EFFECTIVENESS OF CERVICAL MUSCLE STRENGTHENING IN PATIENTS WITH CHRONIC MECHANICAL NECK PAIN.

Dr. A. ANITHA

MPT, PhD

SAVEETHA UNIVERSITY,

R. MADHUMATHI

SAVEETHA UNIVERSITY.

This condition mainly interferes with daily activities like forward flexion of neck above normal ranges and excessive use of deep cervical flexors**. Aim:** To find out the combined therapeutic effects of of ultrasound therapy along with strengthening exercises in pain reduction and range of motion-functional activity in subjects with chronic mechanical neck pain. **Methodology**: A Convenient sample of subjects with chronic neck pain was taken from Saveetha medical college and hospital and the subjects were divided into two groups, Group-1(control group)who were diagnosed with chronic neck pain and were subjected to ultrasonic therapy for 15 minutes, Group-2(Experimental group) who were diagnosed with chronic neck pain and were subjected to cervical muscle strengthening exercises along with ultrasound for 15 minutes to reduce the pain more effectively. Post-test NPRS were taken and documented for statistical analysis. **Outcome measures**: Numerical pain rating scale for knee pain. **Results**: Statistical analaysis was done to identify the difference between pre and post test measurements by paired t-test analysis. The two- tailed p- value is less than0.0001 by this difference it is considered to be statistically significant. **Conclusion:** The combination of ultrasound therapy along with strengthening exercises was effective in pain reduction in subjects with chronic mechanical neck pain.

INTRODUCTION:

Neck pain is a common problem in the general population, with prevalence reported to be 43%–66.7%[1] at some point in life. A study suggested that the incidence of neck pain was most commonly found in the working age-group 40–59 years old.[2] The source of pain may arise from many structures of the cervical spine, and can develop into chronic pain.[1] Neck problems can adversely affect physical, psychological, and social function. Neck pain also leads to high costs in national healthcare systems.[3]

Mechanical neck pain is the most common type found in neck-pain disorders, where chronicity is encountered in many cases.[4] Studies have demonstrated altered behavior of the cervical muscles in mechanical neck-pain patients.[5,6]Researchers have documented a reduction in the activity of the longus colli and longus capitis.[6] Studies have shown the deep cervical extensor musculature to have different cross-sectional area, particularly the semispinalis cervicis and cervical multifidus muscles in chronic neck-pain patients.[11-13] Deficits in deep cervical muscle activity of the cervical spine due to excess activity may lead to poor control of joint movement, repeated microtrauma, and thus eventual pain.[14]

Exercise is known to be an important component of treatment programs for patients with neck pain.[15,16] Recently, many studies have focused on specific training on deep cervical muscles. Craniocervical flexor-muscle training enhances ability and improves neuromuscular control of the deep cervical flexor muscles, including the longus colli and longus capitis.[17,18] Numerous studies using craniocervical flexor exercise as a treatment have led to a reduction in pain and neck disability, and also enhanced activation of the deep and superficial cervical flexor muscles.[19-24]

Further, the cervical extensor muscles are believed to be equally important for the rehabilitation of patients with neck pain.[25] The deep cervical extensors semispinalis and multifidus are the important cervical spine-stabilization muscles. Their impairment is observed in neck-pain patients,[10,26] and activation of these deep muscles should be emphasized in the rehabilitation of people with neck pain.[26] A study suggested that resisted isometric exercise at the level of the second cervical vertebra can achieve relative isolation of the semispinalis cervicis muscle.[32] Therefore, isometric resisted exercise at the level of the second cervical vertebra may stimulate the semispinalis cervicis muscle. However, to date, specific exercise for the semispinalis cervicis muscle has not been investigated in patients with chronic mechanical neck pain. Therefore, semispinalis cervicis exercise still requires evidence to support its use for clinical effects in chronic mechanical neck pain.

The aim of the current study was to compare the effects of semispinalis cervicis training, deep cervical flexor training, and usual care (control) on functional disability, pain intensity, CV angle, and neck-muscle strength on chronic mechanical neck pain. We hypothesized that semispinalis cervicis training would be superior or equal to deep cervical flexor training and would be superior to usual care (manual therapy, modality, and other exercises).

PROCEDURE:

A randomized control study was done by convenient sampling technique. There were 30 subjects selected on varying ages between 25-40 years and according to the inclusion criteria. They were randomly allocated to two different groups in an alternative manner. The study measured the pain and functional disability of the patient before and after the intervention. All participants were asked to sign an informed consent before participating in the study.

METHOD:

The study was done in two groups were one group receiving the conventional therapy and the other group experimental.

Group 1: (Control group) who were diagnosed with acute mechanical neck pain were given ultrasonic therapy and superficial heating modalities (Conventional Treatment). Experimental group will be treated with cervical muscle strengthening exercises along with conventional treatment (superficial heating modalities with Ultrasound therapy). Cervical muscle strengthening exercises which has been found to give better improvement in patients with acute trauma, the post test NPRS and Functional outcome measures were documented for statistical analysis.

SELECTION CRITERIA:

INCLUSION CRITERIA:

- Age: 25-40 years
- Gender: male and female
- Special test: Spurling's test
- Pain: a baseline of 6

EXCLUSION CRITERIA:

- Degenerative conditions
- Dislocations
- Vertebral fractures
- Cord compressions

OUTCOME MEASURE:

NPRS- Numerical Pain Rating Scale is a number line from 1-10 where 1 means less pain and 10 resembles worst pain and 5 somewhere in between the two. The subjects poain level is measured with their score if its too high then towards right and if less towards left.

STATISTICAL ANALYSIS:

TABLE 1

Pre and post test values of NPRS in Control and Experimental Group

	Pre-test	Post-test
Control Group	7.3	6.1
Experimental Group	7	4.8

GRAPH 1

Pre and post test values of NPRS in Control and Experimental Group

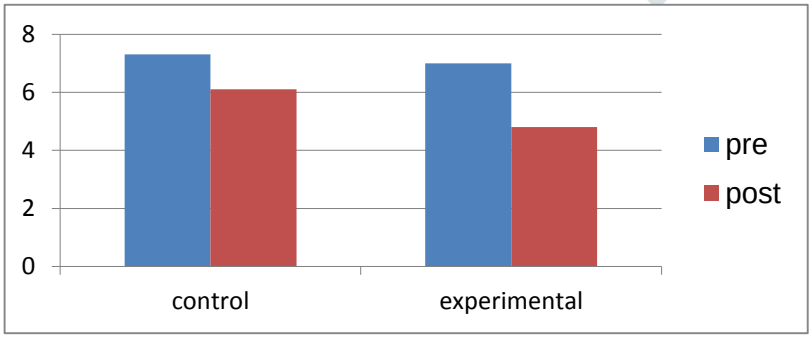
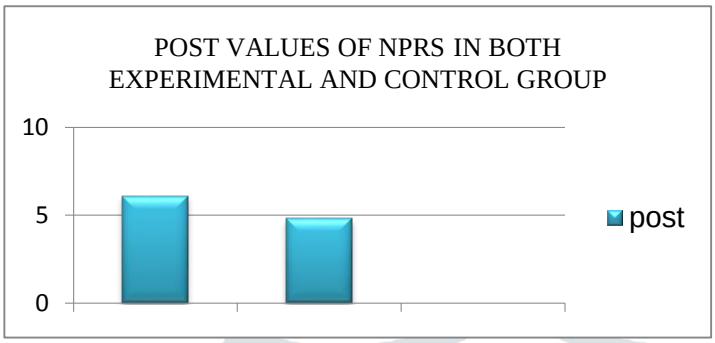


TABLE 2

Post test values of NPRS in Control and Experimental Group

GROUPS	POST TEST VALUES
Control group	6.1
Experimental group	4.8



RESULTS AND DISCUSSION:

This study which emphasizes the effectiveness of strengthening exercises wirth the combined therapy seems to relieve pain and improve functional abilities with increased ranges at cervical level.

Some local factors like altered biomechanics have found to improve when the muscles are able to receive proper movement quality by the strengthening exercises. The need for the study was met when the subjects were able to find visible results by reduced pain perceptions.

In this study NPRS found to be an effective outcome measure as the subjects pain was amplified by the reaction and was easy for the therapist to understand the subject's status.

Many studies tend to express that cervical strengthening exercises tend to reduce pain and improve functional ability and this study found to embrace the same.

Therefore cervical strengthening has found to even improve the blood supply to the muscles when combined with superficial heating modalities and ultrasonic therapy which reduced sarcomeric bands as tightness.

CONCLUSION:

This study concludes the effectiveness of cervical strengthening exercises when combined with the conventional therapy in acute mechanical neck pain tends to reduce pain and improve functional abilities. Similarly these exercises tend to improve the stability component of the cervical segment which in turn gives quality movements.

REFERENCES:

1. Côté P, Cassidy JD, Carroll L. The Saskatchewan health and back pain survey. the prevalence of neck pain and related disability in Saskatchewan adults. *Spine (Phila Pa 1976)*. 1998;23(15):1689–1698.
2. Hogg-Johnson S, van der Velde G, Carroll LJ, et al. Bone and joint decade 2000-2010 Task Force on neck pain and its associated disorders. The burden and determinants of neck pain in general population: results of the bone and joint decade 2000-2010 Task Force on neck pain and it associated disorders. *Spine (Phila Pa 1976)*. 2008;33(4 suppl):S 39–S51.
3. Korthals-de Bos IB, Hoving JL, van Tulder MW, et al. Cost effectiveness of physiotherapy, manual therapy, and general practitioner care for neck pain: economic evaluation alongside a randomised controlled trial. *BMJ*. 2003;326(7395):911.
4. Hogg-Johnson S, van der Velde G, Carroll LJ, et al. The burden and determinants of neck pain in general population: results of the bone and joint decade 2000-2010 Task Force on neck pain and it associated disorders. *Spine (Phila Pa 1976)*. 2008;33(4 suppl):S39–S51.
5. Barton PM, Hayes KC. Neck flexor muscle strength, efficiency, and relaxation times in normal subjects and subjects with unilateral neck pain and headache. *Arch Phys Med Rehabil*. 1996;77(7):680–687.
6. Jull G, Kristjansson E, Dall'Alba P. Impairment in the cervical flexors: a comparison of whiplash and insidious onset neck pain patients. *Man Ther*. 2004;9(2):89–94.
7. Falla D, Jull G, Hodges PW. Feedforward activity of the cervical flexor muscles during voluntary arm movements is delayed in chronic neck pain. *Exp Brain Res*. 2004;157(1):43–48.
8. Cagnie B, Cools A, De Loose V, Cambier D, Danneels L. Differences in isometric neck muscle strength between healthy controls and women with chronic neck pain: the use of a reliable measurement. *Arch Phys Med Rehabil*. 2007;88(11):1441–

1445.
9. O'Leary S, Cagnie B, Reeve A, Jull G, Elliott JM. Is there altered activity of the extensor muscles in chronic mechanical neck pain? a functional magnetic resonance imaging study. *Arch Phys Med Rehabil*. 2011;92(6):929–934.
10. Schomacher J, Farina D, Lindstroem R, Falla D. Chronic trauma-induced neck pain impairs the neural control of the deep semispinailscervicis muscle. *ClinNeurophysiol*. 2012;123(123):1403–1408.
11. Kristjansson E. Reliability of ultrasonography for the cervical multifidus muscle in asymptomatic and symptomatic subjects. *Man Ther*. 2004;9(2):83–88.
12. Elliott J, Jull G, Noteboom JT, Darnell R, Galloway G, Gibbon WW. Fatty infiltration in the cervical extensor muscles in persistent whiplash-associated disorders: a magnetic resonance imaging analysis. *Spine (Phila Pa 1976)*. 2006;31(22):E847–E855.
13. Elliott J, Jull G, Noteboom JT, Galloway G. MRI study of the cross-sectional area for the cervical extensor musculature in patients with persistent whiplash associated disorders (WAD). *Man Ther*. 2008;13(3):258–265.
14. Falla D, Farina D. Neural and muscular factors associated with motor impairment in neck pain. *Curr Rheumatol Rep*. 2007;9(6):497–502.
15. Kay TM, Gross A, Goldsmith CH, et al. Exercises for mechanical neck disorders. *Cochrane Database Syst Rev*. 2012;8:CD004250.
16. Leaver AM, Refshauge KM, Maher CG, McAuley JH. Conservative interventions provide short-term relief for non-specific neck pain: a systematic review. *J Physiother*. 2010;56(2):73–85.
17. O'Leary S, Jull G, Kim M, Vicenzino B. Specificity in retraining craniocervical flexor muscle performance. *J Orthop Sports Phys Ther*. 2007;37(1):3–9.
18. O'Leary S, Jull G, Kim M, Uthaikhup S, Vicenzino B. Training mode-dependent changes in motor performance in neck pain. *Arch Phys Med Rehabil*. 2012;93(7):1225–1233.
19. Jull G, Trott P, Potter H, et al. A randomized controlled trial of exercise and manipulative therapy for cervicogenic headache. *Spine*. 2002;27(17):1835–1843.
20. Jull GA, Falla D, Vicenzino B, Hodges PW. The effect of therapeutic exercise on activation of the deep cervical flexor muscles in people with chronic neck pain. *Man Ther*. 2009;14(6):696–701.
21. Falla D, Jull G, Hodges P. Training the cervical muscles with prescribed motor tasks does not change muscle activation during a functional activity. *Man Ther*. 2008;13(6):507–512.
22. Falla D, O'Leary S, Farina D, Jull G. The change in deep cervical flexor activity after training is associated with the degree of pain reduction in patients with chronic neck pain. *Clin J Pain*. 2012;28(7):628–634.