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Effectiveness of Muscle Energy Technique & High power pain threshold static ultrasound in myofascial trigger points- A systematic review.

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ABSTRACT

Background

The lifetime prevalence of mechanical neck pain in the general population is estimated to be 45–54 percent, (Aker et al., 1996), with up to 30 percent of males and 50 percent of women reporting lifelong neck discomfort. (Saturno et al., 2003) In 2005, Saringovallis and Hollins calculated that between 13.4 percent and 22.2 percent of people experience neck pain at any given moment. Furthermore, according to reports, 14% of people with neck discomfort run the risk of developing chronic pain, which makes the condition very expensive in terms of lost productivity at work and medical expenses.

Methods

Study followed the PRISMA criteria for reporting systematic reviews of randomised controlled trials and utilised systematic review methodologies as specified in the Cochrane handbook of systematic reviews. Study included papers that were randomised controlled trials (RCTs) with randomization at the individual or cluster level to eliminate selection bias.

Results

Techniques like Muscle energy technique, trigger point therapy, Active release technique, Passive release technique & Thai massage. All articles described treatment of either the cervical spine, shoulder, or scapular muscles. Some studies focused on one technique while others employed a combination. HPPTUS technique, which is used for active MTrP treatment, is better than the traditional US technique. However, in studies, different approaches were used, and at the last follow-up week, they had equivalent & different therapeutic results.

Conclusion

There are inconsistencies in the research on the use of manual therapy (MET) & HPPT static ultrasound for myofascial pain relief related to myofascial trigger points, despite its current popularity and use. Due in part to the diversity of procedures mentioned in the literature, there aren't enough high-quality randomized controlled trials demonstrating the efficacy of MET & HPPT static ultrasound. In order to demonstrate the effectiveness of manual therapy (MET) and HPPT static ultrasonography in the management of myofascial pain that goes beyond placebo effect, more study is required. A deeper examination of the content and structural validity problems with patient-reported outcome measuring techniques is also necessary.

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Abbreviations: MPS: Myofascial pain syndrome, MTrP: Myofascial trigger point, VAS: Visual analog scale, PPT: Pressure pain threshold, MET: Muscle energy technique, MP : Myofascial pain, High HPPTSU : Power Pain Threshold Static Ultrasound

1. Background

The lifetime prevalence of mechanical neck pain in the general population is estimated to be 45–54 percent, (Aker *et al*., 1996), with up to 30 percent of males and 50 percent of women reporting lifelong neck discomfort. (Saturno *et al*., 2003) In 2005, Saringovallis and Hollins calculated that between 13.4 percent and 22.2 percent of people experience neck pain at any given moment. Furthermore, according to reports, 14% of people with neck discomfort run the risk of developing chronic pain, which makes the condition very expensive in terms of lost productivity at work and medical expenses.

(Travell and Simons 1983) The clinical characteristics of MTrPs, include a taut muscle band containing a distinct nodule, a history of localised discomfort, and a persistent increase in pain. and repeatable pattern of transferred pain; a local twitch reaction brought on by "snapping" palpation; and a patient's spontaneous exclamation of pain in response to mechanical pressure (the "jump sign").

(Dziedzig *et al*., 2005) The myofascial pain syndrome (MFPS) is one of the conditions that physiatrists see the most frequently. Trigger points, which are described as hyperirritable areas inside taut bands of skeletal muscle fibres, are what give it its characteristic pain. The syndrome is characterised by muscle discomfort, typical transferred pain, spasm, and restriction of mobility.

Depending on whether a distinctive pattern of pain referral is present, trigger points are categorised as "active" or "latent" in nature. Active MTrPs refer to pain during muscle action, while at rest, and when it is directly palpated.Latent MTrPs, in contrast, do not feel pain and only refer it when sustained direct pressure is applied. (Travell and Simons 1983 & 1999)

Almost any muscle group can develop trigger points. The muscles that help with posture, including the levator scapulae, upper trapezius, sternocleidomastoid, scalenes, and quadratus lumborum, are the most often affected areas. Patients with active MTrPs frequently experience restricted range of motion as a result of localised, persistent pain. Physical examinations typically reveal no accompanying symptoms, such as joint edoema or neurologic impairments, and the pain does not have a dermatomal or nerve root distribution. (Travell and Simons 1983 & 1999)

Postural tensions, poor biomechanics, and recurrent usage are the most often mentioned explanations of the pathogenesis of MTrP and the underlying aetiology of myofascial pain.(Daniels *et al*., 2003 & Smania *et al*.,2003)

In 2004, Simons. However, MTrPs exhibit a variety of clinical results that defy a straightforward explanation, and there is no backed-up scientific hypothesis that explains the specific physiological makeup of these clinical entities. The objective diagnosis and treatment of this condition remain clinically challenging despite the abundance of theories that have been put out due to the dearth of information on the pathophysiology of MTrP.(Alvarez *et al*., 2002)

In 1996, Simons. The energy crisis theory, the muscle spindle idea, and the motor endplate hypothesis have all been put out as potential explanations for the aetiology of MPS and MTrP.

A "integrated hypothesis" incorporating local myofascial tissues, the central nervous system, and biomechanical factors is put forth in the 1999 edition of Travell and Simons' Myofascial Pain and Dysfunction: The Trigger Point Manual as a potential explanation for the main clinical features of MTrPs. (Simons & Travell 1999)

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The integrated hypothesis broadens the scope of the previously put forth hypotheses to encompass presynaptic, synaptic, and postsynaptic mechanisms of abnormal depolarization, involving, respectively, excessive acetylcholine release, acetylcholinesterase defects, and up-regulation of nicotinic acetylcholine-receptor activity.(Gerwin *et al.,* 2004 ; Portland in 2004)

Muscle fibre relaxation will be hampered by the ensuing muscle spasm, which may reduce arterial inflow and, consequently, the availability of oxygen, calcium, and other nutrients. Spasm that continues could harm the affected tissues, which could trigger the production and release of nociceptive-enhancing endogenous inflammatory and algogenic chemicals. (Wheeler in 2004)

A plausible aetiology for MTrPs is supported by the integrated hypothesis, which also integrates available electrodiagnostic and histological evidence. However, more study and improvement are still required. (Simons in 2004)

In a recent histological study, the initial findings of a novel microanalytical method for testing soft tissue with a microdialysis needle revealed significant differences in the levels of pH, substance P, CGRP, bradykinin, norepinephrine, TNF, and IL-1 in subjects with an active MTrP compared to subjects with a latent MTrP and normal subjects. (Shah *et al*., in 2004)

In 2004, Sciotti *et al.,* Clinicians from a variety of medical specialties often recognise and manage MTrPs. Nevertheless, there are currently no recognised official biochemical, electromyographic, or diagnostic imaging criteria for their conclusive diagnosis.

As a result, the diagnosis of MTrPs depends on the patient's response and manual palpation skills. This has sparked a lot of questions about how MTrP diagnoses are made, which are subjective. (Ward *et al.,* 1997)

There is also no trustworthy list of physical diagnostic standards for MTrPs at this time. The reliability of the physical examination in the diagnosis of MPS has not yet been established by research studies, which have not yet shown that the physical characteristics of MTrPs are reproducible among the various examiners.(Gerwin *et al.,* 1997)

In 1997 Gerwin et al., demonstrated that the interrater reliability of the various features and the identification of MTrP features among the various muscles both vary. This work has the implication that researchers investigating MPS or MTrPs must define the MTrP in order to conduct their research. To appropriately assess the dependability of the study, the criteria used to identify an MTrP or make a diagnosis of MPS must be made explicit.

Sciotti et al., and Gerwin et al., have proven to be effective at diagnosing the existence of MTrPs when used by a group of skilled clinicians, ranging from good to exceptional. But in order to get these results, it was discovered that training was necessary. The two MTrP characteristics that are deemed to be the least important for identification are the taut band and spot tenderness. An MTrP's state as active or latent is indicated by reproducible pain. Referred pain patterns and the local twitch response, which are seen as confirming signals but are less dependable.
Although MTrP symptomatology is thought to be resolved using a variety of therapeutic techniques, the processes underlying these treatments' effectiveness are likewise largely unknown. Numerous therapies are now being employed to treat MTrP pain as a result of this. (Sciotti *et al.,* 2001)
In 2005, Saringovallis *et al*., Numerous therapeutic strategies, including ultrasound therapy, physical therapy (PT) modalities, stretching exercises, and trigger point injections, have been reported in the literature. (Lucas *et al*., 2004) The high-power, pain-threshold ultrasonic approach was mentioned by Travell and Simons in a private discussion with Nielson in 1983, but little is known about it.

According to this method, "ultrasound power is first raised to the threshold pain level (1.5 W/cm2) and then decreased to half that intensity. The intensity is raised gradually over the course of the following two to three minutes as the patient is frequently asked about their feelings, up to but not

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past the original pain threshold level. Researchers are aware of no studies or reports in the literature that have used this ultrasonic approach for the treatment of MFPS.

The autonomic nervous system regulates a variety of bodily processes, including heart rate, blood pressure, peristalsis of the digestive tract, and perspiration. Any of these functions may be affected by ANS dysfunction. Symptoms (pain, autonomic abnormalities, and restricted motion) are caused by active MTrPs, but latent MTrPs may not immediately cause pain but do so when manual pressure is applied. Latent MTrPs are alleged to be common in both symptomatic and asymptomatic people, are easily made "active" by slight muscle overload or exhaustion, and there is evidence that they may disrupt typical patterns of motor recruitment and movement efficiency. (Wolfe *et al*., 1992)

Myofascial trigger points and tender points are frequently mentioned together in the literature. However, there are assertions made by professionals in clinical practise that myofascial trigger points (MTrPs), defined as "tender points located in taut bands of skeletal muscle, which on palpation reproduce the patient's pain" (Greenman *et al*., 2003), are responsible for the symptoms of both disorders, despite the differences in Table 1. The vast variances argue against a shared pathophysiology and aetiology. (Magnusson *et al*., 1996)

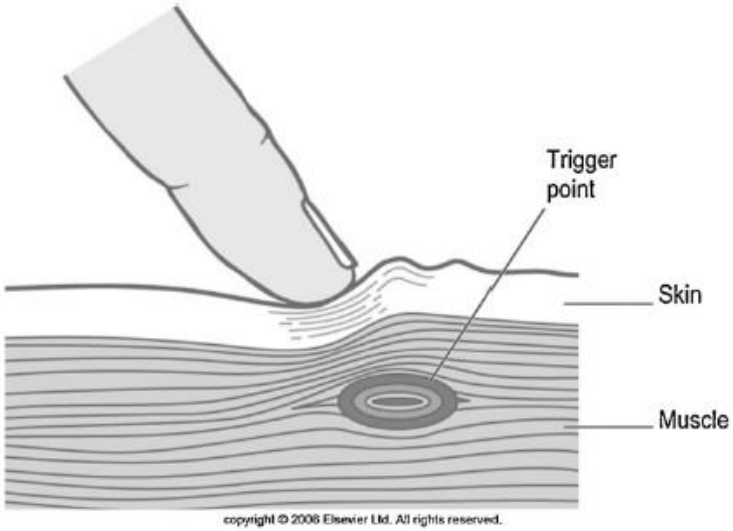

Figure 1 The trigger point in the muscle fiber.

Figure 1 :The trigger point in the muscle fiber.

Features	Trigger point	Tender point
Palpable nodule	Yes	No
Site of nodule	Often located close to muscle belly	Often close to the muscle attachments
Allodynia and hyperalgesia	At the MTrP	Outside the tender points
Referral of the MTrP pain	Yes	No
Local twitch response	Yes	No
Local contracture	Yes	No
Mechanism probable	Peripheral	Central

Table 1. Different features between trigger and tender point.

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Like many manual therapeutic approaches, MET's efficacy and effectiveness are not well understood, and there is little information to help practitioners choose the technique variations that are most beneficial (such as the number of repetitions, the intensity of the contraction, and the length of the stretch phase). This frustrates those who try to apply pertinent research to their daily work. Studies on the effects of MET interventions have been few, although they are increasing.

Although there is little data on clinical outcomes, studies that show a rise in muscle extensibility (Ballantyne *et al*., 2003; Ferber *et al*., 2002) and spinal range of motion (Schenk *et al*., 1994; Lenehan at el 2005) reinforce the case against treating individuals with limited mobility. The only English-language studies that looked at MET as the only treatment utilising clinical outcomes were one case study series (Lamberth *et al*., 2003) and one randomised single-trial (Wilson *et al*., 2003) for the treatment of acute low back pain (LBP).

Both reported less discomfort after receiving treatment. Given that MET is often employed in concert with other approaches, the dearth of therapeutically applicable studies is not surprising. The fact that MET was a part of several clinical trials looking into osteopathic care of spinal pain and dramatically decreased the reported pain and disability in those trials lends more evidence to the efficacy of MET when used as a whole. (Licciardone *et al*., 2003) While more research on MET is required, the evidence that is now available favours its use in the treatment of spinal pain and limited mobility.

2. Objectives:

The aim of this study is to review the evidence for the effectiveness of Muscle Energy Technique & High power pain threshold static static ultrasound in the treatment of patients with myofascial pain resulting from active myofascial trigger points.

3. Methodology:

Study followed the PRISMA criteria for reporting systematic reviews of randomised controlled trials and utilised systematic review methodologies as specified in the Cochrane handbook of systematic reviews.

3.1 Types of studies

Study included papers that were randomised controlled trials (RCTs) with randomization at the individual or cluster level to eliminate selection bias. The analyses omitted studies that were only presented as abstracts or those were unable to obtain as full text copies through interlibrary loans or email contact with authors. Patients having trigger point who were identified retrospectively were likewise excluded from the study.

3.2 Types of interventions

Any study which included MET & HPPT Static Ultrasound intervention was included

3.3 Search methods for identification of studies

PEDro, Science Direct, PubMed, EBSCO host and Cochrane Library databases were searched from inception to 5 October 2022. Search terms related to: trigger point; randomised controlled trial; MET; HPPT Static ultrasound. The search strategy using Boolean Operators ‘and’ or ‘or’ to combine the search key search terms to collect the best current evidence.

3.4 Study selection

An initial screening of titles and abstracts was conducted based on the inclusion criteria to identify potentially relevant studies. Following that, a final review of the retrieved full text papers was done. The investigator reviewed all titles, abstracts, and entire articles before deciding whether or not the study was eligible.

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3.5 Assessment of risk of bias in included studies

The Cochrane risk of bias scale was used to evaluate potential sources of bias. Random sequence generation, allocation concealment, blinding of outcome assessment, insufficient outcome data, selective reporting, and other sources were used to assess bias. The PEDro scale checklist was used to rate the assessment's methodological aspects, such as randomised sequence, allocation concealment, blinding, and conflicts of interest. The PEDro score was interpreted as follows: a score of greater than 9 indicates exceptional methodological quality, a score of 6 to 8 indicates good methodological quality, a score of 4 to 5 indicates fair methodological quality, and a score of less than 4 indicates poor methodological quality.

3.6 Search, screening, and selection results

The outcomes of the search strategy and screening process are depicted in Fig. 2 as a flowchart. In the beginning, database searching yielded a total of 67 records. After removing duplicates and screening the remaining 55 articles (of which 41 were deemed invalid), 14 papers were examined in full text. A total of eleven articles were chosen as being eligible for inclusion in this review.

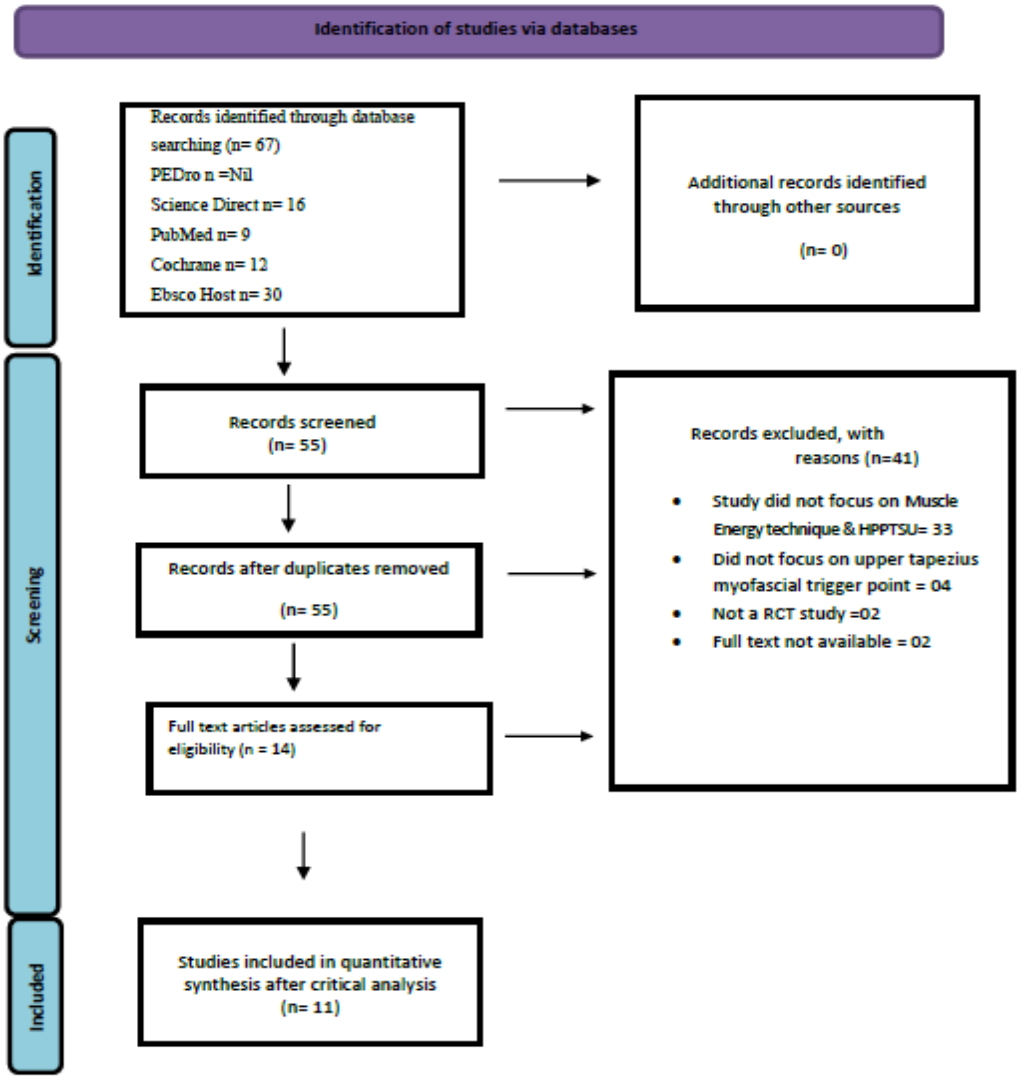

Figure 2 Prisma Flow Diagram of systematic search, screening and selection process.

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3.7 Description of included studies

Five studies were single blinded randomised controlled trials, four studies were randomised controlled trials, one study was double blinded randomised controlled trial & one study is of preliminary type that were reviewed.
It became clear that the trials could be classified into 3 categories:
1. Only one manual therapy treatment;
2. A combination of various manual therapies;
3. Another physical medicine modality.

Use of just one manual therapy treatment was investigated in 4 trials (NM Oliveira *et al*., 2012; G Sadria *et al*., 2017; Buttagat V *et al*., 2021; Mehdikhani *et al*., 2012) combination of various manual therapies in 1 studies (M Wendt *et al*., 2020), and another physical medicine modality in 2 studies (Halil Unalan *et al*., 2011; Majlesi J *et al*., 2004). Many parts of the body were represented, but in all the trials, neck and shoulder pain were involved, specifically upper trapezius and levator scapulae muscles.

Table 2: Outcome measures of studies reviewed

OUTCOME MEASURES OF STUDIES REVIEWED							
SNO.	**AUTHOR**	**PRIMARY OUTCOME**	**MEASUREMENT OF PRIMARY OUTCOME**	**SECONDARY OUTCOME**	**MEASUREMENT OF SECONDARY OUTCOME**	**FREQUENCY OF OUTCOMES**	**ADVERSE EVENTS**
1	M Wendt ,et al	Goniometry of the Cervical Spine	Penny & Giles tensometric electrogoniometer	Pressure Pain Threshold (PPT)	Wagner Instruments Algometer	Before therapy (pre), After therapy (post), and on the second day after therapy (follow-up)	Not reported
2	G Sadria, et al	Neck pain	VAS			Before therapy (Pre) & After Therapy (Post)	Not reported
		Active range of cervical lateral flexion	Measuring tape				
		Upper trapezius thickness	Ultrasonic apparatus (HS 2100 Honda electronics, Japan) and a 7.5 MHz linear array.				
3	NM Oliveira-Campelo, et al	Pressure pain threshold (PPT)	Algometer			Before therapy (Pre) & After Therapy (Post)	Not reported
		Pressure pain perception (PPP).					

		Cervical Active ROM	cervical range of motion instrument (CROM)				
4	Majlesi J, et al	Pain	VAS			Before the first sessions and after each session.	Not reported
		Active lateral bending of the cervical spine	Goniometer				
5	Buttagat V, et al	Pain intensity	VAS	pressure pain threshold (PPT)	Algometer	All outcome measures were assessed before, immediately after the first treatment session, and one day after the last treatment session	Not reported
				Neck Disability	Neck Disability Index (NDI) questionnaire		
				neck flexion range of motion (NFROM)	cervical range of motion (CROM) goniometer		
6	Halil Unalan, et al	Pain	VAS			Before 1st session and after each session	Not reported
		Active lateral bending of the neck,	Goniometer				
7	Mehdikhani, et al	Pressure pain thresholf	Algometer			Pre & Post Assesment of values	Not reported
		Pain intensity	VAS				

		Cervical Contralateral flexion	Inclinometer				
8	Amit Dhawan et al	Pain	VAS			0 (baseline), 1, 2, 3, and 4 weeks.	Not reported
		Pressure pain threshold	Algometer				
		Range of motion	Goniometer				
9	Yushin Kim, et al	Pain	VAS			Before treatment (baseline) • After one week of treatment (final assessment) • At three weeks after final assessment (follow up)	Not reported
		Disability	Neck Pain Disability Index				
		Range of motion	Goniometer				
10	Yushin Kim, et al	pressure pain threshold	Algometer	pressure pain tolerance	Algometer	each preand post-session.	Not reported
				Pain	visual analog scale		
11	Hari Haran, et al	Pain	Numeric Pain rating Scale	Range of Motion	Goniometer		
				Disability	Neck Disability Index (NDI) questionnaire		

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General characteristics of participants

There were 984 participants who contributed to the studies reported in this review. Total number of participants in the control groups & intervention group were 560, the gender of the included subjects was predominantly female. Mean age was 35 years. Table 3 summarizes each study's numbers including reported losses to follow up.

Table 3: Study Numbers

Sr.no.	Author	Eligible for Inclusion	Excluded	Number Allocated					Lost to follow up	Included in final analysis				
				N1	N2	N3	N4	N5		N1	N2	N3	N4	N5
1	M Wendt, et al	92	32	20	20	20	—	—	1	19	20	20	—	—
2	G Sadria, et al	64	0	32	32		—	—	0	32	32	—	—	—
3	NM Oliveira-Campelo, et al	298	134	32	29	37	31	35	47	23	23		22	25
4	Majlesi J, et al	72	0	36	36	—	—	—	8	31	29	—	—	—
5	Buttagat V, et al	74	29	15	15	15	—	—	0	15	15	15	—	—
6	Halil Unalan, et al	197	148	25	24	—	—	—	7	20	22	—	—	—
7	Mehdikhani, et al	36	0	18	18	—	—	—	0	18	18	—	—	—
8	Amit Dhawan et al	42	0	21	21	—	—	—	0	21	21	—	—	—
9	Yushin Kim, et al	53	9	22	22	—	—	—	3	19	22	—	—	—
10	Yushin Kim, et al	26	2	8	8	8	—	—	0	8	8	8	—	—
11	Hari Haran, et al	30	0	15	15	—	—	—	—	15	15	—	—	—
Totals		984	354	244	240	80	31	35	66	221	225	67	22	25

Table 4 Pico information of the studies included in the review

Table 4. PICO Information of the studies included in the Review

S.No	Year of Publication	Reference Study	Sample size & characteristics		Intervention / Task for N1	Intervention / Task for N2	Intervention / Task for N3	Intervention / Task for N4	Intervention / Task for N5	Time of intervention	Conclusion
			Age	Participants in each group							
1	2020	M Wendt *et al.*	Age below 21 years	N1 (MET+ TPT) GROUP = 20 [10 MEN AND 10 WOMEN] N2 (MET) GROUP = 20 [12 MEN AND 8 WOMEN] N3 (TPT) GROUP = 20 [14 MEN AND 6 WOMEN] LOST TO FOLLOW UP N1 = 1 N1 ANALYSED = 19	TPT (both sides of upper trapezius) followed by MET (bilaterally)	On both sides of upper trapezius muscle contrast- relax- agonist-contrast technique was used, 5 cycles was performed	Positional release technique was performed on the right and left upper trapezius muscle , 2 mintues for each muscle	—	–	One time study	Muscle energy technique & trigger point therapy proved to be the most effective as it causes changes in all examined goniometric & subjective parameters.

				N2 ANALYSED = 20 N3 ANALYSED = 20							
2	2017	G Sadria *et al*	18 to 50 years	N1 (ART) GROUP = 32 [16 MEN AND 12 WOMEN] N2 (MET) GROUP = 32 [16 MEN AND 12 WOMEN]	Active release technique, patient was sitting on a chair leaning backward with his/her hands placed on his/her thighs.	Muscle energy technique group received treatment with Lewit's post isometric relaxation approach	–	–	–	One time study	Both ART & MET manual approachs reduced latent trigger points symptoms in the upper trapezius in the 2 groups similarly, when neither treatment outperforming the other.
3	2013	NM Oliveira *et al*	18 years or older	N1 (MET) GROUP = 32 N2 (PS) GROUP = 29 N3 (IC) GROUP = 37	Muscle energy technique group, The researcher performed a passive contralateral flexion to the	Passive stretching group, The researcher used the identical first contact sites as previously stated. While individuals were requested to breathe steadily, a contralateral flexion of the muscle	Ischemic compression group, The researcher applied incremental pressure to the latent MTrP in the upper	Placebo technique control group, For 30 seconds, the researcher used	Wait & see control group , The participants were supine	One time study	Manual treatment on the upper trapezius with latent trigger points appeared to increase cervical ROM & sensitivity to

				N4 (PLACEBO) GROUP = 31 N5 (WS OR CONTROL) GROUP = 35 N1 (LOST TO FOLLOW UP) = 9 N2 (LOST TO FOLLOW UP) = 6 N3 (LOST TO FOLLOW UP) = 13 N4 (LOST TO FOLLOW UP) = 9 N5 (LOST TO FOLLOW UP) = 10 N1 (ANALYSED) = 23 [7MALE & 16 FEMALE] N2 (ANALYSED) = 23 [6MALE 17FEMALE]	muscle with one hand on the occipital area and the other maintaining the shoulder, taking the subject's head to an end-feel point without causing discomfort. Subjects were then instructed to perform an isometric contraction of 25% of their maximal force, which had previously been assessed	was done, moving the subject's head passively to the maximum available range of motion without causing discomfort. The researcher increased the range of motion while keeping this position during the breathing phase. This technique was carried out 30 times.	trapezius muscle. Pressure was maintained at this position until pain levels were lowered to level 3. The researcher increased the pressure once more until the pain level reached 7. This method was carried out again for 90 seconds.	the identical contact locations as those specified for the PS group, but without moving.	for 30 seconds.		pressure pain. In the IC group these effects last for one week.

				N3 (ANALYSED) = 24 [4MALE & 20 FEMALE] N4 (ANALYSED) = 22 [8MALE & 14FEMALE] N5 (ANALYSED) = 25 [7MALE & 18 FEMALE]	using a sphygmomanometer. This pattern was repeated three times. Finally, the researcher guided the cervical section to its neutral position passively.						
4	2004	Majlesi J *et al*	b/w 18 and 60 years	N1 (HIGH POWER ULTRASOUND) GROUP = 36 N2 (CONVENTIONAL ULTRASOUND) = 36 N1 (LOST TO FOLLOW UP) = 5 N2 (LOST TO FOLLOW UP) = 3 N1 (ANALYSED) = 31, [67.7% WOMEN, 32.3 &	Continuous modes of high power , pain threshold ultrasound therapy were used , with the probe positioned directly on the trigger point and held immobile.This technique was carried	Stroking technique was used , intensity used was 1.5 W/ cm square while duration was 5 min for each session	–	–	–	4 week	In the treatment of individuals with acute myofascial pain syndrome , a high power, pain threshold static ultrasound technique may be used, with the understanding that this technique requires more

				MEN] N2 (ANALYSED) = 29, [79.3% WOMEN, 20.7 % MEN]	out three times. Patients reported their pain intensity, location, and nature on a regular basis.						concentration & communication b/w the patient & the therapist.
5	2021	Buttagat V *et al*	b/w 18 and 40 years	N1 (TRADITIONAL THAI MASSAGE) GROUP = 15, [9 FEMALES, 6 MALES] N2 (MET) GROUP = 15, [10 FEMALES , 5 MALES] N3 (CONTROL) GROUP = 15, [11 FEMALES , 4 MALES]	Over the course of 2 weeks, TM group had eight , 15 min session of TM administered to the posterior neck area while laying on their back.	8 sessions of Post isometric relaxation technique was used over the neck extensor muscles	The control group relaxed by lying supine in silence for the same amount of time as TM 7 ME method groups (15 min during 8 sessions). Each group was treated separately in a quiet, secluded, room according to a schedule. The therapy rooms were all set to a temperature or 25 degree celcius . All participants were given the option of a free	–	–	2 Week	The use of TM or the ME technique for the treatment of persistent neck pain associated with MTrPs can be a viable alternative.

							TM session or the ME technique after the study was completed.				
6	2011	Halil Unalan *et al*	b/w 18 & 60 years	N1 (STUDY) GROUP = 25 N2 (control) GROUP = 24 N1 (LOST TO FOLLOW UP) = 5 N2 (LOST TO FOLLOW UP) = 2 N1 ANALYSED = 20 N2 ANALYSED = 22	High power pain threshold static US technique	1 session of injection of 1ml of 0.5% local anesthetic (lidocaine)	–	–	–	One time study	In the therapy of active MTrPs of the upper trapezius muscle , we found no differences b/w the HPPTUS method & TrP injection. In the treatment of myofascial pain syndrome , HPPTUS approach can be viable alternative to TrP injection.
7	2012	Mehdikhani *et al*	b/w 18 & 35 years	N1 (MET GROUP) N2 (CONTROL GROUP)	Muscle energy technique for 3 times	Sham ultrasound, Novin ultrasound (512X model) machine was used.	–	–	–	One time study	The results show that the upper trapezius muscle's latent MTrPs experienced alterations in

											pressure pain sensitivity as a result of the muscular energy approach.
8	2010	Amit Dhawan et al	20-30 yrs	N1(Group A) 14 N2(Group B) 14 N3(Group C) 14	High power pain threshold static US technique	Interferential Therapy 10 Hz for 20 min	Stretching of Upper trapezius muscle			Everyday for 7 days	significant difference in Pain & NPDI but no significant difference in ROM
9	2014	Yushin Kim et al	65-73 yrs	N1(Group A) 8 N2(Group B) 8 N3(Group C) 8	High Power Pain Threshold Static Ultrasound -5	High Power Pain Threshold Static Ultrasound -9	conventional US group received continuous US for 5 min with an intensity of 1.0 W/cm2 and a duty cycle of 100%			First day, after 2 days & after 1 week	HPPTSU -9 Group shows significant difference than other groups
10	2014	Yushin Kim, et al	60-75 Yrs	N1(Group A) 19 N2(Group B) 22	Participants in the conventional US group received continuous US for 5 minutes at a frequency of	High power pain threshold static US technique				2 session per week for 4 Week	Significant difference between pre & post values of VAS, PPT, ROM.

					1 MHz, an intensity of 1.0 W/cm2, and a duty cycle of 100%						
11	2013	Hari Haran et al	18-45 Yrs	N1(Group A) 15 N2(Group B) 15	HPPT static ultrasound with transvers friction massage & Stretching of upper trapezius muscle fiber	Transvers friction massage & Stretching of upper trapezius muscle fiber				2 session per week for 4 Week	Result shows significant difference between pre & post values of NPRS, ROM & NPDI

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4. Result

4.1 Manual therapy

Studies met the inclusion criteria and were reviewed regarding the effects of manual therapy techniques on myofascial pain syndrome and MTrPs. numerous types of techniques were described, Muscle energy technique, trigger point therapy, Active release technique, Passive release technique & Thai massage. All articles described treatment of either the cervical spine, shoulder, or scapular muscles. Some studies focused on one technique while others employed a combination. All treatment details of participants, primary intervention, secondary intervention, time of intervention & target area included in the evaluation. Table 4.1provides information related to the studies.

4.2 High Power Pain Threshold Static Ultrasound

When treating older individuals with latent MTrPs, the high-power pain threshold ultrasound (HPPTUS) technique, which is used in the same way as for active MTrP treatment, is better than the traditional US technique. However, in studies, different approaches were, and at the last follow-up week, they had equivalent & different therapeutic results. In either the traditional US procedure or the HPPTUS technique, no adverse side effects were noticed. To fully understand the HPPTUS technique's workings and execution strategy, more research is needed.

5. Discussion:

This systematic analysis's main goal is to evaluate the efficacy of static ultrasonography for myofascial trigger points using MET and HPPT. The main finding of this study is that a small number of randomised controlled trials have examined the use of manual therapy (MET) and HPPT Static Ultrasound in the treatment of MPS. Results didn't show a lot of dependable proof of noticeable improvement.

Establishing the effectiveness, beyond placebo, of various manual therapies that therapist’s use in their everyday practise to treat MPS is the most pressing need for additional research. The major finding of this systematic review is in agreement with that of (M Wendt *et al*., 2020), who claimed that muscle energy technique and trigger point therapy proven to be the most successful since they result in changes in all studied objective and subjective criteria. Some of the trials considered in this review provided evidence that MTrP therapy is successful in lowering the pressure pain threshold and VAS scores. (G Sadria *et al*., 2017; NM Oliveira *et al*., 2013; Buttagat V *et al*., 2021).

6. Limitations

This review's shortcoming was publication bias. Reviews should ideally cover all studies, regardless of language, including unpublished research. Only English language publications were included in the review due to resource and linguistic limitations, and no effort was made to find unpublished trials. Unpublished data, however, is also acknowledged to be a potential source of bias.
Two or more reviewers typically evaluate the included trials' methodological quality. Unfortunately, only one reviewer did the methodological quality assessment. The evaluation was also blinded. Even while there is some evidence that blinded evaluations of the quality of trials may be more trustworthy than unblinded evaluations, blinding can be challenging to accomplish, takes time, and may not significantly affect the outcomes of a review.

To sum up, there were a number of issues with the articles, including bias, small sample sizes, ambiguous randomization and concealment procedures, inappropriate blinding, imbalanced baseline characteristics, an absence of standardised methodologies, unreliable outcome measures, unknown long-term treatment effects, an absence of effective sham techniques, a non-standardized definition of manual therapy, variation in application and number of techniques, and an absence of standardised guidelines for the location of the study.

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7. Conclusion

To provide a more solid foundation for considering these treatments as feasible possibilities, additional high-quality trials are required. The clinical utility of the widely used. It is important to conduct more study on medicines for which there is some indication of effectiveness. Myofascial trigger point locations should be precisely documented in trials, and changes in the diagnostic parameters of MPS should be taken into account when measuring outcomes. Wherever it is practical, contributing and sustaining variables ought to be managed. Additionally, as randomization techniques and establishing sufficient statistical power were consistently subpar throughout the included studies, more consideration should be given to these areas. Trials should assess and record not only the variations in group averages but also the distribution of clinical values or outcomes within each treatment group in order to better inform decisions about patient management.

There are inconsistencies in the research on the use of manual therapy (MET) & HPPT static ultrasound for myofascial pain relief related to myofascial trigger points, despite its current popularity and use. Due in part to the diversity of procedures mentioned in the literature, there aren't enough high-quality randomized controlled trials demonstrating the efficacy of MET & HPPT static ultrasound. In order to demonstrate the effectiveness of manual therapy (MET) and HPPT static ultrasonography in the management of myofascial pain that goes beyond placebo effect, more study is required. A deeper examination of the content and structural validity problems with patient-reported outcome measuring techniques is also necessary.

Conflicts of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Authors' Contributions

All authors contributed to the research design, data collection, data analysis, and manuscript formatting, drafting, and critical revision; gave final approval of the version to be published; and agreed to be held responsible for all facets of the work.

Data Availability

The dataset supporting the conclusions of this article is available through the corresponding author on reasonable request.

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