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Comparison between Immediate Effect of Postero-Anterior and Antero-Posterior Cervical Mobilization on Chronic Mechanical Neck Pain

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Abstract

Background: Chronic mechanical neck pain is a common problem that can cause economic and social problems for an individual, although there were different types of joint mobilization that have an effect on pain but it still debates which type is more effective than others.

Aim of Study: This study was conducted to compare the immediate effect of different techniques of cervical mobilization (anterior posterior-posterior anterior) on pain intensity in chronic mechanical neck pain.

Subjects and Methods: Forty five chronic mechanical neck pain patients were recruited and assigned into 3 groups 2 study and one control group, Group A, B and C with their mean age SD (27.6±6.77), (27.07±6.42) and (28.8±6.99) years with BMI (27.32±2.37), (26.43±2.08) and (26.38±2.14) KG/m^2 were recruited and assigned into three groups (two study and one control groups). The study groups (A) and (B) received the mobilization technique (posterior anterior-anterior posterior respectively) and the control group (C) received only ultrasound assessment was conducted by VAS for pain intensity.

Results: There was significant difference in each group (A), (B), and (C) pre and post treatment on pain intensity (p=0.0001). While comparison between the two-study group and the control group, in post treatment effect on pain there was non-significant difference between group (A and B) (p=0.285) and significant difference between groups (A and C), and (B and C) (p=0.0001).

Conclusion: There was an immediate effect of posterior anterior-anterior posterior mobilization on pain intensity in patients with chronic mechanical neck pain, but in compare between the two different technique the posterior anterior mobilization had the more immediate effect on decreasing pain.

Key Words: *Mobilization - Chronic mechanical - Neck pain - VAS.*

Introduction

MECHANICAL neck pain (MNP) is defined as nonspecific pain of non-pathological origin occurring in the cervical spine **[1]**. Its causes could be from poor posture, anxiety, depression, neck strain, and sporting or occupational activities its prognosis for individuals experiencing chronic neck pain is poor, as many patients continue to suffer from persistent pain and disability following conservative physical therapy intervention **[2]** chronic neck pain is defined as neck pain with a duration of symptoms longer than 3 months **[3]**.

Manual therapy is one of the methods that used in the treatment of mechanical neck pain **[4]** It may include massage, exercise therapy, traction, stretching, transcutaneous electrical nerve stimulation (TENS), interferential currents, ultrasound, thermal agents, and education. Physiotherapists can specialize in passive manual techniques, including mobilization or manipulation **[5]**.

Manipulation and mobilization are commonly used treatments for neck pain and may be performed by physical therapists, chiropractors, traditional bone setters, osteopaths, medical doctors, and massage therapists. Spinal mobilization or manipulation has demonstrated mechanical effects including permanent or short-term change in length of connective tissue and neurophysiological effects including analgesic effects, motor effects, and sympathetic nervous system effect dysfunction **[6]**.

There is a need to determine the most important type of mobilization that reduce pain as there is a debate in the literature about the most effective type. So the Purpose of this study was to compare the immediate effect of different techniques of cervical mobilization (anterior posterior-posterior anterior) on pain intensity in chronic mechanical neck pain.

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Subjects and Methods

Forty-five chronic mechanical neck pain patients recruited from Al-Ahly FC, Benha University Hospital and Cairo university from June 2018 to February 2019 and assigned into two study (A), (B) and one control group (C).

Before the experiment the purpose and procedures of the study were fully explained to all the patients and they all voluntarily agreed to enroll in the present study.

The subjects was included if they hadchronic mechanical neck pain (more than 3 months with neck pain) [7], Their age ranged from 18 to 40 [5], Both sex, Unilateral or bilateral neck pain, BMI less than 30 [8].

The subjects were excluded if they hadPrevious fracture in cervical spine or shoulder, Osteoporosis, Any symptom of vertebrobasilar insufficiency, History of whiplash, History of cervical spine surgery, Diagnosis of cervical radiculopathy or myelopathy and Diagnosis of fibromyalgia syndrome.

Instrumentations:

- Height and weight scale.
- Visual analog scale.
- Ultrasound device.

Procedure:

The subjects weregiven a full explanation about the study protocol and we described each movement to the patients.

Group A: Posterior anterior unilateral mobilization [9].

All the patients received ultrasound (Continuous ultrasonic waves of 1.1 MHz frequency and 1-1.5 watt/cm^2 power) were applied for 8 minutes before the posterior anterior mobilization, the patient lied prone with his forehead resting comfortably on his hands. The physiotherapist stood at the head of the patient with his thumbs held in opposition and back to back with the thumb tips on the spinous process of the vertebra to be mobilized. The fingers straddle the sides of the patient's neck and head. Balance and steadiness of the physiotherapist's thumbs are gained through the finger position, but it is unnecessary for the fingers to grip firm. Grade III Oscillatory pressure directed posterior-anterior against spinous process at rate 2-3 per second for five minutes at level of C5/C6.

Group B: Anterior posterior mobilization [9].

All the patients received ultrasound (Continuous ultrasonic waves of 1.1 MHz frequency and 1-1.5 watt/cm^2 power) were applied for 8 minutes before the anterior posterior mobilization, The patient lies supine. A pillow is not used unless the patient has a 'poking-chin' postural abnormality. The physiotherapist stands by his head and makes a broad contact with the transverse process of the vertebra to be mobilized with both thumbs. The thumbs should be used with care as direct bone-to-bone contact can be uncomfortable. The therapist spreads his fingers around the adjacent neck area for stability while positioning his shoulders above the joint being treated. An oscillatory anteroposterior pressures 2/3 times per sec for 5-minute following Maitland's approach are performed very gently at level of C5/C6 and the movement must be produced by the physiotherapist's arms and trunk.

Group C: This group received only ultrasound treatment (Continuous ultrasonic waves of 1.1MHz frequency and 1-1.5 watt/cm^2 power were applied for 8 minutes. The dosage was adjusted according to the treatment area. The treatment was applied using circular movements with a 4cm^2 US head [10].

Data analysis:

Mean, standard deviation, paired and unpaired *t*-test.

Results

The present study was conducted to compare the immediate effect of different techniques of cervical mobilization on chronic mechanical neck pain.

As shown in Table (1), the mean ±SD value before treatment (pre-treatment) in groups (A), (B) and (C) were 6.53± 1.41, 6.6± 1.35, and 7.33± 1.23 respectively, while after treatment (post) in groups (A), (B), and (C) were 3.53 ±0.64, 3.87± and 5.73±0.96 respectively. The MD when comparing between pre and post-treatment of the three groups (A), (B) and (C) were (MD=3, MD=2.73 and MD=1.6 respectively), while % of improvement were (45.94%, 41.36%, and 21.83% respectively), there was statistical significant difference when compared with the corresponding mean values (pre-treatment) in groups (A), (B) and (C) (p=0.0001, p=0.0001, p=0.0001 and p=0.0001) respectively.

As in Table (2) comparing between mean value of VAS (pre-treatment) between each group.

As in Table (3) comparison between value of VAS (post treatment) between each group and other.

Items	Group (A)		Group (B)		Group (C)	
	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
Mean	6.53	3.53	6.6	3.87	7.33	5.73
±SD	±1.41	±0.64	±1.35	±0.99	±1.23	±0.96
MD	3		2.73		1.6	
% of Improvement	45.94%		41.36%		21.83%	
t-value	12.55		13.25		9.8	
p-value	0.0001		0.0001		0.0001	
Level of Significance	S		S		S	

Pre : Before treatment.
Post : After thirteen minutes of treatment.
SD : Standard Deviation.
MD : Mean Difference.
t-value : Paired and Un-paired *t*-test value.
p-value : Probability value.
% of improvement: Percentage of improvement.
S. : Significant

Table (2): Comparison of pre-treatment mean values of visual analog scale (VAS) between (A and B), (A and C) and (B and C) groups.

Items	Visual analog scale (VAS) (pro-treatment)					
	Group (A)	Group (B)	Group (A)	Group (C)	Group (A)	Group (C)
Mean	6.53	6.6	6.53	7.33	6.6	7.33
±SD	±1.41	±1.35	±1.041	±1.23	±1.35	±1.23
MD	0.07		0.8		0.73	
p-value	0.896		0.109		0.132	
Level of Significance	NS		NS		NS	

Pre : Before treatment.
MD : Mean Difference.
NS : Non Significant.
SD : Standard Deviation.
p-value : Probability value

Mean	3.53	3.87	3.53	7.33	3.87	5.73
±SD	±0.64	±0.99	±0.64	±1.23	±0.99	±0.96
MD	0.34		2.2		1.86	
% of Improvement	–		31.16%		24.03 %	
p-value	0.285		0.0001		0.0001	
Level of Significance	NS		S		S	

Post : After treatment.
MD : Mean Difference.
p-value : Probability value.
SD : Standard Deviation.
% of improvement: Percentage of improvement.
NS : Non Significant.
S : Significant.

Discussion

Neck pain is one of the most common and costly musculoskeletal disorders, with a high rate of recurrence and chronicity. Many authors have reported that the persistence of symptoms is associated with changes in the biomechanics of the neck region **[11-12]** . The main contributing factor seems to be the muscular imbalance between the neck muscles and specifically between the deep and superficial neck flexors which is confirmed by electromyography **[3]** .

Patients with chronic mechanical neck patients have been associated with persistent weakness in neck muscle. There is also evidence that muscle

activation patterns in the shoulder and arms are altered in patients with acute and chronic neck and shoulder pain **[13]**.

A recent systematic review has suggested that joint-biased manual therapies (MT) (i.e. joint manipulation and mobilization) have immediate or short-term pain relief effectiveness for mechanical neck pain treatment, but the superiority of one MT over another has not been demonstrated **[6]**.

This study was conducted on chronic mechanical neck pain patients to investigate the effect of different types of mobilization on pain intensity and to determine the effect on muscle strength by using Lafayette dynamometer to measure the muscle strength of shoulder lateral rotators.

This experiment was done on 45 patients from both sexes randomly assigned into three groups (2 study group and one control group) this chapter will provide a reasonable and logical explanation for the results of each variable:

The results of this study agreed with Farooq et al., **[5]** who found that patients with chronic mechanical neck pain receiving mobilization (posterior-anterior) plus routine physiotherapy showed significantly more reduction in pain and disability as well as an increase in neck muscle endurance and neck ROM compared to the control group receiving routine physiotherapy alone **[5]**. It also agreed with Ganesh et al., **[14]** who reported that there was significant decrease in pain using posterior anterior mobilization more than the other group using mulligan mobilization **[14]**.

The current results are contradicted with those reported by Kanlayanaphotporn et al., **[15]** who had found that no effect of posterior anterior mobilization on pain or ROM when applicated unilaterally on painful side.

Our explanation of pain reduction following mobilization to this level that increase afferent input from mechanoreceptor stimulation might result in greater changes to spinal cord hyper excitability leading to an increased stimulation of the periaqueductal gray at the level of the brain. This results in an increased descending cortical control pain inhibition and this opinion agreed with Schmid et al., **[16]**.

In our study, we agreed with Degenhardt et al., **[17]** that explained the reduction in Pain intensity following mobilization may occur due to the altered concentration of pain biomarkers in the blood. Manual therapy has been found to decrease the serotonin level and increase the b- endorphin level in the blood. Bialosky et al., **[18]** that reported that joint mobilization may also relieve pain through its spinal cord mediated effect. For example, inhibition of C fibers by the dorsal horn of the spinal cord has been described as the potential mechanism to produce hypoalgesia following spinal manipulation George et al., **[19]**.

Conclusion:

There was an immediate effect of posterior anterior-anterior posterior mobilization on pain intensity in patients with chronic mechanical neck pain, but in compare between the two different technique the posterior anterior mobilization was the most effective technique in decreasing the pain.

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مقارنة بين التأثير الوقتى لتحريك الخلفى الأمامى والأمامى الخلفى للفقرات العنقية على الام الرقبة الميكانيكية المزمنة

آلام الرقبة الميكانيكية المزمنة هى مشكلة شائعة يمكن أن تسبب مشاكل اقتصادية واجتماعية للفرد، على الرغم من وجود أنواع مختلفة من تحريك الفقرات ولها على تأثير على الألم لكنها مازالت تناقش أى نوع أكثر فعالية من الآخرين فكان الهدف من الدراسة: أجريت هذه الدراسة لمقارنة التأثير الفورى للتقنيات المختلفة لتحريك الفقرات العنقية (الخلفى الأمامى– الأمامى الخلفى) على شدة الألم فى الألم الرقبة الميكانيكية المزمنة.

تم تجميع المرضى من مستشفى بنها الجامعى والنادى الاهلى وجامعة القاهرة وكان عددهم خمسة واربعون حالة تم تقسيمهم لثلاثة مجموعات المجموعة الأولى تم تطبيق عليها التحريك الخلفى الأمامى للفقرات العنقية مع جهاز موجات فوق صوتية والمجموعة الثانية تم تطبيق عليها التحريك الأمامى الخلفى وموجات فوق صوتية والمجموعة الثالثة طبق عليها جهاز الموجات فوق الصوتية وتم قياس درجة الألم قبل وبعد التطبيق.

فكانت النتيجة ان التحريك الخلفى الأمامى له أكبر تأثير على تقليل الألم فى حالات الام الرقبة الميكانيكية المزمنة.