"EFFECT OF INTEGRATED NEUROMUSCULAR INHIBITION TECHNIQUE VERSUS TENS WITH PASSIVE STRETCHING IN PATIENTS WITH UPPER TRAPEZIUS TRIGGER POINTS IN NON-SPECIFIC NECK PAIN"

A project submitted in partial fulfillment

of the requirement for the degree of

MASTER OF PHYSIOTHERAPY

Submitted by

Reg.No:271610207

Under the guidance of

Prof. Dr. C.SIVAKUMAR, MPT., Ph.D., MIAP

Submitted to

THE TAMILNADU DR.M.G.R.MEDICALUNIVERSITY

CHENNAI -32

PPG COLLEGE OF PHYSIOTHERAPY

COIMBATORE-35

MAY 2019

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Dissertation Evaluated on: ……...

INTERNAL EXAMINER **EXTERNAL EXAMINER**

CERTIFICATE

This is to certify that the dissertation entitled **"EFFECT OF INTEGRATED NEUROMUSCULAR INHIBITION TECHNIQUE VERSUS TENS WITH PASSIVE STRETCHING IN PATIENTS WITH UPPER TRAPEZIUS TRIGGER POINTS IN NON-SPECIFIC NECK PAIN"** is a bonafide compiled work, carried by **Reg. No: 271610207** PPG College of Physiotherapy, Coimbatore-641035 in partial fulfillment for the award of degree in Master of Physiotherapy as per the doctrines of requirements for the degree from **THE TAMILNADU DR. M. G. R. MEDICAL UNIVERSITY, CHENNAI-32.**

This work supervised by **Prof. Dr. C.SIVAKUMAR, MPT., Ph.D., MIAP**

PRINCIPAL& GUIDE

Prof. Dr. C.SIVAKUMAR, MPT., Ph.D., MIAP

ACKNOWLEDGEMENT

I thank **GOD AND ALMIGHTY** for providing me the wisdom and knowledge to complete this study successfully.

I thank **MY PARENTS,** who had given me the opportunity, guidance, encouragement and support throughout the course of my study.

I express my sincere gratefulness to our ***chairman*** **Dr. L.P. THANGAVELU,M.S.,F.R.C.S** and our ***correspondent*** **MRS.SHANTHI THANGAVELU, M.A.,** P.P.G group of institutions, Coimbatore, for their encouragement and providing the source for the successful of the study.

I express my heartfelt thanks to my ***Principal*** and ***Guide*** **Prof. Dr. C.SIVA KUMAR**, **MPT., Ph.D, MIAP.** for his guidance, support and constant encouragement through out of this project .

I extend my special thanks and sincere gratitude, to our **research committee members**, and **all faculties** for the making the project coherent & for making the analytical perusal an every stage of this study without their guidance, this project would have not come through.

I sincerely thank my each and every **SUBJECT** who co-operated to fulfill this project work the given time limit.

I sincerely acknowledge **my best friends, batch mates, my seniors, and all my well-wishers** who were always there to guide and render their support to me throughout my project.

I extend my gratitude to **Mr. K Venugopal, MA, MPhil**, Professor, Research & Statistics, for letting me know the intricacies of biostatistics and helping me in making my step into the field of research.

Last but not least I also extend my thanks to **PARTICIPANT** for their willingness and co-operation in the study.

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I-INTRODUCTION

Neck pain is a frequent musculoskeletal disorder in the general population. Neck pain is one of the most common musculoskeletal complaints and is attributed as the second largest cause of time off work after low back pain. Normally the neck moves 600 times every hour whether we are awake or asleep. Neck pain is a relatively common problem with 67 % of all individuals at some stage of life. (Cote et al.,1988).

The frequency of neck complaints increases with age, stress, material handling and occupation, which include prolonged sitting posture such as clerical workers, computer workers, etc. Neck disorders are common and costly problem in the community, affecting 70% of people at some point in their life.

The pathoanatomic sources of an individual's pain cannot be identified in the majority of the cases and it is therefore defined as non-specific in nature (Nagrale et al.,2010). Non –specific neck pain can be defined as mechanical pain sited anyplace between the occiput and upper thoracic spine and surrounding muscles devoid of any specific etiology. A common cause of neck pain is muscle tightness. Positive signs include tenderness in the posterior neck region, asymmetry, increased tension and restriction of movements. Among the various muscles of the cervical

region, the upper trapezius is more prone to be affected in non- specific neck pain.

Trapezius is a postural type of muscle. This means that, when dysfunctional, it will almost always be shorter than normal. It attaches from mid third of the nuchal line and ligamentum nuchae to the lateral third of the clavicle. Unilaterally, it helps in lateral flexion of the head and neck to the same side when the shoulder is fixed, in contra lateral extreme head rotation and elevation of the scapula. When the muscle becomes shorter than normal, it tends to form trigger points.

Trigger point is described as “a hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band”.(Travell and Simons) Myofascial trigger points are classified into active and latent trigger points. An active myofascial trigger point is a symptom-producing one and can trigger local or referred pain or other paraesthesiae. A latent myofascial trigger point does not trigger pain without being stimulated.

Upper trapezius trigger point can cause pain in the neck, limited cervical range of motion limited and increased functional disability according to the neck disability index.

Trigger points can be identified by recognizing a pattern of clinical signs during physical examination. Clinical signs such as, the occurrence of a taut band in a skeletal muscle, the existence of a tender spot inside the taut band, a palpable or noticeable local twitch response upon palpation or needle examination of the trigger point (called a jump sign), the occurrence of a typical referred pain pattern, and limited range of motion of the affected tissues (Dimitrios et al., 2008).

The various modalities that can be utilized for treating trigger points are Trigger Point Injection, Spray and Stretch method, Dry Needling, Ultrasound, TENS, LASER, Trigger Point Pressure Release /Ischemic Compression (Direct Inhibitory Pressure), Muscle Energy Technique (MET), Myofascial Release Therapy (MRT), Positional Release Therapy (PRT) i.e. Strain Counter Strain Technique and Integrated Neuromuscular Inhibitory Technique (INIT).

Since the development of the gate control theory of pain perception by Melzack and Wall in 1965, transcutaneous electric nerve stimulation (TENS) has been used effectively to treat acute and chronic pain conditions. The effect of TENS on pain relief may be through a peripheral mechanism or central effects that increase circulating endogenous opiates or that modulate autonomic response (Thomas T W et al,. 2005).

Passive stretching which can be also known as myofascial stretching is directed at the specific muscle which avoids overstretching and requires absolute relaxation of the muscle (Arthur et al.,2008).

Ischemic Compression is one of the Manual Therapy Technique which can be frequently employed for deactivating the trigger points. This involve applying Direct Sustained Digital Pressure to the trigger points by means of sufficient force for a specified period of time, to slow down the blood supply and alleviate the tension within the concerned muscle. Pain and muscle spasm relief owing to Direct Digital Pressure results from the reactive hyperemia formed in the region, or from the spinal reflex mechanism.

Strain-Couterstrain (SCS) has also been utilized in the treatment of trigger points. When this position of ease is attained, the stressed tissues are for the most part relaxed and a local diminish of tone is produced.

METs (Muscle Energy Technique) have been suggested as a way of managing trigger points. METs are a frequently utilized technique for achieving release in a muscle earlier to stretching it. This advance involves the introduction of an isometric contraction of the affected muscle which produces post-isometric relaxation through the control of the Golgi tendon

organs (autogenic inhibition). Concurrent gating of the nociceptive impulses takes place in the dorsal horn of the spinal cord owing to the stimulation of mechanoreceptors.

The blending of MET, Ischemic Compression and SCS produce the most effectual, targeted approach to trigger point release. This technique is termed the Integrated Neuromuscular Inhibition Technique (INIT). Advantage of this method lies in its many-sided approach (Paul glynn et al.,). The INIT approach permits for delivery of the techniques in a solo coordinated manner.

In this study, the efficacy of INIT is compared with TENS and passive stretching in treating of upper trapezius trigger points in subjects with non-specific neck pain.

1.1 NEED FOR THE STUDY

Trapezius muscle is a major source of neck pain. Tightness felt in the neck, upper part of shoulder blades and back of the skull frequently come from trigger points in the trapezius. Management of the trigger points in the upper trapezius will help to relieve the neck pain, since the upper trapezius is the most commonly affected muscle in non-specific neck pain. Various treatment options are prevalent for the

treatment of this non-specific neck pain. Recent literature suggested that INIT proves to be a growing treatment technique which has proved to be effective too. So, the aim of this study is to compare the effect of INIT and TENS with passive stretching in patients with upper trapezius trigger points in non-specific neck pain.

1.2 STATEMENT OF THE PROBLEM

"Effect of Integrated Neuromuscular Inhibition Technique versus TENS with passive stretching in patients with upper trapezius trigger points in non-specific neck pain."

1.3 OBJECTIVES

- To compare the effectiveness of Integrated Neuromuscular Inhibition Technique and TENS with passive stretching in patients with upper trapezius trigger points in non-specific neck pain.
- To find out the effectiveness of INIT in patients with upper trapezius trigger points in non-specific neck pain.

- To find out the effectiveness of TENS with passive stretching in patients with upper trapezius trigger points in non-specific neck pain.

1.4 HYPOTHESES

NULL HYPOTHESIS-

There is no significant difference between INIT and TENS with passive stretching in the treatment of trigger points of upper trapezius in non- specific neck pain.

ALTERNATE HYPOTHESIS-

There is a significant difference between INIT and TENS with passive stretching in the treatment of trigger points of upper trapezius in non- specific neck pain.

II-REVIEW OF LITERATURE

1. NON- SPECIFIC NECK PAIN-

Lars L Andersen et al., (2011)

They stated that many adults experience bothersome neck pain. Research and treatment strategies often centre on the upper trapezius which may be affected. They established a high prevalence of tenderness existing in numerous anatomical locations of the neck/shoulder complex amongst adults with nonspecific neck pain particularly in the upper trapezius. The upper trapezius muscle is well suited for clinical research due to its bulky and superficial nature.

Schellingerhout JM et al., (2008)

Conducted a study to identify the subgroups of patients with non-specific neck pain who may benefit from either physiotherapy, manipulation therapy or the usual care. A relevant improvement in recovery rate up to 25% could be established in patients receiving a tailored instead of a non-advised treatment.

Florian Schwerla et al., (2008)

Suggested that chronic non-specific neck pain is a disabling condition. Empirical evidence suggested that manipulative interventions might be effective in alleviating chronic non-specific neck pain symptoms. A series of test-dependent manipulative interventions may be a promising therapeutic regimen for chronic non-specific neck pain sufferers.

Leaver et al., (2006)

Stated that two out of three will have neck pain at some point in their life. Most of the cases are not owing to some grave disease or neck problem and frequently the precise cause for the pain is not apparent, known as non- specific neck pain. The probable reason for these can be minor sprains or improper posture. Recovery usually occurs.

Jari Ylinen et al.,(2004)

They conducted a study to compare neck flexion, extension and mainly rotation strength in women with non-specific neck pain with healthy controls. They have also evaluated the repeatability in the measurement of isometric neck strength in patients with neck pain and concluded that the

group with neck pain has lower neck muscle strength in every direction tested than control group.

Michael Cummings et al., (2001)

Reported that trigger points were the primary source of pain in 74% of 96 patients with musculoskeletal non- specific neck pain admitted to a comprehensive pain center. Myofacial trigger point pain is defined, as pain arising from 1 or more myofascial trigger points, which are hyperirritable spots in skeletal muscle that are associated with hypersensitive palpable nodules in taut bands. These spots are found to be painful on compression and give rise to typical referred pain, tenderness, motor dysfunction and autonomic phenomena.

Marja Mikkelsson et al., (1997)

Stated that neck disorders are common cause of non-specific neck pain, affecting 70% of people at some point in their life. Females are more commonly affected than the males

Bogduk et al., (1988)

Found that the pain may arise from any of the structures in the neck. These structures include the intervertebral discs, ligaments, muscles, facet

joints, dura and nerve roots. There are a large number of potential causes of neck pain. These vary from tumours, trauma (e.g. fractures, whiplash), infection, inflammatory disorders (e.g. rheumatoid arthritis) and congenital disorders.

2. TRIGGER POINTS

Amit et al., (2010)

Suggested that an integrated approach has potential benefits in deactivating upper trapezius trigger points.

Hugh Gemmell et al., (2008)

Stated that trigger points are a general cause of severe and disabling pain in many neck pain cases. Whilst trigger points can be found in any skeletal muscle the majority are found in the upper trapezius. Common manual therapy treatments used for upper trapezius trigger points include manual pressure and myofascial release.

Chang –Zern Hong et al., (2006)

Concluded that myofascial pain syndrome is caused by myofascial trigger points that are usually activated by a soft tissue lesion, rather than the

muscle itself .The underlying lesion should be treated appropriately before the inactivation of active myofascial trigger points.

Simons et al., (2004)

Travell and Simons defined a primary trigger point as “a central trigger point that was apparently activated directly by acute or chronic overload, or repetitive overuse of the muscle in which it occurs and was not activated as a result of trigger point activity in another muscle”.

Kazunori Itoh et al.,(2004)

Found that the palpable band within which the trigger was found was initially regarded as a localised muscle contracture induced by the increase of intracellular calcium ion within the muscle cell, then the idea developed into the more sophisticated energy crisis theory. This theory postulates an initial release of intracellular calcium from the sarcoplasmic reticulum or inflow from the extracellular fluid through the injured membrane. The increase of intracellular calcium ions causes sustained contraction of the muscle, which may inhibit the local circulation and thus induce a shortage of oxygen and ATP in the tissues. The lack of energy may prevent calcium re-uptake by the calcium pump into the sarcoplasmic reticulum. This would again perpetuate the vicious cycle.

Rudin et al.,(2003)

Stated that the first construct for the formation of trigger point was described as a result of tissue injury secondary to repetitive muscle overload or direct muscle injury, and the subsequent release of kinins and inflammatory mediators. This would lead to sensitization of peripheral nociceptors and the formation of painful local muscle contraction and the development of myofascial trigger points . The second construct briefly mentioned that trigger points are due to muscle spindle dysfunction. Along the same lines, Rudin mentioned that "another theory states excessive activity of acetylcholine at the motor endplate."

Simons et al. (1999) and Gerwin et al. (1997)

Found that there are five diagnostic criteria of myofascial trigger point as : (1) presence of a palpable taut band in the skeletal muscle; (2) presence of a hyper sensible tender spot in the taut band; (3) local twitch response elicited by the snapping palpation of the taut band; (4) reproduction of the typical referred pain pattern of the trigger point in response to compression; and (5) spontaneous presence of the typical referred pain pattern or patient recognition of the referred pain . If the first four criteria were satisfied the trigger point was considered as latent. If all of these criteria were present the trigger point was considered to be active.

David G Simons et al., (1996)

Suggested that myofascial trigger points are a frequent cause of musculoskeletal pain. Reliable examination requires both training and experience. Quite a few considerations are available which help to decide the most suitable diagnostic criteria of myofascial trigger points. They also recommended that this typical electrical activity of trigger points most probably originate at dysfunctional endplates of extrafusal muscle fibers and this dysfunction appear to have a key role in the pathophysiology of trigger points.

3. INTEGRATED NEUROMUSCULAR INHIBITION TECHNIQUE (INIT)

Amit et al., (2010)

Proposed that the benefit of the integrated neuromuscular inhibition technique approach may be in the addition of direct ischemic compression and consequent tissue relaxation, due to strain-counter strain. Ischemic compression decreases the sensitivity of aching nodules in muscle. Local pressure may well equalize the length of sarcomeres in the concerned trigger

point and hence decrease the pain. Additionally, the resultant tissue relaxation created by attaining a position of trigger point ease due to strain-counter strain, has been proposed as a mechanism of facilitating 'unopposed arterial filling' which allow for a decrease of tone in the tissues involved. This reduction in local tone results in adjustment of neural reporting and improving the local circulation. These changes ultimately result in a more normal resting length, greater circulation, and decreased pain.

Iqbal Amir et al., (2010)

Suggested a study to disable myofascial trigger points via means of the blending of ischaemic compression technique with strain-counterstrain technique. The group A received ischaemic compression technique in addition with straincounterstrain technique and group B ischaemic compression technique alone whereas group C received conventional treatment only. Key outcome measure used were pain pressure threshold to assess with the pressure threshold meter . Pain and function of the patients were measured by a visual analogue scale and the Neck Disability Index scores respectively. The effect was combination of ischemic compression technique with strain-counterstrain has been revealed to generate greater improvement in pain pressure threshold, function status and reduction in pain intensity even after one week of the treatment.

Sibby et al., (2010)

Conducted a study to compare the effectiveness of Integrated Neuromuscular Inhibitory Technique and Laser with stretching in reducing pain, improving ROM and functional activities of subjects with neck pain due to upper trapezius trigger points. Group A received INIT and Group B received Laser with stretching. The outcome measures that they used were the Visual numeric scale, cervical range of motion and neck disability index (NDI). Neck disability index exhibited reduction across both the groups with a significant difference between the groups (p=.045). This study concluded that both INIT and Laser with stretching are equally effective in managing subjects with neck pain due to upper trapezius trigger point.

Aakanksha Joshi., (2010)

Conducted a study to compare the effects of two manual treatment regimen on persons with upper trapezius trigger points and concluded that an integrated advance, that is,integrated neuromuscular inhibition technique, to the management of trigger points has established to be more valuable to relieve pain, reducing stiffness, and improving practical ability as compared to muscle energy techniques in seclusion.

Wang et al., (2009)

Reported a study to test the hypothesis that large-diameter myelinated muscle afferents supply to the pathophysiology of myofascial trigger points. The ischemic compression obstruction of large-diameter myelinated muscle afferents was gained with a 7-cm-wide tourniquet applied about the upper arm proximal to the brachioradialis muscle in 20 fit subjects. The outcome showed that ischaemic compression blockage, which chiefly blocks large-diameter myelinated muscle afferents, was linked with an increase in pain pressure threshold at myofascial trigger point regions but not at non-myofascial trigger point regions. These results suggested that large-diameter muscle afferents are involved in pain and mechanical hyperalgesia at the trigger points.

Javier Montanez Aguilera et al., (2009)

Proposed a study to determine immediate effects of ischemic compression and ultrasound for the treatment of myofascial trigger points in the trapezius muscle. Sixty-six subjects, diagnosed with latent myofascial trigger points in the trapezius muscle were randomly placed into 3 groups: Group 1 received ischaemic compression, Group 2 received ultrasound and Group 3 received sham ultrasound. The outcome measure were cervical active range of motion measured with goniometer, basal electrical activity

of muscle trapezius measured with surface electromyography, and pressure tolerance of trigger point measured with visual analogue scale. They established that range of motion of cervical rachis, basal electrical activity of the trapezius muscle and myofascial trigger point sensitivity of the same muscle achieve short-term positive effects through use of ischaemic compression.

Hugh Gemmell et al., (2007)

Conducted a study to determine the effect of ischemic compression, trigger release and ultrasound on pain, degree of cervical lateral flexion and pressure pain threshold of upper trapezius trigger points in patients with non-specific neck pain. The outcome showed that ischemic compression is superior to sham ultrasound in immediately reducing pain in patients with non-specific neck pain and upper trapezius trigger points.

Chuen-Ru Hou et al., (2002)

Conducted a study to find the effects of different physical therapy modalities and their influence on cervical myofascial and trigger point pain. They concluded that ischemic compression therapy provide an alternative treatment using either low pressure and a long duration of about 90seconds or short duration of 30seconds and high pressure. This provided for immediate pain relief and trigger point sensitivity suppression.

Goodridge (1997)

Defined that muscle energy techniques are osteopathic procedures which are used to mobilize joints with limitation in movement, stretch tight muscles and fascia, improve local muscle circulation and balance neuromuscular relationships to alter muscle tone.

4. TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS) AND PASSIVE STRETCHING

Dimitrios Kostopoulos et al., (2008)

Concluded that passive stretching, also known as myofascial stretching , is directed at a specific muscle under treatment that avoids overstretching and requires absolute relaxation of the muscle. The target muscle is placed where tension is sensed at the finish of the range of motion . The muscle is allowed to relax while stretching is increased and the subject exhales. The newly gained position is held while the subject exhales. In subsequent movements, further gain is obtained by holding the position for 20–45 seconds at a rate of 3–4 mm/second, and then allowing the muscle to relax.

Jari Ylinen et al. (2007)

Reported a study to differentiate the effects of manual therapy and stretching exercise on neck pain and disability. They concluded that both stretching exercise and manual therapy reduces neck pain and disability in women with non-specific neck pain. In addition they also concluded that low-cost stretching exercises could be suggested as an appropriate therapy intervention to relieve pain.

Chiu et al.,(2005)

Proposed to investigate the outcome of transcutaneous electrical nerve stimulation (TENS) resting on trigger points and neck exercise in chronic non- specific neck pain patients. The patients of the TENS as well as exercise group have a enhanced and clinically pertinent improvement in disability, pain and isometric neck muscle strength.

Farina et al., (2004)

Proposed a study to compare the short and medium-term effects of frequency modulated neural stimulation with those of TENS in myofascial pain syndrome and concluded that both FREMS and TENS has positive short-term effects on myofascial pain syndrome.

Hou et al., (2002)

Conducted a study to find out the immediate effect of different physical therapy modalities on myofascial pain perceived in the upper trapezius muscle and it was concluded that immediate relief from cervical myofascial pain can be obtained in 6 therapeutic modalities. Hot pack along with active ROM, ischemic compression, and TENS provide major pain relief. Application of TENS along with ischemic compression therapy is more effective in pain relief than hot pack with active range of motion therapy.

Lean Chaitow et al.,(1996)

Proposed that stretching of the muscles with either active (or) passive methods is helpful in treating both the shortness and trigger points as this reduces the contraction (taut band) as well as increases circulation to the area.

Hayes et al. (1993)

Found that Transcutaneous electrical nerve stimulation is very effective in the treatment of neck pain. It reduces pain in patient spinal level by closing pain gate.

Russell A. Foley (fourth edition)

Stated that TENS relieves pain through a spinal cord gating mechanism. Input from mechanoreceptors is conveyed through large diameter A beta and A Gamma fibers to the dorsal horn of the spinal cord. These fibers synapses with cells in various laminae including the substantia gelatonisa(SG) and laminae II and III. Interneurons from the SG exert an inhibitory influence on the T cells of the pain fibers in lamina V. These interneurons "close the gate" to pain transmission at the spinal cord level through a presynaptic or postsynaptic inhibitory events. The interneurons that close the gate to pain transmission may involve the variety of neurochemical inhibitory processes using enkephalin or dynorphin through opoids receptors. High TENS is an approach that activates the large diameter peripheral nerve fibers to neuromodulate pain through a spinal neurochemical gating mechanism.

Graff-Radford et al., (1989)

Stated that TENS alone might be insufficient for the long-term treatment of myofascial pain because myofascial trigger point appeared to remain unaltered. The pain-reducing properties of TENS coupled with

stretching would produce the desired effect of reducing pain and myofascial trigger point sensitivity.

Melzack and Wall (1982)

Conventional TENS relieves pain through a spinal cord gating mechanism. It stimulates the muscle through large diameter A beta and A Gamma fibers and close the gate to nociceptive(pain) transmission at the spinal cord level through a presynaptic or postsynaptic inhibitory events

5. NECK DISABILITY INDEX (NDI) AND VISUAL ANALOGUE SCALE (VAS)

Macderid et al., (2009)

The NDI has established to have adequate support and importance to retain its existing status as the most commonly used self-report measure for neck pain.

Boonstra Anne et al., (2008)

Conducted a study to find out the reliability and concurrent validity of a visual analogue scale (VAS) as a single-item tool measuring disability in neck pain patients. For the study pertaining to reliability a test-retest design and for the validity study a cross-sectional design was used. The

population used for the study consisted of patients over 18 years of age, suffering from musculoskeletal pain; 52 patients were incorporated in the reliability study, 344 patients in the validity study. The conclusion of the study was that the reliability of the VAS for disability range from moderate to good.

Arianne et al., (2006)

Found that Neck Disability Index has a good reliability and responsiveness with the test–retest results after 1 week. High response rates of the self-rated questionnaires resulted in a sufficient number of cases for evaluation.

Myles et al., (1999)

Visual analogue scale (VAS) score is a linear scale. Change in the VAS score represents a relative change in the degree of pain sensation. VAS in comparative analgesic trials can help to quantify differences in potency and efficacy.

Vernon et al., (1991)

They conducted a study to evaluate the reliability and validity of NDI. The study is aimed at evaluating the test- retest reliability and validity of

NDI. A group of 52 subjects with cervical pain were included in the study. Test – retest scores were analysed using Pearlson correlation. NDI scores were compared to Mc Gill pain questionnaire. The correlation was high (0.69-0.70). the results concluded that NDI achieved a high degree of reliability and internal consistency than Mc Gill questionnaire.

Poland et al., (1984)

They conducted a study in neck pain patients with neck disability index as a tool to measure the disability in activities of daily living. On the basis of study findings they concluded that neck disability index is a valid tool in assessing neck pain and disability

III-METHODOLOGY

3.1 STUDY DESIGN

Pre test and Post test experimental study design.

3.2 STUDY SETTING

The study was conducted at Department of Physiotherapy, Ashwin Hospital, Coimbatore

3.3 STUDY POPULATION

Patients with non-specific neck pain were selected after due consideration of the inclusion and exclusion criteria.

3.4 STUDY DURATION

The study was conducted over a period of one year. Individual subjects underwent treatment duration of four weeks.

3.5 SELECTION OF SAMPLES

Total of 30 subjects were included for the study by using convenience sampling method.

3.6 INCLUSION CRITERIA

- Patients with non-specific neck pain with upper trapezius trigger points are included for this study.
- Age group of 20-40 yrs
- Both male and female patients.
- Duration: neck pain of less than 3months duration

3.7 EXCLUSIVE CRITERIA

- Subjects with moderate to severe cervical, thoracic and shoulder degenerative pathology.
- Individuals with neuromuscular entrapment.
- Subjects having recent history of trauma to neck or shoulder.
- Subjects with any systemic disorder.
- Subjects with congenital and acquired spinal deformities.
- Subjects with any space occupying lesion in neck and shoulder region.
- Subjects with any metal implants, open wounds or infection in that areas, malignant conditions and pregnant patients.

3.8 VARIABLES

DEPENDENT VARIABLE

- ❖ Pain
- ❖ Function/Disability

INDEPENDENT VARIABLE

- ❖ Integrated Neuromuscular Inhibition Technique
- ❖ TENS with passive stretching

3.9 PARAMETERS

- Pain
- Function /Disability

3.10 OPERATION TOOLS

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

3.11 PROCEDURE

Subjects with non- specific neck pain who visited the Outpatient Department- Ashwin Hospital were selected by convenience sampling method.

Patients who are meeting the inclusion and exclusion criteria were selected for this study. 30 patients with non-specific neck pain who fulfilled inclusion and exclusion criteria were selected and all the subjects were divided into 2 groups, 15 subjects in each group.

A clear explanation of the study was given to the selected patients and informed consent was obtained from the patients who agreed to participate. The subjects will be positioned comfortably and assessed thoroughly about his/her condition.

Pain and function measures are taken at the beginning and first day of treatment and at the end of the fourth week.

GROUP A

15 subjects will be treated with integrated neuromuscular inhibitory techniques**.** The trigger points to be treated within the upper trapezius muscle is identified by placing the subject in high sitting position to reduce tension in the upper trapezius muscle with their arm positioned in slight shoulder abduction with the elbow bent and hand resting on the stomach. Using a pincer grasp, the fibers of the upper trapezius are moved and made note of any trigger points. Once the trigger point is identified, treatment is started with the ischemic compression.

Ischemic compression:-

The subject will be positioned in the high sitting position, with the involved side exposed appropriately. The therapist will stand behind the subject. Slow and increasing levels of pressure will be applied until the tissue resistance barrier is identified. Pressure will be maintained until a release of the tissue barrier is felt. At that time, pressure will again be applied until a new barrier is felt. This process will be repeated until tension/tenderness is unable to be identified or 90 seconds have elapsed, whichever would come first. All identified trigger points will be treated.

Strain- counter strain:-

Ischemic compression is followed by the application of strain- counter strain . Moderate digital pressure will be applied to the identified trigger point. If pain is unable to be identified, pressure will be increased. If pain is reproduced, the pressure is maintained over the active trigger point as the position of ease is identified. The position of ease is often produced through positioning the muscle in a shortened/relaxed position. Ease is defined as the point where a reduction in pain of at least 70% is produced. For upper trapezius, high sitting with the head side bent towards the involved side while the practitioner positioned the ipsilateral arm in flexion, abduction and external rotation to reduce the reported trigger point pain.

Once the position of ease is identified, it will be held for 20–30 seconds and will be repeated for three to five times.

Muscle Energy Technique:-

Lastly, the subjects will receive muscle energy technique directed towards the involved upper trapezius. The patient will be asked to take the stabilized shoulder towards the ear (a shrug movement) and the ear towards the shoulder. The degree of contraction will be mild and pain free (20% of maximum voluntary contraction). The contraction will be sustained for 10 seconds and upon complete relaxation of effort, the therapist will gently ease the head/neck into an increased degree of side bending, flexion and ipsilateral rotation, where it will be stabilized, and the shoulder will be stretched caudally. The stretch will be maintained for 30 seconds and repeated three to five times per treatment session.

Frequency of treatment:-

Once a day, for 3 days a week

Treatment duration:-

4 weeks

GROUP B

1. Conventional physiotherapy –TENS for 12 mins, (2 pole method, pulse width – 100ms, 70 -120 Hz). The intensity will be set at a level that each subjects could feel.
2. Stretching – Passive stretching for 30 seconds- 30 sec hold x 3 repetition (3 times a week)

   Frequency of treatment:-

   Once a day, for 4 weeks.

   Treatment duration:-

   4 weeks

3.12 STATISTICAL TOOLS

STUDENTS 't' TEST

Paired 't' test

Unpaired 't' test

Paired 't' test:

Paired 't' test was conducted to compare the pre-test and post-test values of visual analogue scale for pain and functional disability.

Formula of paired 't' test:

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between the pre test versus post test

$\bar{d}$ = mean difference

n = total number of subjects

S = standard deviation

$\sum d^2$ = sum of the squared deviation

Unpaired't' test:

The Unpaired't' test was used to compare the pre test and post test values of group A and group B for visual analogue scale and functional disability.

Formula of Unpaired‘t’ test:

$$S = \sqrt{\frac{\sum(x1-\overline{x1})^2+\sum(x2-\overline{x2})^2}{n1+n2-2}}$$

$$t = \frac{\overline{x1-x2}}{S}\sqrt{\frac{n1n2}{n1+n2}}$$

n1 = total number of subjects in group A

n2 = total number of subjects in group B

$x1$ = difference between pretest Vs posttest of group A

$\overline{x1}$ = mean difference between pretest Vs posttest of group A

$x2$ = difference between pretest Vs posttest of group B

$\overline{x2}$ = mean difference between pretest Vs posttest of group B

S = combined standard deviation

Level of significance = 5%

IV-DATA ANALYSIS AND INTERPRETATION

TABLE - I

VISUAL ANALOGUE SCALE FOR PAIN

PAIRED‘t’ TEST - GROUP A (INTEGRATED NEUROMUSCULAR INHIBITION TECHNIQUE)

S.NO	VISUAL ANALOGUE SCALE	MEAN	STANDARD DEVIATION	‘t’ VALUE
1.	PRE TEST	5.33	1.19	8.26
2.	POST TEST	2.80		

Using Paired ‘t’ test with 14 degrees of freedom and 5% as level of significance, the table ‘t’ value is 2.145 which was lesser than the calculated ‘t’ value 8.26. This test showed that there was significant effect of INIT in reduction of pain.

GRAPH - I

VISUAL ANALOGUE SCALE FOR PAIN

PAIRED 't' TEST - GROUP A (INIT)

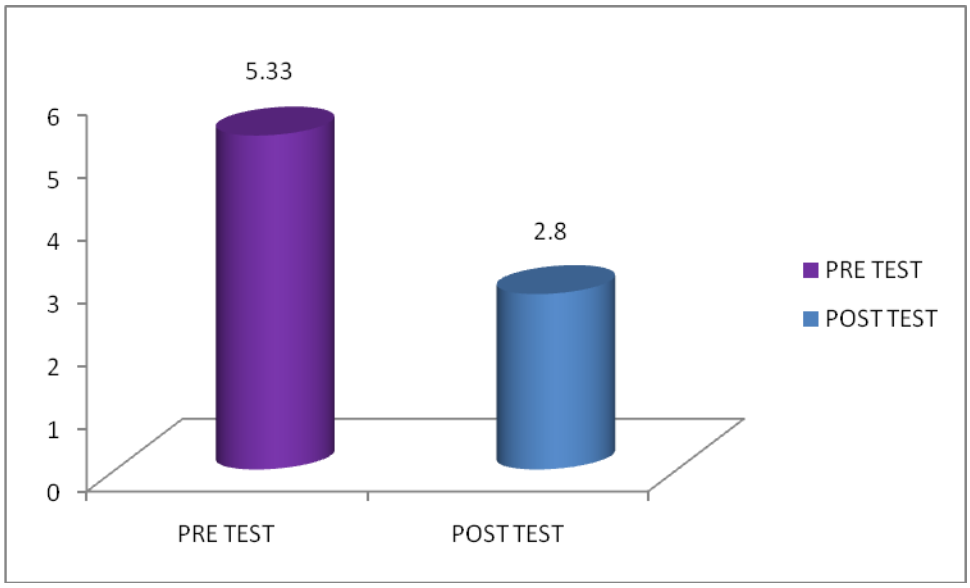


TABLE – II

VISUAL ANALOGUE SCALE FOR PAIN

PAIRED‘t’ TEST - GROUP B (TENS WITH PASSIVE STRETCHING)

S.NO	VISUAL ANALOGUE SCALE	MEAN	STANDARD DEVIATION	‘t’ VALUE
1.	PRE TEST	5.20	0.990	3.39
2.	POST TEST	4.33		

Using paired‘t’ test with 14 degrees of freedom and 5% as level of significance, the table‘t’ value is 2.145 which was lesser than the calculated‘t’ value 3.39. This test showed that there was significant effect of TENS with passive stretching in reduction of pain.

GRAPH - II

VISUAL ANALOGUE SCALE FOR PAIN

PAIRED‘t’ TEST - GROUP B (TENS WITH PASSIVE STRETCHING)

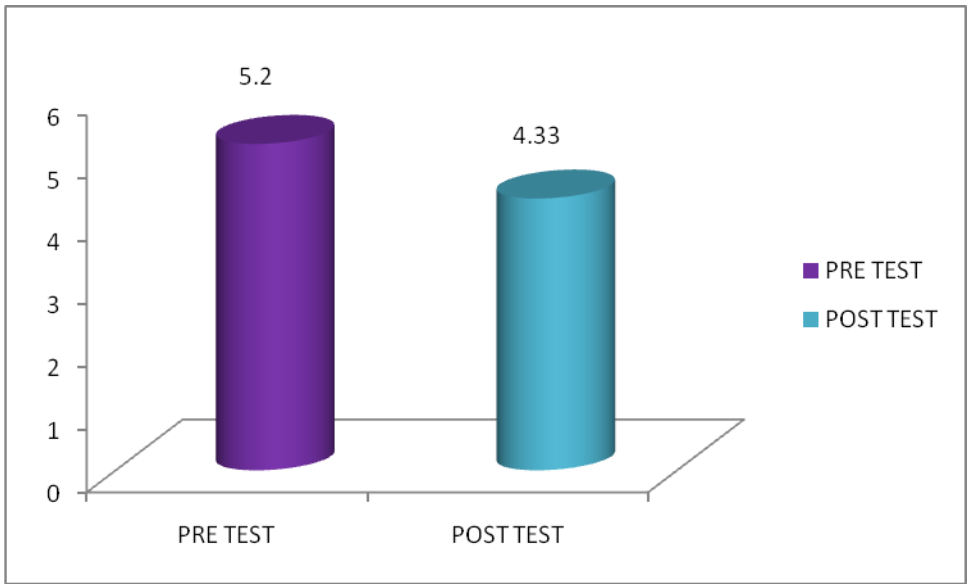


TABLE - III

VISUAL ANALOGUE SCALE FOR PAIN

UNPAIRED‘t’ TEST - PRETEST VALUES OF GROUPA Vs GROUP B

GROUPS	N	MEAN	STANDARD DEVIATON	‘t’ VALUE
GROUP A	15	5.33	1.06	0.343
GROUP B	15	5.20		

Pretest values of group A and B is analyzed by unpaired‘t’ test. The calculated‘t’ value is 0.343, which is lesser than the table‘t’ value is 2.048 at 5% level of significance and 28 degrees of freedom. This test showed that there was no significant difference in reduction of pain between the effect of group A and group B.

GRAPH - III

VISUAL ANALOGUE SCALE FOR PAIN

UNPAIRED‘t’ TEST - PRETEST VALUES OF GROUP A Vs GROUP B

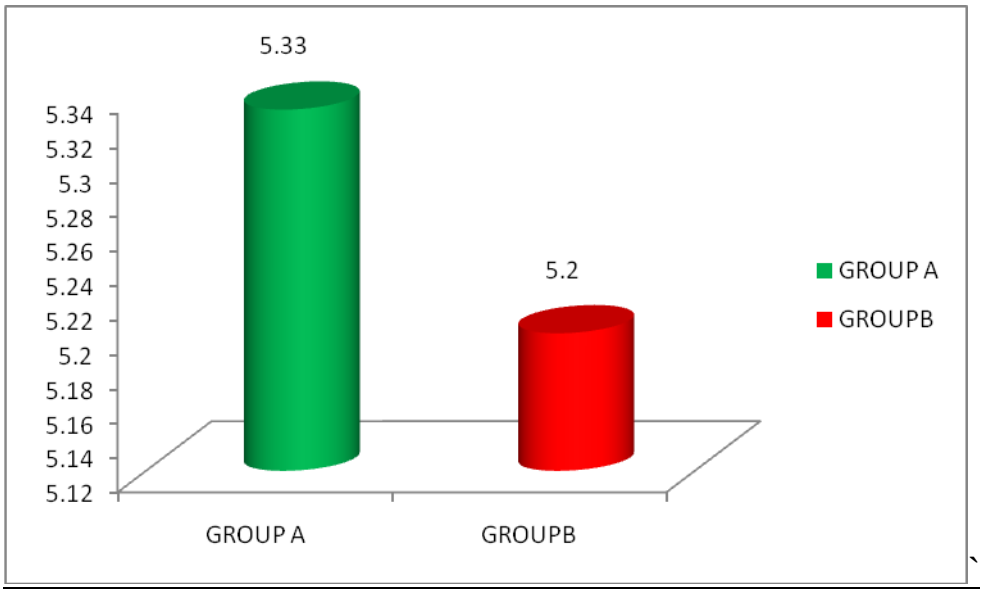


TABLE - IV

VISUAL ANALOGUE SCALE FOR PAIN

UNPAIRED‘t’ TEST-POSTTEST VALUES OF GROUPA Vs GROUP B

GROUPS	N	MEAN	STANDARD DEVIATON	‘t’ VALUE
GROUP A	15	2.80	0.995	4.22
GROUP B	15	4.33		

Posttest values of group A and B is analyzed by unpaired‘t’ test. The calculated‘t’ value is 4.22, which is greater than the table‘t’ value is 2.048 at 5% level of significance and 28 degrees of freedom. This test showed that there was significant difference in reduction of pain between the effect of group A and group B.

GRAPH - IV

VISUAL ANALOGUE SCALE FOR PAIN

UNPAIRED‘t’ TEST - POSTTEST VALUES OF GROUP A Vs GROUP B

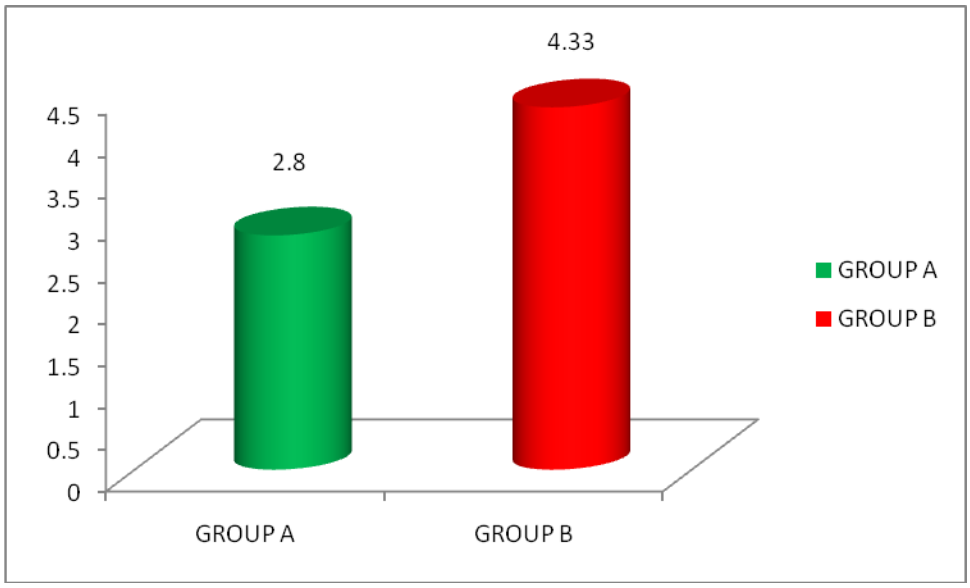


TABLE – V

NECK DISABILITY INDEX FOR FUNCTION

PAIRED‘t’ TEST - GROUP A (INIT)

S.NO	NECK DISABILITY INDEX SCALE	MEAN	STANDARD DEVIATION	‘t’ VALUE
1.	PRE TEST	16.1	4.34	6.85
2.	POST TEST	8.40		

Using paired‘t’ test with 14 degrees of freedom and 5% as level of significance, the table‘t’ value is 2.145 which was lesser than the calculated‘t’ value 6.85. This test showed that there was significant effect of integrated neuromuscular inhibition technique in improvement of function.

GRAPH - V

NECK DISABILITY INDEX FOR FUNCTION

PAIRED‘t’ TEST - GROUP A (INIT)

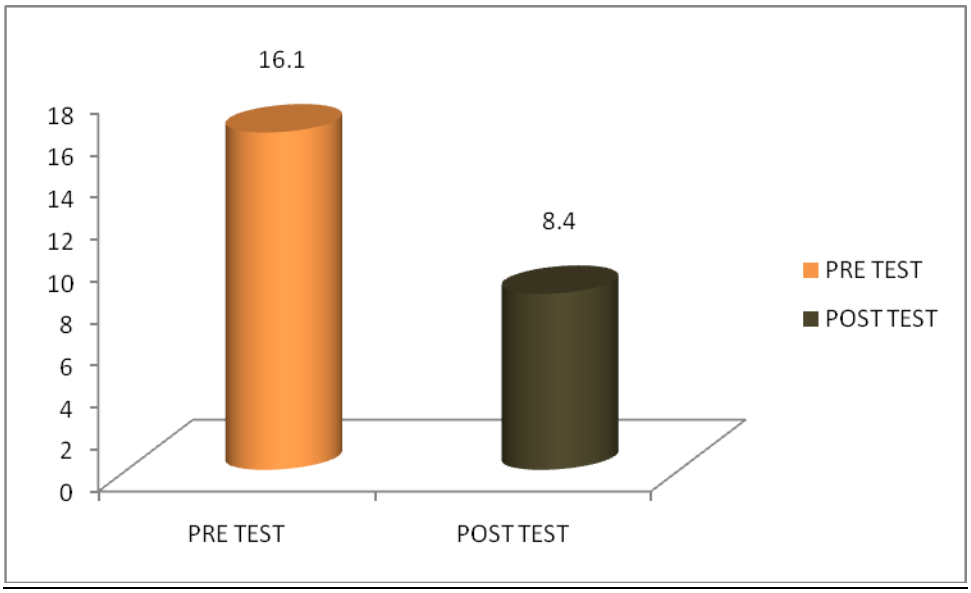


TABLE – VI

NECK DISABILITY INDEX FOR FUNCTION

PAIRED‘t’ TEST - GROUP B (TENS WITH PASSIVE STRETCHING)

S.NO	NECK DISABILTY INDEX SCALE	MEAN	STANDARD DEVIATION	‘t’ VALUE
1.	PRE TEST	16.4	1.41	8.62
2.	POST TEST	13.3		

Using paired‘t’ test with 14 degrees of freedom and 5% as level of significance, the table‘t’ value is 2.145 which was lesser than the calculated‘t’ value 8.62. This test showed that there was significant effect of TENS with passive stretching in improvement of function.

GRAPH – VI

NECK DISABILITY INDEX FOR FUNCTION

PAIRED‘t’ TEST - GROUP B (TENS WITH PASSIVE STRETCHING)

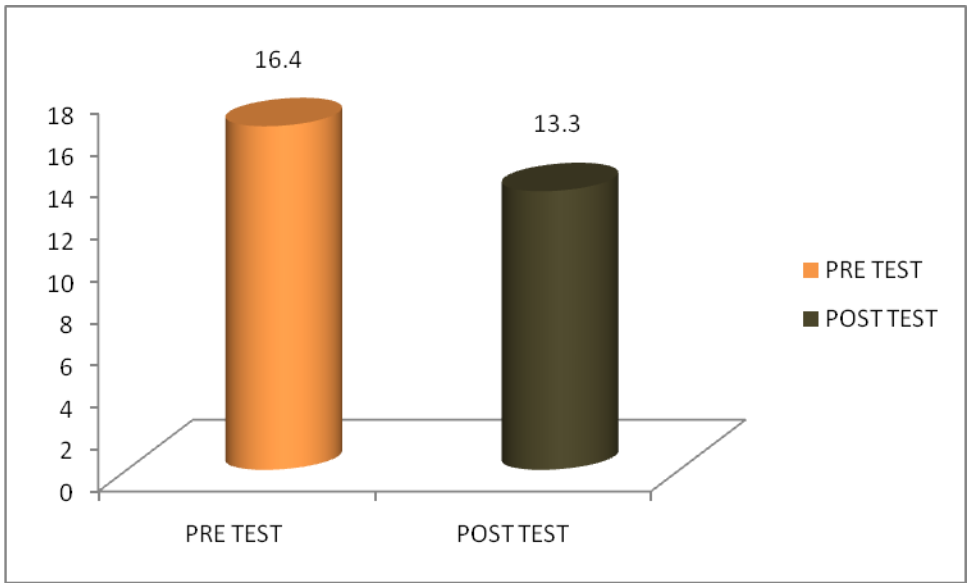


TABLE – VII

NECK DISABILTY INDEX FOR FUNCTION

UNPAIRED‘t’ TEST - PRETEST VALUES OF GROUP A Vs GROUP B

GROUPS	N	MEAN	STANDARD DEVIATON	‘t’ VALUE
GROUP A	15	16.1	3.10	0.295
GROUP B	15	16.4		

Pretest values of group A and B is analyzed by unpaired‘t’ test. The calculated‘t’ value is 0.295, which is lesser than the table‘t’ value is 2.048 at 5% level of significance and 28 degrees of freedom. This test showed that there was no significant difference in improvement of function between the effect of group A and group B.

GRAPH - VII

NECK DISABILITY INDEX FOR FUNCTION

UNPAIRED‘t’ TEST - PRETEST VALUES OF GROUP A Vs GROUP B

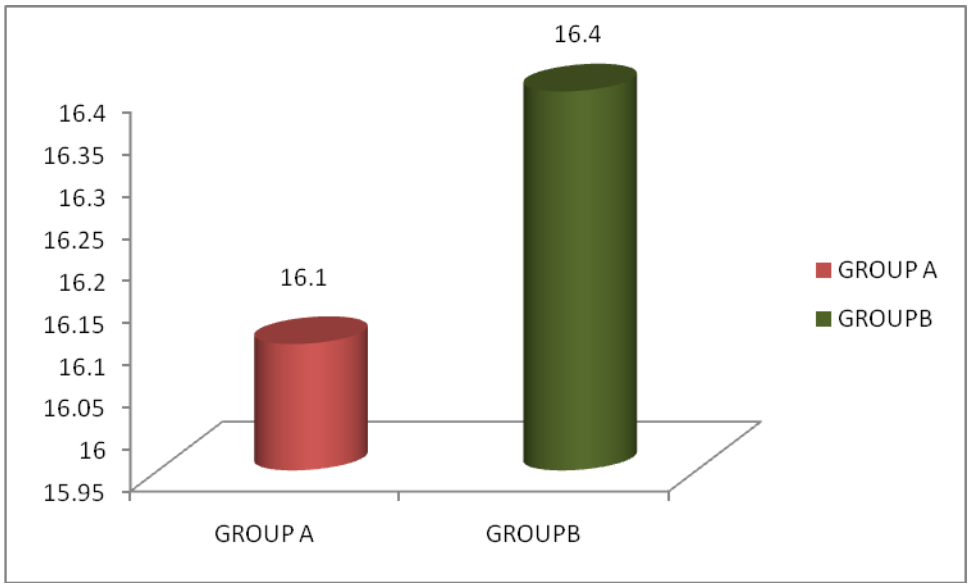


TABLE - VIII

NECK DISABILITY INDEX FOR FUNCTION

UNPAIRED‘t’ TEST - POSTTEST VALUES OF GROUP A Vs GROUP B

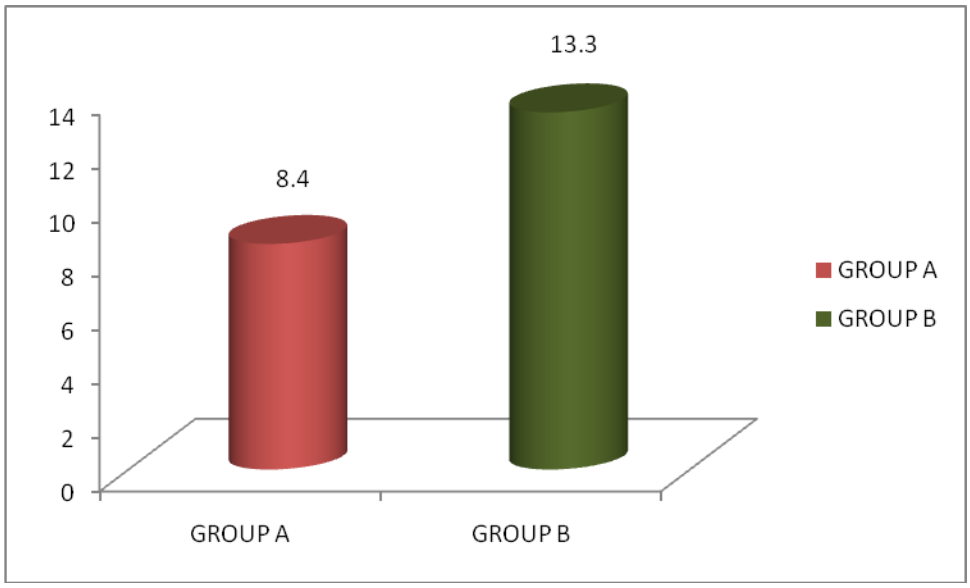
GROUPS	N	MEAN	STANDARD DEVIATON	‘t’ VALUE
GROUP A	15	8.40	2.35	5.67
GROUP B	15	13.3		

Posttest values of group A and B is analyzed by unpaired‘t’ test. The calculated‘t’ value is 5.67, which is greater than the table ‘t’ value is 2.048 at 5% level of significance and 28 degrees of freedom. This test showed that there was significant difference in improvement of function between the effect of group A and group B.

GRAPH - VIII

NECK DISABILITY INDEX FOR FUNCTION

UNPAIRED‘t’ TEST - POSTTEST VALUES OF GROUP A Vs GROUP B



V-DISCUSSION

The intention of the study was to compare the effect of integrated neuromuscular inhibition technique and TENS with passive stretching on upper trapezius trigger points in patients with non specific neck pain.

30 subjects were selected who fulfilled the predetermined inclusive and exclusive criteria. The subjects were divided into two groups, 15 in each group. Group A underwent integrated neuromuscular inhibition technique (INIT) and Group B underwent TENS with passive stretching.

Statistical analysis using Unpaired‘t’ test showed that there was a significant difference between the effect of integrated neuromuscular inhibition technique and TENS with passive stretching on pain and function on upper trapezius trigger points in patients with non specific neck pain.

In group A, Paired‘t’ test concluded that there was a significant effect of integrated neuromuscular inhibition technique in reduction of pain and improvement of function in patients with non specific neck pain which was supported by previous studies as follows.

The benefit of the integrated neuromuscular inhibition technique approach may be in the add up of direct ischemic compression and ensuing tissue relaxation, owing to strain-counter strain. Ischemic compressions decrease the sensitivity of painful nodules in muscle. Local pressure may possibly equalize the length of sarcomeres in the concerned trigger point and thus decrease the pain. Furthermore, the subsequent tissue relaxation formed by attaining a position of trigger point ease due to strain-counter strain, has been proposed as a means of facilitating 'unopposed arterial filling' which allows for a decrease of tone in the tissues concerned. This decline in local tone additionally results in alteration of neural reporting and enhanced local circulation. These changes eventually aid in a resetting of the neural reporting structures, ensuing in an added normal resting length, enhanced circulation and reduced pain **(Amit V Nagrale et al., 2010)**

Integrated neuromuscular inhibition technique is advantageous than muscle energy technique alone to relieve pain, reducing stiffness, and gaining functional capability in individuals with upper trapezius trigger points. (**Aakanksha Joshi., 2010)**

In group B, Paired't' test concluded that there was a significant effect of TENS with passive stretching in reduction of pain and improvement of function in patients with non specific neck pain which was supported by previous studies as follows:

Transcutaneous electrical nerve stimulation (TENS) is very effective in the treatment of neck pain. It reduces pain in patient's spinal level by closing pain gate (**Hayes et al 1993**).

Conventional TENS relieves pain through a spinal cord gating mechanism. It stimulates the muscle through large diameter A beta and A Gamma fibers and close the gate to nociceptive(pain) transmission at the spinal cord level through a presynaptic or postsynaptic inhibitory events (**Melzack and Wall 1982**). Conventional TENS is an approach that activates the larger diameter peripheral nerve fibers to neuromodulate pain through a spinal neurochemical gating mechanism (**Howson 1978**).

TENS alone might be insufficient for the long-term treatment of myofascial pain because myofascial trigger point appeared to remain unaltered. The pain-reducing properties of TENS coupled with stretching would produce the desired effect of reducing pain and myofascial trigger point sensitivity. **(Graff-Radford 1989)**

Stretching of the muscles by means of either active (or) passive methods

is of use in treating both the shortness and trigger point as this can diminish the contraction (taut band) as well as increase circulation to the area (**Lean Chaitow 1996**)

Conventional TENS reduces pain by stimulating large diameter A beta fibers and close the pain gate for pain transmission. Passive Stretching of the upper trapezius lessen the contraction (taut band) as well as increases circulation to the area. Conventional TENS with passive stretching only reduces pain as well as contraction and increase the circulation. Where in INIT, an integrated approach includes ischaemic compression, strain – counterstrain and muscle energy technique (MET). Ischaemic compression decreases the sensitivity of painful nodules in muscle. Local pressure could equalize the length of sarcomeres in the concerned trigger point and thus reduce the pain. In addition to that, strain-counter strain lead to consequent tissue relaxation which is produced by attaining a position of trigger point ease. Muscle energy techniques are used to stretch tight muscles, mobilize joints and fascia and improve local muscle circulation.

Integrated neuromuscular inhibition technique works by a method of facilitating 'unopposed arterial filling' that allows for a reducing of tone in the involved tissues. This lessening in local tone further results in variation of neural reporting and better local circulation. These modifications eventually assist a resetting of the neural reporting structures, ensuing in a more normal resting length, improved circulation and decreased pain.

This study concluded that integrated neuromuscular inhibition technique (INIT) is more effective than TENS with passive stretching on upper trapezius

trigger points in reducing pain and improvement of function in patients with non specific neck pain.

VI-CONCLUSION

The aim of this study was to compare the effect of integrated neuromuscular inhibition technique and TENS with passive stretching on pain and function in patients with non-specific neck pain.

30 subjects were selected between the age group of 20-40 years after due consideration of inclusive and exclusive criteria. The subjects were allocated into two groups as group A and group B.

Group A received integrated neuromuscular inhibition technique and group B received TENS with passive stretching. The study duration was 4 weeks.

Before and after 4 weeks of the study, the outcome measures were recorded. Pain was assessed by using visual analogue scale and neck function by neck disability index scale.

Statistical analysis was done by using student‘t’ test. Paired‘t’ test was used to find out the improvement within the group. Unpaired‘t’ test was used to find out the difference between two groups.

The results showed that there was a significant difference between integrated neuromuscular inhibition technique and TENS with passive stretching in reducing pain and improving neck function in patients with non-specific neck pain.

This study concluded that effect of integrated neuromuscular inhibition technique (INIT) is more effective than TENS with passive stretching on upper trapezius trigger points in reducing pain and improvement of function in patients with non specific neck pain.

VII-LIMITATIONS AND RECOMMENDATIONS

- This study was done with small sample size and in further studies can be done on large populations to increase generalizability.
- Follow up can be done to find out long term results in further studies.
- Parameters such as pain felt during neck strength trials in different directions was assessed by visual analog scale (VAS) can be used. Pain can also be measured by numerical pain rating scale (NPRS).
- Range of motion by goniometer can also be done.
- Pressure pain threshold can also assessed by pressure algometer.
- Studies aimed to compare the effect of INIT with stretch and spray, hot packs, IFT, cryotherapy along with passive stretching in patients with non specific neck pain.

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APPENDIX

APPENDIX-I

NECK DISABILITY INDEX

The Neck disability index is an instruct to assess the neck pain complaints. It was developed from oswestry index for back pain disability index. The authors are from the Canadian memorial chiropractic college in Toronto, Canada.

The NDI has become a standard instrument for measuring self-rated disability due to neck pain and is used by clinicians and researchers alike.

Each of the 10 items is scored from 0 - 5. The maximum score is therefore 50. The obtained score can be multiplied by 2 to produce a percentage score. Occasionally, a respondent will not complete one question or another. The average of all other items is then added to the completed items.

Pain instructions:

The questionnaire has been desired to give the doctor information as to how your neck pain affected your ability to manage his everyday life. Please answer every section which applies to you. We realize you may consider that two of the statements in any one section relate to you which most closely describe your problem.

QUESTION 1: Pain Intensity

- A. I have no pain at the moment. (0 pts)
- B. The pain is mild at the moment. (1 pt)
- C. The pain comes & goes & is moderate. (2 pts)
- D. The pain is moderate & does not very much. (3 pts)
- E. The pain is severe but comes & goes. (4 pts)
- F. The pain is severe & does not very much. (5 pts)

QUESTION 2: Personal Care (Washing, Dressing etc.)

- A. I can look after myself without causing extra pain. (0 pts)
- B. I can look after myself normally but it causes extra pain. (1 pts)
- C. It is painful to look after myself and I am slow & careful. (2 pts)
- D. I need some help but manage most of my personal care. (3 pts)
- E. I need help every day in most aspects of self-care. (4 pts)
- F. I do not get dressed; I wash with difficulty and stay in bed. (5 pts)

QUESTION 3: Lifting

- A. I can lift heavy weights without extra pain. (0 pts)
- B. I can lift heavy weights, but it causes extra pain. (1 pt)

- C. Pain prevents me from lifting heavy weights off the floor, but I can if they are conveniently positioned, for example on a table. (2 pts)
- D. Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned. (3 pts)
- E. I can only lift very light weights. (4 pts)
- F. I cannot lift or carry anything at all. (5 pts)

QUESTION 4: Reading

- A. I can read as much as I want to with no pain in my neck. (0 pts)
- B. I can read as much as I want with slight pain in my neck. (1 pts)
- C. I can read as much as I want with moderate pain in my neck. (2 pts)
- D. I cannot read as much as I want because of moderate pain in my neck. (3 pts)
- E. I cannot read as much as I want because of severe pain in my neck. (4pts)
- F. I cannot read at all because of neck pain. (5 pts)

QUESTION 5: Headache

- A. I have no headaches at all. (0 pts)
- B. I have slight headaches that come infrequently. (1 pt)
- C. I have moderate headaches that come in-frequently. (2 pts)

- D. I have moderate headaches that come frequently. (3 pts)
- E. I have severe headaches that come frequently. (4 pts)
- F. I have headaches almost all the time. (5 pts)

QUESTION 6: Concentration

- A. I can concentrate fully when I want to with no difficulty. (0 pts)
- B. I can concentrate fully when I want to with slight difficulty. (1 pts)
- C. I have a fair degree of difficulty in concentrating when I want to. (2pts)
- D. I have a lot of difficulty in concentrating when I want to. (3 pts)
- E. I have a great deal of difficulty in concentrating when I want to. (4 pts)
- F. I cannot concentrate at all. (5 pts)

QUESTION 7: Work

- A. I can do as much work as I want to. (0 pts)
- B. I can only do my usual work but no more. (1 pt)
- C. I can do most of my usual work but no more. (2 pts)
- D. I cannot do my usual work. (3 pts)
- E. I can hardly do any work at all. (4 pts)
- F. I cannot do any work at all. (5 pts)

QUESTION 8: Driving

- A. I can drive my car without neck pain. (0 pts)
- B. I can drive my car as long as I want with slight pain in my neck. (1 pt)
- C. I can drive my car as long as I want with moderate pain in my neck. (2pts)
- D. I cannot drive my car as long as I want because of moderate pain in my neck. (3 pts)
- E. I can hardly drive my car at all because of severe pain in my neck. (4pts)
- F. I cannot drive my car at all. (5 pts)

QUESTION 9: Sleeping

- A. I have no trouble sleeping. (0 pts)
- B. My sleep is slightly disturbed (less than 1 hour sleepless). (1 pt)
- C. My sleep is mildly disturbed (1-2 hours sleepless). (2 pts)
- D. My sleep is moderately disturbed (2-3 hours sleepless). (3 pts)
- E. My sleep is greatly disturbed (3-5 hours sleepless). (4 pts)
- F. My sleep is completely disturbed (5-7 hours sleepless). (5 pts)

QUESTION 10: Recreation

A. I am able to engage in all recreational activities with no pain in my neck at all. (0 pts)

- B. I am able to engage in all recreational activities with some pain in my neck. (1 pt)
- C. I am able to engage in most, but not all, recreational activities because of pain in my neck. (2 pts)
- D. I am able to engage in only a few of my usual recreational activities because of pain in my neck. (3 pts)
- E. I can hardly do any recreational activities because of pain in my neck. (4 pts)
- F. I cannot do any recreational activities at all. (5 pts)

Simply add the score from your answers to the questions above and check the sum against the score.

Raw score	Level of disability
0-4	No disability
5-14	Mild disability
15-24	Moderate disability
25-34	Severe disability
35-50	Completely disability

APPENDIX II

INTEGRATED NEUROMUSCULAR INHIBITION TECHNIQUE.

PROCEDURE-

The trigger points to be treated within the upper trapezius muscle is identified by placing the subject in high sitting position to reduce tension in the upper trapezius muscle with their arm positioned in slight shoulder abduction with the elbow bent and hand resting on the stomach. Using a pincer grasp, the fibers of the upper trapezius are moved and made note of any trigger points.

Once the trigger point is identified, treatment is started with the ischemic compression.

Ischemic compression-

The subject will be positioned in the high sitting position, with the involved side exposed appropriately. The therapist will stand behind the subject. Slow and increasing levels of pressure will be applied until the tissue resistance barrier is identified. Pressure will be maintained until a release of the tissue barrier is felt. At that time, pressure will again be applied until a new barrier is felt. This process will

be repeated until tension/tenderness is unable to be identified or 90 s have elapsed, whichever would come first. All identified trigger points will be treated.

Strain- counter strain-

Ischemic compression is followed by the application of strain- counter strain . Moderate digital pressure will be applied to the identified trigger point. If pain is unable to be identified, pressure will be increased. If pain is reproduced, the pressure is maintained over the active trigger point as the position of ease is identified. The position of ease is often produced through positioning the muscle in a shortened/relaxed position. Ease is defined as the point where a reduction in pain of at least 70% is produced. For upper trapezius, high sitting with the head side bent towards the involved side while the practitioner positioned the ipsilateral arm in flexion, abduction and external rotation to reduce the reported trigger point pain. Once the position of ease is identified, it will be held for 20–30 s and will be repeated for three to five times.

MET-

Lastly, the subjects will receive MET direct towards the involved upper trapezius. The patient will be asked to take the stabilized shoulder towards the ear (a shrug movement) and the ear towards the shoulder. The degree of contraction will be mild and pain free (20% of maximum voluntary contraction). The contraction will

be sustained for 10 seconds and upon complete relaxation of effort, the therapist will gently ease the head/neck into an increased degree of side bending, flexion and ipsilateral rotation, where it will be stabilized, and the shoulder will be stretched caudally. The stretch will be maintained for 30 seconds and repeated three to five times per treatment session.

Duration of the treatment in a week- Alternatively 3 days for four weeks

APPENDIX – III

STRETCHING EXERCISES

Stretching – Passive stretching of the upper trapezius muscle for 30 seconds-30 sec hold x 3 repetition (3 times a week)

- Have the client lying supine on the couch with the head fully relaxed.
- Begin the technique standing at the end of the table, with one hand under the patients occiput.
- Slowly and carefully bring the patients head and neck into pain free flexion, contralateral side flexion and ipsilateral rotation. With the other hand apply an inferior pressure to the shoulder, drawing the scapula inferiorly.
- Perform the stretch in a gentle, sustained manner, always staying within the patients pain tolerance.
- Hold the stretch for approximately 30 seconds and then gradually release the stretch by returning the patients head, neck and shoulder back into the neutral position.
- Repeat the stretch a total of 3 times.

APPENDIX – IV

CONSENT FORM

This is to certify that I ---------- freely and voluntarily agree to participate in the study **"Effect of Integrated Neuromuscular Inhibition Technique Vs TENS with passive stretching in patients with upper trapezius trigger points in non- specific neck pain"**

I have been explained about the procedures and the risks that would occur during the study.

Participant:

Witness:

Date:

I have explained and defined the procedure to which the subject has consented to participate.

Researcher:

Date: