency of the neck muscles and getting rid of the neck syndrome to avoid doubling these pains and avoiding surgical intervention.

#### **Aim of research:**

The research aims to design a rehabilitation program using manual massage and PNF exercises to restore the functional efficiency of the cervical vertebrae and reduce the cervical vertebra syndrome by identifying:

1- The degree of pain, the muscular strength of the neck in all directions.

#### **Research hypotheses:**

There are statistically significant differences between (pre, inter, and post-measurement) of the experimental group in the variables under

investigation (pain degree - neck muscle strength in all directions) in favor of the post-measurement.

**Research terminology:**

**proprioceptive neuromuscular facilitation:** It is the control of neuromuscular mechanisms by stimulating sensory receptors in muscles, tendons and joints.

**Rehabilitative exercises:**

It is therapeutic movements based on a scientific basis and planned according to the patient's condition with the aim of stimulating or restoring the normal functions of the affected part or maintaining its current condition or increasing its efficiency

**Pain:**

An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage

**Previous studies:**

"Bassam Abdel-Majeed Mohamed Refaat" (2011) entitled: "The Efficiency of the Rehabilitation Program for the Deep Sensory Receptors in Injury to the Cervical Cartilage", where the study aimed: to identify the extent of the impact of the proposed program in relieving cervical vertebrae pain and increasing the range of motion of the spine and its effect in strengthening the muscles Surrounding and corresponding to the cervical region and knowing whether there is a defect in the sensorimotor control function in the spine in general and the cervical region in particular. Study method: The experimental method. Study sample: The research sample included (30) patients with cervical cartilage, and stretching and stretching exercises for the neck muscles, ultrasound and electrical stimulation of the injured were used. The most important results: The results of the research showed an improvement in relieving the severity of cervical vertebrae pain, improving the flexibility of the cervical region and the spine in all directions, and showing an improvement in the muscular strength of the cervical region muscles.

On the other hand The study of (Hwangbo PN, Don Kim K 2016) entitled: The effect of using the neck neuromuscular facilities to control the trunk and maintain balance in patients with chronic stroke. On the control of trunk and balance control for patients with chronic stroke, the experimental method was used, and the study was conducted on 30 injured people and they were selected randomly and divided into two equal groups, each group of whom was 15 patients, the neuromuscular facilitation

exercises for the neck muscles were applied to the experimental group And a traditional rehabilitation program was applied to the 15 injured control group, and one of the most important results: There were statistically significant differences in all variables of the trunk weakness scale, the overall result of the scale of low trunk control, and the scale of balance (Berg Balance) for both the experimental group and the control group. , significant differences were found between the two groups in all study variables except for the fixed sitting balance.

(The study of Maiki T, et. al. 2017) entitled: Results of the use of neuromuscular sensory facilities and manual therapy on patients with osteoporosis in the cervical vertebrae. The aim of this study was to evaluate the effectiveness of neuromuscular sensory facilities (PNF) and methods Manual therapy in the treatment of patients with osteoarthritis of the cervical vertebrae, its efficacy in reducing pain and improving daily living exercise functions; The experimental method was used and the study was conducted on 80 women who were randomly selected in the age group (45-65) years, they were divided into two groups of 40 people for each group, and to assess functional abilities, the functional classification index was used to assess changes in pain, and among the most important results: The sensorimotor neuromuscular facility (PNF) group showed a significant improvement in the decrease in the degree of pain and improvement in muscle strength in the experimental group, and the (PNF) group showed a significant improvement in the performance of daily activities such as sleep, personal care, travel, work, leisure, walking and standing, as well as a decrease in the intensity of and frequency of pain compared with the MAN.T group. The study proved that the effectiveness of using (PNF) has an effect after use for a short term after two weeks and a long term after three months.

(The study of Piotr Tederko , Marek Krasuski , Beata Tarnacka 2019) entitled: Effectiveness of rehabilitation after cervical disk surgery: a systematic review of controlled studies, Objectives:: To present a synopsis of evidence on the efficacy of rehabilitation after cervical disk surgery performed for neck pain and radiculopathy. Review methods:: Project was registered with PROSPERO database (number CRD42018085937). Randomized controlled trials that evaluated the efficacy of rehabilitation interventions versus other, sham, or no treatment were selected. The

primary outcomes were disability and pain. Secondary outcomes were other measures assessing biological, psychological or social effect of rehabilitation. Two reviewers independently screened studies for eligibility, assessed risk of bias and extracted data. Evaluation of evidence was performed with the GRADE system. Results:: Five papers were included in the review. The eligible studies were heterogeneous in intervention and outcome reporting. There are low- to very-low-quality evidence that some interventions (use of cervical collars after non-plated anterior cervical discectomy an fusion, structured physiotherapy, and interactive patients' education) provide some benefit within functioning, pain, and selected psychological variables in patients undergoing cervical disk surgery. Controlled trials addressing comprehensive interdisciplinary rehabilitation, multidisciplinary pain management, occupational therapy, psychotherapy, social and vocational interventions were not identified. Conclusion:: There is insufficient evidence with few trials of low quality to allow any conclusion to be drawn about the effectiveness, harms, and general ineffectiveness of rehabilitation for people who have had cervical disk surgery for pain or radiculopathy.

(The study of Renata Kielnar, Anna Mika , Dorota Bylina , Jarosław Sołtan , Artur Stolarczyk, Błażej Pruszczyński, Henryk Racheniuk, Jan Szczegielniak, Aleksandra Królikowka, Łukasz Oleksy 2021) entitled: The influence of cervical spine rehabilitation on bioelectrical activity (sEMG) of cervical and masticatory system muscles, Background: Coexistence of temporomandibular joint discomfort along with cervical spine disorders is quite common, and is associated with many limitations and adverse symptoms for the patient. Both diagnostics and treatment of these ailments are difficult, and in many cases, the effects of therapy are not satisfactory. This study assessed the impact of a 3-week neck-only rehabilitation programme without direct intervention in the craniofacial area on the bioelectric activity of both the cervical spine and muscles in the craniofacial area among patients with idiopathic neck pain who do not report TMJ pain. Design: A parallel group trial with follow-up; Setting: Rehabilitation Clinic. Methods: Twenty five patients experiencing idiopathic neck pain underwent the 3-week rehabilitation programme. Thirty five age-matched subjects with no cervical spine and temporomandibular joint (TMJ) dysfunctions were control group. At baseline and after 3 weeks the cervical and craniofacial area muscles' bioelectrical activity (sEMG) was evaluated.

**Results:** In the experimental group during cervical flexion, a significant decrease of sEMG amplitude was noted in the right (mean 25.1  $\mu$ V; 95% CI: 21.5-28.6 vs mean 16.8  $\mu$ V; 95% CI: 13.8-19.7) and left (mean 25.9  $\mu$ V; 95% CI: 21.7-30.0 vs mean 17.2  $\mu$ V; 95% CI: 13.6-20.7) Sternocleidomastoid as well as a significant increase in sEMG amplitude of the right (mean 11.1  $\mu$ V; 95% CI: 7.9-14.2 vs mean 15.7  $\mu$ V; 95% CI: 12.1-19.2) and left (mean 15.3  $\mu$ V; 95% CI: 11.9-18.6 vs mean 20.2  $\mu$ V; 95% CI: 15.7-24.2) Upper Trapezius muscles. In the experimental group, after therapy right and left Sternocleidomastoid, Temporalis Anterior and Masseter muscles presented lower fatigue levels. **Conclusions:** Three weeks of rehabilitation without any therapeutic intervention in temporomandibular joint significantly decreased the bioelectrical activity of the neck and craniofacial muscles while improving the muscle pattern of coactivation in participants with idiopathic neck pain who do not report temporomandibular joint pain. These observations could be helpful in the physiotherapeutic treatment of neck and craniofacial area dysfunctions.

### **Methodology:**

This research provides a detailed description of the subjects, Procedures for data collection, study design, measures and statistical analyses.

### **Research Methodology**

Used the experimental method and designed into one experimental group (pre-inter-post measurement) because of its relevance to the nature of the research.

### **Subjects**

Participants consisted of 15 women of middle aged between (40: 45) chosen for the purposeful research of women with cervical vertebrae syndrome who attended the Sports Medicine Unit in Fayoum.

### **Data collection:**

Experimental Procedures/Pre-Testing: Participants completed electronic questionnaires, the researcher designed a proposed rehabilitation program to restore muscular functional efficiency and range of motion in the neck area, using ( Manual Massage - Neuromuscular Sensory Facility Exercises) by means of a survey (7) experts Annex (1) in the field of physical education and physical rehabilitation to determine the type of appropriate rehabilitative exercises, manual massage and neuromuscular



sensory facilitation exercises in terms of appropriate time periods and the type and extent of the effect of rehabilitative exercises for each The period of the program, the frequency and intensity of the exercises, as well as the period of rest in between

### Study design

The research was applied at the Sports Medicine Unit in Fayoum initially on an exploratory sample of (5) women with cervical vertebrae syndrome in the time period from 2/3/2021 to 31/4/2021, and then applied to the basic sample of the research of (15) women from Those attending the sports medicine unit and those with cervical vertebra syndrome, from 5/5/2021 to 15/1/2022, and the program was applied using (manual massage - rehabilitation exercises - neurosensory facilities exercises) in the total time period for applying the program (12) weeks, with a number of (3) sessions per week, and the session time is (30: 45 minutes), according to the progress of the program, its requirements and rest periods.

### Measurement tools:

The researchers selected some tools and devices for measuring and applying the length of the research, which included (a rheostat measuring device - a scale to measure weight - a watch to determine the time - a dynamic device to measure muscle strength - a visual analogue scale (V.A.S) to measure the degree of pain).

**Statistical analysis :** 1- skew modulus. 2 - T-test for significance of differences for one group. 3 - percentage of improvement. 4- One-way analysis of variance (F-test). 5- Least significant difference (L.S.D) test.

### Results :

Table (1)

The arithmetic mean, median, standard deviation, and skew coefficient of the research sample in the research variables (N=15)

Variables	Measuring unit	SMA	Mediator	standard deviation	skew modulus	
Degree of pain	degree	7.4	7	0.91	0.34	
Muscular strength	Down	KG	3.95	4.1	0.43	-0.39
	Up	KG	4.27	4.5	0.56	0.05
	Right tilt	KG	4.27	4.3	0.56	0.05
	Left tilt	KG	4.28	4.2	0.79	1.38
	Right rotation	KG	2.66	2.62	0.40	0.51
	Left rotation	KG	2.88	2.95	0.42	0.05

**Table (2)**  
The mean pre and post measurements, "T" values, and the rate of change for the experimental group (T = 15)

Variables	Average Pre-measurement	Average post-measurement	Difference measurement	Standard deviation	Value of (T)	Vate of change %	
Degree of pain	7.4	0.27	7.13	0.99	27.89	96.365%	
Muscular strength	Down	3.95	5.66	1.70	0.40	16.68	43.04%
	Up	4.27	7.32	3.06	1.03	11.46	71.66%
	Right tilt	4.27	6.26	1.99	0.82	9.42	46.60%
	Left tilt	4.28	7.14	2.86	1.05	10.55	66.82%
	Right rotation	2.66	5.00	2.34	0.49	18.31	87.97%
	Left rotation	2.88	5.40	2.52	0.52	18.62	87.5%

Tabular T-value at a degree of freedom of 14 and a level of significance of 0.05 = 1.761

**Table (3)**  
One-way analysis of variance between the three measurements (pre, inter, and post-measurement) for the experimental group in the research variables (N = 15 )

Contrast source		Total squares	Degrees of freedom	mean squared	Value of (F)	
Degree of pain	between groups	388.58	2	194.29	410.74	
	Inside groups	19.87	42	0.47		
	Total	408.44	44			
Muscular strength	Down	between groups	22.07	2	11.03	80.58
		Inside groups	5.75	42	0.14	
		Total	27.82	44		
	Up	between groups	81.99	2	40.997	107.51
		Inside groups	16.02	42	0.38	
		Total	98.01	44		
Right tilt	between groups	32.81	2	16.41	57.6	
	Inside groups	11.96	42	0.28		
	Total	44.78	44			
	between groups	70.65	2	35.32	84.77	



<b>Left tilt</b>	<b>Inside groups</b>	<b>17.5</b>	<b>42</b>	<b>0.42</b>	
	<b>Total</b>	<b>88.15</b>	<b>44</b>		
<b>Right rotation</b>	<b>between groups</b>	<b>41019</b>	<b>2</b>	<b>20.59</b>	<b>129.13</b>
	<b>Inside groups</b>	<b>6.7</b>	<b>42</b>	<b>0.16</b>	
	<b>Total</b>	<b>47.89</b>	<b>44</b>		
<b>Left rotation</b>	<b>between groups</b>	<b>49.17</b>	<b>2</b>	<b>24.28</b>	<b>243.04</b>
	<b>Inside groups</b>	<b>4.25</b>	<b>42</b>	<b>0.1</b>	
	<b>Total</b>	<b>53.42</b>	<b>44</b>		

**Table (4)**  
**The least significant difference (L.S.D) between the three groups in the dimensional measurement of the research variables**

<b>Variable</b>	<b>Measurement</b>	<b>Average</b>	<b>pre</b>	<b>inter</b>	<b>post</b>	
<b>Degree of pain</b>	<b>Pre</b>	<b>7.4</b>		<b>0*</b>	<b>0*</b>	
	<b>Inter</b>	<b>4.67</b>			<b>0*</b>	
	<b>Post</b>	<b>0.27</b>				
<b>Muscular strength</b>	<b>Down</b>	<b>Pre</b>	<b>3.95</b>		<b>0.000012*</b>	<b>0*</b>
		<b>Inter</b>	<b>4.62</b>			<b>0*</b>
		<b>Post</b>	<b>5.66</b>			
	<b>Up</b>	<b>Pre</b>	<b>4.27</b>		<b>0.058</b>	<b>0*</b>
		<b>Inter</b>	<b>4.71</b>			<b>0*</b>
		<b>Post</b>	<b>7.32</b>			
	<b>Right tilt</b>	<b>Pre</b>	<b>4.27</b>		<b>0.034*</b>	<b>0*</b>
		<b>Inter</b>	<b>4.7</b>			<b>0*</b>
		<b>Post</b>	<b>6.26</b>			
<b>Left tilt</b>	<b>Pre</b>	<b>4.28</b>		<b>0.045</b>	<b>0*</b>	
	<b>Inter</b>	<b>4.75</b>			<b>0*</b>	
	<b>Post</b>	<b>7.14</b>				
<b>Right rotatio</b>	<b>Pre</b>	<b>2.66</b>		<b>*0</b>	<b>0*</b>	
	<b>Inter</b>	<b>3.68</b>			<b>0*</b>	

	<b>n</b>	<b>Post</b>	<b>4.997</b>			
	<b>Left rotation</b>	<b>Pre</b>	<b>2.88</b>		<b>0*</b>	<b>0*</b>
		<b>Inter</b>	<b>3.74</b>			<b>0*</b>
		<b>Post</b>	<b>5.401</b>			

### Discussion:

Discussing the variable degree of pain: It is clear from Table (2) that there are statistically significant differences between the mean of the pre-measurement and the average of the dimensional measurement of the sample under investigation in the variable degree of pain and in favor of the post-measurement, as it is clear from Table (3) (4) that there are statistically significant differences between the averages of the three measurements (Pre-, inter-, and post-test) for the sample under investigation in the variable degree of pain in favor of the post-measurement, as the calculated “T” values were greater than the tabular “T” values, which indicates the effectiveness of the proposed program in treating neck pain in the research sample. The researchers attribute the results of the general improvement that occurred to the sample under investigation in the variable degree of pain, which may be due to the fact that massage has an effective effect on this area as it activates blood circulation, which helps to improve the process of blood distribution to the central nervous system and peripheral nerves, as the arterial vessels that supply muscles The blood gives branches that supply the nerves, which helps reduce the sensation of pain, and massage increases the sensitivity of muscle excitability, which leads to muscle stretching and re-oxidation in the muscles, which leads to blood flow to the masseter muscle, and it also speeds up the isolation of metabolic results, as studies have proven. The cases of muscle contracture, swelling, and a sense of pain are among the things that can be overcome with the help of different methods of massage and the decrease in the level of muscle tension in the muscles working on the neck as a result of muscular work due to the use of effective exercises. Movement exercises suitable for the neck area, as the exercises help improve blood circulation and increase strengthening Muscles, thus improving neuromuscular coordination, increasing the speed of muscle fiber contraction, and helping to increase oxygen delivery to tissues As well as increasing the disposal of muscle waste resulting from metabolism, and thus exercises led to strengthening the muscles and increasing their endurance, and this thus increases the flexibility of the joints and increase

the range of motion for them, as there is a close link between the flexibility of the joints and the ability of muscle fibers to elongate when there is deficiencies In the motor range of the joint, this may cause a determination of the extent of the elongation of the muscle fibers working on it, and this is confirmed by an official Iqbal study.

Ali Jalaluddin, Muhammad Qadri Bakri (2011) also indicated that it is possible to treat a lot of neck pain and reduce the degree of curvature of the neck area by practicing strength and lengthening exercises for the group of muscles working on the neck and shoulder girdle. (18: 205, 206) The researchers attributed the percentage of improvement in the degree of pain to the use of manual massage, which is consistent with what was mentioned by Ahmed Salama Ali (2010), Ahmed Samir Fathi (2006), Ahmed Abdel Rahman Mohamed (2014), and Ahmed Mahmoud Abdel Zaher (2003) that massage is used in The beginning of therapeutic programs and it is used to help speed recovery and improve symptoms, thus reducing pain and improving movement ability, and after symptoms improve, the role of therapeutic exercises will be. These exercises include flexibility and strength of tendons, muscles and ligaments.

It is clear from Table (2) that there are statistically significant differences between the mean of the pre-measurement and the mean of the dimensional measurement of the sample under investigation in the muscular strength variable under consideration and in favor of the post-measurement, as it is clear from Table (3) (4) that there are statistically significant differences between the means of The three measurements (pre-, inter-, and post-test) of the sample under investigation in the muscular strength variable in all directions and in favor of the post-measurement, as the calculated “T” values were greater than the tabular “T” values, which indicates the effectiveness of the proposed program in treating neck pain among Research sample and increase the muscle strength of the neck. The researchers attributed the difference between the level of improvement in the muscular strength variable of the neck muscles in all directions of the research sample between the pre-measurement, inter-measurement and dimensional measurement to the use of rehabilitation exercises and the use of exercises of neuromuscular facilities for sensory receptors (P.N.F) of all kinds, which led to an improvement of muscle tone in the cervical region in terms of direction Muscular work and intensity in the rehabilitation units and intermittent rest periods, which were applied to the research sample.

This is consistent with what was indicated by the studies of Bernard et al (2002) and Dave Schmitz (2003) in that rehabilitation exercises contribute to improving the level of muscle strength, muscle tone and restoring body balance. It also agrees with the results of the study Mustafa

Ibrahim Ahmed (2004) that the balanced development of muscle strength, joint flexibility, and muscle elongation in rehabilitation exercise programs have a significant impact on increasing the mobility of joints, and may also be effective in treating cartilage hernia and neck pain. Hassan Al-Kurdi (2001), Mahmoud Farouk Sabra Abdullah (2006) indicated that the application of the contents of the rehabilitation program led to an improvement and increase in muscle strength in the affected area.

Amal Saeed Al-Azab (2005) and "Hamdi Muhammad Al-Qalyubi (2004) and Powers, et al. (2008) and Ezzat Al-Kashef (2018) indicate that "therapeutic exercises help to remove cases of dysfunction of the affected part, and this is through Caring for the muscles, ligaments, and joints, and paying attention to the mechanics of body movements and stature, in order to restore the natural state of balance of the body, as well as have associated functional effects that increase the activity of blood circulation and the metabolic process, which helps to more nutrients and the amount of oxygen received to the affected area through blood flow, which helps to strengthen It works to improve muscle sensitivity by moving joints and contracting working muscles, as well as limiting the negatives resulting from negative (clinical) rest and its impact on vital organs

It is also in agreement with the results of the study of "Ahmed Mohamed Sayed" (2004), "Abdul Majid Abdel Fattah Awad" (2003) "Rainvill and Hartigan (2003), which demonstrated the success of rehabilitation exercises in restoring muscle strength to the muscle groups affected by injury.

"Qadri Bakri, Siham Al-Ghamry 2011" confirmed that the use of various types of kinetic physical therapy, whether through physical exercises, playing, swimming, or otherwise, all work to strengthen and improve the patient's condition in general, as well as increase his awareness and awareness of various things, especially what surrounds him It is of different nature and fields, human and spatial, and is helped by the effects resulting from kinetic physical therapy.

The results also agreed with the results of the study of "Islam Muhammad and others" (2010), "Ihab Mustafa Kamel" (2007), that the use of exercises of neuromuscular facilities for sensory receptors with their different methods is more effective in increasing the range of motion and also contributes to the development of both ( Strength and muscular strength - flexibility - coordination - agility - static and mobile balance)

Michael, J. Alter, (2004) indicates that the use of neuromuscular facilitators of sensory receptors with their different methods works to develop and improve the range of motion more, compared to other methods of lengthening and increases strength, as rubber without strength may

expose the individual to injury. in the joint and that the use of these methods and methods are useful in preventing sports injuries by developing both strength and elasticity together, in addition to that they help in good muscle relaxation.

This was confirmed by Frederick (2001) that one of the advantages of methods of nerve facilities for sensory receptors (repeated contraction, slow reciprocal contraction with fixation) helps to develop the component of balance and strength, and increase the range of motion, which leads to an improvement in movement.

Through the above, it is clear that the use of massage, rehabilitation exercises, and exercises of neuromuscular facilities for sensory receptors (P.N.F.) within the kinetic physiotherapy program led to an improvement in the results of measurements of the research variables to the degree of pain and an improvement in the level of muscular strength of the neck muscles, and this is evident through the differences between the three measurements which was in favor of telemetry; This is what achieves the imposition of the search.

### **conclusions:**

Within the limits of the nature of the research field, its objective and the nature of its procedures, it was possible to reach: 1- The proposed rehabilitation program, the subject of the research, had a positive effect on the sample under study and led to the improvement of those with cervical vertebrae syndrome in question and a reduction in the degree of pain. 2- The proposed rehabilitation program, the subject of the research, has a positive effect on increasing muscle strength and flexibility. 3- The use of (P.N.F) exercises within the physical rehabilitation program had a faster and better effect in reducing pain, increasing the level of neck muscle strength, and increasing the range of motion of the research sample members.

### **Recommendations:**

In light of the research objective, hypotheses, procedures and results, and through statistical analysis, the researchers can recommend the following: 1- Using (P.N.F) exercises and the rehabilitation program in question to overcome neck pain for cases similar to the research sample. 2- Relying on the rehabilitation program used and (P.N.F.) exercises to restore the flexibility of the spine for patients with cervical vertebrae syndrome. 3- Be guided by physical kinetic rehabilitation and exercises (P.N.F) to improve muscle strength and range of motion. 4- Attention to designing programs of therapeutic and preventive exercises from exposure to cervical

vertebra syndrome, for different groups of society according to the nature of their work and their age. 5- Directing all researchers to do research similar to this research on other samples of different age groups.



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