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Comparison between Stretching Exercises & Maitland Mobilization in Chronic Neck Pain

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Original Research Article

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Abstract: Pain in the neck can be more than just a hassle. The objectives of this study were to determine and compare the role of Maitland mobilization and stretching exercises along hot pack therapy in both groups. Total 30 subjects were selected and divided into group A & B sample was collected through simple random sampling with chronic cervical pain and fulfilling the inclusion and exclusion criteria. The treatment was gives as: Group A: Maitland mobilization of cervical spine along with hot pack. Group B: Cervical stretching exercises along with hot pack. This study was a comparative experimental study and it used assessment form, consent form, examination couch, Goniometer, Visual Analogue Scale, Neck Disability Index Scale and Hot pack. Patients were evaluated for their pain profile using VAS, their ROM using the Goniometer and neck disability using NDIS. Time Frame for this study and data collection was one year and the source of data was Liaquat National Hospital Physiotherapy Out Patients Department, Karachi, Pakistan. Pre and post treatment parameters were collected on assessment form and later evaluated further on SPSS 21 through independent sample T-test. The results indicated that both techniques produced a hypoalgesic effect as revealed by improved NDIS and decreased VAS. Both the techniques when compared with each other with respect to post treatment NDIS, VAS and ROM, showed significance difference (VAS P= 0.012, NDIS P= 0.042, Cervical Ranges < 0.05).The combination of all findings has supported the use of Maitland technique in chronic cervical pain.

Keywords: cervical, chronic, neck, pain, chronic neck pain, Maitland mobilization, stretching, exercises, stretching exercises, Maitland, mobilization.

INTRODUCTION

Neck is made up of vertebrae that extend from the skull to the upper torso. Cervical discs absorb shock between the bones. The bones, ligaments, and muscles of your neck support your head and allow for motion. Any abnormalities, inflammation, or injury can cause neck pain or stiffness. Many people experience neck pain or stiffness occasionally. In many cases, it's due to poor posture or overuse. Sometimes, neck pain is caused by injury from a fall, contact sports, or whiplash.

Most of the time, neck pain isn't a serious condition and can be relieved within a few days But in some cases, neck pain can indicate serious injury or illness and require a doctor's care. If you have neck pain that continues for more than a week, is severe, or is accompanied by other associated symptoms [1].

Neck pain can feel like any of the following:

- Stiff neck that makes turning the head difficult
- Sharp or stabbing pain in one spot
- Soreness or tenderness in a general area
- Pain that radiates down into the shoulders, arms, or fingers; or radiates up into the head

In some cases, other symptoms associated with the neck pain are even more problematic, such as:

- Tingling, numbness, or weakness that radiates into the shoulder, arms, or fingers
- Trouble with gripping or lifting objects
- Problems with walking, balance, or coordination
- Loss of bladder or bowel control [2].

Work-related musculoskeletal disorders are widespread among computer users and costly to the

health care system. Workstation setup and worker postures contribute to upper-extremity and neck symptoms among computer users. Ergonomic interventions such as work risk analysis and workstation modifications can improve workers' symptoms. However, ergonomic interventions do not appear to be a common component of traditional physical therapy treatment [3].

Severe symptoms of unspecific neck pain include decreased mobility, numbness of limbs, headaches, and migraines [4]. Neck pain can be caused by a number of different and complex conditions.

Ankylosing spondylitis**:** A type of inflammatory arthritis that can cause pain and stiffness from the neck down through the lower back. It creates inflammation in the joints between the vertebrae of the spine.

Cervical radiculopathy: Compression of a spinal nerve root in the neck caused by injury or inflammation and resulting in neurological symptoms such as severe neck pain, tingling, and numbness in the hands or arms.

Whiplash injury is a term used to describe an injury to the neck area that usually involves a rapid movement into extension and flexion, such as in a car accident. Whiplash is the most common non-fatal injury associated with a motor vehicle accident and can even occur at speeds of less than 15 miles per hour. Symptoms of neck stiffness and pain usually appear in the days following the accident and can last for several months, often becoming chronic in 25% of individuals [5].

Cervicogenic headache: A headache created by neck pain or problems.

Degenerative disk disease: The wearing down of the disks that act as shock absorbers between the vertebrae of the neck and lower back. This causes the vertebrae to rub together and pinch nerves.

Degenerative joint disease: Also known as osteoarthritis, the deterioration of the cartilage that lines a joint, which causes the joint space to narrow and bones to rub together [6].

Neck pain may be a warning sign of cancer, infection, autoimmune disease, or some kind of structural problem like spinal cord injury or a threat to an important blood vessel. Some of these ominous situations cause hard-to-miss signs and symptoms other than pain and are *likely* to be diagnosed correctly and promptly

Three general red flags for neck pain:

- it's been bothering you for more than about 6 weeks
- it's severe and/or not improving, or actually getting worse
- There is at least one other "red flag" an accident with forces that may have been sufficient to fracture your spine or tear nerves [7].

Pain is an uncomfortable feeling that tells you something may be wrong. It can be steady, throbbing, stabbing, aching, pinching, or described in many other ways. Sometimes, it's just a nuisance, like a mild headache. Other times it can be debilitating.

The International Association for the Study of Pain (IASP) defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage.

Pain is not just a physical sensation. It is influenced by attitudes, beliefs, personality and social factors, and can affect emotional and mental wellbeing.

Although two people may have the same pain condition, their experience of living with pain can be vastly different .

Acute pain typically comes on suddenly and has a limited duration. It's frequently caused by damage to tissue such as bone, muscle, or organs, and the onset is often accompanied by anxiety or emotional distress.

Chronic pain lasts longer than acute pain and is generally somewhat resistant to medical treatment. It's usually associated with a long-term illness, such as osteoarthritis. In some cases, such as with fibromyalgia, it's one of the defining characteristic of the disease. Chronic pain can be the result of damaged tissue, but very often is attributable to nerve damage.

Nociceptive pain arises from various kinds of trouble in tissues, reported to the brain by the nervous system. This is the type of pain everyone is most familiar with, everything from bee stings and burns and toe stubs to repetitive strain injury, nausea, tumors, and inflammatory arthritis. Nociceptive pain typically changes with movement, position, and load.

Neuropathic pain arises from damage to the nervous system itself, central or peripheral, either from disease, injury, or pinching. The simplest neuropathies are mechanical insults, like hitting your funny bone or sciatica, but this is a big category: anything that damages neurons, from multiple sclerosis to chemotherapy to alcoholism to phantom limb pain. It's often stabbing, electrical, or burning, but nearly any quality of pain is possible [8].

Pain intensity, pain-related disability, pain duration and pain affect are the aspects that define pain and its effects. For each of these aspects, different assessment instruments exist and are discussed in terms of advantages and disadvantages [9].

A Visual Analogue Scale (VAS) is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured. It is often used in epidemiologic and clinical research to measure the intensity or frequency of various symptoms. For example, the amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain. From the patient's perspective, this spectrum appears continuous ± their pain does not take discrete jumps, as a categorization of none, mild, moderate and severe would suggest. The pain VAS is a one-dimensional measure of pain intensity, which has been widely used in diverse adult populations, including those with neck pain and their associated factors

The Neck Disability Index is a modification of the Oswestry Low Back Pain Disability Index . It is a patient-completed, condition-specific functional status questionnaire with 10 items including pain, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. The NDI has sufficient support and usefulness to retain its current status as the most commonly used self-report measure for neck pain. The NDI can be scored as a raw score or doubled and expressed as a percent Each section is scored on a 0 to 5 rating scale, in which zero means 'No pain' and 5 means 'Worst imaginable pain'. Al the points can be summed to a total score. The test can be interpretedas a raw score, with a maximum score of 50, or as a percentage. 0 points or 0% means: no activity limitations, 50 points or 100% means complete activity limitation.

A higher score indicates more patient-rated disability. There is no statement in the original literature on how to handle missing data. To use the NDI for patient decisions, a clinically important change was calculated as 5 points

- 0-4points (0-8%) no disability,
- 5-14points (10 – 28%) mild disability,
- 15-24points (30-48%) moderate disability,
- 25-34points (50- 64%) severe disability,
- 35-50points (70-100%) complete disability [10].

Perform a physical exam to determining whether your pain is related to muscle, joint, or ligament structures and to determine treatment options. This will include an assessment of your neck movements and the strength and sensation felt in your neck and arms.

During the course of assessing the range of motion of cervical spine a device which is very useful to assess the measurement is a goniometer which is used in physical therapy to measure the range of motion around a joint in the body. The word goniometer is derived from the Greek terms gonia and metron, which mean angle and measure, respectively. Before starting any treatment physical therapist may use a goniometer to obtain a baseline range of motion measurement around a specific joint according to their function. After a specific intervention or treatment, it is also measure again to ensure that the treatment is effective. Goniometers come in different sizes. Small goniometers are available to measure range of motion around the joints of your fingers, thumbs and hands. Large goniometers are used to measure the range of motion around other joints [11].

Physical therapy is one of the most common treatments for chronic neck pain. Most physical therapy programs for neck pain involve applying treatments to reduce pain and/or stiffness enough to begin an exercise program of strengthening and stretching the neck. The specific methods and exercises used in physical therapy [12].

Isometric exercises are a static form of exercises in which a muscle contracts and produce a force without appreciable change in the length of the muscle and without visible joint motion. Although there is no mechanical work done a measureable amount of tension and force output are produced by the muscle. Sources of resistance for isometrics exercise include holding against a force applied manually, holding a weight in a particular position, maintaining a position against the resistance of body weight, or pushing or pulling an immovable object [13].

Hot and cold therapies: By using heat, the physical therapist seeks to get more blood to the target area because an increased blood flow brings more oxygen and nutrients to that area. Blood is also needed to remove waste byproducts created by muscle spasms, and it also helps healing. Cold therapy slows circulation, helping to reduce inflammation, muscle spasms, and pain. Your physical therapist will alternate between hot and cold therapies.

Manual Therapy includes both passive techniques (hands-on) and active techniques (hands-off) and should be used within a clinically reasoned and evidence-based-practice framework The aim of MT in the context of Neck pain is to decrease pain, improve movement, motor control, and function and thereby reduce disability [14].

Manual therapy, the use of hands in a curative and healing manner or a hands-on technique with therapeutic intent. There is a wide range of disciplines which use manual therapeutic methods to treat and manage pathology and dysfunction as a primary treatment method or in conjunction with other treatments. Physiotherapists are sometimes considered specialists in manual therapy. Manual therapy works through a multitude of different mechanisms to be effective and understanding the physiological, neurological and psycho physiological mechanisms is critical to utilizing manual therapy clinically in a competent and safe manner. Psycho physiological mechanisms is critical to utilizing manual therapy clinically in a competent and safe manner [15].

"The Maitland Concept of Manipulative Physiotherapy as it became to be known emphasizes a specific way of thinking, continuous evaluation and assessment and the art of manipulative physiotherapy ("know when, how and which techniques to perform, and adapt these to the individual Patient") and a total commitment to the patient. The application of the Maitland concept can be on the peripheral or spinal joints both require technical explanation and differ in technical terms and effects. The application of the Maitland concept can be on the peripheral or spinal joints, both require technical explanation and differ in technical terms and effects [16].

Maitland Joint Mobilization Grading Scale:

- Grade I - Small amplitude rhythmic oscillating mobilization in early range of movement
- Grade II - Large amplitude rhythmic oscillating mobilization in midrange of movement
- Grade III - Large amplitude rhythmic oscillating mobilization to point of limitation in range of movement
- Grade IV - Small amplitude rhythmic oscillating mobilization at end range of movement
- Grade V (Thrust Manipulation) - Small amplitude, quick thrust at end range of movement [15].

Better posture. If poor posture is causing the neck pain, then simple changes might be the solution. This could include changing a workstation to become more ergonomically friendly, with a chair, monitor, and keyboard positioned in ways to keep the body, head, and neck more aligned in a natural position; or learning to sleep on the back (instead of the stomach or side) with an ergonomically-friendly pillow and mattress [17].

Correct sitting posture reduces the risk of slouched posture, protruded chin and prevents the neck pain from disability [13].

METHODOLOGY

HYPOTHESIS

Null hypothesis (H0): there will be no significant difference produced between Maitland technique and cervical stretching exercises in decreasing pain and improving ROM in patients with chronic cervical pain.

Alternate Hypothesis (HA): there will be significant difference produced between Maitland technique and cervical stretching exercises to decrease pain and improve ROM in patients with chronic cervical pain.

MATERIALS & METHODS

The study design was randomized control trial this study was implemented on individuals with chronic neck pain who had visited to the OPD, 30 patients were requested to participate in the study after finding their inclusion and exclusion criteria.

All participants received information about the study and signed a consent form. The assessment included the pain intensity with visual analogue scale (VAS), neck disability assessed with neck disability index scale (NDIS), and active cervical range of motion assessed with goniometer. All examination and treatment was noted in assessment form.

The participants were randomly divided into two groups

1. Group A
2. Group B

In group A: 15 patients were treated with moist heat pack for 15mins and then following this the subjects were treated with Maitland mobilization for chronic neck pain.

For the joint mobilization Maitland Grade 1, 2, 3 and Grade 4 were used depending on the subject's condition, after the painful sites were located by examination.

The intervention was central and unilateral PA and rotation mobilization of cervical vertebrae

Central gliding

- Patient position: prone lying
- Method: with the therapist's thumb, along the longitudinal axis, pressure is applied in a direct postero-anterior direction on the spinous process.

Unilateral gliding

- Patient position: prone lying
- Method: with the therapist's thumb 2-3 cms from the midline, pressure is applied to the vertebrae over the spinous process mobilizing the successive joint.

Rotation

- Patient position: supine lying with head rotated from the painful side
- Method: the head is cradled into the therapist's hand, fingers supporting the chin
- Rotation of the head and thus the cervical spine is achieved by even and rhythmic movements of both the hand in unison to produce a smooth oscillatory movements around an axis

Duration of treatment is 3 sets of 30 sec after the treatment pain, range of motion and disability were assessed by visual analogue scale, universal goniometer and Neck disability scale.

In group B:15 patients were treated with 15 minutes moist heat pack and then following this, the subjects were treated with cervical stretching exercises for at least about 20 minutes. Therapeutic stretching exercises involved enhancing mobility, stability and muscular strength of the neck, improvingproprioception, and performing re-education of movement and the intensity of exercises were adjusted to the physical abilities of the subjects.

After the treatment participant evaluated their pain and range of motion with the help of visual analogue scale (VAS), universal goniometer and neck disability index scale (NDIS)

Inclusion criteria:

- Age; 25 to 60
- Gender: both gender
- Patient with primary complain of nonspecific chronic neck pain
- Pain of sufficient intensity (greater than 2 out of 10 on visual analogue scale)
- Pain and stiffness for at least more than 3 weeks
- Cervical radiculopathy

Exclusion criteria:

- Cervical spine fracture
- Inflammatory arthritis
- Malignant neoplasm around neck
- Osteoporosis
- Vascular disease
- Psychiatric problem
- Cervical spine instability/spondylolisthesis
- Neurological damage
- Vertigo
- Nausea & vomiting
- Vitally unstable.

Statistical analysis performed by using SPSS software version 21. Independent Sample T-test has been applied for the comparison of mean differences between pre and post treatment which was done through Maitland's mobilization technique and stretching exercises technique in chronic cervical pain. The level of significance in calculations was set at the 5% confidence level.

RESULTS

Total 30 patients were evaluated, 15 in each treatment group to determine the pre and post treatment score for Maitland's and Stretching exercise techniques. SPSS version 21 was used and Independent sample t-test was used for the comparison of mean differences between pre and post treatment which was done through Maitland's mobilization technique and stretching exercise technique in chronic cervical pain. P-value $\leq$ 0.05 was considered as significant while P-value > 0.05 considered as Non-significant.

The Post treatment Visual Analogue Scale was evaluated by Independent Sample T-Test showed that mean of Stretching exercise techniques is 2.33 and Maitland's technique is 3.33 with significance level of 0.012, which showed the significant result. Consider Table-1 and Graph-1.

The mean value of post treatment NDIS in Maitland technique through Independent Sample T-test was 17.73 while Stretching exercise techniques post treatment NDIS was 14.60. The P-value showed significant result with P-value < 0.05. The results are presented in Table-2 and graphical presentation of Mean values showed in Graph-2.

Mean value in Maitland technique for cervical flexion was 44.67 while in case of Stretching exercise techniques its calculated value was 40.07 P-value < 0.05 considered significant.Graph-3 represented Mean value between Maitland and Stretching technique.

Independent Sample T-Test of Post Treatment Cervical Extension in Stretching Exercise & Maitland's Techniques showed mean values with P-value significant results < 0.05. Consider Table-4 and Graph-4.

Table-5 represented detailed statistical analysis of post treatment cervical left lateral flexion with evaluated P-value < 0.05. Consider graphical analysis in Graph-5.

Table-6 showed detailed statistical results of post treatment cervical right lateral flexion with evaluated P-value < 0.05. Consider graphical analysis in Graph-6.

Stratification was done for Post treatment cervical right rotation, detailed analysis showed in Table-7. Considered P-value < 0.05 thus results are significant with graphical representation in Graph-7.

Among 30 patients with chronic cervical pain having restricted cervical left rotation received Maitland's and stretching exercise with 15 patients in each group. The post treatment detailed stratum showed in Table-8 while the further graphical analysis observed in Graph-8.

Table-1: Independent Sample T-test For Post Treatment VAS in Maitland & Stretching Exercises

Post Treatment VAS	N	Mean	P-value
Maitland	15	3.33	0.012*
Stretching Exercise	15	2.33	

Independent Sample T test was applied, * P-value ≤ 0.05 considered as significant.

Table-2: Independent Sample T-test For Post Treatment NDIS in Maitland & Stretching Exercises

Post Treatment NDIS	N	Mean	P-value
Maitland	15	17.73	0.042*
Stretching Exercise	15	14.60	

Independent Sample T test was applied, * P-value ≤ 0.05 considered as significant.

Table-3: Independent Sample T-test For Post Treatment Cervical Flexion in Maitland & Stretching Exercises

Post Treatment Cervical Flexion	N	Mean	P-value
Maitland	5	44.67	0.001*
Stretching Exercise	1	40.07	

Independent Sample T test was applied, * P-value ≤ 0.05 considered as significant.

Table-4: Independent Sample T-test For Post Treatment Cervical Extension in Maitland & Stretching Exercises

Post Treatment Cervical Extension	N	Mean	P-value
Maitland	15	45.00	0.030*
Stretching Exercise	15	40.00	

Independent Sample T test was applied, * P-value ≤ 0.05 considered as significant.

Table-5: Independent Sample T-test For Post Treatment Cervical Left Lateral Flexion in Maitland & Stretching Exercises

Post Treatment Cervical Left Lateral Flexion	N	Mean	P-value
Maitland	15	38.20	0.003*
Stretching Exercise	5	34.00	

Independent Sample T test was applied, * P-value ≤ 0.05 considered as significant.

Table-6: Independent Sample T-test For Post Treatment Cervical Right Lateral Flexion in Maitland & Stretching Exercises

Post Treatment Cervical Right Lateral Flexion	N	Mean	P-value
Maitland	15	38.20	0.001*
Stretching Exercise	15	33.80	

Independent Sample T test was applied, * P-value ≤ 0.05 considered as significant.

Table-7: Independent Sample T-test For Post Treatment Cervical Right Rotation in Maitland & Stretching Exercises

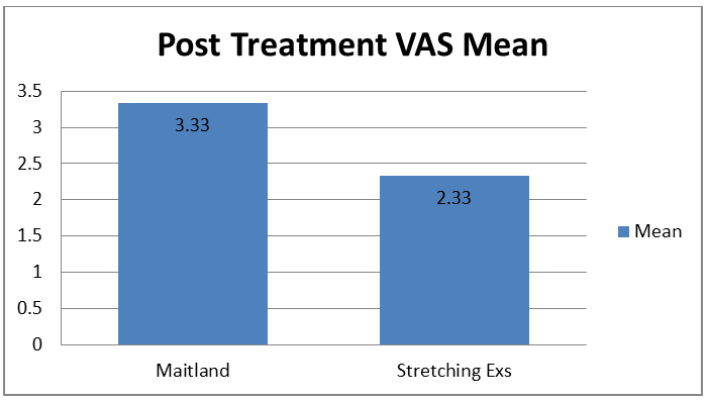
Post Treatment Right Rotation	N	Mean	P-value
Maitland	15	78.87	0.022*
Stretching Exercise	15	73.53	

Independent Sample T test was applied, * P-value ≤ 0.05 considered as significant.

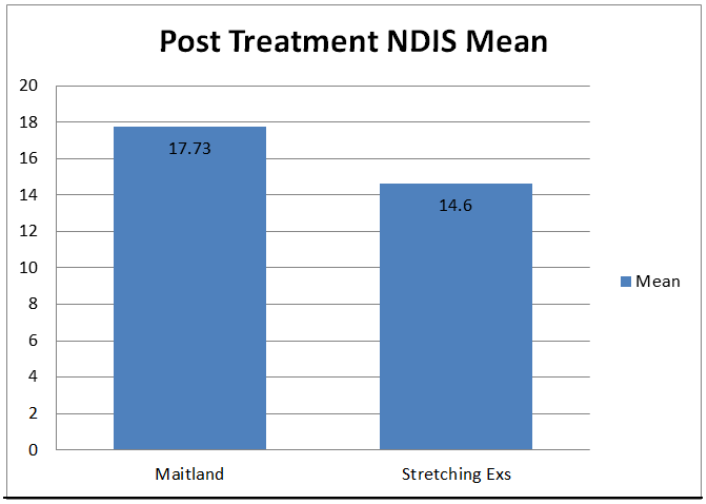
Table-8: Independent Sample T-test For Post Treatment Cervical Left Rotation in Maitland & Stretching Exercises

Post Treatment Cervical Left Rotation	N	Mean	P-value
Maitland	15	79.20	0.015*
Stretching Exercise	15	73.73	

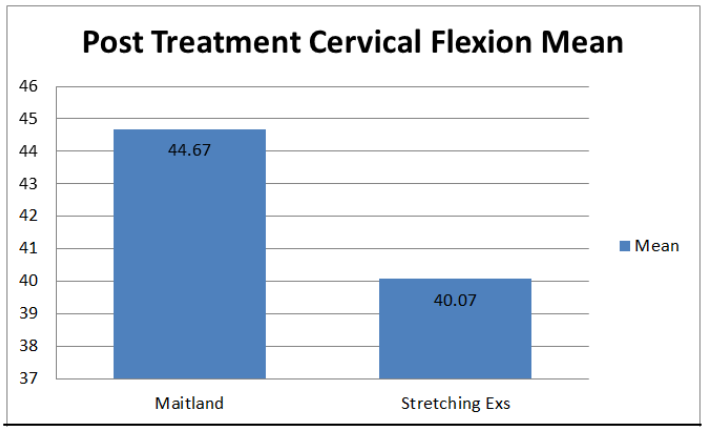
Independent Sample T test was applied, * P-value ≤ 0.05 considered as significant.



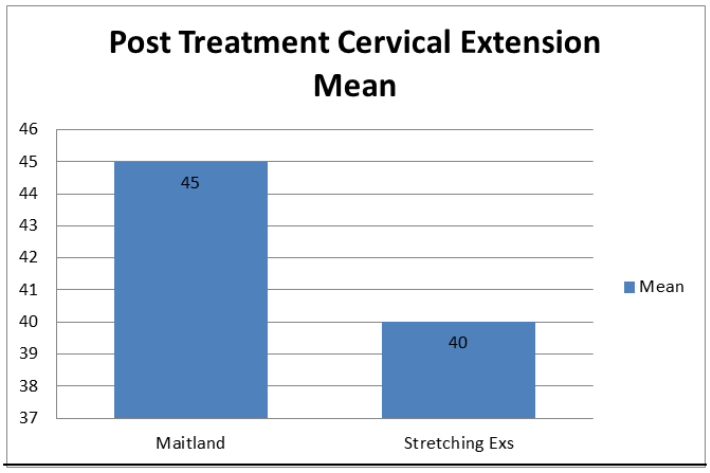
Graph-1: Distribution of Mean in Post Treatment VAS



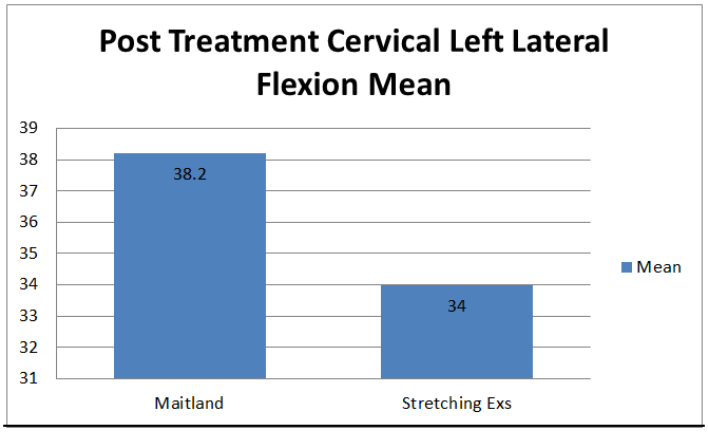
Graph-2: Mean of Post Treatment NDIS in Maitland versus Stretching Exercise



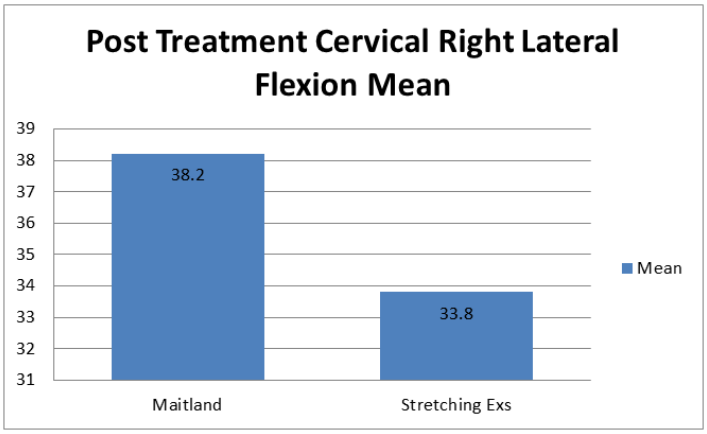
Graph-3*:* Mean of Cervical Flexion in Post Maitland & Stretching Exercise



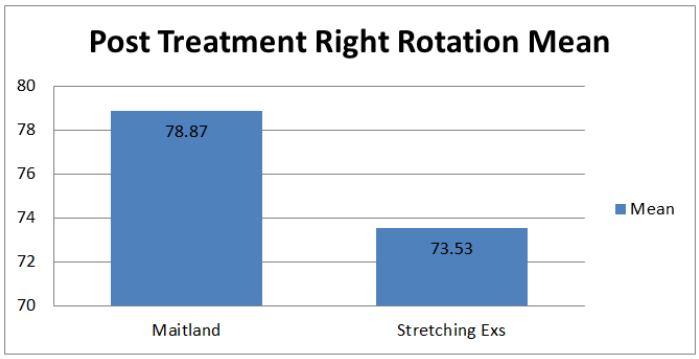
Graph-4: Distribution of Mean of Post Treatment Cervical Extension in Stretching Exercise & Maitland's Technique



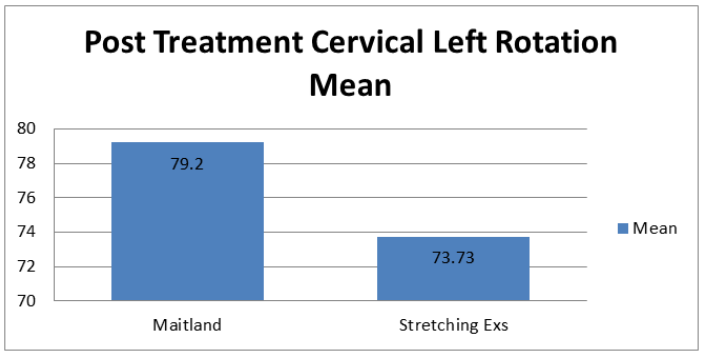
Graph-5: Distribution of Mean of Post Treatment Cervical Left Lateral Flexion in Stretching Exercise & Maitland's Technique



Graph-6: Distribution of Mean of Post Treatment Cervical Right Lateral Flexion in Stretching exercise & Maitland's Technique



Graph-7: Distribution of Mean of Post Treatment Cervical Right Rotation in Stretching Exercise & Maitland's Technique



Graph-8: Distribution of Mean of Post Treatment Cervical Left Rotation in Stretching Exercise & Maitland's Technique

All variables led to significant changes in both groups, and Group II (Maitland) improved significantly more than Group I (Stretching Exercise. The cervical ROM increased significantly and VAS and NDIS scale also improved significantly in both groups, and Group II improved significantly than Group I.

DISCUSSION

The present study found that the patients with chronic neck pain suffering multiple functional impairments including muscle stiffness, decrease range of motion and patients face problem in doing ADLs (Activities of daily living).This research found that patient with chronic neck pain receiving Maitland mobilization with moist heat pack showed significantly more reduction in pain and disability as well as increase in neck range of motion compared to the control group receiving stretching exercises with moist heat pack. There are more efficient intervention based on evidence through systematic reviews and the intervention combining Maitland mobilization and therapeutic exercise.

In addition Maitland mobilization to reduce pain and improve the movements of the soft tissue exhibiting contracture and restricted motion of joints applying grade I,II, III and IV of Maitland techniques in group A individual they had marked improvement in their range of motion as well as in pain assessed with NDIS and VAS scale.

The limitations of this study were small sample size, use of heating therapy and biomechanical analysis of cervical spine. Heating therapy has its own hypoalgesic effect.

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