

**A STUDY TO COMPARE MECHANICAL TRACTION VERSUS MOBILIZATION OF
CERVICAL SPINE IN REDUCING PAIN AND DISABILITY IN PATIENTS WITH
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ABSTRACT

Background & Purpose: Neck pain is common musculoskeletal disorder in modern society that can produce severe pain. Neck pain is defined as pain and stiffness on posterior aspect of the cervical spine. Neck pain symptoms are longer than 6months in chronic stages and in acute stage its below 3 months. In Chronic Neck Pain, conservative management such as stretching, ultrasound, Interferential therapy, Transcutaneous electrical nerve stimulation are said to be effective. However, there are no studies in literature on Mechanical traction and Mobilization techniques for chronic neck pain. The purpose of the study is to compare Mechanical traction versus Mobilization of cervical spine in reducing pain and disability in patients with chronic neck pain. **Methodology:** A total number of 40 subjects who fulfilled the inclusion criteria were recruited in the study through simple random sampling method. The subjects were divided into Two groups of 20 each. Group A received Mechanical traction and Group B received Mobilization for 6 weeks and after 6 weeks the outcome was measured (a) pain by using Visual analogue scale (VAS) and (b) functional disability was measured using Neck disability Index (NDI). **Result:** Both the groups showed improvement after 6 weeks of intervention. But in Group A with Mechanical traction showed a higher statistical significance with a value of ($p < 0.0001$) while compared to Group B Mobilization. **Conclusion:** Based on above results Group A with Mechanical traction showed greater improvements in reducing pain and disability scores when compared to Group B Mobilization.

KEYWORDS: Chronic Neck Pain, Mulligan Mobilization, Mechanical Traction, Moist heat therapy, Sustained natural epiphyseal glides and Natural epiphyseal glides.

INTRODUCTION

Neck pain is defined as pain and stiffness on posterior aspect of the cervical spine.^[1] Neck pain is common musculoskeletal disorder in modern society that can produce severe pain. Decreased movement of upper cervical spine can cause excessive movement of the lower cervical spine, increase fatigue in the sternocleidomastoid, anterior scalenus and upper trapezius cause change of neck posture and breathing patterns and decrease range of motion.^[2] About 50% of the adult population experience a single episode of neck pain or stiffness in their lifetime and 4.6% experience the limitations of daily activities because of neck pain. The prevalence of this condition increases with age and is greater in women than in man.^[3]

Neck pain is a work-related musculoskeletal disorder that occurs when a person works for a long time or with high intensity. Neck pain symptoms are longer than 6months in chronic stages and in acute stage its below 3 months. The aetiology of neck pain is multifactorial and poorly

understood. The common factors include poor posture, depression, anxiety, aging, acute injury and occupational or sporting activities which lead to altered joint mechanics, muscle structure or functions and can result in mechanical neck pain. Studies stated that the most common cause of Mechanical neck pain in zygapophyseal joint locking and muscle strain.^[4,5,6] Neck pain occurs mostly in age group of 18- 30 years. But mainly mechanical neck pain occurs in adults at 25-35 years.

Mechanical traction (MT) shown to decrease pain by causing a number of physiological effects, such as decreased pressure on intervertebral joints, nerve roots, neural tissues and blood vessels. The ligaments are stretched which thus leads to a release muscle tension, stimulation of mechanoreceptors and increased blood circulation.^[7,8] Traction may prevent or reduce attachment/ adhesions inside the dural sleeve and can ease nerve root compression inside the central foramina.^[13,14]

Mobilization is usually defined as low-velocity and small amplitude movements applied within joint ROM. Maitland and mulligan mobilization techniques are most common types used.^[16] Mulligan mobilization techniques (MMTs) include several methods such as sustained natural epiphyseal glides (SNAG) and natural epiphyseal glides (NAGS) that target the spine.^[10] An immediate improvement in pain-free range of motion (ROM) in the involved joints is reported as a result of applying this treatment approach.^[11] Heat packs are inexpensive, readily available adjuncts in the treatment of musculoskeletal disorders.^[12-15]

The aim of this study is to find out the comparison between Mechanical traction versus mobilization of cervical spine in reducing pain and disability in patients with chronic neck pain. According to this study, there are many treatment strategies in management of chronic neck pain. Among them Mechanical traction and Mobilization along with hot packs is said to be beneficial. So, this study is done to compare the treatment techniques of Mechanical traction and Mobilization.

METHODOLOGY

The study aims to compare Mechanical traction versus Mobilization of cervical spine in reducing pain and disability in patients with chronic neck pain.

Study Design: Comparative Study Design.

Sampling Techniques: Simple Random Sampling Method.

Study Sample: A total of 40 Subjects were taken, who are willing to participate in this stud, taken then consent form, from the subjects who met the indication criteria with Group A and Group B 40 subjects. (20 in each group).

Sample Size: 40

Study Duration: 6 Weeks

Study Groups: 2 Groups – Group A, Group B

Materials Used For The Study: Chair, Traction couch, Traction Belts, Pillow, Written Informed Consent, Moist heat therapy packs, Patient assessment chart, Patient consent form, Data analysis chart.

Inclusion Criteria

- Patients age group between 18-30 years with chronic neck pain for ≥ 3 months
- Both male and female patients with cervical spine pain are included
- Neck pain that aggravated by persistent neck posture or neck movements or pressure for at least 3months without a knowing pathology
- VAS pain rating score of $\geq 3/10$
- NDI score $>20\%$ or 2 points
- Patients with limited flexion and extension ROM of Neck
- Myofascial tightness of neck

- People who are willing to join as trials by signing an informed consent form

Exclusion Criteria

- Osteoporosis
- Tumours
- Cervical spine fractures
- History of cervical surgery in last 12 months
- History of trauma
- Fibromyalgia/ generalized pain syndrome
- Signs and symptoms of cervical radiculopathy/myelopathy
- Neck pain associated with arthritis or inflammation of joints
- Subjects under drug therapy
- Positive radicular signs consisting with nerve root compression
- Malignant neoplasm
- Vascular diseases
- Psychiatric problem or pregnancy
- Contraindicated to mobilization
- Patients who are taking any analgesic medication since past 3 months

Outcome Parameters

- Visual Analogue Scale (VAS)
- Neck Disability Index (NDI)

Procedure

The study was a comparative design study. A total number of 40 patients were included in the study after taking informed consent and they were divided into two equal quantities of 20 subjects and arranged in Group A & Group B. Subjects were randomly selected according to above selected criteria.

Group – A [Mechanical Traction]

Subjects of this group (20 patient's) receive Mechanical traction and Moist heat packs Subjects in this Group receives Intermittent cervical Traction (ICT) for 10 minutes, with 60s of hold time and 20s of Rest time. Traction is given in supine lying, as this is one of most comfortable position during cervical traction. Cervical belt is placed over the patient's neck. Patient feels the stretch on his/her cervical area when the traction machine pulls the cervical vertebrae. Assessment is taken on pre and post treatment process to analyse the data.

For this treatment Mechanical Traction machine is used with parameters ranging from 10% - 20% of the patient's body weight; Hold time for about 10 – 20 seconds; Rest time: 20 – 50% of holding. After Mechanical traction technique participants were treated with Moist heat therapy. Patients received moist heat packs in sitting position for about 15 minutes on cervical region with head resting on table with a pillow. The electrical heating pad set on high maintained an average skin temperature of 132°F, varying between 130 and 135°F. Treatment Time including both mechanical traction + Moist heat

therapy; Mechanical Traction = 10 min with 60s hold time and 20s rest time, Moist Heat = 15 min with 130-135°F. Duration of treatment: - 3 times a week for 6 weeks (3 sessions/week for 6 weeks).

Group – B [Mulligan Mobilization]

Subjects in this group (20subjects) receives Mulligan concept of SNAG and NAGs Mobilization techniques of cervical spine and Moist Heat packs.

The participant in the sitting position receives, Natural Apophyseal Glides (NAGs) consists of passive mid to end range oscillatory mobilization applied antero-cranially in plane of joint selected. Direction of force is parallel to highly irritable-grossly restricted cervical facet joints. Application dosage of NAGs was set to 2-3 Hertz in 3 sets of 3 repetitions. Later the participant in the sitting position receives SNAGs, is asked to move their head in the direction that particularly produces their symptoms. As the participant moves their head, the physiotherapist gently glides the painful vertebra anteriorly and sustains the glide through the movement. During application of the glides, the participant should

stay symptom free and is instructed to stop moving if any pain is produced. Application dosage of SNAGs was set to 6 repetitions of 3 sets. Assessment was taken both pre and post treatment process to analyse the data.

After both the Mulligan Mobilization technique participants were treated with Moist heat therapy. Patients received moist heat packs in sitting position for about 15 minutes on cervical region with head resting on table with a pillow. The electrical heating pad set on high maintained an average skin temperature of 132°F, varying between 130 and 135°F. The application of NAGs and SNAGs Mulligan Mobilization techniques in cervical neck pain along with a complementary Moist heat packs were done for 6 sessions in 3 days per weeks (3/w) with 1 day rest between each session for 6 weeks. Treatment duration: - 6 sessions in 3 days/ week for 6 weeks with 1days rest in between each session.

Statistical Analysis

Statistical analysis was performed using MS Excel. The demographic data like standard deviation and mean difference percentage were calculated and presented.

Comparison of post VAS in Group – A versus Group – B.

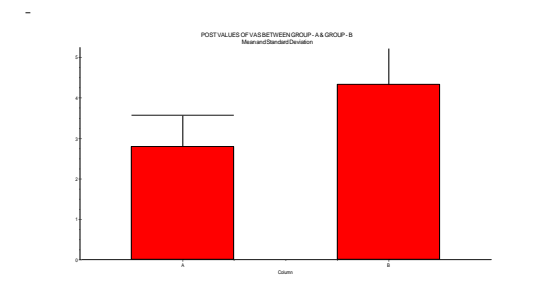
GROUP – A & GROUP – B	MEAN	STANDARD DEVIATION	p- VALUE	t- VALUE
PRE	2.8	0.7746	<0.0001	5.002
POST	4.3	0.8997		

Description: The difference between post values measured by VAS using the two tailed P value is (<0.0001), considered extremely significant.

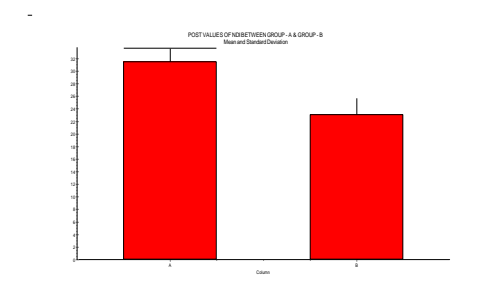
Comparison of Post NDI between Group - A Versus Group – B.

GROUP - A & GROUP – B	MEAN	STANDARD DEVIATION	p- VALUE	t- VALUE
PRE	31.46	2.200	<0.0001	9.318
POST	23.06	2.712		

Description: The difference between post values of disability measured by NDI using the two tailed p value is (<0.0001), considered extremely significant.



VAS



NDI

RESULT

In this current comparative study 40 patients were participated for a period of 6 weeks showed statistically improvement in mechanical traction [Group – A] compared with mobilization techniques [Group – B] with a significant of $p < 0.0001$ in decreasing pain in chronic neck pain.

DISCUSSION

Based on the results above, it is seen that subjects in both the Groups A and B showed reduction in pain and disability after 6 weeks of intervention but significant reduction in pain and disability was seen in Group A when compared to Group B.

Pre and Post treatment values of Neck disability index [NDI] and Visual analogue scale [VAS] were recorded.

In M. Krause, her study stated some evidence which suggests that a transitory increase in physiological range of motion occurred with alterations of length and mobility of connective tissue structure. Separation of vertebral bodies may provide a stretch to the spinal soft tissues that is adequate to induce a transitory increase in length.

In study of Barnsley *et al.* reported that limited range of motion (ROM) induces tightness of muscles surrounding the neck well as joint adhesions, resulting in decrease in biomechanical junctions of neck and leads to chronic neck pain. In addition, there have been reported of weakness and deficits of motor control of the neck muscles.^[7,8,9] Mechanical traction shown a decrease in pain by causing a number of physiological effects, such as decreased pressure on intervertebral joints, nerve roots, neural tissues, and blood vessels. The ligaments are stretched which thus leads to a release muscle tension, stimulation of mechanoreceptors and increased blood circulation.^[10,11]

Gatterman (1990) defines spinal traction as application of drawing or pulling force along the long axis of the spine in order to stretch the soft tissues, separate joint surfaces, to separate bony segments and enlargement of intervertebral foramina. It is believed that stretching of the muscle will lead to relaxation, thus improves local circulation and diminishing pain. These effects include improved pain related measures like increased pressure threshold and decreased visual analogue scale pain rating.^[20]

Mulligan's Mobilization techniques could stimulate joint mechanoreceptors to decrease pain (neuro-physiologic effect), and to stretch the joint tissues (mechanical effect). The oscillations may have an inhibitory effect on perception of painful stimuli by stimulating mechanoreceptors that block nociceptive pathways at the spinal cord or brain stem levels.^[21] Hot packs or moist heat pack is one of the most common methods of thermotherapy and various heat transfer substances, such as silicate gel, polymer gel and water were used in hot packs.^[18,19] A comparison done between two groups showed an equally significant result in Group A mechanical traction, and Group B mobilization but Group A showed more reduction in pain and disability due to its longer duration and increased separation of vertebral bodies.

The pain intensity of the subjects evaluated by VAS presented with abatement in the mean, standard deviation values from pre- treatment to post- treatment. The results of paired t- test also revealed a statistical significance in the VAS score during the post – treatment period [$p < 0.0001$]. The mean, standard deviation values of NDI scale revealed a statistical significance during post –

treatment period of $p < 0.0001$.

The above studies show pre- post treatment for chronic neck pain comparing between mechanical neck pain and mobilization techniques. Hence in this study mechanical traction [Group – A] seems to be more effective than the mobilization techniques [Group -B] as per statistical analysis.

CONCLUSION

In conclusion, the result of this study shows that there was significant reduction in pain and disability in subjects with Chronic neck pain who are treated with Mechanical traction (Group A) compared with the subjects who were treated with Mobilization techniques (Group B). Based on statistical analysis, we have concluded that Mechanical traction is better in the treatment of the patients with chronic neck pain when compared with Mulligan Mobilization techniques. Hence the null hypothesis is rejected, and alternative hypothesis is accepted. Therefore, Group A is shown effective in reduction of pain and disability in Chronic neck pain.

REFERENCES

1. Ferrari R, Russell AS. Neck pain. *Best Practice & Research Clinical Rheumatology*, 2003; 17: 57-70.
2. Kapreli E, Vourazanis E, Strimpakos N: Neck pain causes respiratory dysfunction. *Med Hypotheses*, 2008, 70: 1009–1013
3. Côté P, Cassidy J, Carroll LJ, *et al.*: The annual incidence and course of neck pain in the general population: a population-based cohort study. *Pain*, 2004; 112: 267– 273.
4. Bolanle Tinubu, Chidozie E Mbada Adewale L Oyeyemi and Ayodele A Fabunmi. Work-related musculoskeletal disorders among Nurses in Ibadan, South-west Nigeria: a cross-sectional survey. *BMC Musculoskeletal Disord*, 2010; 11: 12.
5. Peterson, D.H and Bergman, T.F. *Chiropractic Technique: Principles and Procedures*. United States of America, 2002.
6. Gatterman, M.I. *Chiropractic management of Neck Pain of Mechanical Origin*, 1998.
7. Barnsley L, Lord S, Bogduk N: Comparative local anaesthetic blocks in the diagnosis of cervical zygapophysial joint pain. *Pain*, 1993; 55: 99–106.
8. Falla D: Unravelling the complexity of muscle impairment in chronic neck pain. *Man Ther*, 2004; 9: 125–133.
9. Falla D, Rainoldi A, Jull G, *et al.*: Lack of correlation between sternocleidomastoid and scalene muscle fatigability and duration of symptoms in chronic neck pain patients. *Neurophysiol Clin*, 2004; 34: 159–165.
10. Chiu T, Kim-Fai Ng J, Walther-Zhang B, *et al.* A randomized controlled trial on the efficacy of intermittent cervical traction for patients with chronic neck pain. *Clin Rehabil*, 2011; 25(9): 814-822.

11. Graham N, Gross A, Goldsmith CH, Klaber Moffett J, Haines T, Burnie SJ, Peloso PMJ. Mechanical traction for neck pain with or without radiculopathy. *Cochrane Database of Systematic Reviews*, 2008; 3.
12. Albayrak A, Yazicioğlu K. Cervical intermittent traction: does it really work in cervical radiculopathy due to herniated disc? *Turk J Phys Med Rehabil*, 2012; 58: 277–282.
13. Constantoyannis C, Konstantinou D, Kourtopoulos H, Papadakis N. Intermittent cervical traction for cervical radiculopathy caused by large-volume herniated disks. *J Manipulative Phys Therapeut*, 2002; 25: 188–192.
14. Young I, Michener L, Cleland J, Aguilera A, Snyder A. Manual therapy, exercise, and traction for patients with cervical radiculopathy: a randomized clinical trial. *Physical Therapy*, 2009; 89: 632–642.
15. L. Exelby, “The Mulligan concept: its application in the management of spinal conditions,” *Manualtherapy*, 2002; 7(2): 64–70.
16. Cramer, H.; Baumgarten, C.; Choi, K.E.; Lauche, R.; Saha, F.J.; Musial, F.; Dobos, G. Thermotherapy self-treatment for neck pain relief—A randomized controlled trial. *Eur. J. Integr. Med.*, 2012; 4: e371–e378.
17. Nadler, S.F.; Deprince, M.L.; Stitik, T.P.; Hendgehold, D.; Weingand, K. Experimentally induced trapezius fatigue and the effects of topical heat on the EMG power density spectrum. *Am. J. Phys. Med. Rehab.*, 1999; 80: 1123.
18. Oshima-Saeki, C.; Taniho, Y.; Arita, H.; Fujimoto, E. Lower-limb warming improves sleep quality in elderly people living in nursing homes. *Sleep Sci.*, 2017; 10: 87–91.
19. Saeki, Y. Effect of local application of cold or heat for relief of pricking pain. *Nurs. Health Sci.*, 2002; 4: 97–105.
20. Kumar A., Kumar S., Aggarwal A., et al. 2012. Effectiveness of Maitland Techniques in idiopathic shoulder adhesive capsulitis. *International Scholarly Research Network Rehabilitation*, 2012.
21. Gatterman MI. *Chiropractor management of spine related disorders*. Baltimore: Williams and Wilkins, 1990.