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A Study of Recent advance Treatments/Physiotherapy interventions on Non-specific Neck Pain: A Systematic Review

Dubey Karishma Satyaprakash[*,a], Smruti Swagatika Dash[b], Rajendra Kachhwaha[c]

[a]*MPT (First year), Narayana Hrudayalaya Institute of Physiotherapy, Bangalore-560 099, India.*
[b]*Professor, Narayana Hrudayalaya Institute of Physiotherapy, Bangalore-560 099, India.*
[c]*Principal, Narayana Hrudayalaya Institute of Physiotherapy, Bangalore-560 099, India..*

Abstract

Background: Non-specific neck pain (NS-NP) is a common reason for adults to consult health care providers. Therefore, one should always seek the most effective intervention(s) within the wide spectrum of treatments available. Equally important is to optimize evidence-based treatment decisions.

Results: Based on various articles, systemic reviews, comparative studies, and randomized control tests:Muscle Energy Techniques (MET) combined with Interferential Current Therapy (ICT) effectively reduces pain and muscle tenderness in chronic non-specific neck pain (NSNP), particularly in upper trapezius myofascial trigger points (MTrPs). This dual-action approach improves muscle function and addresses pain and inflammation, making it superior to MET alone or other treatments like manual therapy or Shortwave Diathermy.

Conclusion: The study concluded with reference to existing studies.Muscle Energy Techniques (MET) combined with Interferential Current Therapy (ICT) is one of the most effective and recent treatments for chronic non-specific neck pain (NSNP), particularly in addressing upper trapezius myofascial trigger points (MTrPs). This approach combines MET's ability to improve muscle function with ICT's effectiveness in reducing pain and inflammation, offering a comprehensive therapeutic solution. Its dual-action mechanism targets both the mechanical and neurological aspects of NSNP, making it a superior choice compared to MET alone or other modalities like manual therapy or Shortwave Diathermy.

Keywords: ROM (range of motion), NDI (neck disability index), VAS (visual analog scale), MET (Muscle energy technique), ICT (Interferential current therapy)

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*Corresponding author

1. Introduction

Neck pain is one the most common musculoskeletal disorders worldwide, with a reported 12 month prevalence ranging from 42 % to 62% in young adults. (1) Neck pain is highly prevalent affecting up to 50% of the population annually and now ranked 4th for global disability. It is also the most frequently reported musculoskeletal disorders encountered in clinical practice, with the mean lifetime prevalence of 50%. The lifetime incidence of mechanical neck pain is about 37% in general population globally. (2) It is associated with the disability and reduced quality of life and in young adult's neck pain has been shown to be a risk factor for reduced general work productivity. The onset of mechanical neck pain is insidious and varieties of factors such as poor posture, neck strain, and sporting or occupational activities are possible causes of neck pain. Also shortening of upper trapezius and levator scapulae muscles are the causes of restricted neck mobility. (3) Non-specific neck pain is defined as neck pain without any known structural or neurological factors to account for the pain and is commonly caused by postural and mechanical factors, it is also called mechanical neck pain. Visual Analog Scale (VAS) will be used for measuring the acute and chronic musculoskeletal pain. The level of pain intensity was measured using the VAS score range that is 0-10, with higher scores indicating more neck pain. There is a strong relationship between cervical disability and neck pain. Within the functional alterations, the active range of motion (ROM) is an important physical variable for daily life activities and it aids in stabilizing and orienting the head. It has been proven that the cervical ROM decreases in patients who have neck pain, which

may be related to the degree of pain and cervical functionality. (4)

The neck consists of 7 cervical vertebrae (C1-C7), which are connected by facet joints. Common neck pain (NP) causes include osteoarthritis (joint degeneration) and muscle/tendon strains or ligament sprains from overstretching. Cervical nerves (C1-C8) control head movement, shoulder elevation, arm strength, and hand functions. For example, C5 controls the deltoid (shoulder) and biceps, while C8 controls finger movements. Compression or irritation of these nerves can cause pain, tingling, or weakness in the arms and hands. (4)

Common neck issues include osteoarthritis, muscle/tendon strains, and nerve compression, often from disc problems or arthritis. These can lead to pain, stiffness, or neurological symptoms depending on which nerve is affected. (4)

1.1 Common causes for non specific neck pain include (4):

- Muscle strains
- Weakness
- Worn joints
- Nerve compression
- Injuries
- Diseases

1.2 Intervention for non-specific neck pain:

Acute NP

- Interventions: Thoracic manipulations, neck ROM exercises, scapulothoracic and upper extremity strengthening, cervical manipulation/mobilization.
- Adherence: Improved with thoracic manipulation, neck ROM exercises, and scapulothoracic and upper extremity strengthening.

Subacute NP

- Interventions: Neck and shoulder girdle endurance exercises (e.g., chin tuck endurance exercises), thoracic manipulation, cervical manipulation/mobilization.

Chronic NP

- Interventions: Multimodal management including thoracic and cervical manipulation/mobilization; mixed exercises (neuromuscular, stretching, strengthening, endurance, aerobic conditioning, cognitive affective elements); intermittent mechanical/manual traction.
- Additional Treatment: Dry needling is effective for short-term and long-term relief in pain intensity, mechanical hyperalgesia, neck active range of motion, neck muscle strength, and perceived neck disability.

1.3 Need of the study:

Non-specific neck pain (NSNP) is a common and disabling condition that significantly impacts quality of life, work productivity, and healthcare costs. Despite various treatment options, there is no consensus on the most effective interventions, and NSNP often becomes chronic, leading to ongoing pain and disability.

Recent advancements in physiotherapy, including manual therapy, exercise programs, cognitive-behavioral therapy (CBT), and neuromuscular training, show promise in managing NSNP. However, their effectiveness and optimal combinations are still unclear. A systematic review is needed to consolidate evidence, assess the latest treatment techniques, and provide clear, evidence-based guidelines for clinicians to better manage NSNP.

The goal is to identify which physiotherapy interventions are most effective, explore integrated approaches, and fill gaps in the current literature to improve patient outcomes and guide future research.

2. Methodology

2.1 Inclusion criteria:

- Population: non-specific neck pain aged between 18 to 40 years.
- Both genders included.
- Subjects with pain intensity more than 4 in VAS scale.
- History of neck pain, decreased cervical ROM included.

2.2 Exclusion criteria:

- History of trauma or accidental injuries.
- History of surgery on cervical region .
- Existence of disc prolapse, tumor in cervical spine, whiplash injury, tumors / malignancies.
- Subject with mental disorders.

3. Discussion

Recent studies on chronic non-specific neck pain (NSNP) have explored various treatment options with mixed outcomes. It was found that exercises like motor control, yoga, Pilates, Tai Chi, and Qigong are effective (5), though the evidence quality is low. It was highlighted that combining Muscle Energy Techniques (MET) with Interferential Current Therapy (ICT) is more effective (6) than MET alone in reducing neck pain and muscle tenderness. It was reported that dry needling offers moderate short-term pain relief but is less effective (7) compared to other therapies in the long run. It was shown that Kinesio taping helps (8) reduce pain and joint position errors, though it does not improve disability scores. McConnell taping combined with scapular exercises was found to be more effective than exercises alone for reducing pain and disability. (9) Similarly, adding Interferential Current Therapy (IFC) to exercise therapy improved pain and disability but not cervical range of motion. (10)

It was also found that IFC therapy was more effective (11) than Shortwave Diathermy for improving pain and function. VR therapy, while effective for reducing pain-related fear of movement, was not superior to exercise in most outcomes. (12)

Table 1. Type of study, Participants Details and study result

Sr.No	Type of study and year	Participants details	Treatment/ Interventions Outcome measures	Results
1	Systemic review and meta analysis, 2020 (5)	INCLUSION - ● Age - More than or equal to 18 years of age group chronic non specific neck pain. ● Any physical exercise intervention, or a control group, sham group, placebo group or no-treatment group. EXCLUSION- ● Participants younger than 18 years, non-human participants, participants with traumatic neck pain (eg, whiplash associated disorder) or participants with specific pathology (eg, cancer). ● Studies reporting primary complaints other than neck pain, such as post-concussion syndrome, headache and migraine, were excluded	GROUP A- with no treatment. GROUP B- With motor control, yoga/Pilates/Tai Chi/Qigong and strengthening exercises.	The findings of this NMA indicate that there is not one superior type of exercise for people with chronic non-specific neck pain. Rather, compared with 'no treatment' some exercise types have positive effects on pain intensity and pain-related disability, including motor control, yoga/Pilates/Tai Chi/Qigong and strengthening exercises. Other types of physical exercise were less consistently effective, and some interventions (range of motion, balance and multimodal exercises) were found to be not effective. Comparing all interventions against each other did not identify which types of exercise were superior to others. These novel findings may assist clinicians to choose an appropriate exercise intervention for individuals with chronic non-specific neck pain, while recognizing that the certainty of evidence included in the two NMAs is very low.
2	Randomized control trial , 2019 (6)	INCLUSION - ● Males between the age group of 19-38 years. ● Subjects with neck pain, muscle aches over shoulder girdle. ● Muscle tenderness over upper trapezius with active trigger points. EXCLUSION- ● Subjects diagnosed with fibromyalgia syndrome. ● Subjects having an active trigger point over bilateral upper trapezius. ● Subjects having history of whiplash injury, cervical spine surgery.	GROUP A- Received hot pack and active stretching exercises for upper trapezius muscles followed by ICT and MET. GROUP B- Received all exercises like group a except ICT GROUP C- Received all exercises like group b except MET.	This study validated our hypothesis and concluded that MET plus ICT is more efficacious than MET alone in reducing neck pain and muscle tenderness in male patients with upper trapezius active MTrPs. Its immediate and short-term effects established this combination therapy as a prime treatment plan in the clinical setting to counteract the neck pain and muscle tenderness due to active MTrPs. (e clinical relevance of our findings to practice is that MET plus ICT is highly effective in dismissing MTrPs pain within a very brief period of time, is cost effective, is noninvasive, and achieves relief without causing much pain.
3	Systematic review and meta analysis, 2020 (7)	INCLUSION- ● Adults older than 18 years old with at least at one active TrP in the cervical muscles associated with neck pain symptoms	● Dry needling of muscle or tendon. ● Acceptable comparators were any sham or placebo	This systematic review and meta-analysis found moderate-to-low evidence suggesting that dry needling can be effective for improving neck pain intensity and related disability when compared with a comparative

		• One group receiving muscle/tendon dry needling. • Neck pain intensity or pain-related disability as one of the primary outcomes of the study. • Secondary outcomes included sensitivity to pressure pain (e.g., pressure pain thresholds) or cervical range of motion (e.g., as assessed with a goniometer). EXCLUSION- • Trials including participants with neurological-related pain (e.g., post-stroke pain). • Postoperative cervical pain • The use of needling interventions different than dry needling, e.g., acupuncture or wet needling (e.g., lidocaine injection).	dry needling, any control group without intervention, or any other type of physiotherapy intervention. Interventions should be applied in isolation (self-stretching was permitted).	group immediately after and at short-, but not at mid-, term follow-ups in people with myofascial TrPs associated with neck pain symptoms. The effects were mostly observed when dry needling was compared with sham/placebo/waiting list/other forms of dry needling but not against other physical therapy interventions. No significant effects on the pressure pain sensitivity or cervical range of motion were found. The RoB of the clinical trials included was relatively low, but the inconsistency (heterogeneity) and imprecision of the results downgraded the level of evidence.
4	Randomized, placebo controlled trial, 2020 **(8)**	INCLUSION- • Participants who had been diagnosed with mechanical neck pain, aged above 18 years, and who were willing to participate. EXCLUSION- • Participants with a history of whiplash or cervical surgery, diagnosis of fibromyalgia, cervical myelopathy, or any tape allergies, or those who had previous Kinesio™ tape applications to the cervical region.	The participants sit in an upright position with their necks flexed and their chins touching their chests. Following this, the split ends (Y-strip) of the tape were stretched by 15 to 25% of the tape's resting length and they were pasted up and over either ridge of the spine, covering the cervical musculature. The first strip of Kinesio™ tape extended from T1–T2 of the thoracic region to C1–C2 of the cervical region. The second layer was an overlaying I-strip placed perpendicularly to the Y-strip, covering the maximum posterior cervical musculature at maximum tension to the mid-cervical region (C3–C6). The Kinesio tape was stretched from both ends, and the middle portion of the tape was stuck first, after which tension was released to apply the ends without stretching. The placebo group received Kinesio tape application with the Y- and I-	Kinesio tape application significantly decreased joint position errors and VAS scores at the 3rd-day and 7th day follow-ups compared to the placebo group. However, we found no differences between the two groups when it came to improving the NDI score after the 3rd-day and 7th-day of tape application. Kinesiotape is an adjunct modality that one could use in combination with exercises in treating athletes with mechanical neck pain for better outcomes.

			strips, resembling the real application though with no tension placed on the cervical muscles. Moreover, the practitioner placed the cervical spine of the placebo participants neutrally while applying the tape. The Kinesio tape was applied to both groups at the beginning of the testing day and reapplied every two days over the course of a week.	
5	Randomized control trial , 2023 **(9)**	INCLUSION- ● Age range from 18-30 years old from both genders. ● A history of cervical pain for three months or more, moderate pain intensity (>3 on VAS). ● Positive lateral scapular slide test (distance more than 1 5 cm or 15mm between RT and LT side at one or more of the three positions) with type I or II scapula dyskinesis. EXCLUSION- ● Any previous shoulder or neck surgery, poor general health status interfered with the exercises during the study, cervical fractures or trauma history , previous temporomandibular surgery or dysfunctions, idiopathic scoliosis, extreme thoracic kyphosis, torticollis,neurologic diseases, discogenic problems, osteoporotic patients or vertebral basal insufficiency , and any skin problem (skin diseases or skin infection) in the shoulder or scapular region.	GROUP A (Control)- Patient performed selected scapular exercises which include scapular stabilization exercises and scapular strengthening exercises with stretching exercises of upper trapezius muscle and Levator scapula (3 sessions per week for 6 weeks). GROUP B (experimental)- Patients were received McConnell taping in addition to selected scapular exercises include scapular stabilization exercises and scapular strengthening exercises with stretching exercises of upper trapezius muscle and Levator scapula.	In the present study, it could be seen that McConnell taping was more effective with scapular exercises on pain and level of disabilities in patients of chronic non-specific neck pain with scapula dyskinesis than scapular exercises alone. So, using McConnell taping combined with scapular exercises may be a major strategy in dealing with chronic non-specific neck pain patients with scapula dyskinesis.
6	Randomized controlled trial,2021**(10)**	INCLUSION- ● Adults with NSNP (grades I or II), with or without radiating pain to the head, trunk or upper extremities for at least 12 weeks duration. ● Neck symptoms had to be evoked by postures, movements, and/or palpation. EXCLUSION- ● History of severe traumatism or surgery in the neck region; fear of treatment with electrical	GROUP A- therapeutic exercises plus IFT, Participants remained in a comfortable sitting position. Self Adhesive electrodes of 9 x 5 cm were placed approx. 3 cm below the transverse processes of C5 and at both sides of the transverse processes of C7.	Adding IFC to a 2-week exercise therapy regime demonstrated higher clinically effectiveness immediately after intervention, compared with the sole use of exercise, to decrease neck pain intensity and disability, but not to improve active cervical ROM in adults with chronic NSNP.

		currents. ● Diagnosis of cervicogenic headache or dizziness; medical signs or symptoms suggestive of a non-musculoskeletal source for the neck pain; cervical myelopathy or spinal stenosis. ● Any contraindication to IFC, e.g., use of metallic implants; diagnosis of visceral pain referred to the neck; and pregnancy or breastfeeding.	GROUP B- only therapeutic exercise which was an individualized program, adapted to each participant's perceived fatigue, pain and strain tolerance, and primarily included neck-shoulder strengthening and stretching exercises, and ergonomic advice. All exercises were repeated in 3 sets of 3 to 5 repetitions. During the initial 2 sessions, participants performed active bilateral stretching of the upper trapezius, levator scapulae, scalene, and sternocleidomastoid muscles, and received educational and postural advice to manage their pain. From the third session on, these activities were combined with strengthening exercises of the same neck-shoulder muscles (isometric and eccentric training). Each movement was held between 3 to 10 seconds. We included functional neck movements in different directions, together with oculomotor training (e.g., saccadic eye movements; and smooth pursuit exercises.The duration of the exercise therapy was progressively increased (from 25 min the first 2 sessions, up to 45 min during the last sessions).	
7	Randomized control trial,2020 **(11)**	INCLUSION- ● Patients diagnosed with mechanical neck pain. ● Gender-Both male and female EXCLUSION- ● Patients with cervical Radiculopathy ● Cervicogenic headache ● Trauma to neck ● Vertebro-basillary artery insufficiency ● Thoracic Outlet Syndrome ● Any traumatic or non-traumatic shoulder	Group- A [SWD + conventional therapeutic exercise group]Patients in the group 1 were administered Short wave diathermy along with conventional therapeutic exercise group for mechanical neck pain. Group- B [IFT + conventional therapeutic exercise group] Patients in the group 2 were administered	From the present study, it can be concluded that either Shortwave Diathermy or Interferential Therapy can be used as an adjunct to therapeutic exercise to improve pain and function in patients with Mechanical Neck pain. But for greater improvement in pain and function, Use of Interferential Therapy can be considered more effective.

		disorders	interferential therapy along with conventional therapeutic exercise group for mechanical neck pain. Patients in both the groups were advised to follow ergonomic advice and apply hot water fomentation if required.	
8	Randomized Clinical Trial,2020 (12)	INCLUSION- ● Non-specific chronic neck pain ● Age 18 to 65 years ● Both gender included EXCLUSION- ● Pregnancy ● Specific neck pain caused by metastasis, neoplasia, infectious or inflammatory disorders, bone fractures or traumatic precedents with neck injuries. ● Positive neurological signs or evidence of spinal compression. ● Cervical osteoarthritis, spondyloarthritis. ● Neck pain associated with vertigo (vestibular involvement). ● Cervical surgeries. ● Headaches prior to the onset of neck pain and without cervical origin;	GROUP A- In the first sessions, the patients were instructed to perform a previous cranio-cervical flexion before starting any movement. Then, the therapist controlled the contraction of the superficial musculature with their hands. Gradually, the aid of the physiotherapist was removed so that the participants could integrate deep muscle contraction and the correct cranio-cervical posture innately. For these patients to carry out the same work as the control group. The physiotherapist counted and controlled in each exercise the number of movements the patient performed, in order to not exceed the dose proposed: 3 series of 10 repetitions of each exercise with 30 s rest between exercises. GROUP B-This group performed three series of 10 repetitions of every exercise, with a 30 s rest between exercises. The researcher provided the necessary verbal corrections for the proper execution of the exercises, using the same verbal commands for all participants. Flexion exercise: in a sitting position, a ball was placed between the wall and the neck of the patient that performed a controlled neck flexion with a previously	VR was not superior to exercise in improving pain intensity, CPM, ROM, neck disability, pain catastrophizing, fear-avoidance beliefs, PPT or anxiety in patients with NS-CNP. Kinesiophobia was the only variable that showed differences between VR and exercise at 3 months, with a decrease of almost 10 points in the VR group versus a decrease of less than 4 points in the exercise group. Therefore, immersive VR showed to be a more effective tool for reducing the pain-related fear of movement in NS-CNP.

			maintained cranio-cervical flexion. Extension exercise: in a sitting position, the participant was asked to perform a controlled neck extension and a cranio-cervical flexion before returning to the initial position. Rotation and tilt exercises: in a sitting position, the subject who had previously done a cranio-cervical flexion to activate the deep flexor musculature was asked to perform the movement.	
9	Randomized controlled trial,2020 (13)	INCLUSION- ● Age 18–50 years ● Current neck pain ● Neck Pain continued for at least the last 12 weeks . EXCLUSION- ● Irradiated neck pain ● Neck pain associated with vertigo ● Osteoporosis ● Diagnosed psychological disorders ● Vertebral fractures ● Tumors ● Diagnosed metabolic diseases ● Previous neck surgery ● Red flags (night pain, severe muscle spasm, loss of involuntary weight, symptom mismatch) ● Physiotherapeutic treatment continued in the last 3 months.	GROUP A-Manual therapy this protocol was composed of three techniques based on scientific evidence for the treatment of neck pain. High thoracic manipulation on T4, Cervical articular mobilization, Suboccipital muscle inhibition (3 min). GROUP B- Therapeutic exercises this protocol is based on a progression in load composed of different phases: at first, activation and recruitment of deep cervical flexors, secondly, isometric exercise deep and superficial flexors co-contraction, and finally, eccentric recruitment of flexors and extensors.	Both experimental treatments, manual therapy and therapeutic exercise, produce statistically significant and clinically relevant changes with respect to the control group. There are no statistically significant differences between the experimental groups in the short and medium terms. The therapeutic exercise group reduces cervical disability before manual therapy group does. The manual therapy group reduces pain perception more than the therapeutic exercise group does.
10	Intervention study,2024 (14)	INCLUSION- ● Subjects with mechanical neck pain. ● Pain level of mild to moderate: VAS < or = 6 ● Age 20 to 50 years. ● Inability to perform ADL without pain EXCLUSION- ● Subjects with non-musculoskeletal pain, signs of neurological involvement, cervical disc prolapsed, spinal stenosis, previous neck	Group A were treated with a common protocol of High velocity thoracic thrust in which the patient was placed in a prone position with head in neutral position. The chin was supported on the bed. Hands were placed relaxed on both sides. Then, the Patient was asked if he/ she was	The result suggested that combination of thoracic manipulation with isometric neck contractions with craniocervical flexion in two positions of disability for both the groups showed significant effectiveness in increasing the deep neck flexor muscles endurance, VAS in pain and neck functional disability index score. The results of the study suggested that there was significant difference between the difference in mean values of pain and disability between group-A&B. The

		surgery, history of cervical trauma, history of whiplash disorder, spasmodic torticollis, frequent migraine, peripheral nerve entrapment, fibromyalgia, non-cooperative patient, carcinoma, cervical radiculopathy.	comfortable or not. The therapist in the meantime, placed himself on the couch upon the patient. The patient was asked to inhale slowly through nose and exhale out slowly but completely. Therapist then put his thenar and hypothenar eminence over the desired thoracic level. The therapist then exerted pressure over the first exhalation and then increased with the second one. At the end of the third exhalation, the therapist applied the high velocity thrust to the desired thoracic level when the patient had completely exhaled out. Then this group was treated with isometric neck contractions, the subjects were instructed to do isometric contraction for neck flexors, extensors, and side flexors. GROUP B, were also treated with the common protocols of High velocity thrust and isometric neck contractions. However, in this group the craniocervical neck flexion was now done in prone on elbow position. Here the subjects were trained to perform 'chin tucks' in supine lying position as a part of familiarization of procedure. As the experimental treatment, the 58 subjects were positioned in a sphinx position (prone on elbow) with shoulder protracted & neck in neutral. A command was given to "Tuck in your chin and hold" which was given to them by the instructor. This position was maintained for 10 seconds.	findings also suggested that there was significant difference within group-A, group-B for pain and disability.

Both manual therapy and therapeutic exercises were effective in reducing pain and disability, with no clear superiority between the two. (13) Lastly, It was demonstrated that combining thoracic manipulation with neck exercises improved pain, disability, and muscle endurance. (14)

Recent studies indicate that Muscle Energy Techniques (MET) combined with Interferential Current Therapy (ICT) is among the most effective treatments for chronic non-specific neck pain (NSNP). This approach targets both the mechanical dysfunction of muscles and the neurological components of pain and inflammation. MET enhances muscle flexibility and function, while ICT reduces pain and muscle tenderness through electrical stimulation. This combination has shown superior results compared to MET alone and is particularly effective for patients with active myofascial trigger points in the upper trapezius, making it a comprehensive and promising option for managing NSNP.

4. Conclusion

Muscle Energy Techniques (MET) combined with Interferential Current Therapy (ICT) is one of the most effective and recent treatments for chronic non-specific neck pain (NSNP), particularly in addressing upper trapezius myofascial trigger points (MTrPs). This approach combines MET's ability to improve muscle function with ICT's effectiveness in reducing pain and inflammation, offering a comprehensive therapeutic solution. Its dual-action mechanism targets both the mechanical and neurological aspects of NSNP, making it a superior choice compared to MET alone or other modalities like manual therapy or Shortwave Diathermy.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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