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EFFICACY OF POST ISOMETRIC RELAXATION VERSUS STATIC STRETCHING IN SUBJECTS WITH CHRONIC NON SPECIFIC NECK PAIN

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ABSTRACT

Background: Neck pain is a common problem within our society. Upper trapezius sternocleidomastoid and the levator scapulae are the most common postural muscles that tends to get shorten leading to restricted neck mobility. There is lack of evidence to allow conclusions to be drawn about the effectiveness of post isometric relaxation when compared with static stretching exercises. The aim is to find out the effectiveness of Post isometric relaxation Versus Static stretching in the subjects with chronic nonspecific neck pain. To evaluate the effectiveness of post isometric relaxation technique on pain by using Visual analogue scale, range of motion by using Universal Goniometry, and functional disability by using Neck Disability Index in chronic nonspecific neck pain.

Methods: A convenient sample of thirty seven subjects was diagnosed with nonspecific neck pain was randomly allocated to one of the two treatment groups on the basis of the inclusion criteria. The experimental group (n = 15) received three sessions of post isometric relaxation technique for trapezius, sternocleidomastoid and the levator scapulae and control group (n = 15) received the three sessions of static stretching for trapezius, sternocleidomastoid and levator scapulae for four weeks.

Results: Non parametric tests demonstrated a statistically significant difference with experimental group showing greater improvement in ROM, VAS, and NDI than the control group and significant difference within the group also.

Conclusion: This study concluded and the results reflected that post isometric relaxation technique group had better improvement in reduction of pain, improvement in the range of motion, and increased neck functional activities than the static stretching group.

Keywords: Non-specific neck pain, Post isometric relaxation, Static stretching, Visual Analogue Scale, Range of motion and Neck Disability Index.

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INTRODUCTION

Neck pain is one of the common musculoskeletal disorders, it refers to pain along the axis of cervical spine column and it is related to para spinal musculature.¹ Neck pain was more prevalent among women and prevalence of neck pain peaked in middle age. The incidence of neck pain increases with age and is more common among woman. Prevalence is highest in the middle age with the women being affected than the men.^{2,3}

The prevalence of the neck pain varies widely between the studies with a mean life time prevalence of neck pain is 48.5%. Global Burden of Disease of study 2010 study neck pain ranked 4th highest in terms of Disability.⁴ Most of the patients who present with neck pain have nonspecific neck pain where the symptoms have a postural or mechanical basis, etiological factors are poorly understood and usually multifactorial including poor posture, anxiety, depression sport or occupational activities. Neck pain after whiplash injury also fits into this category, provides no bone injuries or neurological deficits is present.⁵

The neck moves more than 600 times each hour whether one in a sleep or awake. The cervical spine is subject to stress and strain with daily activities such as sitting, lying in the supine or prone, speaking, rising, walking, turning, and gesturing.⁶ Most of the episodes of chronic neck pain are due to muscle strain/other tissue sprain. This type of injury can be caused by sudden force (such as an accident) or from strain the neck (such as stiff neck from sleeping in wrong position).⁷ Causes associated with neck pain muscle tightness, muscle strain, ligamentous strain, bad postural habits, disc prolapsed, trauma, tumors, inflammation and the risk factors include flexion of the neck, sitting posture, heavy lifting. In office workers, history of neck complaints, Pain started after duration of employment and, high muscular tension.¹¹

Las L. Anderson et al conducted study on prevalence and anatomical location of muscle tenderness in adults with nonspecific neck/shoulder pain. This study concluded that a high prevalence of tenderness exists in neck/shoulder muscles, including the levator scapulae, neck extensors and infraspinatus, and not only the upper trapezius.⁸ The common muscle imbalance in cervical region is hypertrophy of cervical erector spinae muscle, upper trapezius, levator scapulae, scalene, and sternocleidomastiod. They believe that emphasis of programme should

initially be placed on regaining the normal length of the tight muscle.⁸

A wide variety of treatment protocols nonspecific neck pain are available, however, the most effective management remains an area of debate. This is because the value of most current protocols for this condition remain unverified (Mc Morland and Suter, 2000). In a review of current literature Haldeman et al. (2008) supported the use of neck manipulations, mobilizations, education, acupuncture analgesics, massage, low-level laser and exercise therapy in the treatment of "non-specific" (simple) neck pain. They concluded that none of these active treatments were superior to any other in the short or long term and that no one treatment has been studied in enough detail to assess its efficacy or effectiveness adequately. Therefore there is a need to further investigate and compare treatment protocols. Spinal conditions are most often treated by manipulations (Skargenet al., 1997). However, muscle energy technique (a form of mobilization) is often used when manipulation is contra-indicated (Liebenson, 1996 and Greenman, 1996). In the current literature these treatment protocols showed PIR to be superior to Static stretching.

The use of muscle energy technique(MET) more specifically the post isometric technique(PIR) technique in non specific neck pain has not been widely studied but is positioned to be the most effective technique for increasing range of motion, decreases the pain and functional disability, and when compared to static stretching .

There are few studies available on review of literature supporting the effective method for nonspecific neck pain. So, far less trails are done on the effect of PIR. Hence my need of my study is to find out the efficacy of post isometric relaxation versus static stretching technique on pain, ROM, and functional activities in subjects with chronic non specific neck pain. Muscle Energy Technique (MET) is a manual technique developed by osteopaths that is now used in many different manual therapy professions. It is claimed to be effective for a variety of purposes, that includes lengthening of shortened or contracted muscle, strengthening of muscles, asymphytic or venous pump to aid the drainage of fluid or blood, and increase the range of motion (ROM) of a restricted joint.⁹ Muscle Energy Technique was developed by Fred L. Mitchell snr and two corners of MET are Reciprocal inhibition and Post isometric relaxation. The technique used in this study is PIR. The effect of PIR was mediated by the afferent input from the

golgi tendon organ when a muscle is held in an isometric contraction, the afferent feedback leads to inhibition of the given muscle which is thought to result in relaxation of muscle when the contraction is released. It is useful when muscle tightness or shortness is major contributing factor to somatic dysfunction. It involves having the patient activate the actual muscle with the problem after the effort it will be further lengthened⁹. Static stretching is a method by which soft tissues are lengthened just past the point of tissue resistance and then held in the lengthened position for an extended period of time with a sustained stretched force.¹⁰ Apart from Static stretching increases the of motion (ROM) of a restricted joint .This technique involves passively stretching of a given antagonist muscle by placing it in a maximal position of stretch and holding it there for an extended time. A static stretch of each muscle should be repeated 3 or 4 times.¹⁰

METHODS

Selection of patients

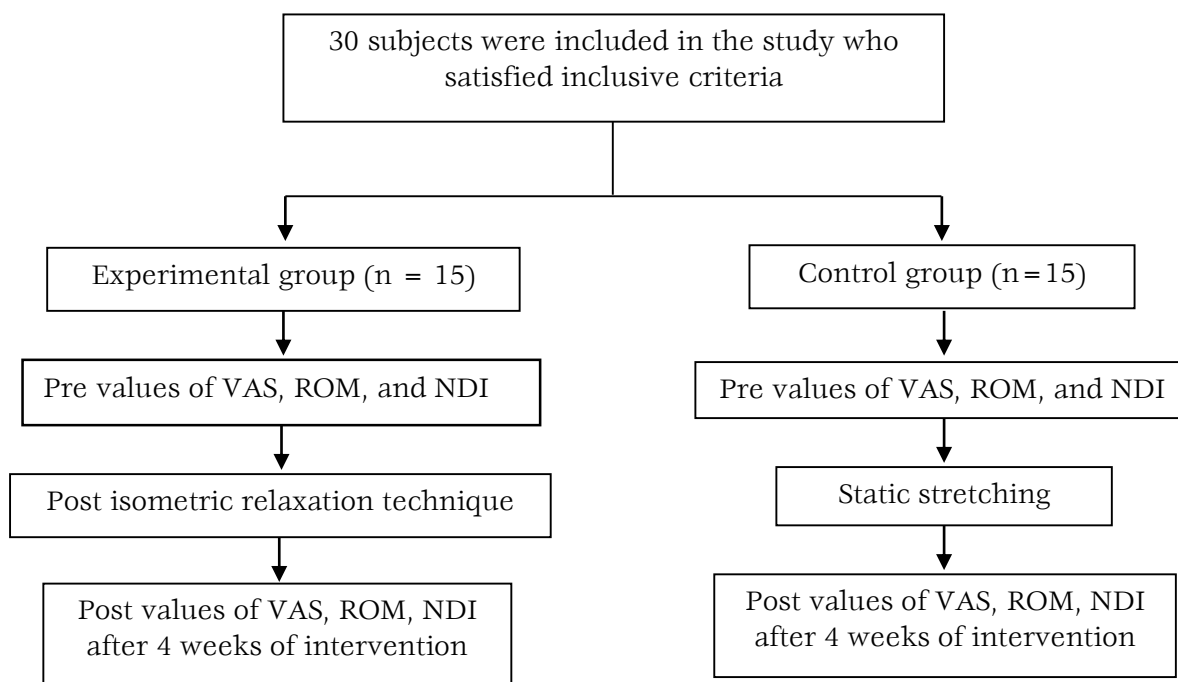
The participants in the study are patients with chronic nonspecific neck pain, defined as the pain

in the cervical region existing for more than 3 weeks. The neck pain may radiate to the shoulder region or the upper extremities, or be accompanied by headache, but the main complaint must concern the neck. The inclusion criteria are: non-specific neck pain, age between 18-45 years and history of surgery, tumors, cervical spondylosis, cervical radiculopathy, headache are excluded in this study. During consultation, these criteria are assessed and the patient is informed about the study. Patients who are eligible and agree to participate are asked to sign the informed consent form and the baseline measurement is performed.

Randomization

After the base line measurement the patients are randomly assigned either to the post isometric relaxation technique group or to the static stretching group. Then participants were randomly allocated into 2 groups: Post isometric group and Static stretching group. The two groups received the selected intervention for 3 times a week for 4 weeks. The subjects in the experimental group received (15) post isometric relaxation for trapezius, levator scapulae, and sternocleidomastoid.

Chart 1: STUDY ALGORITHM



INTERVENTION:

EXPERIMENTAL GROUP

The subjects in the experimental group (15) received post isometric relaxation for upper trapezius, elevator scapulae and Sternocleidomastoid Duration of stretch: 5-7 secs. Repetitions :3times/day, 3days/weeks over a period of 4 weeks.

(PIR) FOR UPPER TRAPIZIUS

With the subjects in supine, the therapist placed one hand on the point of the shoulder on the involved side. The other are cradled the patients head and the head is flexed laterally flexed away and rotated towards the side of the involvement. The ipsilateral head was used to push the shoulder inferiorly to lengthen the muscle until the restrictive barrier is met, then we ask the patients

to raise the shoulder against the hand isometrically for 15 secs then gently lengthened the muscle until meeting a new barrier. Repeat it 3-5 times according to chaitow.

(PIR)FOR LEVATOR SCAPULAE

With the subject in a supine position with the cervical spine flexed and rotated away from the side to be stretched. The therapist stabilizes the head with one hand the other hand contacts the subject's shoulder. Subject is instructed to elevate the shoulder against equal and opposite resistance from the therapist for 10secs. Repeat for 3-5 times according to Chaitow.

(PIR)FOR STERNOCLEIDOMASTIOD

The patient was supine with his or her head off the table. The patient was instructed to place his middle finger opposite the side of involvement under the occipital ridge they moved into lateral flexion away from the side of the involvement, rotation of the side of involvement, extension of the lower cervical spine and flexion of upper cervical spine to meet the restrictive barrier. The thumb of the involved side is then placed onto the forehead. The patient instructed to push upward against the thumb isometrically for 15 secs. Repeat for 3-5 times according to Chaitow.

CONTROL GROUP: The subjects in the control group (15) received static stretching for Upper trapezius, Levator scapulae, and Sternocleidomastiod. Duration of stretch: 5-7secs. Repetitions: 3 times/day, 3 days/weeks over a period of 4 weeks.

(SS) FOR UPPER TRAPIZIUS:

Sit with your chest up and hold onto the chair with one hand. Turn your head toward the hand that is holding onto the chair. Use your free hand to pull your head straight toward the opposite side.

(SS) FOR LEVATOR SCAPULAE Sit up straight on a chair. Put your hand up over your shoulder and bring your elbow back, pointing your elbow up to the ceiling. Use your left hand to pull your head forward and to the left

(SS)FOR STERNOCLEIDOMASTIOD

When acting unilaterally this muscle will flex the neck, side flex the neck to the same side and rotate it to the opposite side. Sit tall with your chest up. Rotate your head to one side side flex your neck to the opposite side. Extend your head back while maintaining side flexion and rotation.

STATISTICAL ANALYSIS

The base line scores of the patients (PAIN, ROM and NDI), outcome measures will be used to compare the two intervention groups. Difference between base-line and after 4 weeks intervention will be calculated and compared between the two

intervention groups group. Statistical analysis has been carried out to analyze the significant impact of the treatments issued to the subjects of both experimental and control groups by using statistic software "IBM SPSS.Inc.20.0 Version. All the 30 subjects 15 were randomized into control group and 15 were randomized into experimental group. All the 30 subjects completed to entire protocol as defined by 4 weeks intervention the outcome of the study were VAS, ROM, NDI.

Statistical tools unpaired t-test has been applied for parameters in between groups and paired sample t-test for parameters within group.

Statistical tools such as independent sample t -test and paired sample t test has been applied to the outcome measures VAS, ROM, NDI.

RESULTS

To compare the results between the groups of post isometric relaxation technique and static stretching, paired t-test was selected. the mean and standard deviation values of post isometric relaxation group and static stretching group are 2.066 ± 0.2582 and 1.133 ± 0.5164 , in VAS which shows significant reduction of pain in experimental group, 8 ± 1.291 and 5 ± 3.273 , in ROM (lateral flexion LT), 7 ± 1.291 and 5.67 ± 3.2 in ROM (lateral flexion RT), 7 ± 1.291 and 5.33 ± 3.162 in ROM (extension) ROM which shows significant improvement in the range of motion in experimental group, 6.446 ± 2.5317 and 8.0667 ± 3.88158 in NDI which shows improvement in functional activities in experimental group.

GRAPH 1: Graphical representation comparing between the experimental and control group of VAS, ROM, and NDI.

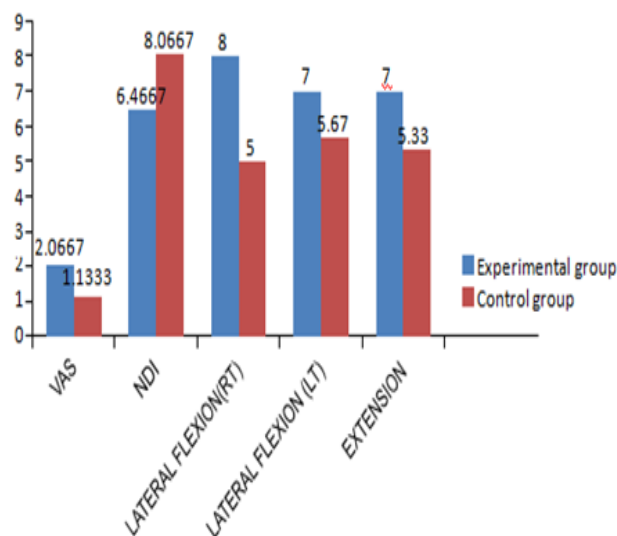


TABLE 1: Table representing the comparison between the experimental and control group of VAS, ROM, and NDI.

		Mean	Sd	T-Value	P-Value
Vas	Experimental group	2.066	0.2582	0.447	0.001
	Control group	1.133	0.5164	0.447	
Rom (rt) Lateral flexors	Experimental group	8	1.291	0.367	0.001
	Control group	5	3.273	0.367	
Rom (rt) Lateral flexors	Experimental group	7	1.291	0.374	0.001
	Control group	5.67	3.2	0.374	
Rom (ext)	Experimental group	7	1.291	1.89	0.001
	Control group	5.33	3.162	1.89	
NDI	Experimental group	6.4467	2.5317	1.337	0.001
	Control group	8.0667	3.88158	1.337	

To compare significant difference between experimental and control group independent unpaired t-test has been used. After a 4 week protocol period, the subjects in post isometric relaxation technique group . a statistically significant improvement at 0.05 level with the outcome measures VAS- 0.05*, ROM(Lateral flexors rt and lt)- 0.05*, NDI-0.005.

DISCUSSION

This study demonstrated that there was significant improvement in neck pain, range of motion and functional activities in the experimental group as compared with the control group. Although there are numerous studies that have discussed about manual therapy in neck pain, but no studies have utilized post isometric relaxation as intervention study in neck pain. This improvement in experimental group possibly may be due to rapid hypoalgesic effects of mobilization -induced analgesia and is generally consistent with the proposed mechanisms of action for the post isometric relaxation and is used to treat somatic dysfunctions that result in cervical motion restriction.

In a recent randomized clinical trial (Bronfort et al, 2001)¹² substantial improvement in the neck disability index (NDI) was observed in the groups, but no significant differences between groups reported (p > 0.05). In this study demonstrated that experimental group had significantly improved in neck disability score (p < 001) than control group after four weeks of treatment.

In the recent randomized control trial (Cassidy JD et al 1992)¹³ involved the application of muscle energy technique (active resisted isometric contraction held for 5 secs and repeated four times

with increasing rotation or lateral flexion of the neck: aims to improve neck mobility and pain via post isometric relaxation) to hyper tonic muscles responsible for restricting joint movement. All the subjects showed marked reduction in visual analogue scale (VAS) when compared to their baseline values. Most of the subjects reported pain to be moderate to severe before intervention. In the control group though there was improvement, but most of the subjects showed slight VAS score after 4 weeks.

In a randomized trial (Schenk, R., Adelman, K., and Rousselle)¹⁴ Range of motion (ROM) improved more markedly for the experimental group as compared to the control group due to reduced reflex activity. Postisometric relaxation modifies stretch perception and nociceptive nerve endings in the joint and muscle play important role via neurotransmitter modulation or gate control. Repetitive light muscle contractions increase venous, lymphatic drainage and relieve paraspinal congestion.

The results of the post isometric relaxation group came in agreement with Gupta et al¹⁵ who evaluated the efficacy of post isometric relaxation (PIR) in patients with non-specific neck pain and they concluded that PIR may be more effective in decreasing pain and disability and increasing cervical range of motion in patients with non-specific neck pain.

The results of this study showed that the use of post-isometric technique was more superior than that of the static stretching. PIR were effective in relieving pain and disability and improved the range of motion. From the statistical analysis results obtained, it is obvious that there is a significant differences between pretest and post test values obtained using post isometric relaxation and patients in the control group.

Various researchers have found that PIR (Post isometric relaxation technique) were effective in increasing joint ROM however, many of these studies only examined the immediate effect of intervention.

CONCLUSION

Although there were no RCT on chronic nonspecific neck pain on improving range of motion, reduction of pain and improvement in the range of motion. So, the main objective of the study is to evaluate the efficacy of post isometric relaxation in decreasing pain, increasing the range of motion and improving the functional activities in subjects with chronic nonspecific neck pain. This study is conducted with randomly selected with chronic

nonspecific neck pain subjects with age group 18 - 45 years. The entire subjects were evaluated for pain with VAS scale, ROM with goniometer and functional with NDI. Pre and Post evaluation was done. 30 subjects were divided into control group and experimental group. Experimental group received PIR for SCM, LS, TRZ, 3 reps/day, 3 days/week for over a period of 4 week duration. Control group received SS for SCM, LS, TRZ 3 reps/day, 3 days/week for over a period of 4 week duration. Statistical analysis was performed with paired and unpaired t-tests. The results show that PIR was better than SS. Hence it is concluded that PIR is more effective than SS in decreasing the pain, increasing the range of motion, improving functional activities in subjects with chronic nonspecific neck pain.

LIMITATIONS

This study was limited to effect of pir on cervical neck muscles. Other studies are needed to evaluate the effect of PIR on muscle group like neck flexors, neck extensors, neck lateral flexors and rotators. Inclusion of the small sample size into the study is another drawback. Large and well-designed prospective studies would add more information to the literature. Further studies can be focused on executing with long time duration in neck muscles and in age groups and risk factors. Further researches can examine the effect of PIR on particular group muscles in subjects with neck pain.

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