# “EFFECTIVENESS OF TWO DIFFERENT TREATMENT PROTOCOLS IN REDUCING NECK DISABILITY: A COMPARATIVE STUDY”

## DISSERTATION

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*The Barkatullah University*

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*By*

**Neha Gaur**

*Guide*

**Dr. Divya Khare**

*Co-Guide* **Dr. Ajay Kumar Upadhyay**


**DEPARTMENT OF PHYSIOTHERAPY**

**AYUSHMAN COLLEGE**

**BHOPAL, (M.P.)**

**INDIA**

# CERTIFICATE

This is to certify that this dissertation entitled **"EFFECTIVENESS OF TWO DIFFERENT TREATMENT PROTOCOLS IN REDUCING NECK DISABILITY: A COMPARATIVE STUDY"** submitted by **Neha Gaur.** In partial fulfillment of requirements for the degree of **Master of Physiotherapy (Orthopaedics)** is an original work done under my supervision and guidance.

I recommend that the research work is fit to be evaluated for the award of **Master of Physiotherapy (Orthopaedics)** in the Department of Physiotherapy, Ayushman College, Bhopal (M.P.) India.


**Co-Guide**

**Dr. Ajay Kumar Upadhyay**

**Assistant Professor**

**Department of Physiotherapy**

**Guide**

**Dr. Divya Khare**

**Vice-Principal & Associate Professor**

**Department of Physiotherapy**

# DECLARATION BY THE CANDIDATE

I hereby declare that the dissertation **"EFFECTIVENESS OF TWO DIFFERENT TREATMENT PROTOCOLS IN REDUCING NECK DISABILITY: A COMPARATIVE STUDY"** is my original work and is not substantially the same as any other already submitted by anyone at any university to the best of my knowledge and belief and I declare that Barkatullah University, Bhopal shall have rights to preserve, use and disseminate the dissertation in print or electronic format for academic or research purpose.

**Place: Bhopal** Neha Gaur

**Date:**

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Date:

Place: Bhopal NEHA GAUR

# INDEX

# INTRODUCTION

Neck pain is a common musculoskeletal problem in societies [1]. It is a common disorder with a reported 6 month prevalence rate of 54% [2]. In the majority of cases the pathological basis for neck pain is unclear and complaints are labeled as 'non-specific' or 'mechanical' [3]. Non-specific neck pain (NP) is defined as ''an episodic occurrence over a lifetime with variable degrees of recovery in between episodes" [4].

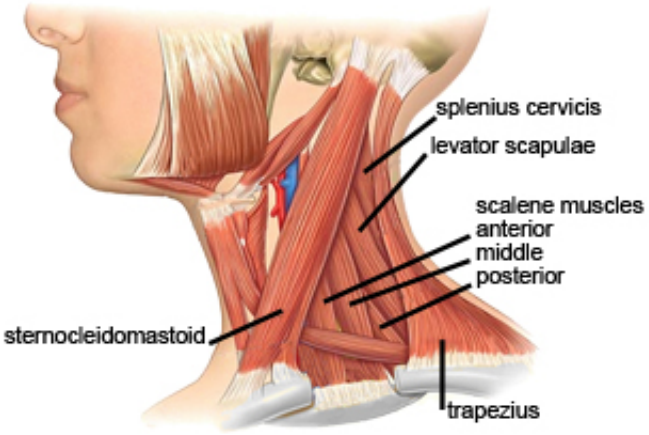



Figure-1[1]

Mechanical neck pain has a lifetime prevalence of45—54% in the general population [5], and up to 30% of men and 50% of women experience neck pain in the course of a lifetime [6]. The point prevalence of neck pain has been estimated to be between 13.4and 22.2% [7]. Up to 37% of individuals develop persistent symptoms and neck pain has become a condition that places a large economic burden on the health care system [8]. Neck pain may result in disability, limitations in activities and restrictions in participation in daily living and work [9]. In patients with chronic neck pain neck strength reduces by 20–50% [10].

Self-reported disability in patients with neck pain is often measured by means of region-specific and generic questionnaires [11]. Questionnaires should have good psychometric qualities, including validity [12].

The pain may originate from many structures in the cervical region, including the spine or soft tissues, and its aetiology is multi-factorial [13].

The main factors for neck pain are age[14], gender[14], a history of Neck pain[13], the occurrence of other musculoskeletal complaints (e.g. low back pain)[15], poor posture[16], repetitive strains[17], poor self-rated health[17], social[18] and psychological factors[18], and myofascial tightness[19]. Although there are many potential contributing factors to non-specific neck pain, one area that has received little scientific emphasis is the “trigger point” [20].

Myofascial trigger points may be implicated in all types of musculoskeletal and mechanical muscular pain. Their presence has even been demonstrated in children and babies [16].

Trigger points have been associated with hyperalgesia and limited range of motion and therefore they have the potential to restrict functional activities [21].

Myofascial trigger point is defined as a hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band. [22]

Trigger points are tender spots in taut bands of a hardened muscle that produce local and referred pain. A Trigger point is composed of numerous so-called contraction knots. An individual contraction knot appears as a segment of a muscle fibre with extremely contracted sarcomeres and an increased diameter [23].

Myofascial trigger point can develop from a number of conditions including genetics, aging, and strenuous activity [24]. Myofascial trigger points can be developed by direct macro-trauma or by muscle overuse [25]. Abnormal posture, repetitive motion and psychological stresses are the reasons for micro-trauma [26]. Muscle pain, weakness and movement dysfunction are also the causes of formation and presence of a Myofascial trigger point[27].

The etiology of myofascial pain and myofascial trigger points pathogenesis appears to be multi-factorial, and no scientific theory exists that explains the precise physiological nature of it [23]. Although several theories have been suggested, but the lack of data regarding myofascial trigger point patho-physiology has made the diagnosis and management of this disorder challenging [28].

The proposed hypotheses for myofascial trigger point pathogenesis have included the energy crisis theory, the muscle spindle concept, and the motor endplate hypothesis [29].

Travell and Simons' Myofascial (1999) proposes an 'integrated hypothesis', incorporating local myofascial tissues, the central nervous system, and biomechanical factors, that account for the clinical characteristics of myofascial trigger points.[23] The integrated hypothesis expands the previously proposed hypotheses to include presynaptic, synaptic, and postsynaptic mechanisms of abnormal depolarization, which involve excessive release of acetylcholine, defects of acetylcholinesterase, and up-regulation of nicotinic acetylcholine-receptor activity, respectively.[30] The resultant muscle spasm may impair arterial inflow, and therefore the supply of oxygen, calcium and other nutrients necessary for muscle fiber relaxation. Continued spasm could cause damage to the involved tissues, which may precipitate the synthesis and release of endogenous algogenic and inflammatory substances that enhance nociception [31].
The integrated hypothesis also combines available electro-diagnostic and histo-pathological evidences to provide the basis for pathogenesis of myofascial trigger points.[23] In a recent histological study, the preliminary results of a novel micro-analytical technique for assaying soft tissue using a microdialysis needle revealed significant differences in the levels of pH, substance P, bradykinin, norepinephrine, and Interlukin-1 in those subjects with an active myofascial trigger point, compared with subjects with a latent myofascial trigger point and normal subjects.[32]

**Simons et al. (1999)** suggested that changes in biochemical inputs might influence trigger point formation and or perpetuation as[16] :

| Factors | Influence |
|---|---|
| Allergic/Hypersensitivity<br>Hormonal | May have a potentising effect.<br>Estrogen & thyroid deficiency may impact the endoplasmic environment leading to increased trigger point development and/or perpetuation. |
| Chronic viral, yeast and or parasite infection. | May increase the likelihood of trigger point formation. |
| Vitamin C<br><br>Iron deficiency | Deficiency may perpetuate trigger point longevity.<br>10-15% of people with chronic myofascial pain syndromes may be iron deficient. |
| Vitamin $B_{12}$ deficiency | May increase tiredness, fatigue and increase chronic trigger point formation. |
| Folic acid | May change the internal endoplasmic environment sufficiently to increase trigger point development and/or perpetuation. |

Type of muscle fibers also has a direct correlation with trigger point formation and their treatment:[16]

1. Type 1 fibers are postural, and are responsive to stress or overuse by shortening and become hypertonic. A trigger point in a muscle with a high percentage of type 1 fibers may take longer to respond to treatment [16].
2. Type 2 fibers are built for explosive, short-term activity and tend to become weak, atrophic and hypertonic under chronic or sustained endurance. A trigger point in a muscle with a high percentage of type 2 fibers may respond more rapidly to treatment [16].

Trigger points are described in various ways according to location and tenderness: central (or primary); satellite (or secondary); attachment; diffuse; inactive (or latent); and active [16].

The central trigger points always exist in the centre of the muscle belly, where the motor end plate enters the muscle whereas secondary trigger points may be developed in response to the central trigger point in neighbouring muscles that lie within the referred pain zone. Attachment trigger point exists in the area where the tendon inserts into the bone (tendino-osseous) is often 'exquisitely' tender. Diffuse Trigger points can sometimes occur where multiple satellite trigger points exist secondary to multiple central trigger points. Person with sedentary lifestyle are more prone to suffer from Inactive or Latent trigger points. These are lumps and nodules that feel like trigger points. These can develop anywhere in the body and are often secondary. Active trigger point can apply to central and satellite trigger points. A variety of stimulants can activate an in-active trigger point such as forcing muscular activity through pain [16].

An active Trigger point causes a clinical pain complaint. It is always tender and refers a Patient-recognized pain on compression. It prevents full lengthening of the muscle, weakens the muscle, and mediates a local twitch response of muscle fibres when adequately stimulated. When compressed within the patient’s pain tolerance, it produces referred motor and often autonomic phenomena, generally in its pain

reference zone and causes tenderness in the pain reference zone. Active myofascial trigger points refer pain at rest, with muscular activity, and upon direct palpation as compare to latent myofascial trigger points which remain non-painful and only refer pain when steady direct pressure is applied [33].

Identification of trigger point is done by the recognition of a pattern of clinical signs on physical examination.To locate myofascial trigger points in neck muscles, we followed the diagnostic criteria established by Simons et al [33]:

1. Presence of palpable taut band in a skeletal muscle.
2. Presence of a hypersensitive tender spot in the taut band.
3. Local twitch response provoked by the snapping palpation of the taut band.
4. Reproduction of the typical referred pain pattern of the Myofascial trigger points in response to compression held for 10 seconds.
5. Spontaneous presence of the typical referred pain pattern and/or patient recognition of the referred pain as familiar.
6. Restricted range of motion in the joint the muscle crosses.

If only the four first criteria were satisfied, the myofascial trigger point was considered to be latent. If all of the above mentioned criteria were present, it was considered to be active. [34]

Following technique can be used to palpate the trigger point: [16]

- **Flat palpation**: we use the fingertips to slide around the patient's skin across muscle fibers. (Figure 2-a)
- **Pincer palpation**: In this belly of the muscle is pinched between the thumb and the other fingers, and roll the muscle fibers back and forth. (Figure 2-b)

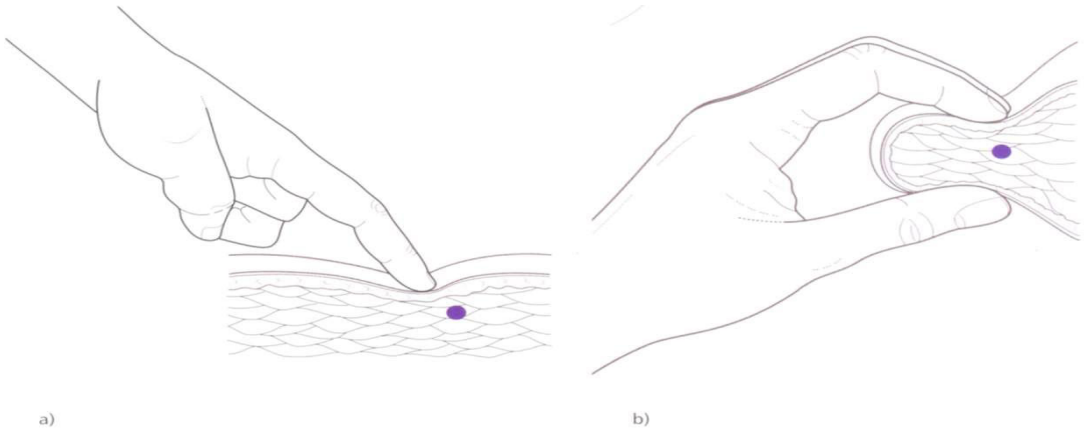



Figure 2- a Flat palpation[16]

Figure 2-b Pincer palpation[16]

Trigger points can arise in any muscle group. However, the most common sites are the muscles involved in maintaining posture: levator scapulae, upper trapezius, sternocleidomastoid, scalene and quadrates lumborum muscle and the muscles of neck that are more prone for the development are: trapezius, sternocleidomastoid, levator scapulae and scalene muscles. [33]

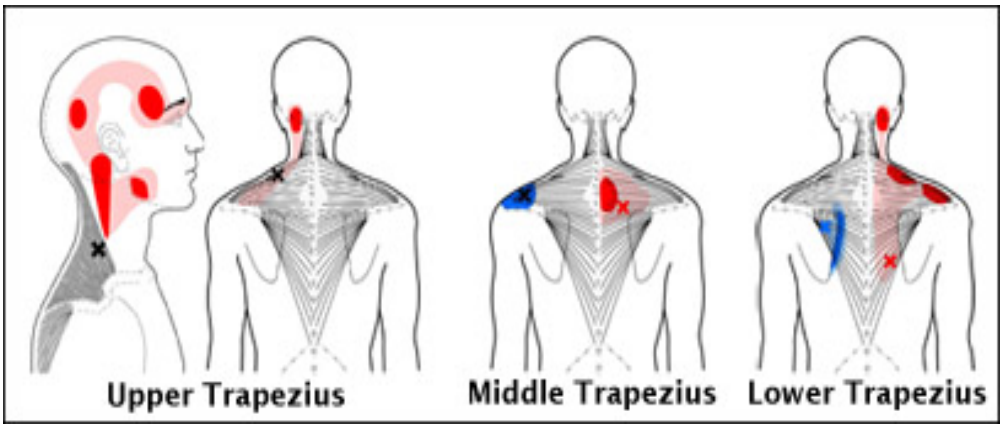



Figure 3-a Trapezius muscle[33]

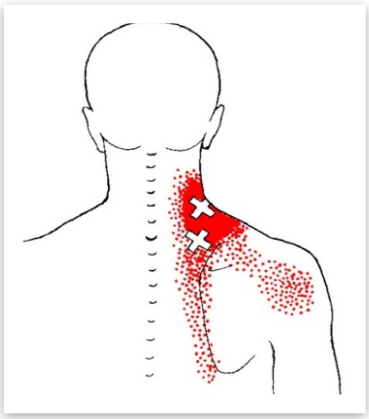


Figure 3-b Levator scapulae[33]

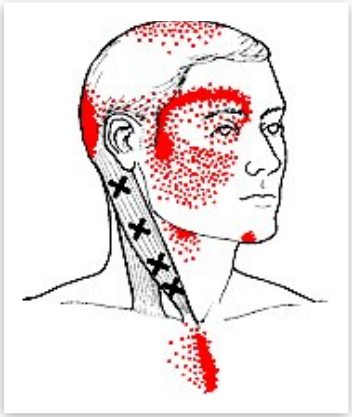


Figure 3-c Sternocleidomastoid[33]

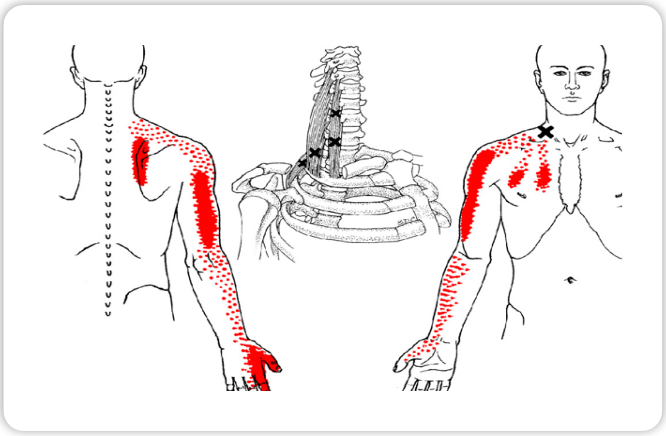


Figure 3-d Scalene muscles[33]

There are various soft tissue techniques to release the trigger points [35] and these are myofascial release, trigger point release using ischaemic compression, positional release technique, muscle energy techniques, and Integrated Neuromuscular Inhibition Technique.

Myofascial therapy can be defined as "the facilitation of mechanical, neural, and psycho-physiological adaptive potential as interfaced via the myofascial system" [36].
Myofascial Release is a highly interactive stretching technique that requires feedback from the patient's body to determine the direction, force, and duration of the stretch and to facilitate maximum relaxation of tight or restricted tissues [36].

Myofascial techniques generally fall under the two main categories. The direct myofascial release (or deep tissue work) method engages the myofascial tissue "restrictive barrier" (tension). The tissue is loaded with a constant force until release occurs .The indirect method involves a gentle stretch, with only a few grams of pressure, which allows the fascia to 'unwind' itself. The dysfunctional tissues are guided along the path of least resistance until free movement is achieved [37].

Trigger point release using ischaemic compression is done by inactivating the trigger points that are causing the taut bands which are responsible for the increased tension. Trigger point pressure release is the application of slowly increasing, non-painful pressure over a trigger point until a barrier of tissue resistance is encountered. Contact is maintained until the tissue barrier releases and pressure is increased to reach a new barrier to eliminate the trigger point tension and tenderness [33].

Myofascial Release and trigger point release using ischaemic compression are used in many papers [62,63], but till date no study has proven the difference between the above two mentioned soft tissue techniques.

**Purpose of study:**

The purpose of present study is to identify the difference between trigger point pressure release and myofascial pain syndrome in reducing the neck disability.

# AIMS AND OBJECTIVE

**Aim:**

To compare the effectiveness of Myofascial release and Ischemic compression in patients with non specific neck pain in terms of pain and neck disability and cervical lateral flexion.

**Objectives:**

1) To find out the efficiency of **Myofascial Release** in patients with non specific neck pain in terms of pain, neck disability and cervical lateral flexion.

2) To find out the efficiency of **Ischemic compression** in patients with non-specific neck pain in terms of pain, neck disability and cervical lateral flexion.

# REVIEW OF LITERATURE

- **Barbara Cagnie et al (2013)** studied the short-term effect of ischemic compression for trigger points on nineteen office workers with mild neck and shoulder complaints and they received 8 sessions of IC in which deep pressure was given. This study has demonstrated that a 4-week treatment of trigger points for ischemic compression resulted in a significant improvement in general neck and shoulder complaints, pressure pain sensitivity, mobility, and muscle strength. At 6-month follow-up, there was a further decrease in general pain, but no change in NDI scores.[38].

- **Pinar Kucuk et al (2013)** assess and compare the efficiency of dry needling, lidocaine injection and oral flurbiprofen treatments on sixty patients with myofascial pain syndrome (MPS) involving the neck and back region. Treatments with dry needling, lidocaine injection and oral flurbiprofen along with home exercises are all effective in the management of myofascial pain syndrome.[39]

- **Gopal S Nambi et al (2013)** conducted a study to find out the difference in effect of Ischemic compression and muscle energy technique (MET) on upper trapezius myofascial trigger points. Treatment program consisting of muscle energy technique with ultrasound was found to be more effective in reducing pain and improve ROM in patients in upper trapezius myofascial trigger points.[40]

- **Bhavesh et al (2013)** conducted a study on thirty subjects is to determine the effectiveness of ischemic compression for the treatment of myofascial trigger points in upper trapezius for seven days and found that Ischemic compression technique is highly effective in reducing the trigger point sensitivity and pain intensity in the trapezius muscle.[41]

- **Soo A Kim (2013)** investigate the effects of trigger point injection with or without ischemic compression for 30 and 60 seconds in treatment of active myofascial trigger points in the upper trapezius muscle on 60 patients and found receiving trigger point injections with ischemic compression group showed significant improvement as compared with the receiving only trigger point injections group.

And no significant differences between receiving 30 seconds of ischemic compression group and 60 seconds of ischemic compression group [42].

- **Albert F. Moraska (2013)** conducted a pilot study on 2 subjects with chronic headache pain to demonstrate physiological change within an active myofascial trigger point undergoing trigger point release (ischemic compression). For this Interstitial fluid was sampled continuously at a trigger point before and after intervention. Following intervention, a sustained increase in lactate was noted for both subjects. The present study is providing methodological insight toward treatment mechanism and pain resolution. Lactate may be the most relevant biomarkers for detection and treatment of abnormalities in the myofascial trigger points. We found that upon Myofascial trigger point release, dialysate lactate concentration and blood flow increased at the Myofascial trigger point.[43]

- **Sarrafzadeh J. et al (2012)** compare the effects of pressure release, phonophoresis of hydrocortisone 1%, and ultrasonic therapy on sixty patients with an upper trapezius latent myofascial trigger point. All the treatment groups showed decreases in pain and pressure pain threshold and an increase in cervical lateral flexion range of motion but Both Phonophoresis of hydrocortisone and Pressure release techniques showed more significant therapeutic effects than Utlrasonic therapy.[44]

- **Farshad Okhovatian et al (2012)** compared the immediate effect of manual pressure release and strain/counterstrain on latent trigger point of the upper trapezius muscle on sixty patients. Both the experimental groups showed an increase in pressure pain threshold levels and decrease in VAS after the intervention procedures. But manual pressure release is superior to strain/ counterstrain in immediately reducing pain in patients with non-specific neck pain and upper trapezius myofascial trigger points.[45]

- **Marco Monticone et al (2012)** conducted a Randomized Controlled Trial on 80 patients and were randomly assigned to the usual neck exercises and cognitive-

behavioural treatment (40 subjects) or to treatment based on neck exercises alone (40 subjects). Before treatment, at the end of treatment and 12 months later all of the patients completed a booklet including the Neck Pain and Disability Scale, a numerical rating scale ,and the disability, pain and quality of life improved at the end of treatment in both groups, without differences between them[46].

- **Wim Jorritsma et al (2012)** investigate the validity of the Neck Pain and Disability Scale Dutch Language Version (NPAD-DLV) and the Neck Disability Index (NDI-DLV) on 112 patients with nonspecific chronic neck pain and found that the NPAD–DLV and NDI–DLV are valid measures of self-reported neck-pain related disability. [47]

- **Mette K Zebis et al. (2011)** conducted a study to evaluate the effect of implementing strength training at the workplace on non-specific neck and shoulder pain among industrial workers on 537 adults from occupations with high prevalence of neck and shoulder pain (industrial production units). The participants were randomize for 20 weeks of high-intensity strength training for the neck and shoulders three times a week and a control group of advice only. The primary outcome of this high-intensity program results in significant reductions of neck and shoulder pain [48].

- **Carel Bron (2011)** conducted a randomized and controlled trial to assess the effectiveness of treatment of myofascial Trigger Points in patients with chronic shoulder pain, consisting of manual compression of the Myofascial trigger points, manual stretching of the muscles and intermittent cold application with stretching. Patients were instructed to perform muscle-stretching and relaxation exercises at home and follow ergonomic advice. The control group remained on the waiting list for 3 months. Compared with the control group, 55% of the patients in the intervention group reported improvement [49].

- **Amit V. Nagrale et al (2010)** conducted a clinical trial to compare the effects of muscle energy technique and integrated neuromuscular inhibition technique on

sixty individuals with upper trapezius trigger points for four weeks. Integrated neuro-muscular inhibition technique (INIT) consisting of muscle energy techniques, ischemic compression, and strain–counterstrain. There was significantly greater improvement in pain and neck disability and lateral cervical flexion ROM were detected in favour of the integrated neuromuscular inhibition group. [50]

- **Jay Kain et al (2009)** compared which intervention increases passive range of motion most effectively: the indirect tri-planar myofascial release (MFR) technique or the application of hot packs for gleno-humeral joint flexion, extension, and abduction on 31 participants and myofascial release was found to be as effective as hot packs in increasing range of motion.[51]

- **Gemmell H, Miller P and Nordstrom H (2008)** conducted a study on 45 subjects between 18 and 55 years of age with non-specific neck pain of at least 30 mm on a visual analogue scale (VAS) for pain, an upper trapezius trigger point and decreased cervical lateral flexion to the opposite side of the active upper trapezius trigger point, to determine the immediate effect of ischaemic compression, trigger point pressure release and placebo ultrasound on pain, degree of cervical lateral flexion and pressure pain threshold of upper trapezius trigger points in subjects with non-specific neck pain, and found that ischemic compression group improved better than trigger point pressure release and sham ultrasound [52].

- **Ana Claudia Violino Cunha et al (2008)** Compare the effect of conventional static stretching and muscle chain stretching, in the manual therapy of patients with chronic neck pain on thirty-three female patients aged 35 to 60 years old and found that conventional stretching and muscle chain stretching in association with manual therapy were equally effective in reducing pain and improving the range of motion and quality of life of female patients with chronic neck pain, both immediately after treatment and at a six-week follow-up.[53]

- **Jari Ylinen et al. (2007)** conducted a randomized cross over trial on 125 women with non-specific neck pain. Group 1 received manual therapy twice weekly and

Group 2 performed stretching exercises 5 times a week. After 4 weeks the treatments were changed. Neck pain (visual analogue scale) and disability indices were measured after 4 and 12 weeks. Both stretching exercise and manual therapy considerably decreased neck pain and disability in women with non-specific neck pain. The difference in effectiveness between the 2 treatments was minor [54].

- **Arja Hakkinen (2007)** conducted a study on the effect of manual therapy and stretching on neck function in women with chronic neck pain on 125 women. Neck function was assessed by isometric neck strength and mobility measurements, and neck pain during the past week and strain-evoked pain during the neck strength trials using a visual analogue scale both manual therapy and stretching were effective short-term treatments for reducing both spontaneous and strain-evoked pain in patients with chronic neck pain [55].

- **Atienza Meseguer et al (2006)** studied 54 subjects with trapezius trigger points treated with classic Strain-counterstrain, modified Strain-Counterstrain, and control groups. Both treatment groups showed immediate improvement in pressure pain threshold as compared to control group, but not with each other.[56]

- **Fernandez-de-las-Penas et al (2006)** compared ischemic compression to transverse friction massage in forty subjects with myofascial trigger points in the upper trapezius muscle. Both groups obtained significant improvement in pressure pain threshold within 2 minutes. No difference was found between the groups.[57]

- **Fryer and Hodgson et al (2005)** compared manual pressure release to sham myofascial release in thirty seven subjects with upper trapezius myofascial trigger points. A statistically significant increase in pressure pain threshold was obtained immediately after the intervention in the manual pressure group as compared to control group that was found to be due to a change in tissue sensitivity.[58]

- **Chatchawan et al. (2005)** compared Thai massage plus stretches with Swedish massage plus stretches. This was a very well conducted study, although no control

was used. Both groups showed significant reductions in pain and disability measures, however, there was no difference between the groups. [59]

- **Dziedzic K, Hill J, Lewis M, et al. (2005)** conducted one Randomized Controlled Trial in that manual therapy or pulsed shortwave diathermy in addition to neck exercises and advice about coping with neck pain and staying active was not associated with reduced pain-related disability or greater global improvement in the short-term (6–26 weeks) in patients with sub-acute or chronic “non-specific” neck pain when compared to exercise and advice alone [60].

- **Aslak Savolainen et al (2004)** compared the effectiveness of thoracic manipulations with instructions for physiotherapeutic exercises for the treatment of neck pain in occupational healthcare on seventy-five subjects aged 30–55 years. Both treatments were found effective at the12 month follow-up. The effect of four manipulations was more favorable than the personal exercise program in treating the more intense phase of pain.[61]

- **Van den Heuvel SG et al. (2003)** conducted one Randomized Controlled Trial on computer software-stimulated work breaks, which included rest or exercises, was associated with perceived recovery and productivity, but not associated with pain reduction or sick leave over a week period in computer users with neck, shoulder or upper extremity symptoms [62]

- **Hou et al (2002)** studied various combinations of exercise, manual therapy, stretching and modalities. In this study, all groups that received some form of electrotherapy modality had a superior effect on pain intensity compared to the control group. The combination of hot pack, range of motion exercise, IFC and myofascial release showed the largest reduction in pain.[63]

- **Hanten et al (2000)** conducted a study to determine the effectiveness of a home program of ischemic pressure followed by sustained stretching for the treatment of myofascial trigger points in forty patients who have neck and upper back pain and

found that the home program was effective in reducing trigger point sensitivity and pain intensity in individuals.[64]

- **Gam et al. (1998)** also used massage and exercise in both the US treatment and the placebo US groups and made comparisons with a no treatment control group. No significant difference in pain intensity or analgesic use was measured between any of the groups at anytime. However, significant reduction in the myofascial trigger point characteristics was noted for both groups that received massage and exercise.[65]

- **Ekberg K et al (1994)** evidenced from 2 randomized controlled trials and a alone or in combination with education, relaxation, and behavioural support were not associated with better 1-year pain and disability outcomes or reduced sick leave in employees with sub-acute chronic, or recurrent neck pain when compared with advice and information, ordinary activity, relaxation training, or to physiotherapy and medications [66].

# HYPOTHESIS

## Experimental Hypothesis ($H_1$):

There may exist a significant difference between Myofascial Release and Ischemic compression in patients with non-specific neck pain in terms of pain and disability.

## Null Hypothesis ($H_0$):

There may not exist significant difference between Myofascial Release and ischemic compression in patients with non specific neck pain in terms of pain and disability.

# METHODOLOGY

## Study design

A Comparative Study.

## Sources of Data

- ➢ Dr. Ganguli Charitable Hospital, Bhopal
- ➢ Healing Hands Organization Physiotherapy clinic, Bhopal

## Sample Criteria

50 subjects were divided into two groups by randomized sampling method.

**Experimental Group A:**

This group consists of 25 patients with chronic non-specific neck pain treated with Myofascial Release.

**Experimental Group B:**

This group consists of 25 patients with chronic non-specific neck pain treated with Trigger point release using Ischemic compression technique.

## Inclusion Criteria

- ➢ Industrial and Computer workers
- ➢ Presence of palpable taut band in neck muscle
- ➢ Reproduction of the typical referred pain pattern of the myofascial trigger points in response to compression

- ➢ A jump sign characterized by patient vocalization or withdrawal
- ➢ Patient diagnosed of neck disability based on NDI score of 20% and above.

## Exclusion Criteria

- ➢ Cervical rediculopathy
- ➢ Intervertebral disc prolapsed
- ➢ Recent history of cervical surgery
- ➢ History of cervical whiplash
- ➢ Fail to identify myofascial trigger points of the trapezius muscle clearly
- ➢ Clotting disorders

# MATERIALS AND METHODS

## PROCEDURE:

After checking the inclusion and exclusion criteria, 50 subjects of age group between 20-60 years with chronic non-specific pain were selected and assigned into two groups.

**The experimental group A** consists of 25 chronic non-specific neck pain subjects to be treated with Myofascial Release.

**The experimental group B** consists of 25 chronic non-specific neck pain subjects, to be treated with Trigger Point Release using Ischemic compression.

The subject entered the treatment room and filled out the pain scale. If the pain level was at least 30 mm, the examiner then took the assessment of neck. The trigger points were identified by either flat palpation or pincer palpation. The trigger points located on the same side as the neck pain, was marked with a cross using a skin-pencil. If the subject had bilateral neck pain, the side which has the most tender trigger point was used. To determine cervical lateral flexion, goniometer was used and the subject was asked to sit up straight and first laterally flex the head to the right (degrees of lateral flexion was recorded) and then laterally flex the head to the left (degrees of lateral flexion was recorded).

For entry into the study, the subject had to have decreased lateral flexion to the side opposite the active trigger point. It was this measurement that was used in the statistical analysis.

After getting informed consent, a brief introduction about the treatment procedure to be explained to all the subjects before starting the treatment procedure, baseline

measurement of pain intensity and neck disability and cervical range of motion were assessed using VAS, NDI and goniometer.

Each patient of the 2 groups will receive a Neck Disability Index (NDI) questionnaire that will contain questions regarding pain intensity, personal care, lifting activity, work recreational activities etc. and a visual analogue scale (VAS) to measure the pain before the start of the treatment.

Then both groups will be treated with stretching of lateral flexors, levator scapulae, trapezius, pectoralis major and upper cervical extensors and myofascial release and trigger point release using ischemic compression of the trigger points present in trapezius, rhomboids, levator scapulae, and ergonomic advice and then we will check the NDI and VAS after 2 weeks to know the improvement and then after 4 weeks to know the improvement in pain intensity, ROM and functional status again pre treatment measurements were taken on 2nd week and 4th week for data analysis.

| | Group A | Group B |
|---|---|---|
| No. of Subjects | 25 | 25 |
| Treatment Protocol | Hot Fomentation, Myofascial Release, Stretching | Hot Fomentation, Ischemic Compression, Stretching |
| Treatment Sessions | 1 session per day for 4 weeks | 1 session per day for 4 weeks |

**Experimental Group A :**

25 patients in this group were given hot fomentation then myofascial release technique followed by stretching of neck musculature was given for 1 session per day for 4 weeks.

First the patient will lie down on couch in prone position with properly exposed the area of treatment. Then hot fomentation was given for 10 minutes. The treatment area should be properly cleaned and dried. The therapist will stand on the head end of treatment

table. Then the therapist will evaluate the trigger points on the affected side. Myofascial release of neck can be performed in both supine and prone lying positions but we prefer prone lying.

To perform a Unilateral Stretch of the Upper Trapezius, the therapist placed her one hand over the patient's head and placed her fingers at the base of the occiput to stabilize the distal fibres of the affected Upper Trapezius. Place the palm of her other hand over the patient's affected side shoulder joint with her fingers pointing down the patient's arm. Push down toward the patient's feet and out at the same time to take up the available slack. Hold, wait for the release and stretch again. Repeat this sequence

until an end-feel is reached. To stretch the Splenius Capitis, the therapist will sit at the

patients' head, place finger of one hand at the base of the occiput to stabilize the distal fibers of the right Upper Trapezius and fingers or the thumb of her another hand stretch diagonally downward. Hold, wait for the release and stretch the neck portion again.

Repeat the stretch sequence until a soft end-feel is reached. For gross stretch of the

Sternocleidomastoid rotate the patient's head laterally for the initial stretch while preventing lateral flexion and apply traction at the base of the occiput. Use the side of the thumb on the sternal and clavicular distal attachments to push the clavicle down toward the patient's feet. Hold, wait for the release and stretch again by increasing

rotation. When uneven tightness is present in the Sternocleidomastoid, stretch the

muscle in small sections. Use two fingers to take up the available slack in a one - to two-inch section of the muscle. Hold, wait for the release and stretch again. Repeat this sequence until an end-feel is reached. Move to the next section of the muscle using the distal point of the first section as the superior anchor of the next section to be 'stretched. Repeat this sequence until the entire muscle is stretched [19].

Then the therapist will perform the stretching of the neck muscles. First stretch the trapezius and Sternocleidomastoid by standing behind the patient and place one hand on head of the patient on the side in which the patient have the pain and place other hand on the shoulder on the affected side and then bend the neck to the opposite side. Hold all the stretch for 30 seconds and repeat them twice. Then the therapist stretch the scalene muscle group by axial extension (chin tuck and straighten the neck), then side-bend the neck opposite, and rotate it towards the tight muscle and another hand on the shoulder of the affected side. Then stretch the levator scapulae muscle by flexing the head then rotate the head towards the affected side with one hand and stabilize the affected side of shoulder with another hand.

Figure-4 Therapist giving MFR

**Experimental Group B :**

25 patients in this group were given hot fomentation then trigger point release using ischemic compression technique followed by stretching of neck musculature was given for 1 session per day for 4 weeks.

First the patient will lie down on couch in prone position with properly exposed the area of treatment. Then hot fomentation was given for 10 minutes. The treatment area should be properly cleaned and dried. The therapist will stand on the head end of treatment table. Then the therapist will evaluate the trigger points on the affected side. Ischaemic compression consisted of sustained deep pressure was given with the thumb to the trigger point for 30 seconds—1 minute. Pressure was released when there was decreased tension in the trigger point or when the trigger point was no longer tender or one minute had elapsed, whichever occurred first [69]. Then the therapist will tell the patient to come in sitting position for stretching of neck muscles. First stretch the trapezius and Sternocleidomastoid by standing behind the patient and place one hand on head of the patient on the side in which the patient have the pain and place other hand on the shoulder on the affected side and then bend the neck to the opposite side. Hold all the stretch for 30 seconds and repeat them twice. Then the therapist stretch the scalene muscle group by axial extension (chin tuck and straighten the neck), then side-bend the neck opposite, and rotate it towards the tight muscle and another hand on the shoulder of the affected side. Then stretch the levator scapulae muscle by flexing the head then rotate the head towards the affected side with one hand and stabilize the affected side of shoulder with another hand.

Figure-5 Therapist giving Ischemic Compression

The subjects in both the group were advised to use thin soft pillows and take a break during long sitting hours.

## VARIABLES:

**Dependent Variables**

1. Pain
2. Cervical Range of motion

3. Neck Disability

**Independent Variables**

1. Visual Analogue Scale (VAS)
2. Neck Disability Index (NDI)

# INSTRUMENTATION

**Material Used**

1. Informed consent form
2. Assessment Form
3. Visual analogue Scale
4. Neck Disability Index
5. Goniometer
6. Treatment Table

**Measurement Tools**

Intensity of neck pain, neck disability and cervical range of motion were the the parameters considered for the study. The pain intensity was assessed using visual analogue scale, neck disability by neck disability index and cervical lateral flexion by goniometer.

A visual analogue scale was used for subjects to grade their current level of neck pain. The VAS for pain is a 10 cm horizontal line with marked descriptions of ‘‘no pain’’ and ‘‘worst pain possible’’ at both ends. Subjects indicated their pain by drawing a vertical mark across the horizontal line that best represents the pain level [67].

The NDI consists of ten items: pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and recreation. Each item has six different assertions expressing progressive levels of pain or limitation in activities. Item scores range from 0 (no pain or limitation) to 5 (as much pain as possible or maximal limitation). The total NDI score ranges from 0 to 50 points. Higher scores indicate greater disability [68].

The CROM goniometer was used to measure lateral cervical flexion. Inter-examiner reliability of the CROM device for measuring lateral cervical flexion is good to excellent.

# STATISTICAL AND DATA ANALYSIS

## Statistical Methods:

The statistical software SPSS 11.0 was used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

**1. Mean:**

The mean is used to describe numerical data that is normally distributed.

The mean of a sample $x_1, x_2, x_3$----------$x_n$ is the sum of the sampled values divided by the number of items in the sample:

$$\bar{X} = \frac{x1 + x2 + \_\_\_\_\_xn}{n}$$

**2. Standard Deviation:**

Formula used for Standard Deviation:

$$\bar{X} = \frac{xi \times f}{n}$$

Where $f =$ frequency of individual data

**3. Paired 't' Test:**

The collected data were analyzed statistically with Paired 't' Test.

A paired t-test is used to determine whether there is a significant difference between the average values of the same measurement made under two different conditions. Both measurements are made on each unit in a sample, and the test is based on paired differences between these two values.

**4. Pearson's Correlations:**

When associated variables are normally distributed, the correlation coefficient is called Pearson's Correlation coefficient.

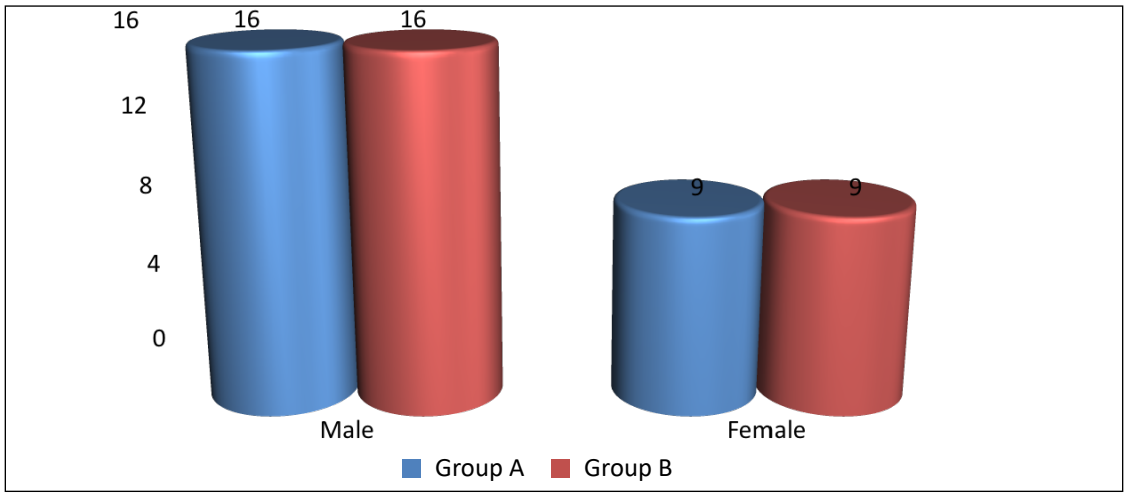
$$r = \frac{\sum xy}{\sqrt{\sum_x 2 \sum_y 2}}$$

## Data Analysis

**Table-1 Sex distribution of subjects**

| Groups | Male | Female |
|---|---|---|
| Group A | 16 | 9 |
| Group B | 16 | 9 |

**Graph-1**



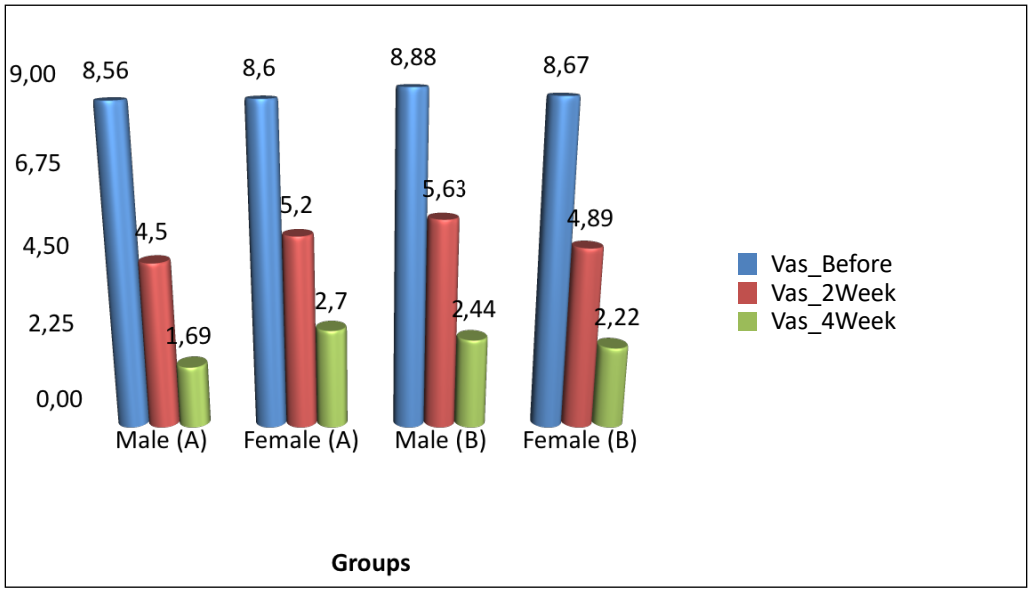

Graphical representation shows that in group A there were 16 males and 9 females and in group B there were 16 males and 9 females.

**Table 2 Assessment of pain intensity using VAS**

| | Male (A) | Female (A) | Male (B) | Female (B) |
|---|---|---|---|---|
| VAS Before | 8.56 | 8.60 | 8.88 | 8.67 |

| | | | | |
|---|---|---|---|---|
| VAS after 2 weeks | 4.50 | 5.20 | 5.63 | 4.89 |
| VAS after 4 weeks | 1.69 | 2.70 | 2.44 | 2.22 |

**Graph-2**



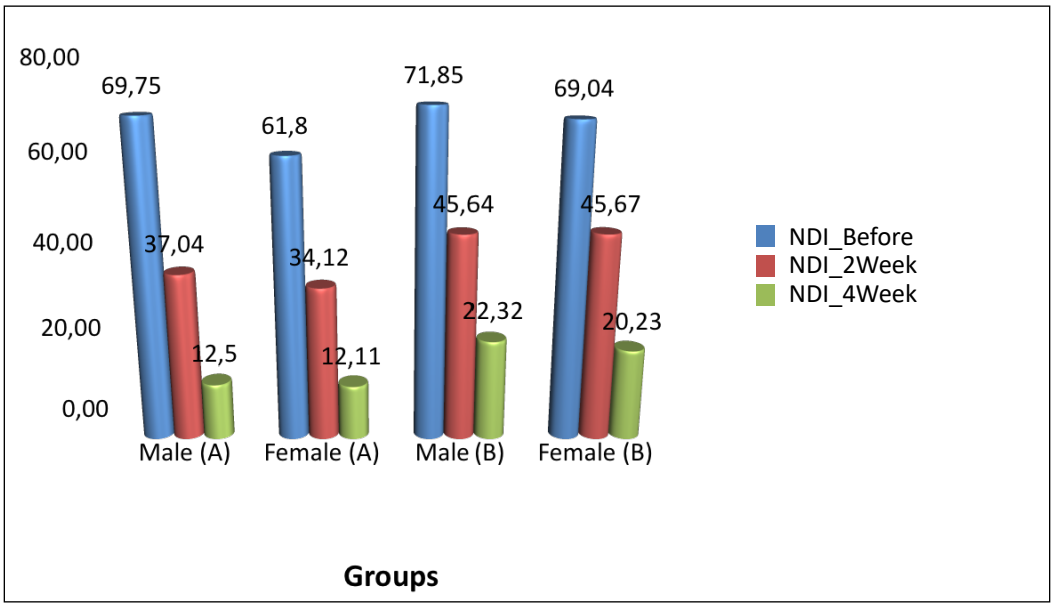

This graphical representation shows VAS for males in group A was 8.56 before treatment, 4.50 after 2 weeks and 1.69 after 4 weeks. VAS for group A females was 8.60 before treatment, 5.20 after 2 weeks and 2.70 after 4 weeks. VAS for males of group B was 8.88 before treatment and 5.63 after 2 weeks and 2.44 after 4 weeks. VAS for females of group B before treatment was 8.67, 4.89 after 2 weeks and 2.22 after 4 weeks.

**Table-3 Assessment of neck disability using NDI**

| | Male (A) | Female (B) | Male (B) | Female (B) |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| NDI Before | 69.75 | 61.80 | 71.85 | 69.04 |
| NDI after 2 weeks | 37.04 | 34.12 | 45.64 | 45.67 |
| NDI after 4 weeks | 12.50 | 12.11 | 22.32 | 20.23 |

**Graph-3**

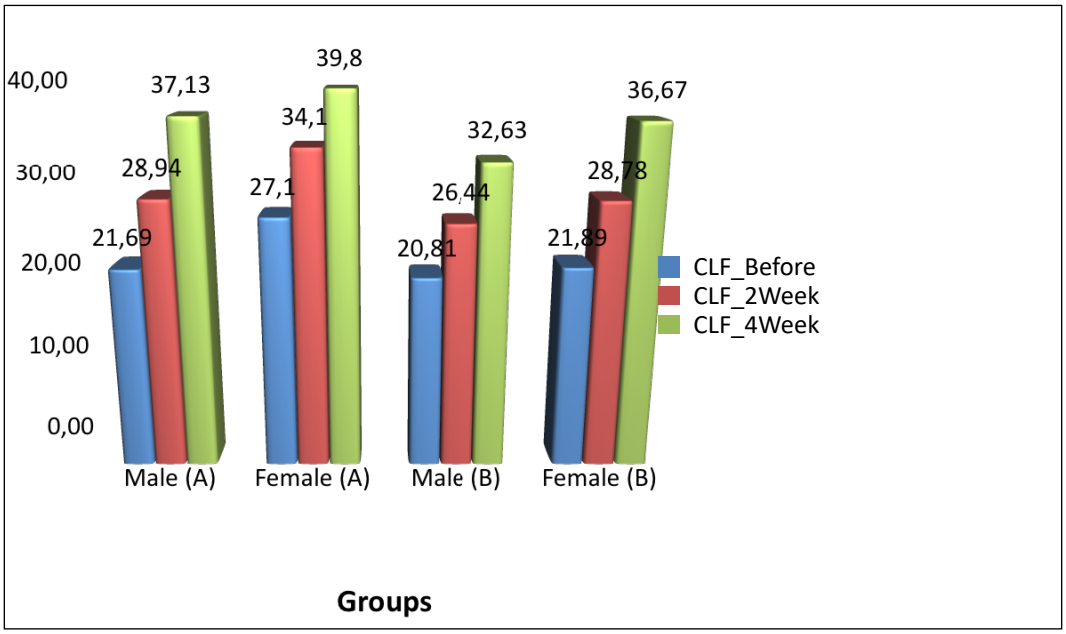



This graphical representation shows NDI for males in group A was 69.75 before treatment, 37.04 after 2 weeks and 12.50 after 4 weeks. NDI for group A females was 61.80 before treatment, 34.12 after 2 weeks and 12.11 after 4 weeks. NDI for males of group B was 71.85 before treatment and 45.64 after 2 weeks and 22.32 after 4 weeks. NDI for females of group B before treatment was 69.04, 45.67 after 2 weeks and 20.23 after 4 weeks.

**Table 4 Assessment of cervical lateral flexion**

| | Male (A) | Female (A) | Male (A) | Female (B) |
|---|---|---|---|---|
| CLF Before | 21.69 | 27.10 | 20.81 | 21.89 |
| CLF after 2 weeks | 28.94 | 34.10 | 26.44 | 28.78 |
| CLF after 4 weeks | 37.13 | 39.80 | 32.63 | 36.67 |

**Graph-4**




Graphical representation shows CLF for males in group A was 21.69 before treatment, 28.94 after 2 weeks and 37.13 after 4 weeks. CLF for group A females was 27.10 before treatment, 34.10 after 2 weeks and 39.80 after 4 weeks. CLF for males of group B was 20.81 before treatment and 26.44 after 2 weeks and 32.63 after 4 weeks. CLF for females of group B before treatment was 21.89, 28.78 after 2 weeks and 36.67 after 4 weeks.

# Result

## Result Analysis:

In this study 50 subject who had chronic non-specific neck pain and who fell in the inclusion criteria were selected. They were randomly divided in two groups, group A and Group B consisting of 25 subjects each. To compare the effectiveness of myofascial release technique ischemic compression technique in reduction of pain intensity by VAS and improvement in neck functions by NDI and improvement in cervical lateral flexion by goniometer was the objective.

The parameters used for this study were VAS, NDI and Cervical lateral flexion for pain intensity, neck disability and cervical range of motion. They were measured as before treatment, after 2 weeks and after 4 weeks.

The data was analysed using paired t-test to find the significance of the interventions used within the groups.

**Table-1**

**Comparison of VAS, NDI, and CLF mean and SD in Group A**

| | N | Mean | Std. Deviation |
|---|---|---|---|
| Age A | 25 | 38.80 | 14.748 |
| VAS Before A | 25 | 8.56 | .917 |
| VAS after 2 Week A | 25 | 4.60 | .913 |
| VAS after 4 Week A | 25 | 1.80 | .645 |
| NDI Before A | 25 | 69.00 | 12.118 |
| NDI after 2Week A | 25 | 36.99 | 8.374 |
| NDI after 4Week A | 25 | 12.48 | 4.260 |
| CLF Before A | 25 | 24.36 | 6.054 |
| CLF after 2 Week A | 25 | 31.80 | 6.178 |
| CLF after 4 Week A | 25 | 39.32 | 5.186 |

The, mean±SD of age in group A was 38.80±14.748.

Before Treatment, mean±SD of VAS in group A was 8.56±.917 recorded before the treatment. After 2 weeks it was 4.60±.913. After 4 week of treatment it was reduced to 1.80±.645.

Before starting of treatment, mean±SD of NDI in group A was 69.00±12.11. after 2 weeks of treatment it was reduced to 36.99±8.37. After 4 week of treatment it was further reduced to 12.48±4.26.

Before starting of treatment, mean±SD of CLF in group A was 24.36±6.05. after 2 weeks of treatment it was reduced to 31.80±6.17. After 4 week of treatment it was further reduced to 39.32±5.18.

**Table-2 Comparison of VAS, NDI and CLF mean and SD score in Group B**

| | N | Mean | Std. Deviation |
|---|---|---|---|
| Age B | 25 | 39.72 | 14.653 |
| VAS Before B | 25 | 8.80 | 1.080 |
| VAS after 2 Week B | 25 | 5.36 | 1.075 |
| VAS after 4 Week B | 25 | 2.36 | 1.114 |
| NDI Before B | 25 | 70.84 | 13.857 |
| NDI 2Week B | 25 | 45.65 | 11.503 |
| NDI 4Week B | 25 | 21.56 | 8.627 |
| CLF Before B | 25 | 21.20 | 4.583 |
| CLF 2Week B | 25 | 27.28 | 4.238 |
| CLF 4Week B | 25 | 34.08 | 4.743 |

The, mean±SD of age in group B was 39.72±14.653.

Before Treatment, mean±SD of VAS in group B was 8.80±1.080 recorded before the treatment. After 2 weeks it was 5.36±1.075. After 4 week of treatment it was reduced to 2.36±1.114.

Before starting of treatment, mean±SD of NDI in group B was 70.84±13.857. After 2 weeks of treatment it was reduced to 45.65±11.503. After 4 week of treatment it was further reduced to 21.56±8.627.

Before starting of treatment, mean±SD of CLF in group A was 21.20±4.583. After 2 weeks of treatment it was reduced to 27.28±4.238. After 4 week of treatment it was

further reduced to 34.08±4.743. . After 4 week of treatment NDI in group A was further reduced to 12.48±4.26, whereas for group B it reduces to 34.08±4.743.

**Table-3 Comparison of mean and SD between group A & B**

| | | Mean | N | ± Standard Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Age A | 38.80 | 25 | 14.748 | 2.950 |
| | Age B | 39.72 | 25 | 14.653 | 2.931 |
| Pair 2 | VAS Before A | 8.56 | 25 | .917 | .183 |
| | VAS Before B | 8.80 | 25 | 1.080 | .216 |
| Pair 3 | VAS after 2 Week A | 4.60 | 25 | .913 | .183 |
| | VAS after 2 Week B | 5.36 | 25 | 1.075 | .215 |
| Pair 4 | VAS after 4 Week A | 1.80 | 25 | .645 | .129 |
| | VAS after 4 Week B | 2.36 | 25 | 1.114 | .223 |
| Pair 5 | NDI Before A | 69.00 | 25 | 12.118 | 2.424 |
| | NDI Before B | 70.84 | 25 | 13.857 | 2.771 |
| Pair 6 | NDI after 2 Week A | 36.99 | 25 | 8.374 | 1.675 |
| | NDI after 2 Week B | 45.65 | 25 | 11.503 | 2.301 |
| Pair 7 | NDI after 4 Week A | 12.48 | 25 | 4.260 | .852 |
| | NDI after 4 Week B | 21.56 | 25 | 8.627 | 1.725 |
| Pair 8 | CLF Before A | 24.36 | 25 | 6.054 | 1.211 |
| | CLF Before B | 21.20 | 25 | 4.583 | .917 |
| Pair 9 | CLF after 2 Week A | 31.80 | 25 | 6.178 | 1.236 |

| | | | | | |
|---|---|---|---|---|---|
| | CLF after 2 Week B | 27.28 | 25 | 4.238 | .848 |
| Pair 10 | CLF after 4 Week A | 39.32 | 25 | 5.186 | 1.037 |
| | CLF after 4 Week B | 34.08 | 25 | 4.743 | .949 |

The mean±SD for group A 38.80±14.748, where as for group B it is 39.72±14.653. Before Treatment, mean±SD of VAS in group A was 8.56±.917, where as in group B it was 8.80±1.080. After 2 weeks VAS was 4.60±.913 for group A whereas for group B it was 5.36±1.075. After 4 week of treatment VAS for group A was reduced to 1.80±.645 whereas for Group B it was 2.36±1.114.

Before starting of treatment, mean±SD of NDI in group A was 69.00±12.11, whereas in group B it was 70.84±13.857. After 2 weeks of treatment it was reduced to 36.99±8.37 for group A whereas for group B it was reduced to 45.65±11.503. After 4 weeks of treatment NDI for group A was 12.48±4.26, whereas NDI for group B was 21.56±8.627.

Before starting of treatment, mean±SD of CLF in group A 24.36±6.05, whereas for group B CLF was 21.20±4.583. After 2 weeks of treatment in group A CLF it was reduced to 36.99±8.37, whereas in group B it was 27.28±4.238. After 4 weeks of treatment in group A CLF was 39.32±5.18 whereas for group B it was 34.08±4.743.

**Table-4 Paired t-test comparing VAS**

| | Paired Differences | t | df | Sig. (2-tailed) |
|---|---|---|---|---|
| | 95% Confidence Interval of the Difference | | | |
| | Upper | | | |
| VAS Before A – VAS Before B | .322 | -.881 | 24 | .387 |
| VAS after 2 Week A – VAS after 2 Week B | -.138 | -2.520 | 24 | .019 |

| | | | | |
|---|---|---|---|---|
| VAS after 4 Week A – VAS after 4 Week B | .037 | -1.937 | 24 | .065 |

The degree of freedom was 24 because the data analysis was done using paired t-test and the total no. of subjects was 50.

For confidence interval of 95% the t-value for age for group A and group B is –.325 and it not significant.

For confidence interval of 95% the t-value for VAS for group A and B before treatment was -.881 and it is not significant.

t-value for VAS for group A and B after 2 weeks was -2.520 and it is not significant.

t-value for VAS for group A and B after  weeks was -1.937 and it is not significant.

**Table-5 Paired t-test comparing NDI**

| | Paired Differences | t | df | Sig. (2-tailed) |
|---|---|---|---|---|
| | 95% Confidence Interval of the Difference | | | |
| | Upper | | | |
| NDI Before A – NDI Before B | 5.076 | -.548 | 24 | .588 |

| | | | | |
|---|---|---|---|---|
| NDI after 2 Week A – NDI after 2 Week B | -3.511 | -3.473 | 24 | .002 |
| NDI after 4 Week A – NDI after 4 Week B | -5.167 | -4.788 | 24 | .000 |

For confidence interval of 95% the t-value for NDI for group A and B before treatment was -.548, and it is not significant.

For confidence interval of 95% the t-value for NDI after 2 weeks for group A and B was -3.473, and it is not significant.

For confidence interval of 95% the t-value for NDI after 4 weeks for group A and B was -4.788, and it is not significant.

**Table-6 Paired t-test comparing CLF**

| | Paired Differences | t | df | Sig. (2-tailed) |
|---|---|---|---|---|
| | 95% Confidence Interval of the Difference | | | |
| | Upper | | | |

| | | | | |
|---|---|---|---|---|
| CLF Before A – CLF Before B | 5.551 | 2.728 | 24 | .012 |
| CLF after 2 Week A – CLF after 2 Week B | 7.395 | 3.245 | 24 | .003 |
| CLF after 4 Week A – CLF after 4 Week B | 7.692 | 4.411 | 24 | .000 |

For confidence interval of 95% the t-value for CLF for group A and B before treatment was -2.728, and there is significance between group A and B.

For confidence interval of 95% the t-value for CLF after 2 weeks for group A and B was 3.245, and there is significance between group A and B.

For confidence interval of 95% the t-value for CLF after 4 weeks for group A and B was 4.411, and there is significance between group A and B.

# DISCUSSION

Chronic non-specific neck pain has a lifetime prevalence of 45—54% in the general population, and up to 30% of men and 50% of women experience neck pain in the course of a lifetime. Many studies suggest various treatments available for myofascial trigger points. Non-invasive methods include myofascial release, spray (freeze) and stretch, physical therapy (posture correction and body mechanics), ischemic compression, massage, muscle energy technique (MET), strain counter strain (SCS), electrical modalities such as laser, ultrasound therapy, TENS, electrical muscle

stimulation, and invasive methods like acupuncture, trigger point injections (dry or wet needling). There is no general acceptance of one standard treatment [40].

For this purpose the study was conducted on 50 patients with two groups of 25 each. Group A was intervened with MFR, hot fomentation and stretching, whereas Group B was intervened with IC, hot fomentation and stretching. Outcome measures included pain intensity by VAS, neck disability by NDI and cervical lateral flexion by goniometer which were measured prior to treatment, after 2 weeks and after 4 weeks of treatment.

The primary outcome of this study shows clinical significance instead of statistical significances (except in cervical lateral flexion). Statistical significance does not necessarily equate to clinical importance and non-significance does not necessarily mean no effect. In this study VAS ($t = -1.937$) and NDI (t=$-4.788$) does not show any statistical significance with treatment but CLF (t=4.411) shows significant difference with treatment. Small studies may report non- significance even when there are real clinically important effects.

The results of the study supports **Hugh Gemmell et al** who compare the immediate effect of ischaemic compression, trigger point pressure release and placebo ultrasound on pain, degree of cervical lateral flexion and pressure pain threshold of upper trapezius trigger points in subjects with non-specific neck pain, and found that ischemic compression group improved better than trigger point pressure release and sham ultrasound. A one-way analysis of variance (ANOVA) indicated there was no statistically significant difference beyond chance in pain level, lateral flexion or pain threshold among the groups (P > 0.05) [42].

Functional disability was calculated using neck disability index. Both the group showed no significant difference in NDI. There was a greater reduction in mean of both the group after 2 week and after 4 week of treatment. **Wim Jorritsma et al** investigate the validity of the Neck Pain and Disability Scale Dutch Language Version (NPAD-DLV) and the Neck Disability Index (NDI-DLV) on 112 patients with nonspecific chronic neck pain

and found that the NPAD–DLV and NDI–DLV are valid measures of self-reported neck-pain related disability [47].

The result of our study strongly supports the study of **Barbara Cagnie et al** who compare the effect of ischemic compression on trigger points and the results showed a statistically significant decrease in general neck/shoulder pain at post treatment (P = .001) and at 6-month follow-up (P = .003) compared with pre control and post control. There was no significant main effect for NDI scores. Pressure pain threshold increased at post treatment in all 4 treated TPs (P b .001). There was a significant increase in mobility and strength from pre-control/post-control to post-treatment (P b .05) [38].

Although in our study NDI scores of the subjects improved over time, but this improvement was not significant. A possible cause for this lack of significant improvement can be the low mean baseline NDI-score, which indicates a study population with mild complaints. Because of this, a relative high improvement is needed to obtain clinically significant results.

Neck pain in all the subjects were rated using 10 point VAS scale. **Fernandez-de-las Penas et al** analyzed sensitivity changes in active and latent myofascial trigger points in the trapezius muscle after the application of ischemic compression for 90 seconds. Data were collected using a VAS and a pressure threshold meter, which applied a 2.5-kg/cm$^2$ pressure on this point. This method for measuring sensitivity and the duration of ischemic compression application are identical to those used in our study. Results proved satisfactory in both cases [57].

**Gopal S Nambi et al** conducted a study to find out the difference in effect of Ischemic compression and muscle energy technique (MET) on upper trapezius myofascial trigger points. Treatment program consisting of muscle energy technique with ultrasound was found to be more effective in reducing pain and improve ROM in patients in upper trapezius myofascial trigger points. Statistically, no significant ($P > 0.05$) changes in the scores were found in the ischemic compression(IC) group and muscle energy (MET)

technique group for VAS, and statistically significant ($P < 0.05$) changes in the scores were found in the IC group and MET for Range of Motion (ROM) with greater change scores in the MET group compared with IC group [40].

**Hou et al.** compared the immediate effect of various physical therapeutic modalities on patients with myofascial pain syndrome in the upper trapezius. Their result demonstrated that the pressure pain threshold and tolerance values of myofascial trigger points were significantly increased after the treatment with ischemic compression ($p<0.05$). VAS scores were also significantly decreased after treatment. Specifically, therapeutic combinations, such as hot pack plus active ROM with either stretch with spray; trans-cutaneous electrical nerve stimulation (TENS); interferential current (IC); or myofascial release technique, are all effective for easing myofascial trigger point pain and increasing cervical range of motion [63]. However, no placebo comparison group was used, and unlike our study, subjects with non-specific neck pain were not included. Further, clinical significance was not investigated and in our study modalities were also not used so that the result would not affected by the result of modality.

**Hanten et al.** investigated the home use of IC with a self-treatment tool followed by sustained stretching for trigger points located in the neck or upper back. Active range of motion was used as the control and IC was found to be superior in reducing pain and increasing pressure pain threshold. There was no comparison group or myofascial release group, but the home program was followed over a 5-day period. It is difficult to make direct comparisons to our study, which was limited to those with non-specific neck pain and active upper trapezius trigger points. Also, clinical significance was not investigated [64].

This study has not found long term effect because the treatment which was included in conventional therapy has short term effect. Ischemic compression as well as myofascial release has also showed immediate effect only. The study has not included the strengthening program (which is having the long term effect) in the protocol.

# CONCLUSION

This study can be concluded by stating that both myofascial release technique and ischemic compression have got beneficial effect in reducing the pain intensity, neck disability and cervical range of motion in patients suffering from chronic non-specific neck pain.

But both the treatment showed no significance in reducing the pain intensity levels and improving the neck functions from baseline day to 4th week of treatment.

Only cervical range of motion was improved in myofascial trigger point release.

So both myofascial release and ischemic compression are not helpful for reduction of pain and neck disability in long term application of treatment, but MFR is helpful in improving cervical lateral flexion.

# LIMITATIONS

## LIMITATIONS OF THE STUDY

1. The study was limited to assess only the unilateral neck pain.
2. The study was limited to assess only the unilateral lateral flexion.
3. The study was limited to assess only the pain intensity by using VAS and NDI.
4. The study had duration of 4 weeks only.
5. The study had limited patient no. of 50 only.

## FURTHER RECOMMENDATIONS

1. The study was limited to assess only the unilateral neck pain it can be done to assess bilateral neck pain in future.
2. The study was limited to assess only the unilateral lateral flexion it can be done to assess bilateral neck flexion or other movements of neck.
3. The study was limited to assess only the pain intensity by using VAS and NDI further more outcome measure could be studied.
4. The study had short duration of 4 weeks only further duration could be increased for better results.
5. The sample size can be increased.

# REFERENCES

1. Ferrari R, Russell AS Regional musculoskeletal conditions: neck pain. Best Pract Res ClinRheumatol 2003:17(1):57–70.

2. Douglass AB, Bope ET. Evaluation and treatment of posterior neck pain in family practice. J Am Board FamPract 2004; 17: S13–22.

3. Bogduk N (1999). The neck. Baillieres ClinRheumatol 13(2):261–285.

4. Haldeman S, Carroll LJ, Cassidy JD, Schubert J, Nygren A (2008). The Bone and Joint Decade 2000–2010 Task Force on Neck Pain and its Associated Disorders: Executive summary. Spine (Phila Pa 1976) 33(Suppl):S5–S7.

5. Aker PD, Gross AR, Golsmith CH, Peloso P. Conservative management of mechanical neck pain: a systematic overview and meta-analysis. BMJ 1996; 313: 1291—6.

6. Dziedzig K, Hill J, Lewis M, Sim J, Daniels J, Hay EM. Effectiveness of manual therapy or pulsed shortwave diathermy in addition to advice and exercise for neck disorders: a pragmatic randomised controlled trail in physical therapy clinics. Arthritis Rheum 2005; 53: 214—22.

7. Saringovallis P, Hollins B. Effectiveness of manual therapy in treatment of non-specific neck pain: a review. PhysTher Rev 2005; 10: 35—50.

8. Cote P, Cassidy JD, Carroll LJ, Kristman V. The annual incidence and course of neck pain in the general population: a population-based cohort study. Pain 2004; 112: 267–73.

9. Wheeler AH, Goolkasian P, Baird AC, Darden BV (1999) Development of the neck pain and disability scale. Item analysis, face and criterion-related validity. Spine 24(13):1290–1294.

10. Silverman JL, Rodriquez AA, Agre JC. Quantitative cervical flexor strength in healthy subjects and in subjects with mechanical neck pain. Arch Phys Med Rehabil 1992; 72: 679–681.

11. Pietrobon R, Coeytaux RR, Carey TS, Richardson WJ, De Vellis RF (2002) Standard scales for measurement of functional out come for cervical pain or dysfunction: a systematic review. Spine 27(5):515–522

12. Portney LG, Watkins MP (2000) Foundations of Clinical Research, 2nd Ed. Prentice Hall Health., Upper Saddle River, New Jersey

13. Croft P, Lewis M, Papageorgiou A, Thomas E, Jayson M, Macfarlane G et al (2001) Risk factors for neck pain: a longitudinal study in the general population. Pain 93(3):317–325.

14. Binder AI (2007). Cervical spondylosis and neck pain BMJ334 (7592):527–53.

15. Guzman J, Hurwitz EL, Carroll LJ, Haldeman S, Cote P, Carragee EJ et al (2008) A new conceptual model of neck pain. The Bone and Joint Decade 2000 -2010 Task Force on Neck Pain and its Associated Disorders. Spine (Phila Pa 1976) 33(Suppl):S14–S22.

16. Simeon Niel Asher. The Concise Book of Trigger points. 2nded; 2008; p 29, 30, 31, 36, 44.

17. National Research Council, Institute of medicine: Musculoskeletal disorders and the workplace - Low back and upper extremities Washington D.C.: National Research Council; Institute of medicine; 2001, ISBN-10: 0-309-07284-0.

18. Linton S (2000). A review of psychological risk factors in back and neck pain. Spine (Phila Pa 1976) 25(9):1148–1156.

19. Carol J. Manheim. The Myofascial Release Manual. 3rded; 2008: p 5, 74-110

20. Nagrale et al. The efficacy of an integrated neuromuscular inhibition technique on upper trapezius trigger points in subjects with non-specific neck pain: a randomized controlled trial. Journal of Manual and Manipulative Therapy 2010 VOL. 18.

21. Harden RN, Bruehl SP, Gass S, Niemiec C, Barbick B. Signs and symptoms of the myofascial pain syndrome: a national survey of pain management providers. Clin J Pain 2000; 16: 64–72.

22. Travell JG, Simons DG. Myofascial pain and dysfunction: the trigger point manual, vol. 1. Baltimore, MD: Williams & Wilkins; 1989. p. 80, 87, 89, 99.

23. Simons D. Review of enigmatic MTrPs as a common cause of enigmatic musculoskeletal pain and dysfunction. J ElectromyogrKinesiol. 2004; 14: 95–107.

24. Cheng R. Combination laser/electrotherapy in pain managementSecond Canadian Low Power Laser Conference. 1987.

25. Carel Bron& Jan D. Dommerholt. Etiology of Myofascial Trigger Points. Curr Pain Headache Rep (2012) 16:439–444.

26. Fishbain DA, Goldberg M, Meagher BR, et al. Male and female chronic pain patients categorized by DSM-III psychiatric diagnostic criteria. Pain 1986; 26:181e —97e.

27. Simons DG, Hong C-Z, Simons LS. Nature ofmyofascial trigger points: active loci. J Musculoskelet Pain 1995; 3(Suppl.):124.

28. Hong C. New trends in myofascial pain syndrome. Zhonghua Yi XueZaZhi (Taipei) 2002; 65:501–12.

29. Simons DG. Clinical and etiological up date of myofascial pain from trigger points. J Musculoskeletal Pain 1996; 4:93–121.

30. Gerwin RD, Dommerholt J, Shah JP. An expansion of Simon's integrated hypothesis of trigger point formation. Curr Pain Headache Rep 2004; 8: 468–75.

31. Wheeler AH. Myofascial pain disorders: theory to therapy. Drugs 2004; 64: 45–62.

32. Shah JP, Phillips TM, Danoff JV, Gerber LH. An in vivo micro-analytical technique for measuring the local biochemical milieu of human skeletal muscle. J ApplPhysiol 2005; 99:1977–84.

33. Simons D, Travell JG, Simons LS. Myofascial pain and dysfunction. The trigger point manual. Upper half of body. 2nd ed. Baltimore: Lippincott, Williams and Wilkins; 1999.

34. Gerwin RD, Shannon S, Hong CZ, et al. Inter-rater reliability in myofascial trigger point examination. Pain 1997; 69:65—73.

35. Alvarez D, Rockwell P. Trigger points: diagnosis and management. Am Fam Physician 2002; 65: 653–60.

36. Carol J. Manheim. The Myofascial Release Manual. 3rd ed; 2008:2-8.

37. "Glossary of Osteopathic Terminology". American Association of Colleges of Osteopathic Medicine. April 2009. p. 28. Retrieved 25 August 2012.

38. Barbara Cagnie, Vincent Dewitte, Iris Coppieters, Jessica Van Oosterwijck, Ann Cools et al. Effect of ischemic compression on trigger points in the neck and shoulder muscles in office workers: A cohort study. J Manipulative PhysiolTher 2013;1-8

39. Pinar Kucuk eroglu, Ozlem yilmaz, Hatice bodur, Can ates. A Comparison of the Efficacy of Dry Needling, Lidocaine Injection, and Oral Flurbiprofen Treatments in Patients with Myofascial Pain Syndrome: A Double-Blind (For Injection, Groups Only), Randomized Clinical Trial. Turk J Rheumatol 2013; 28(1):38-46.

40. Nambi GS, Sharma R, Inbasekaran D, Vaghesiya A, Bhatt U. Difference in effect between ischemic compression and muscle energy technique on upper trapezius myofascial trigger points: Comparative study. Int J Health Allied Sci 2013; 2:17-22.

41. Bhavesh H. Jagad, Karishma B. Jagad. Effects of Ischemic Compression on the Trigger Points in the Upper Trapezius Muscle. Indian Journal of Physiotherapy & Occupational Therapy. January-March 2013, Vol. 7.

42. Soo A Kim et al. Ischemic Compression After Trigger Point Injection Affect the Treatment of Myofascial Trigger Points Ann Rehabil Med 2013;37(4):541-546.

43. Albert F. Moraska Changes in blood flow and cellular metabolism at a myofascial trigger point with trigger point release (ischemic compression): a proof-of-principle pilot study. Arch Phys Med Rehabil. 2013 January; 94(1):196-200.

44. Sarrafzadeh J, Ahmadi A, Yassin M. The effects of pressure release, phonophoresis of hydrocortisone, and ultrasound on upper trapezius latent myofascial trigger point. Arch Phys Med Rehabil 2012; 93:72-7.

45. Farshad Okhovatian, Royah Mehdikhani, Sedigheh sadat Naimi. Comparison between the immediate effect of manual pressure release and strain/counterstrain techniques on latent trigger point of upper trapezius muscle Clinical Chiropractic 2012; 15: 55—61.

46. Marco Monticone, Paola Baiardi, Carla Vanti, Silvano Ferrari, Tiziana Nava, Catia Montironi, BarbaraRocca, Calogero Foti, Marco Teli: Chronic neck pain and treatment of cognitive and behavioural factors: results of a randomized controlled clinical trial: Eur Spine J (2012) 21:1558–1566.

47. Wim Jorritsma, Grietje E. de Vries, Pieter U. Dijkstra, Jan H. B. Geertzen, Michiel F. Reneman. Neck Pain and Disability Scale and Neck Disability Index: validity of Dutch language versions. Eur Spine J (2012) 21:93–100.

48. Zebis et al.: Implementation of neck/shoulder exercises for pain relief among industrial workers: A randomized controlled trial. BMC Musculoskeletal Disorders (2011) 12:205.

49. Bron et al.: Treatment of myofascial trigger points in patients with chronic shoulder pain: a randomized, controlled trial. BMC Medicine 2011 9:8.

50. Nagrale et al. The efficacy of an integrated neuromuscular inhibition technique on upper trapezius trigger points in subjects with non-specific neck pain:a randomized controlled trial. Journal of Manual and Manipulative Therapy 2010 VOL. 18.

51. Jay Kain, Laura Martorello, Edward Swanson, Sandra. Sego. Comparison of an indirect tri-planar myofascial release (MFR) technique and a hot pack for increasing range of motion. jbmt. 2009; 12:002

52. Gemmel H, Miller P, Nordstrom H. Immediate effect of ischaemic compression and trigger point pressure release on neck pain and upper trapezius trigger point: a randomized controlled trial. Clin Chiropract 2008; 11: 30–6.

53. Ana Claudia Violino Cunha, Thomaz Nogueira Burke, Fabio Jorge Renovato Franca, Amelia Pasqual Marques**.** Effect of global posture reeducation and of static stretching on pain, range of motion, and quality of life in women with chronic neck pain: a randomized clinical trial. CLINICS 2008; 63(6):763-70.

54. JariYlinen, Hannu Kautiainen, Kaija Wiren, and Arja Hakkinen: Stretching Exercises verses Manual Therapy in Treatment of Chronic Neck Pain: A randomized controlled cross-over trial; J Rehabil Med 2007; 39: 126–132.

55. Arja Hakkinen, Petri Salo, Ulla Tarvainen, KaijaWiren, and JariYlinen: Effect of Manual Therapy and Stretching on Neck Muscle Strength and Mobility in Chronic Neck Pain; J Rehabil Med 2007; 39: 575–579

56. Atienza Meseguer A, Fernandez de las Penas C, Navarro-Poza JL, Rodriguez-Blanco C, Bosca Gandia JJ. Immediate effects of the strain/counterstrain technique in local pain evoked by tender points in the upper trapezius muscle. Clin Chiropr 2006; 9:112-8.

57. Fernandez de las Penas C, Alonso-Blanco C, Fernandez- Carnero J, Miangolarra-Page JC. The immediate effect of ischemic compression technique and transverse friction massage on tenderness of active and latent myofascial trigger points: a pilot study. J Bodywork Mov Ther 2006; 10:3-9.

58. Fryer G, Hodgson L. The effect of manual pressure release on myofascial trigger points in the upper trapezius muscle. J Bodywork Mov Ther 2005; 9:248-55.

59. Chatchawan U, Thinkhamrop B, Kharmwan S, Knowles J, Eungpinichpong W. Effectiveness of traditional Thai massage versus Swedish massage among patients with back pain associated with myofascial trigger points. J Bodywork Mov Ther 2005; 9:298–309.

60. Dziedzic K, Hill J, Lewis M, et al. Effectiveness of manual therapy or pulsed shortwave diathermy in addition to advice and exercise for neck disorders: a pragmatic randomized controlled trial in physical therapy clinics. Arthritis Rhenum 2005; 53: 214–22.

61. Aslak Savolainen, Jari Ahlberg, Hanna Nummila and Maunu Nissinen. Active or passive treatment for neck–shoulder pain in occupational health care? A randomized controlled trial.Occupational Medicine 2004; 54:422–424.

62. Van den Heuvel SG, de Looze MP, Hildebrandt VH, et al. Effects of software programs stimulating regular breaks and exercises on work-related neck and upper limb disorders. Scand J Work Environ Health 2003; 29: 106–16.

63. Hou CR, Tsai LC, Cheng KF, Chung KC, Hong CZ. Immediate effects of various physical therapeutic modalities on cervical myofascial pain and trigger-point sensitivity. Arch Phys Med Rehabil 2002; 83: 1406–14.

64. William P Hanten, Sharon L Olson, Nicole L Butts and Aimee L Nowicki Effectiveness of a Home Program of Ischemic Pressure Followed by Sustained Stretch for Treatment of Myofascial Tigger Points. PHYS THER.2000; 80:997-1003.

65. Gam AN, Warming S, Larsen LH, Jensen B, Hoydalsmo O, Allon I, et al. Treatment of myofascial trigger-points with ultrasound combined with massage and exercise e a randomised controlled trial. Pain 1998; 77:73–9.

66. Ekberg K, Bjorkqvist B, Malm P, et al. Controlled two years follow up of rehabilitation for disorders in the neck and shoulders. Occup Environ Med1994; 51:833–8.

67. Crossley KM, Bennell KL, Cowan SM, Green S (2004) Analysis of outcome measures for persons with patellofemoral pain: which are reliable and valid? Arch Phys Med Rehabil 85(5):815–822

68. Vernon H, Mior S (1991). The neck disability index: a study of reliability and validity. J Manipulative Physiol Ther 14(7):409–415.

69. Nimmo RL. A technique for the correction of muscular imbalance of the temporomandibular joints. Receptor 1980; 2:1—8.

# ANNEXURE

# ANNEXURE-I

## LIST OF ABBREVIATIONS

| | |
|---|---|
| ROM | Range of Motion |
| TrP | Trigger point |
| MFR | Myofascial Release |
| IC | Ischemic Compression |
| VAS | Visual analogue scale |
| NDI | Neck Disability Index |
| SD | Standard Deviation |
| et al | And others |
| CROM | Cervical Range of Motion |
| CLF | Cervical Lateral Flexion |
| df | degree of freedom |

# ANNEXURE-II

## CONSENT FORM

**Study Title:** Effectiveness of Two Different Treatment Protocols in Reducing Neck disability: A Comparative Study.

I, _____, age _____years, residing at_____ do hear by give consent of taking part in the proposed study done by Neha Gaur, the investigator at Ayushman College, Bhopal. I have decided to volunteer myself for the study on my own will and was not compelled by any individual or group of people and my consent is not for any monetary benefits.

The treatment procedure is fully explained to me by the researcher in the language best known to me and I am aware that being subjected to this study. I am aware that I have to give more time for the assessment and treatment; and these assessments do not interfere with benefits.

I voluntary have rights to refuse my consent or withdraw from the study any time during the course of the study without adversely affecting my treatment. I am aware of the benefits of the treatment will be helpful in improvement in my activities of daily living. If any harm during treatment or after treatment I am informed that I will be attended with suitable medical care and rehabilitation.

By signing the consent form I understand that I agree all the terms and conditions of the study and shall make this study liable for an ill health or lack of improvement. The matter in this consent form was read by me or read to me by an interpreter and I fully understand the subject matter.

**Signature of patient:** **Signature of investigator:**

# ANNEXURE-III

## GENERAL ASSESSMENT FORM

1. NAME _____
2. AGE/ GENDER _____
3. CURRENT OCCUPATION _____
4. PREVIOUS JOB HISTORY _____
5. LONG DURATION OF SITTING; YES/NO_____

   IF YES THEN HOW MANY HOURS CONTINUOUSLY_____
6. COMPUTER USER; YES/NO _____

   IF YES THEN; LAPTOP OR DESKTOP USER _____

   FOR HOW MANY HOURS _____
7. HISTORY OF TRAUMA IN/AROUND NECK_____
8. MEDICAL HISTORY
   - FRACTURE IN/AROUND NECK
   - DISC PROLAPSE
   - THYROIDISM
   - MEDICATIONS
9. REST TIME _____
10. MUSCLE TIGHTNESS_____
11. MUSCLE SPASM _____

12. TRIGGER POINTS_____

13. CERVICAL RANGE OF MOTION _____

14. TYPE OF PAIN; CONSTANT _____

INTERMITTENT _____

SHOOTING _____

15. TINGLING/ NUMBNESS IN UPPER LIMB _____

16. DURATIOMN OF SYMPTOMS _____

# ANNEXURE-IV

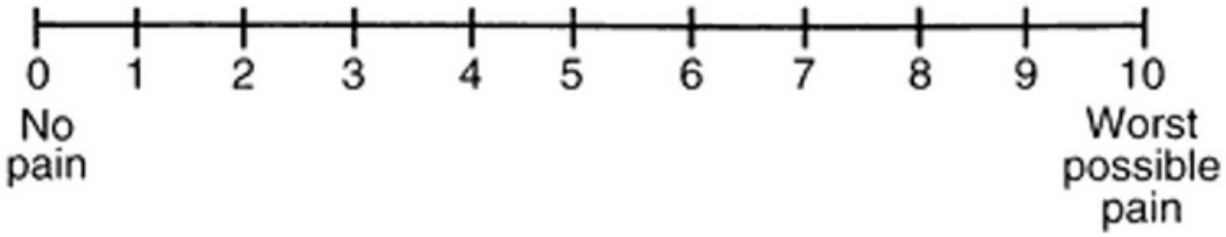
## VISUAL ANALOGUE SCALE

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. Operationally a VAS is usually a horizontal line, 100mm in length, anchored by word descriptors at each end. The VAS score is determined by measuring in millimeters from the left hand end of the line to the point that the patient marks.

_____

**0** **10**

**No Pain** **Worst pain**




# ANNEXURE-V

## NECK DISABILITY INDEX

This questionnaire is designed to enable us to understand how much your neck pain has affected your ability to manage your everyday activities. Please answer each section by circling the one choice that most applies to you. We realize that you may feel that more than one statement may relate to you, but please just circle the one. Choose which most closely describes your problem right now.

| | |
|---|---|
| **Section-1 Pain Intensity**<br><br>A. I have no pain at the moment.<br>B. The pain is very mild at the moment.<br>C. The pain is moderate at the moment.<br>D. The pain is fairly severe at the moment.<br>E. The pain is very severe at the moment.<br>F. The pain is worst imaginable at the moment. | **Section-2 Personal care (washing, dressing etc.)**<br><br>A. I can look after myself normally without causing extra pain.<br>B. I can look after myself normally, but it causes extra pain.<br>C. It is painful to look after myself and I am slow and careful.<br>D. I need some help, but manage most of my personal care.<br>E. I need help everyday in most aspects of self care.<br>F. I do not get dressed, I wash with difficulty and stay in bed. |
| **Section-3 Lifting**<br><br>A. I can lift heavy weights without extra pain.<br>B. I can lift heavy weights, but it gives extra pain.<br>C. Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example, on a table.<br>D. Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.<br>E. I can lift very light weights.<br>F. I cannot lift or carry anything at all. | **Section-4 Reading**<br><br>A. I can read as much as I want to with no pain in my neck.<br>B. I can read as much as I want to with slight pain in my neck.<br>C. I can read as much as I want to with moderate pain in my neck.<br>D. I cannot read as much as I want because of moderate pain in my neck.<br>E. I cannot read as much as I want because of severe pain in my neck.<br>F. I cannot read at all. |

| | |
|---|---|
| **Section-5 Headaches**<br><br>A. I have no headaches at all.<br>B. I have slight headache which comes infrequently.<br>C. I have moderate headache which comes infrequently.<br>D. I have moderate headache which comes frequently.<br>E. I have severe headache which comes frequently.<br>F. I have headaches almost all the time. | **Section-6 Concentration**<br>A. I can concentrate fully when I want to with no difficulty.<br><br>B. I can concentrate fully when I want to with slight difficulty.<br><br>C. I have a fair degree of difficulty in concentrating when I want to.<br><br>D. I have a lot of difficulty in concentrating when I want to.<br><br>E. I have a great deal of difficulty in concentrating when I want to.<br><br>F. I cannot concentrate at all. |
| **Section-7 Work**<br>A. I can do as much work as I want to.<br>B. I can only do my usual work, but no more.<br>C. I can do most of my usual work, but no more.<br>D. I cannot do my usual work.<br>E. I can hardly do any work at all.<br>F. I cannot do any work at all. | **Section-8 Driving**<br>**A.** I can drive my car without any neck pain.<br><br>**B.** I can drive my car as long as I want with slight pain in my neck.<br><br>**C.** I can drive my car as long as I want with moderate pain in my neck.<br><br>**D.** I cannot drive my car as long as I want because of moderate pain in my neck.<br><br>**E.** I can hardly drive at all because of severe pain in my neck.<br><br>**F.** I cannot drive my car at all. |

| **Section-9 Sleeping** | **Section-10 Recreation** |
|---|---|
| A. I have no trouble sleeping.<br>B. My sleep is slightly disturbed (less than 1 hour sleepless)<br>C. My sleep is mildly disturbed (1-2 hour sleepless)<br>D. My sleep is moderately disturbed (2-3 hour sleepless)<br>E. My sleep is greatly disturbed (3-5 hour sleepless)<br>F. My sleep is completely disturbed (5-7 hour sleepless) | A. I am able to engage in all of my recreational activities with no neck pain at all.<br>B. I am able to engage in all of my recreational activities with some neck pain at all.<br>C. I am able to engage in most, but not all of my recreational activities because of pain in my neck.<br>D. I am able to engage in a few of my recreational activities because of pain in my neck.<br>E. I can hardly do any recreational activities because of pain in my neck.<br>F. I cannot do any recreational activities at all. |

**COMMENTS:**_____
_____
_____
_____

**NAME:** _____ **DATE:** _____ **SCORE:** _____**Occupation:** _____

## SCORING TECHNIQUE FOR NECK DISABILITY INDEX

1. Each of the 10 sections is scored separately (0 to 5 points each) and then added up (max. total = 50).

**FORMULA:** PATIENT'S SCORE X 100 = _____ % DISABILITY

# ANNEXURE-VI

## Master Chart - I

### Pre and post values of Group-A (Myofascial Release)

| Sub. No. | Age | Gen-der | VAS | | | NDI | | | CLF | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Base-line | After 2 wks | After 4 wks | Base-line | After 2 wks | After 4 wks | Base-line | After 2 wks | After 4 wks |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 32 | M | 9 | 4 | 1 | 81 | 32 | 4 | 20 | 30 | 40 |
| 2. | 26 | F | 9 | 9 | 2 | 71 | 33.33 | 17.77 | 25 | 30 | 40 |
| 3. | 30 | M | 9 | 3 | 1 | 68 | 30 | 6 | 10 | 20 | 40 |
| 4. | 22 | M | 7 | 4 | 1 | 52 | 28 | 4 | 25 | 35 | 42 |
| 5. | 53 | F | 8 | 4 | 2 | 62 | 26.66 | 8.8 | 30 | 37 | 40 |
| 6. | 26 | F | 7 | 4 | 2 | 55.55 | 42.22 | 11.11 | 25 | 35 | 42 |
| 7. | 52 | M | 8 | 4 | 3 | 68.88 | 42.22 | 20 | 20 | 25 | 35 |
| 8. | 52 | M | 9 | 5 | 1 | 71.11 | 42.22 | 15.55 | 27 | 30 | 35 |
| 9. | 28 | F | 9 | 4 | 2 | 60 | 33.33 | 13.33 | 30 | 38 | 45 |
| 10. | 22 | M | 7 | 3 | 1 | 46 | 24 | 12 | 30 | 35 | 45 |
| 11. | 27 | F | 7 | 4 | 1 | 53.33 | 28.88 | 6.6 | 35 | 40 | 45 |
| 12. | 22 | F | 8 | 5 | 2 | 68.88 | 35.55 | 13.33 | 35 | 42 | 45 |
| 13. | 60 | M | 9 | 4 | 2 | 77 | 42.22 | 15.55 | 22 | 25 | 30 |
| 14. | 25 | F | 10 | 6 | 3 | 96 | 58 | 14 | 32 | 40 | 45 |
| 15. | 31 | M | 8 | 5 | 1 | 64 | 32 | 12 | 25 | 38 | 42 |
| 16. | 54 | M | 9 | 6 | 2 | 71.11 | 42.22 | 13.33 | 22 | 28 | 35 |
| 17. | 56 | M | 9 | 4 | 1 | 76 | 34 | 12 | 20 | 30 | 40 |
| 18. | 45 | F | 9 | 5 | 2 | 82.22 | 42.22 | 11.11 | 22 | 35 | 42 |
| 19. | 52 | M | 8 | 4 | 2 | 68.88 | 37.77 | 15.55 | 15 | 20 | 30 |
| 20. | 56 | M | 9 | 5 | 2 | 78 | 44 | 14 | 26 | 30 | 34 |
| 21. | 56 | M | 10 | 6 | 2 | 90 | 54 | 20 | 20 | 28 | 35 |
| 22. | 49 | M | 8 | 4 | 2 | 54 | 26 | 12 | 25 | 35 | 40 |
| 23. | 54 | M | 9 | 5 | 2 | 80 | 42 | 14 | 15 | 22 | 30 |
| 24. | 20 | M | 9 | 6 | 3 | 70 | 40 | 10 | 25 | 32 | 44 |
| 25. | 27 | F | 10 | 6 | 2 | 60 | 32 | 16 | 28 | 35 | 45 |

## Master Chart - II

## Pre and post values of Group-B (Ischemic Compression)

| Sub. No. | Age | Gen-der | VAS | | | NDI | | | CLF | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Base line | After 2 wks | Afte-r 4 wks | Base line | After 2 wks | After 4 wks | Base line | After 2 wks | After 4 wks |
| 1. | 26 | M | 6 | 4 | 1 | 42 | 22 | 8 | 20 | 25 | 35 |
| 2. | 33 | F | 8 | 5 | 3 | 66 | 33 | 13.33 | 20 | 25 | 35 |
| 3. | 22 | M | 9 | 6 | 3 | 82 | 58 | 24 | 18 | 25 | 32 |
| 4. | 22 | M | 8 | 5 | 4 | 60 | 37.77 | 20 | 25 | 27 | 32 |
| 5. | 20 | M | 7 | 5 | 2 | 52 | 40 | 9 | 25 | 30 | 40 |
| 6. | 50 | F | 8 | 6 | 3 | 48 | 35.55 | 20 | 20 | 27 | 35 |
| 7. | 60 | M | 10 | 6 | 3 | 92 | 48 | 28 | 22 | 25 | 28 |
| 8. | 56 | M | 9 | 6 | 3 | 64 | 36 | 24 | 20 | 25 | 30 |
| 9. | 24 | F | 10 | 7 | 4 | 90 | 68 | 46 | 30 | 35 | 40 |
| 10. | 28 | M | 9 | 5 | 3 | 64 | 36 | 22 | 30 | 35 | 40 |
| 11. | 26 | M | 10 | 6 | 3 | 90 | 60 | 30 | 25 | 30 | 35 |
| 12. | 20 | F | 9 | 6 | 4 | 60 | 46 | 28 | 25 | 30 | 38 |
| 13. | 42 | M | 9 | 4 | 1 | 68 | 40 | 16 | 22 | 30 | 35 |
| 14. | 53 | M | 10 | 7 | 2 | 84 | 64 | 22 | 22 | 26 | 32 |
| 15. | 54 | M | 9 | 6 | 2 | 68 | 42 | 22 | 15 | 20 | 28 |
| 16. | 56 | M | 10 | 7 | 3 | 84 | 66 | 34 | 20 | 25 | 30 |
| 17. | 52 | M | 10 | 6 | 4 | 84 | 40 | 30 | 10 | 18 | 25 |
| 18. | 43 | M | 9 | 6 | 3 | 74 | 50 | 30 | 16 | 25 | 32 |
| 19. | 42 | M | 8 | 6 | 1 | 66 | 46 | 18 | 25 | 32 | 38 |
| 20. | 49 | F | 8 | 4 | 2 | 68 | 38 | 16 | 20 | 25 | 30 |
| 21. | 46 | F | 10 | 4 | 1 | 78 | 44 | 16 | 22 | 30 | 40 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 22. | 58 | M | 9 | 5 | 1 | 75.55 | 44.44 | 20 | 18 | 25 | 30 |
| 23. | 50 | F | 9 | 5 | 1 | 73.33 | 44.44 | 17.77 | 20 | 27 | 32 |
| 24. | 30 | F | 9 | 3 | 1 | 86 | 62 | 16 | 15 | 25 | 35 |
| 25. | 25 | F | 7 | 4 | 1 | 52 | 40 | 9 | 25 | 35 | 45 |