
Comparison of Treatment Outcome of the Effectiveness of Isometric Exercises as Compared to General Exercises with Cervical Spine Mobilization in The Management of Chronic Non Specific Neck Pain

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ABSTRACT: *The purpose of this study was to evaluate the “effectiveness of isometric exercises as compared to general exercises along with cervical spinal mobilization to reduce pain, disability and to increase range of motion in chronic non-specific neck pain” For this randomized controlled experiment total 32 patients (16 in each group) with chronic non-specific neck pain were recruited from physiotherapy Ward Mayo Hospital Lahore, Department of Physiotherapy King Edward Medical University Lahore between October, 2019 and March, 2020. Simple randomization method was used to assign participants into isometric exercise group and general exercise with cervical spine mobilization group. The isometric exercise group performed exercises for neck muscle groups with a rubber band and general exercises with cervical mobilization group performed active range of movement exercises for all neck movements. Patients in both groups received 4 supervised treatment sessions per week for 6 weeks. Visual Analogue Scale (VAS), Neck disability index Questionnaire and goniometer were used to assess pain, disability and neck range of movements at baseline and after 6 weeks. Both interventions showed statistically significant improvements in pain, function and range of movement $p = 0.001$ for isometric exercise group, $p = 0.05$ for general exercises group and $p = <0.001$ for range of movement. However, mean improvements in post intervention VAS score and Neck disability index Questionnaire score was better in isometric exercises group as compared to general exercise group. In conclusion, both interventions are effective in the treatment of chronic non-specific neck pain however; isometric exercises are clinically more effective than general exercises with cervical spine mobilization.*

KEYWORD: isometric exercise, general exercise, neck pain, VAS, Neck disability index

1. INTRODUCTION

Neck pain is considered one of the most common complaints of the musculoskeletal system. Approximately, two thirds of the population will experience neck pain at some point in their life. (1) Neck pain is a common disorder about 70% of adults will experience neck pain during their lifetime, and its prevalence in the general population is found around 22%. Neck pain after low back pain is the most common reason patients seeking chiropractic care and also the second most common reason for the use of spinal manipulation. (2)

Chronic neck pain is characteristic is with a widespread sensation of hyperalgesia in the skin, ligaments and muscles. This sensation is seen more prominent on palpation and during active and

passive movements of neck. Several studies have been conducted to evaluate the role of strengthening exercise in the management of chronic neck pain.(3)The common symptoms of localized or radicular pain are tenderness, spasm, associated with functional disability. Neck pain affects about 330 million people globally as of 2010 (4.9% of the population). It is more common in women (5.7%) than men (3.9%) and less common than low back pain.(4)

Deep cervical flexor (DCF) has a major postural function in supporting and straightening the cervical lordosis .Indeed, evidence is emerging which are proving that people with NP drift into a more forward head position (FHP) when they are distracted. The main action of deep cervical flexor muscle is cranio-cervical flexion which supports deep cervical flexor motion segments(5)

Many non-invasive treatment techniques are being used today for the management of neck pain which includes cervical collars, manipulation, mobilization, exercise therapy, soft tissue work, acupuncture regime, pain medications, NSAIDS steroids and electrotherapy including short wave diathermy, ice application and transcutaneous electrical nerve stimulation. Manipulation and mobilization of spinal segments are frequently applied now a days in clinical practices in the management of non-specific neck pain.(6)

Isometric exercises are frequently used to enhance the power of muscles. Many postural muscles work in isometric fashion and it provides a strengthen base for dynamic exercise.(7) Manual therapy is a treatment commonly used in the management of neck pain. There is growing evidence demonstrating the benefits of thoracic spine thrust manipulation in the management of patients with neck pain.(8)

One of the most common manual techniques used to treat cervical pain and headaches is the postero-anterior (PA) mobilization.(9)

Although numerous randomized controlled studies have demonstrated that manipulation and mobilization may be more efficient than muscle relaxants or standard medical treatment in providing short-term pain relief.(10)

When musculoskeletal abnormalities are present, physical therapists frequently utilize spinal manipulations to reduce pain and improve proprioception normalizing changes in the information coming from the somatosensory system.(11)

Four recent reviews present conflicting results regarding the benefit of strengthening exercises for relieving neck pain symptoms. The study found relatively strong evidence supporting the efficacy of dynamic resisted strengthening exercises of the neck-shoulder musculature.(12)

Spinal mobilization either alone or in conjunction with exercises as part of a multimodal therapy plan, has been found to be a useful intervention for individuals with non-specific mechanical neck pain.(13)

This study is going to conduct with aim to know whether isometric exercises alone effective or general exercises with central posterior anterior cervical spine mobilization are more effective. Physical therapy is important in the management of neck pain including heat therapy, ultrasound, infrared radiations, and manipulation and in some cases traction. This study provided an opportunity to share my personal experience with community. This study was conducted purely in clinical setting of Physiotherapy Department Mayo Hospital, Lahore. The outcome of this study is of great value in treating chronic neck pain which is a great contribution to the health care system of Pakistan.

2. METHODOLOGY:

The study design was Randomized Controlled Trail (RCT). Study was conducted at physiotherapy department of mayo hospital Lahore. Study duration was 6 months after the approval of synopsis. Non-probability convenient sampling technique was used. Sample size was 32 cases; 16 cases in each group were calculated with 95%. Study ethics requirement was fulfilled and informed consent was taken from study participants.

Inclusion criteria :	Exclusion criteria :
<ul style="list-style-type: none">• Both male and female of ages 20-50 years• Neck pain history 3 months to 3 years.• Males and females patients referred from a consultant with diagnosis of chronic non-specific neck pain will be recruited for the study	<ul style="list-style-type: none">• Neck pain radiating to arm due to radiculopathy• Dizziness and other severe cardiac or associated medical conditions.• Patients with medical record of spine pathology or traumatic.

32 patients who complete selection criteria included to this study. Written consent was taken from every individual participating in this study before performing any physical examination. Allocations of patients in two groups were through sealed envelope (Concealed Allocation). On the first day pain was assessed by using visual analogue scale and disability by using Neck

disability index. Treatment frequency was 4 times a week for 30 minutes each. Subjects were examined on first day and by the end of 6th week.

Group A was treated with neck isometric exercises with conventional physical therapy modalities heat pack applied for 10 minutes. Exercise was performed for 5-10 repetitions 4 times per week. Isometric exercise were performed using an elastic resistance band (Thera band) by targeting neck flexors, extensors both sides flexors and rotators. All these exercises were done for about 5-10 repetitions with a hold time of 6 seconds and 4 sessions per week. Sessions for first 4 weeks were given at hospital then 2-weeks home plan was assigned and after 6 weeks re-evaluation were completed.

Group B was treated with General Exercises along with cervical spine mobilization and also received conventional physical therapy modalities that remained the same throughout the study. It included heat pack for 10 minutes. The cervical spine mobilization technique was general posterior anterior mobilization of cervical spine ranges C3-C7. General exercise group performed general range of movement exercises for flexors, extensors, both sides flexors and rotators neck muscles. Patients were instructed to perform exercises in sitting position but they were allowed to perform exercise in supine and prone lying if they have problems with sitting position. Visual Analogue Scale (VAS) and Neck disability index were used to collect pre and post intervention data.

3. RESULTS:

Table 1 shows the demographic analysis of 32 participants involved in this study population. The mean values for the age shows 35.77 ± 9.60 in group A 33.89 ± 7.91 in group Gender distribution was 11 males with 5 females in group 1 and 10 males with 6 females in group 2. The occupational and marital status also shown respectively.

Table 2 and 3 depicts the mean values of cervical spine flexion and extension in both isometrics and general group. Our results in cervical spine movements of flexion and extension in both groups shows that at baseline the mean value in isometric group was increased significantly than general group. After 6 weeks therapy, In general group mean value was decreased significant as compared to isometric group.

Table 4 and 5 shows improved significantly in both outcome measures with P-value = 0.001 for Isometric exercises group and P-value = 0.04 for general exercise group. However, Isometric neck exercises are clinically more effective than general exercises. In Isometric neck exercise group mean VAS reduced to 5.8 ± 0.07 , which was 8.30 ± 0.16 before intervention. In Isometric neck exercise group The Neck disability index Questionnaire score reduced to 11.28 ± 0.15 from 20.12 ± 0.48 .

Table 1: Descriptive statistical analysis (N=32)

	Group A (n=16)	Group B (n=16)
Gender	11/5	10/6
Age	35.77±9.60	33.89±7.91
Occupational Status	1.71± 0.42	1.74 ±0.49
Marital Status	0.84 ±0.52	0.85 ±0.57

Table 2: The mean value of cervical spine movement of Flexion in isometric and general group

Time	Group A (Isometric Neck Exercise)			Group B (General Neck Exercise)			P Value
	Mean	SD	N	Mean	SD	N	
Baseline	29.69	±0.37	16	29.09	±0.56	16	<0.01**
6 weeks	37.82	±0.62	16	35.38	±0.62	16	<0.01**

Mean ± S.D within a row results are more significantly (p<0.01)

Table 3: The mean value of cervical spine movement of Extension in isometric and general group

Time	Group A (Isometric Neck Exercise)			Group B (General Neck Exercise)			P Value
	Mean	SD	N	Mean	SD	N	
Baseline	31.16	±1.10	16	23.35	±0.43	16	<0.01**
6 weeks	39.93	±0.86	16	41.95	±0.59	16	<0.01**

Mean ± S.D within a row results are more significantly (p<0.01)

Mean ± S.D within a

Table 4: The mean value of VAS and Neck disability index in isometric exercise group

Time	Visual Analogue scale (VAS)			Neck disability index questionnaire			P Value
	Mean	SD	N	Mean	SD	N	
Baseline	8.30	±0.16	16	20.12	±0.48	16	0.001**
6 weeks	5.86	±0.07	16	11.28	±0.15	16	

Mean ± S.D within a row results are more significantly (p<0.01)

Table 5: The mean value of VAS and Neck disability index in general exercise group

Visual Analogue scale (VAS)				Neck disability index questionnaire			
Time	Mean	SD	N	Mean	SD	N	P Value
Baseline	7.67	±0.37	16	21.13	±0.11	16	0.04*
6 weeks	6.12	±0.05	16	17.47	±0.28	16	

Mean ± S.D within a row results are more significantly ($p < 0.01$)

4. DISCUSSION

To the authors information this is the first study assessed the effects of isometric and general neck exercises with cervical spine mobilization in the management of non-specific chronic neck pain in Lahore, Pakistan. Both interventions significantly reduced chronic neck pain, improved neck function as well as enhanced neck range of movements after 6 weeks of intervention. In this study the subjects were followed for only 6 weeks, previously reported findings show that 16 weeks of training program and 10-15 repetition of exercises are sufficient to achieve neuromuscular and physiological changes associated to reduce in muscle pain.(14)

The positive results of current study support the findings of (15) study related the effects of strengthening, endurance, coordination as well as control groups in chronic neck pain patients. Both of these studies showed similarity between the duration and frequency of exercises 6 weeks in present study. However, found no difference in all groups above 8, 17 months and 3 years follow up but in present study we did not follow up participants beyond 6 weeks and it is not possible to find whether improvements in pain, range of motion and functional capabilities will last for an extended period. Secondly study only comprised female patients still at work with low base line pain scores and disability while in present study base line pain score was high therefore, more room for developments. Both groups revealed decreased in pain but mean improvements in pain was better in Isometric neck exercise group. These results are in line with randomized controlled trial propose that endurance and strength training significantly de creased neck pain (VAS) at the 6 weeks follow-up. The exercise groups also executed strengthening exercises for the trunk and lower extremity muscles.

These additional exercises could have influenced the findings of this study and no extra explanation was specified why these exercises were comprised in training programs. In our study participants only performed isometric and general exercises with cervical spine mobilization for neck in the supervision of physiotherapist therefore one could propose that the improvements could only be because of the specific intervention. Shows those 2 weeks institutional therapy comprising of isometric neck exercises performed with an elastic rubber band significantly decreased pain and disability scores. Unlike to present study participants also made dynamic exercises for shoulders and arms with dumbbells and it is not clear whether the effect is because of isometric neck or shoulder exercises. Shoulder strength and endurance training has recognized to be effective in chronic neck pain.(16)

On the basis of this clinicians may study to educate patients to carry out home exercises for a longer period to attain and maintain improvements. The present study showed significant improvements in range of movements in all neck movements in both isometric and general exercise with cervical spine mobilization groups. The participants accomplished general exercises dynamically through range of motion and hence may have caused improved in range of motion. Isometric exercise was achieved in static position but still significantly improved range of movement in all neck movements. One reason for this could be that isometric exercise increases muscle strength and offers an established base for movements. (17)Described that isometric neck exercise enhanced neck flexors muscle strength by 110%, extensors strength 69% and rotators strength by 76%. In endurance exercise group neck flexors strength developed 28%, extensors strength 16% and rotator strength 29%. This study comprised only female patients and women achieve only 20% to 70% of the neck strength than men.(18)

In future studies it is suggested to consider measurement of muscle strength to establish a clearer correlation between range of movement as well as muscle strength in both and female patients.

5. Conclusion.

Both isometric and general exercises with cervical spine mobilization are effective in decreasing neck pain, improving function and enhancing active range of neck movements. Though, isometric exercises have recognized to statistically and clinically more effective in all measures than general exercises with cervical spine mobilization.

6. Recommendations

Mobilization techniques greatly affect the ROM and modulate pain. These methods are non-invasive, effective and require fewer hospital visits for a sufficient early response. Further research on a larger scale is recommended.

7. Consent for publication: The study's goals were explained to the participants, and written informed consent was obtained.

8. Competing interests: Nil.

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