Original Article

Effectiveness of isometric neck exercises in neutral spine and multiple angle isometrics in patients with non-specific neck pain

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Objective: To determine the effectiveness of isometric neck exercises in neutral spine and multiple angle isometric exercises in improving pain and functional ability in subjects with non-specific neck pain.

Methodology: This randomized controlled trial was conducted over a period of six weeks at the outpatient department of University Institute of Physical Therapy, The University of Lahore. A total of 30 patients aged 20-35 years with pain perceived anywhere in the region of cervical spine for at least 3 months in last one year were randomly allocated in to two groups by online randomizer software. The patients with red flag signs or history of spinal surgery were excluded from the study. Pre-assessment was done using visual analogue scale (VAS) and neck disability index (NDI). Group A was treated with isometric exercises while group B with multiple angle isometrics along with conventional physical therapy in both groups. Each subject performed exercises twice per week and was reevaluated after 3and 6 weeks. SPSS version 20 was used for data analysis.

Results: The improvement in the score of VAS in Group-A was 3.13±.91548 and in Group B was 4.46±1.06 (p=0.001) showing there is significant difference between mean scores of both groups after 6 weeks of treatment. The improvement in the score of NDI in Group A was 21.20±4.55 and in Group B was 26.00±4.89 (p=0.010).

Conclusion: Multiple angle isometrics were more effective than isometric neck exercise in improving pain and functional ability in patients with non-specific neck pain. (Rawal Med J 202;45:977-980).

Keywords: Isometric neck exercise, multiple angle isometrics, neck stabilization exercises.

INTRODUCTION

Non-specific neck pain (NS-NP) is a most common musculoskeletal condition of adults to seek medical help. It can effect activities of daily livings and can lead to severe disabilities.[1] Isometric neck exercises play a vital role in the treatment of neck pain. Combination of different exercise techniques has shown better improvement. Isometric exercises when combined with aerobic and stretching exercises produce enhanced results. It not only improves strength but also the functional capacity and pain settlement.

Use of multiple interventions also have pronounced impact on patient satisfaction level.[2] These exercises are effective in reducing pain, improving neck range of motion and functional ability when applied alone as well.[3,4] Multiple angle isometric exercise is a type where resistance is applied, manually or mechanically, at multiple joint positions within the available ROM. This approach is used when the goal of exercise is to improve strength throughout the ROM.[5] The aim of this study was to determine the effectiveness of isometric neck exercises in neutral spine and multiple angle isometric exercises in improving pain and functional ability in NS-NP.

METHODOLGY

It was randomized controlled trial which was conducted from January to June 2017 after taking approval from institutional ethical review board (IERB) of University of Lahore. Convenience sampling technique was used. Thirty patients were divided into Group A and Group B with the help of online randomizer software i.e. www .randomizer.org.[6] A total of 30 patients aged 20-35 years with pain perceived anywhere in the region of cervical spine, from superior nuchal line to the first thoracic spinout process, pain without radicular symptoms for at least 3 months in last one year & Visual Analogue Scale (VAS) scoring above 5 on scale were recruited in the study. Patients were excluded with red flags, presented with 2 or more

positive neurologic signs consistent with nerve root compression, cervical spinal stenosis, exhibited bilateral upper extremity symptoms, central nervous system involvement, prior surgery to the neck or thoracic spine, history of whiplash injury within the previous 6 weeks, received treatment for neck pain from any practitioner within the previous month.[7,8]

All participants received a total of 6 weeks treatment with frequency of supervised exercise session of two times per week. In every treatment session, patients in group A performed 3 sets of exercises with 10 repetitions in each set and 6 seconds hold in flexion, extension and side flexion on both right and left sides.[9,10] Patients in group B performed multiple angle isometrics. First set of 10 repetitions was performed in neutral spine, then carried out at every 10-15 throughout ROM because increase in strength are specific to the angle of joint performed.[11] Holding time for each isometric exercise was 6 seconds in flexion, extension and side flexion on both sides.

Both groups also received conventional physical therapy. Along with the supervised clinical sessions all participants were given exercise plan consisting of ROM exercises to perform at home 3 times per week. Before giving home plan, the patients and attendants were trained in all exercises. Postural correction education and intervening rest periods in long working hours was prescribed to all participants in both groups.[12,13] Observations were recorded and analyzed before treatment, 3 weeks after treatment and at the end of 6th week.

Statistical Analysis: SPSS version 20 was used for analysis. VAS and neck disability index were used to measure the level of pain and disability before, during and after the treatment. Repeated measure ANOVA was used to compare the pretreatment, during treatment and post treatment observations for VAS. Independent t test was used to compare the mean differences. $p<0.05$ was considered significant.

RESULTS

Out of 15 patients in Group A, 7 (47%) were male and 8 (53%) were females whereas in Group B 5 (33%) were male and 10 (67%) females. Mean age of subjects in group A was 45.73±11.279 years and in Group B was 44.00±9.91 years (p=0.66). Subjects in both groups were also comparable (Table 1). Comparison of pretest and posttest observations within groups is summarized in Table 2.

Mean score of Group A in pretreatment measurements was 6.20±.56, 3rd week was 4.67±.90 and after 6th week was 3.07±.79 (p<0.001). Mean VAS score in Group B for pretreatment readings was 5.53±.91,

during treatment was 3.67±1.44 and in posttest reading was 1.07±.59 (<0.001). The mean score of Group A for Neck Disability Index in pretest measurements was 34.53±3.67and after treatment was 13.33±1.68(<0.001). Mean Neck Disability Index in Group B for pretest readings was 36.87±4.93, during treatment was 19.27±3.01 and in posttest reading was 10.87±1.30(<0.001).

Table 1. Socio-demographic comparison.

Variables		Group A n=15	Group B n=15	P Value
Age (Years)^		45.73±11.279	44.00±9.91	0.66
		Frequency	Frequency	
Gender	Male	7	5	0.46
	Female	8	10	
Socio Economic Status	Lower Class	2	3	0.54
	Middle Class	10	11	
	Upper Class	3	1	
Marital Status	Single	5	2	0.19
	Married	10	13	
Computer User	Yes	6	7	0.71
	No	9	8	
Tension	Yes	7	10	>0.99
	No	8	5	
Type of Pain	Acute	3	6	0.23
	Chronic	12	9	
Type of Pillow	Soft	3	7	0.12
	Hard	12	8	

Table 2. Within group comparison.

Outcome Measurement	Groups	Pre-treatment (Baseline)	During Treatment (3 week)	After treatment (6 week)	P-Value
Visual Analog Scale	Group A	6.20±0.56	4.67±0.90	3.07±0.79	<0.001*
	Group B	5.53±0.91	3.67±1.44	1.07±0.59	<0.001*
Neck Disability Index	Group A	34.53±3.67	25.80±4.79	13.33±1.68	<0.001*
	Group B	36.87±4.93	19.27±3.01	10.87±1.30	<0.001*

*: the starred values are less than 0.001

Table 3. Between Group Comparison post-treatment comparison at 6th week.

Outcome Measurement	Group A	Group B	P-Value
VAS Scale	3.13±0.91548	4.46±1.06	0.001
Neck disability Index	21.20±4.55	26.00±4.89	0.010

p- value significant at ≤0.05

Mean difference of pretest and posttest VAS score in Group A was 3.13±.91548 and in Group B was 4.46±1.06 (p=0.001). Group B showed greater improvement in pain than in Group A. Mean difference of pretest posttest NDI score in Group A was 21.20±4.55 and in Group B was 26.00±4.89 (p=0.010) (Table 3).

DISCUSSION

Majority of the previous studies focused on traditional isometric exercises for neck pain with additional treatment protocols. Asgari-Ashtiani et al showed that stabilization exercises and maximum isometric exercises decrease pain and disability, fear of pain and fear of re-injury in chronic NS-NP and specific stabilization exercises was more useful than maximum isometric exercises.[14] Our results showed significant improvement with multiple angle isometrics. Similar findings were reported by Rajalaxmi et al.[15]

Gupta et al found that deep cervical flexor training was more beneficial than conventional isometric training.[16] Topp et al determined the effect of dynamic versus isometric resistance training on pain and functionating in adults with knee osteoarthritis and found these exercises to be effective in reducing pain and functional disability.[17] The effects of isometric training at different knee angles on the muscle tendon complex in vivo showed that tendon stiffness increased significantly for longer muscle length than shorter muscle length and maximal voluntary contraction was also increased at all angles for longer muscle length.[18]

Luis et al found greater muscle length gain and change in architecture with long muscle length training.[19] Findings of this study might be important in designing rehabilitation plan for patients with NS-NP. More precisely, resistance training at different angles should also be included for strength training of cervical muscles. A larger and diverse, sample size should be utilized with diverse age groups.

CONCLUSION

Multiple angle isometrics are more effective in improving pain and functional ability than isometric neck exercises in patients with non-specific neck pain.

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Drafting of the article: Faiza Sharif
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Conflict of Interest: None declared
Rec. Date: Dec 2, 2019 Revision Rec. Date: Jul 28, 2020 Accept Date: Oct 3,2020

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