

The Effectiveness of Isometric Strengthening with Static Stretching vs. Static Stretching in Nonspecific Chronic Neck Pain

Nazar Deen^{1*}, Saeed Akhter², Sanjeela Abbas¹

¹Islam College of Physical Therapy, Islam Medical College, Sialkot, Pakistan; ²Institute of Physical Medicine and Rehabilitation, Dow University of Health Sciences, Karachi, Pakistan

ABSTRACT

Background: The objective was to compare the effectiveness of Isometric neck strengthening exercises with static stretching vs. static stretching alone in the management of nonspecific chronic neck pain.

Materials and methods: This study was a randomized controlled trial. 52 patients with non-specific chronic neck pain were randomly assigned through simple random sampling technique, into experimental (group 1) received Isometric training with static stretching and control group (group 2) received Static stretching alone. While aerobic training was initiated by both groups prior their main interventions. Therapeutic session was 3 days per week for 1 month. Neck pain and Disability was assessed by using outcome measures, numeric pain rating scale (NPRS) and neck disability index (NDI). Treadmill machine, Stationary Cycle and Stop watch were used during treatment session.

Results: Both groups showed improvements; the baseline mean NDI score was 34.46 ± 11.80 and the final session score was 23.26 ± 17.46 which was significantly ($p < 0.001$) whilst the baseline mean NPRS score was 5.38 ± 1.60 and the final session mean score was 2.65 ± 1.59 which was significantly ($p < 0.001$) in experimental group (Group 1). In control group (Group 2), the baseline mean NDI score was 30.88 ± 10.75 and the final session mean score was 28.44 ± 10.43 which was significantly ($p = 0.002$) whilst the baseline mean NPRS score was 5.00 ± 1.64 and the final session mean score was 3.80 ± 1.87 which was significantly ($p = 0.001$).

Conclusion: Both treatment regimens are effective in the management of chronic nonspecific neck pain; however Isometric strengthening exercises training with static stretching appears more valuable as compared with Static stretching training alone.

Keywords: Chronic nonspecific neck pain; Isometric strengthening; Static stretching

INTRODUCTION

Chronic neck pain is defined as pain in neck territory along with or without pain in shoulders and arms for three months or more than 24 episodes of pain in a year [1]. It is common in adult population with a lifetime prevalence of 26% to 71% [2]. It is associated with more than 10% with work absenteeism, and disabling neck pain is reported by approximately 5% of adult population [3]. Studies affirmed that standard treatment criteria for non-specific neck pain including cervical collar, traction, thermotherapy, manual therapy, strengthening exercises, postural re-education, pharmacological treatment, electrophysical

agents and patient education [4-6]. Various types of exercise therapy have been used in the management of nonspecific chronic neck pain. Such as, Isometric, stretching and aerobic exercises [7]. The objective of the study was to compare the effectiveness of Isometric neck strengthening exercises with static stretching vs. static stretching alone in the management of nonspecific chronic neck pain.

MATERIALS AND METHODS

This study was a randomized controlled trial and the study was conducted at the Institute of Physical Medicine and

Correspondence to: Nazar Deen, Islam College of Physical Therapy, Islam Medical College, Sialkot, Pakistan, Tel: +92 335 9435020; E-mail: din.nazar@yahoo.com

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Rehabilitation, Dow University of Health Sciences, Karachi, Pakistan. After consent from IRB of (Institutional Review Board), DUHS, the research was started from August 2013 to April 2014. Inclusion criteria were Age group (22-55 years), both genders, Non-Specific Chronic Neck pain >3 months. Exclusion criteria were history of surgery at cervical spine and shoulder area, Neck pain due to any specific pathology, Subjects with neurological deficits/instability, Acute neck pain, Subjects with mental disorders, Shoulder pathologies (adhesive capsulitis, tendinitis, surgeries), Spasmodic Torticollis. Spinal stenosis, Whiplash diseases, Osteoporosis and patients with any clinical disorder where isometric strengthening and static stretching was contraindicated. After informed consent, 52 patients with non-specific chronic neck pain were randomly assigned through simple random sampling technique, into experimental (group 1) received Isometric training with static stretching and control group (group 2) received Static stretching alone. While aerobic training was initiated in both groups prior to main interventions application. Therapeutic session was 3 days per week for 1 month. Neck pain and Disability was assessed by using outcome measures, numeric pain rating scale (NPRS) and neck disability index (NDI) on initial and final sessions.

DATA ANALYSIS

SPSS version 16 was used for data analysis. Statistical results are expressed as mean \pm standard deviation (S.D) for quantitative data and frequency and percentages for qualitative variables. Chi-square test was applied for check the association between the two categorical variables whereas cell count is less than 5, Fisher test was applied.

Paired Sample t-test was used to check the mean difference for pre and post group difference. Independent sample t test was used to check the mean difference between groups. p value (<0.05) was used as a significance level.

RESULTS

Baseline socio-demographic characteristics of experimental and control groups mention (Table 1). Majority of chronic neck pain patients were >39 years of age group.

In experimental group at baseline mean NDI score 34.46 ± 11.80 while after one month follow up after applying the Isometric strengthening exercises with static stretching exercises the total mean score was 23.26 ± 17.46 which was significantly ($p < 0.001$) 11.19 mean point reduced in experimental group (Table 2). In control group at baseline mean NDI score 30.88 ± 10.75 while at one month follow up after applying static stretching exercises, the total mean score was 28.44 ± 10.43 which was significantly ($p = 0.002$) 2.44 mean point reduced NDI mean score in control group. In experimental group at baseline mean NPRS score 5.38 ± 1.60 while after one month follow up after applying the Isometric strengthening exercises with static stretching exercises the total mean score was 2.65 ± 1.59 which was significantly ($p < 0.001$) 2.73 mean point reduced in experimental group. In control group at baseline mean NPRS score 5.00 ± 1.64 while at one month follow up after applying static stretching exercises, the total mean score was 3.80 ± 1.87

which was significantly ($p = 0.001$) 1.19 mean point reduced in control group.

Table 1: Baseline socio-demographic characteristics of experimental and control groups.

Baseline socio-demographic characteristics of experimental and control groups						
	Experimental group		Control group		Pearson	p value
	N	%	N	%	Chi-square	(2-tailed)
Age					0.751 \pm	0.687
<30 years	6	23.10%	7	26.90%		
30-39	11	42.30%	8	30.80%		
>39	9	34.60%	11	42.30%		
Gender					0.078	0.78
Male	11	42.30%	12	46.20%		
Female	15	57.70%	14	53.80%		

Comparing both groups findings; the total mean NDI score was 34.46 ± 11.80 in experimental group and 30.88 ± 10.75 in control group respectively at baseline which was statistically insignificant ($p = 0.258$). After one month follow up, the total mean NDI score was 23.26 ± 7.46 in experimental group and 28.44 ± 10.43 in control group which was mean 5.18 point significantly lower than control group (0.046). The total mean NPRS score was 5.38 ± 1.60 in experimental group and 5.00 ± 1.64 in control group respectively at baseline which was statistically insignificant ($p = 0.398$). After one month follow up, the total mean NPRS score was 2.65 ± 1.59 in experimental group and 3.80 ± 1.87 in control group which was mean 1.15 point significantly lower than control group ($p = 0.021$).

Table 2: NDI and NPRS pre and post values in experimental and control groups.

Study group	Baseline score	After 1 month follow up	Result
Experimental Group	NDI= 34.46 ± 11.80	23.26 ± 17.46	($p < 0.001$) 11.19
Control Group	NDI= 30.88 ± 10.75	28.44 ± 10.43	($p = 0.002$) 2.44
Experimental Group	NPRS= 5.38 ± 1.60	2.65 ± 1.59	($p < 0.001$) 2.73

Control Group	NPRS=5.00 ± 1.64	3.80 ± 1.87	(p=0.001) 1.19
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DISCUSSION

The results of this study exposed facts that both of the isometric strengthening exercises with static stretching and static stretching alone were effective in relieving pain and disability in chronic neck pain patients. Present study confirmed the previous information showing the burden of musculoskeletal problems in the community that was 77%, and in other local study neck pain prevalence was 72% which is more consistent to our study [8,9]. Regarding age factor most participants in our study presented with neck pain were aged below 39 years which showed consistency with the two studies showing peak age of neck pain between 20 and 45 years. Hence their results are consistent with our study and proved that this particular age duration participants with neck pain were due to high work stress and ultimate muscle fatigue. This current study clearly demonstrated significant improvement in pain NPRS and Disability NDI in both groups. Marked improvement in experimental group possibly may be due to rapid hypoalgesia effects of isometric exercises with stretching exercises and is generally consistent with the proposed mechanism of action for Isometric exercises and is used to treat somatic dysfunction that result in cervical pain and restricted full range of motion [10]. Secondly the isometric neck strengthening program was effective because literature suggested that in neck pain patients the neck musculature strength decreases 20%-50% [11]. Kraut and Anderson found that neck flexors strength values were significantly reduced in women with chronic neck pain. Silverman et al. and Barton and Hayes showed that lower neck extensor muscle performance decreases in patients with chronic neck pain, also weakness of rotator muscles were noted in neck pain; however, it is unclear whether muscle weakness is the cause or result of neck pain. In our study it was observed that stretching has marked effects on major population of our research sample size but younger females patients were noted with discomfort and acute soreness while males with 5th decades showed opposite response to female genders with stretching exercises and it is evident from literature that major cause of neck pain in females population was muscular weakness, further more literature showed that stretching had an individuality response and muscle extensibility is still debated either it is real or apparent in nature and other suggested the effectiveness of stretching exercises for extensibility and decreasing pain and discomfort in individuals without neurological disabilities [12-14]. Some studies showed that stretching causes changes in passive mechanical properties of muscles but this concept is less consistent in view of some researchers. In this research study both groups were also trained with general fitness training (GFT) by using treadmills and stationary leg bicycle before interventional exercises, with aerobic activities muscles were oxygenated and tissue warm up was induced, this phenomenon was supported from literature which stated that heat generation in muscular tissues are more durable and effective as compared to heating tissue with modalities [15]. Our research was also supported from other studies which showed that GFT also decreased pain development during repetitive activities, same

study confirmed that 10 weeks interventional general fitness training improved oxygenation of painful trapezius muscles during repetitive tasks [16]. Aerobic training decreases neck pain but no change in local pain over a prolonged period, aerobic training may be related to the release of Bendorphin, increase in core temperature and increase in trapezius muscle oxygenation for that muscle training is substantial to decrease the pain [17].

CONCLUSION

Both treatment regimens are effective in the management of chronic nonspecific neck pain; however Isometric strengthening exercises training with static stretching appears more valuable as compared with static stretching training alone. In this study, the individual effects of Aerobics exercises on neck pain were not accessed through any outcome measure, it could have been done. Future studies should focus on larger sample size with long term follow up (6-1 year) to evaluate the profound effects of the isometric and stretching exercises on nonspecific chronic neck pain.

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