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Integrated Neuromuscular Inhibition Technique for Myofascial Trigger Point Pain Relief: A Systematic Review of Evidence Based Research

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Abstract

Background: An injury to the muscles resulting in the presence of trigger points is known as myofascial pain syndrome. Compression, stretching, overloading, or contracting trigger points can cause hypersensitivity and pain within taut bands of skeletal muscle. These points can cause referred pain that is felt at a distance from the trigger point and can also restrict movement and limit functional activities. Myofascial pain syndrome treatment should address trigger points within a comprehensive program. There are various manual and non-manual interventions available that can help to deactivate trigger points and alleviate the associated pain and discomfort.

Objective: This study seeks to investigate the latest research on myofascial trigger points and evaluate the effectiveness of integrated neuro-muscular inhibition.

Method: The effectiveness of Integrated Neuromuscular Inhibition on myofascial trigger points in a general population was assessed through systematic literature review. Using the PEDro methodological quality scale, two authors independently evaluated the methodological quality of each randomized controlled trial. In order to identify articles meeting the inclusion criteria, the primary researcher reviewed their titles and abstracts.

Results: In comparison with alternative interventions, an integrated approach (INIT) for treating TrPs in patients with neck pain has demonstrated greater efficacy in reducing pain, improving functional ability, reducing disability and enhancing quality of life

Conclusion: This review's findings add to the increasing body of evidence that endorses the utilization of INIT for individuals who have active TrPs.

Keywords: Myofascial Trigger point, Integrated Neuromuscular Inhibition Technique, Myofascial pain

1. Introduction

Myofascial pain syndrome is frequently regarded as a source of musculoskeletal pain by IASP (International association for the study of pain) (Castaldo, M. et al.,2014). A trigger point is an irritable area of tissue found within taut bands of skeletal muscles that becomes painful upon stretching, overloading, compression as well as contracting (Chaitow, L 1996). Symptoms produced by active trigger points can be reproduced by satellites and latent trigger points may become active over time (D'souza et al., 2020). Muscle imbalances, weakness, and impaired motor recruitment are all symptoms of trigger points, disrupting muscle function and placing excessive stress on joints (Handwerker, H., & Arendt-Nielsen, L 2013).

As trigger points can cause pain, limit range of motion, and limit functional activity, they are an essential part of a comprehensive physical therapy program. In order to deactivate trigger points, a variety of manual and non-manual interventions are available, including botulism injections, dry needling, acupuncture, ethyl chloride spraying and stretching techniques, muscle energy techniques (MET), strain-counterstaining (SCS), myofascial release, proprioceptive neuromuscular facilitation, and ischemic compression (Lytras D et al., 2020).

An integrated approach to myofascial trigger point release is achieved by combining several manual therapy techniques under the name INIT (Integrated Neuromuscular Inhibition Technique). The technique combines MET and SCS with ischemic compression in one coordinated technique (Nagrale A V et al., 2010). It has been

shown that these techniques individually are effective in treating chronic myofascial pain syndromes, but there is no evidence that these approaches are effective when combined. Myofascial trigger points warrant further study to determine whether this integrated regimen has a beneficial effect.

2. Methodology

The systematic literature review assessed the effectiveness of INIT for treating myofascial trigger points in the general population. The following electronic databases were screened: PubMed/Medline, Google Scholar, CINAHL, and Research Gate. MeSH terms such as "trigger point," "Myofascial pain syndrome," "musculoskeletal pain," and "Integrated neuromuscular inhibition technique" were used in the search strategy. The search was limited to papers published between 2015 and 2020, in English language, and involving only human subjects.

Identifying the articles that met the inclusion criteria was done by reviewing the titles and abstracts. To determine which articles met the inclusion criteria, the researchers independently reviewed the abstracts of the remaining articles. A reviewer or reviewers will discuss any discrepancies until they are satisfied that it should be included.

Inclusion and Exclusion Criteria Only experimental studies such as Randomized Controlled Trials (RCTs) and pre-test/post-test studies were included. The inclusion criteria were as follows: a) full-text available articles; b) studies published from 2015 to 2020; c) studies including only the general population over 18 years of age; and d) studies providing a detailed description of the type of intervention conducted, measures, and results. Research involving animals, writing results in a non-English language, and studies involving animal testing were excluded.

On a spreadsheet, primary authors recorded information regarding study designs, study populations, sample characteristics, objectives, outcome measures, and results. Using the PEDro scale, two authors independently assessed the methodological quality of each RCT. An overall quality score of 6-10 indicates excellent quality, a score of 4-5 indicates fair quality, and a score of less than or equal to 3 indicates low quality.

A qualitative synthesis of the studies has been presented based on the differences in the design, the outcomes, and the objectives between the studies.

105 records were screened for titles and abstracts based on the initial 900 records. 500 duplicate records were removed and 500 duplicates were excluded. Full-text reviews were conducted on 30 of these studies. It was concluded that eleven studies were eligible for inclusion in this review.

3. Study characteristics

There were eleven studies that met the inclusion criteria in this review, involving 332 participants with neck pain, including chronic mechanical pain, active upper trapezius trigger points, and non-specific neck pain. A total of 20 to 60 patients were included in the studies. Various interventions were compared with the integrated neuromuscular inhibition technique, including exercise programs, Kinesiotaping techniques, specific strength training programs, ischemic compression, trigger point release, dry needling, muscle energy techniques, passive stretching, and TENS.

3.1 INIT's effects over pain intensity

Nagrale, A. V. et al., 2010 found that all eleven studies increased pain intensity significantly. As compared with baseline, the IG only experienced a 46% reduction in VAS score (24.95 mm) while the CG only experienced a 70% reduction (38.14 mm). There was a statistically significant difference between the groups beginning in the second week and lasting until the 32nd week.

A significant difference was also found between the groups in terms of pressure pain thresholds (PPT). Between the second and 34th weeks, the right upper trapezius and left SC values notably increased. In the 10th week, the IG saw a 61.61% rise (+1.83 kg/cm^2) in right trapezius, while the CG had a 39.06% increase (+1.09 kg/cm^2). Similarly, the left SC for the IG increased by 50.62% (+1.62 kg/cm^2), and the CG by 37.74% (+1.17 kg/cm^2). These differences were statistically significant (P <0 .05, 95% CI).

During the fourth and sixth weeks, PPT of the right and left levator scapulae and SCM significantly increased (P < .05, 95% CI).

According to Castaldo, M et al., 2014, all three groups had significantly decreased VAS scores. Patients with upper trapezius active trigger points (Group A) were compared with patients receiving ischemic compression and trigger point release (Group B). Pain scores were significantly reduced between pre-treatment and post-treatment for both groups, but in Group A the p-value was <0.0001, which indicates that INIT is highly effective. VAS changes of 3.3 units (6.9-3.6) showed a significant reduction in pain in the study.

Another study found that INIT and strength training significantly reduced pain by 4.8mm in the experimental group, compared with 1.47mm in the control group. As a result of both dry needling and trigger point compression in a study conducted by Maryam et al., 2018, significant improvements were observed in pain intensity scores. In comparison with pre-treatment scores, VAS scores were lower after a week, two weeks, and three months of treatment. Both groups experienced significant differences in VAS scores after three treatment sessions. At any point in time (one week, two weeks, or three months), there were no significant differences between the groups for variables like VAS, DASH, and NPQ.

Based on a study conducted by Nithya Ponni Priya, A 2016, Group A (experimental group) experienced significant pain reduction compared to Group B (control group), where the mean VAS score at baseline was 5.87 for Group A and 5.80 for Group B. At the end of the third and sixth sessions, Group A showed significant improvements in VAS score compared to Group B.

As in Wakde, P., & Anap, D (2016). the intervention group experienced a significant reduction in pain intensity immediately following their treatment (P=0.01) and 24 hours later (P=0.009).

3.2 INIT effect over disability

Disability was assessed in eight out of eleven studies using the Neck disability index and in one study using the Neck pain questionnaire.

According to Lytras, D.E et al.,2020, the Neck Disability score declined more in the intervention group after the intervention than it did in the control group from the sixth week until the 34th week (P <0.05, 95% CI).

The Arabic neck disability index (ANDI) was used by Asayama et al 2019 to examine the differences between the three groups before and after treatment. Before treatment, no significant differences were found between the three groups (p <0.007), but after treatment, significant differences were found between the three groups (p <0.001).

It was found that the experimental group had a greater mean difference than the control group for neck disability index, as found by Nagrale, A.V. et al 2010. Group A and Group B did not differ statistically significantly for NDI score (p<0.635).

According to Maryam et al., when comparing pain intensity, neck disability, and DASH scores before and after treatment, there was a significant change in each group.

A study by Nithya Ponni Priya, A. 2016 found significant differences between Group A and Group B in terms of functional disability, with Group A showing a significant reduction in disability. A study by Shinde,K., & Karpe, M 2019 found that NDI Group A had significant improvements at the before, third, and sixth sessions compared with Group B. According to Shivakumar et al 2019, the integrated neuromuscular inhibition technique (INIT) improved function in patients with nonspecific neck pain better than TENS with passive stretching.

3.3 INIT effect over cervical range motion

With integrated neuromuscular inhibition technique, cervical range of motion was improved in five out of eleven studies. Lytras, D.E et al 2020 found a statistically significant correlation between all range of motion measurements, except flexion (P <0.05, 95% CI).

There was a greater improvement in left-side bend range of motion among the integrated neuromuscular inhibition technique group from the 6th to 10th week, but not in extension range of motion (P <.05, 95% CI)).

Additionally, Asayama et al 2019. found significant differences between groups in all post-treatment variables throughout the study ($p<0.05$) as well as a significant change within-group ($p<0.05$).

An intervention group showed better cervical range of motion results than the control group in a study by Jyothirmai et al 2018.

Using the integrated neuromuscular inhibition technique, Shinde, K., & Karpe, M. 2019) demonstrated that the cervical lateral flexion of the right was improved by 6.5 degrees (33.3-39.8), the cervical lateral flexion of the left was improved by 6.5 degrees (33.3-39.8), the cervical rotation of the right was improved by 8.1 degrees (65.5-73.6), and the cervical rotation of the left was improved by 8.3 degrees (66.3-74.6).

Nithya Ponni Priya, A. (2016) found that group A improved the cervical range of motion significantly more than group B following a neural inhibition technique.

3.4 INIT Effect over quality of life

It was determined that the intervention group had a statistically significant difference in quality of life from the control group in the study by D'souza, C. J et al 2020. Specifically, the IG scored higher in "Total Physical Health" and "Bodily Pain" categories between the 10th and 34th weeks ($P < 0.05$, 95% CI). "Total Physical Health" in the 10th week increased by 50.44% (+20.05) compared to baseline, but by only 21.04% (+8.25) for CG. Additionally, the IG gained more points for "Total Mental Health" only in week 34 ($P < 0.05$, 95%CI).

TABLE: 1. List of journals reviewed and used in the study

First Author (Year & Country)	Primary Endpoint	Blinding	Method of Randomization	Withdrawals Described	Neck pain Duration	Neck pain Diagnosis	Inclusion Criteria	Patient Demographics	Placebo type	Intervention Approach& Apparatus	Result (Time to follow-up)
Dimitrios E. Lytras Greece 2020	Improvement in VAS scale, Neck disability index & SF-36	Masked assessor	Opaque sealed numbered envelopes with coded treatment	Yes: 02 in control group & 02 in interventional group	3 Months	AT least 01 active/Latent MTrp In levator scapulae, upper trapezius, splenius capitis & sternocleidomastoid, X-ray, Mri, Medical referral	Men & women 30-60y ears	Mean age 46y In IG group & 45Y IN CG Men & women 75% in both groups	Therapeutic Exercises breathing exercises & gentle stretching for 15 mins	Therapeutic exercises & INIT Wagner digital Algometer	INIT improved health related QOL (34 weeks)
Zahra Saadat Iran 2018	Reduced pain intensity in numerical pain rating scale, Pressure pain thresh	Therapist	Computer generated randomization table	No	Greater than 3 Months	Active TrPs by a experienced therapist	Women 20-30 years	Mean age 24y in IG group & 23y in CG group	No INIT Technique Algometer treatment	16/16	Reduction in pain intensity,No reduction in ppt (1 session)

	old										
Shagun Aggarwal India 2018	Improvement in VAS scale & Neck disability index	NA	Simple random sampling	Yes: 02 in IG group (Due to transport difficulty).01 in control group (Due to exams scheduled)	Greater than 2 weeks	Neck disability index greater than 20% & VAS below 70mm in 100 mm scale, upper trapezius trigger point	Men & women 18-35 years	Mean age 25y in IG group & 26y in CG group 18 Males & 12 Females	Neck strengthening exercises, Scapular stabilization exercises, shoulder stabilization exercises postural correction & ergonomic advice	15/15	
Maryam Ziaeifar Iran 2019	Improvement in VAS, NPQ & DASH	NA	Coin tossing method For randomization	Yes: 02 in trigger point compression group	NA	Presence of palpable taut band in upper trapezius, hypersensitive tender spot, Reproduction of typically referred pattern of MTrp	Women 20-48 years	Mean age 26y in Trigger point compression group 30y in dry needling group		17/16	
Alshaymaa S Abd El-Azeim Egypt 2018	Improvement in VAS, Arabic Neck disability index, Cervical ROM	Patient NA	Simple random sampling with sealed envelopes Systematic random sampling	No withdrawls	Less than 3 months	Pain at rest, Jump sign at pressure, limited ROM & referred pain, Active trigger points at upper trapezius bilaterally	20-40 years Male & females	Mean age 22y in Group A (INIT), 23y In Group B (Kinesio Tape), 23y In Group C (Control group)	Trigger point Compression	Group A=20 1 month 3times/week Group B= 20 1 month 2times/week , Group C=20	
A. NITHYA PONNI PRIYA INDIA 2016	Improvement in VAS scale, Cervical ROM & MMT	NA	Simple random sampling	No withdrawls	NA	Non-specific neck pain with upper trapezius trigger points, local tenderness, jump sign, muscle spasm	Males & females	Group A Tens with INIT Group B	Ergonomic Advice	Group A= 15, once a day, 3 days a week for 4 weeks , Group B= 15, 4 weeks	
B.Jyothirmai INDIA 2015	Impro	NA		No withdrawls							

	vement in VAS, NDI		Convenient Sampling	No withdrawls	Less than 3 Months	Taut band over trapezius muscle		Group A INIT+ Specific Strength training, Group B INIT	INIT		
C.Sivakumar INDIA 2019		NA				Palpable tender spot in upper trapezius muscle,	Males & females 20-40years		INIT	15 minutes of INIT & 15 minutes of strength training with 1 session/day with alternated days in 4 weeks -total 14 sessions	
Krishna Shinde INDIA 2019	Improvement in cervical ROM, VAS scale & NDI	NA	Convenient Sampling	No withdrawls	NA	Jump sign characterized by patients vocalization /withdrawl, Limitations of neck movements due to pain, Pain on VAS 3	18-55 years	Group A INIT, Group B Conventional Physiotherapy	NA		
Cyanna Joseph D’souza INDIA 2020	Improvement in VAS, ROM, NDI		Convenient Sampling	NA	Less than 03 Months	Patients with nonspecific neck pain & palpable trigger points	18-30 years Males & females	Group A INIT, Group B,Ischaemic compression & trigger point release	NA	Group A once a day for 3 weeks, Treatment duration 4 weeks, Group B 4 weeks	
Pooja Wakde INDIA	Improvement in NPRS, ROM & NDI Single case		Case study	NA	NA	Pain on palpation, Jump sign characterized by patients withdrawl Or localization Active upper	30 year old female	INIT	INIT regime	Group A & B 6 sessions in two weeks treatm	

A 2016	study design					trapezius MTrPs/Non specific neck pain, Jump sign		INIT		ent 3 times per week for 4 weeks 18 participants NIT 3 repetition in 1 sets total 9 sets 3 days once in a week for 4 weeks	

4. Discussion

This systematic review examined the use of INIT as a treatment for myofascial trigger points (MTrPs) in the upper trapezius muscle causing neck pain. In addition to examining the effectiveness of the technique, the review examined specific aspects of it (Simons, D. G et al., 2019).

A myofascial trigger point (MTrP) is a hypersensitive area in muscles or fascia that causes pain when touched. A particular "zone" of the body can become tender or painful when pressed. There is a particular tendency for myofascial pain syndrome to develop in the trapezius muscle in the cervical region, especially in the upper trapezius. It can be attributed to factors such as lack of physical activity, poor posture, emotional stress, poor ergonomics at work, and prolonged sitting positions in the office. In addition to causing heightened pain sensitivities and restricted ranges of motion, trigger points may also impair regular activities (Simons, D. G et al., 2019, Wakde, P., & Anap, D. 2016).

It has been found that myofascial trigger points can be effectively treated through numerous clinical trials conducted over the years. An integral part of this article is dedicated to introducing the integrated approach introduced by Chaitow et al. referred to as "Integrated Neuromuscular Inhibitory Technique" and showing how it reduces pain, improves range of motion, and improves functional abilities in patients with MTrPs. Multifaceted approach is the key to the technique's effectiveness.

In this systematic review, nine randomized controlled trials (RCTs) were identified to compare INIT with other interventions, including TENS, dry needling, and kinesiotape. The effectiveness of INIT has been proven to be superior to that of other interventions in the treatment of pain. According to the review, INIT reduces pain intensity, but long-term effectiveness is not well documented. VAS scoring demonstrated equal effectiveness of INIT and ischemic compression with trigger point release in reducing pain in a study by Krishna Shinde et al. 2019.

A systematic review of eleven studies found that INIT was effective in treating neck disability in eight of them. Study findings published by A. Nithya Ponni Priya et al. 2016 concluded that INIT can improve function more effectively than TENS with passive stretching on upper trapezius trigger points in people with nonspecific neck pain. Among the 11 studies, five found that INIT improved cervical range of motion.

In a study conducted by Cyanna Joseph D'souza et al., this finding was supported. INIT was shown to significantly improve cervical range of motion in the subjects in 2020, particularly cervical lateral flexion range of motion, which showed a mean increase of approximately 5° [3]

A single study by Dimitrios E. Lytras *et al.* found that INIT significantly improved the subjects' physical and mental health as well as their overall health. Based on all the findings of the selected studies, the combined treatment program of the INIT approach appears to have superior effectiveness compared to other interventions.

There was no bias in any of the nine RCTs included in this review, as they all scored six or higher on the Pedro scale, which suggests that they did not have an excessive risk of bias. As far as sample size and assessor blinding are concerned, the current study has limitations. Despite the small sample sizes of all the studies considered, the results may be biased. To ensure more reliable and accurate results, larger sample sizes should be designed and prioritized in future studies

5. Conclusion

Compared to other interventions, an integrated treatment approach (INIT) for neck pain provides greater pain relief, reduces disability, improves functional ability, and improves quality of life than other treatments. INIT is increasingly supported as a treatment option for individuals with active TrPs, thanks to this review's findings.

6. Conflict of interest

Authors declared that there is no conflict of interest regarding the publication of this study.

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