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EC MICROBIOLOGY
Systematic Review

Effectiveness of Muscles Energy Technique on Pain Intensity and Disability for Chronic Low Back Patients

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Received: December 05, 2022; **Published:** March 23, 2023

Abstract

Background: Low back pain (LBP) is the highly prevalent musculoskeletal condition, and causes activity limitations resulting in reduced productivity and high medical expenditure. Muscle Energy Technique (MET) is a therapeutic technique that has the potential to be successful in LBP, although the evidence for this notion is still inconclusive. The effectiveness of the muscular energy technique on pain intensity and disability for individuals with chronic low back pain was evaluated in published studies through this systematic review of the literature.

Methods: Pub Med, Scopus, Science Direct, The Cochrane Library, Ovid, Clinicaltrials.gov, and Embase were searched until October 30, 2022. Randomized controlled studies reporting on the effectiveness of muscles energy technique on pain intensity and disability for chronic low back patients were included. Information related to demographics, number and duration of treatment, MET protocol, assessment tools used for pain and disability, and key findings were extracted. The PEDro classification scale was used to assess the methodological quality of studies.

Results: 17 research studies (including 817 participants) were retrieved and included for qualitative analysis. The studies published between 2011 and 2022 were retrieved, and the sample size ranged from 10 to one hundred twenty-five participants. The age of the subjects ranged between 18 - 60 years, and interventions were done between 2 days to 12 weeks. Of the included 17 studies, 05 were from Egypt, 04 were from India, 2 each from Iran, Nigeria and one each from Brazil, Poland, Thailand and Pakistan. In comparison to other interventions or the control groups, MET was found to significantly, although modestly, decrease the severity of pain and reduce functional disability in patients with chronic LBP. Most of the included studies had moderate to high study quality.

Conclusion: In patients with CLBP, MET alone as well as in conjunction with other interventions was found to be beneficial in reducing pain intensity, improving lumbar spine range of motion, and decreasing the degree of functional disability.

Keywords: *Muscle Energy Technique; Chronic Pain; Low Back Pain; Functional Disability*

Introduction

Among all musculoskeletal disorders, low back pain (LBP) is the most prevalent type affecting people of all ages, significantly adding to socioeconomic burden. Seventy to eighty-five percent of people at some point in their life will experience LBP, according to published

statistical data [1]. After an acute episode of pain, only 39 - 76% of patients fully recover, suggesting that a sizeable portion of them go on to acquire a chronic condition [2-4]. The condition has been ranked 6th out of 291 diseases by the Global Burden of Disease (GBD) because it is associated with a significant disease burden. This has a negative impact on activity levels, lowers productivity at work, and resulting in healthcare costs that exceed billions of dollars yearly [5].

The reasons of LBP are numerous, ranging from visceral factors to inadequate blood supply to the muscles or musculoskeletal imbalance [6,7]. The proper therapy of chronic low back pain (CLBP) is essential given its substantial economic and social consequences. Currently, managing LBP is difficult due to its complexity, high expense, and unexpected results [8]. Single-model LBP interventions have shown little to no benefit [9]. The Muscle Energy Technique (MET), created by Fred Mitchell, is a popular conservative treatment for pathologies of the spine, primarily in LBP and disability [2]. This therapeutic approach is significant in physical therapy. MET is one of the most widely used treatment techniques for increasing elasticity in both contractile and non-contractile tissues [1,3]. According to studies, MET is as effective as manipulation for treating low back pain. Compared to passive and static stretching, MET more efficiently increases muscular extensibility. The cervical spine, lumbar spine, and spinal joints in general have been proven to benefit from MET [2].

The continuous search for new effective treatment modalities is spurred by the high frequency of chronic spinal disorders, inconsistent diagnostic and therapeutic procedures, and significant financial burden associated with their management. Understanding neurophysiological processes, correctly interpreting pain, spotting undesirable motor and postural patterns, treating the patient holistically, and fusing the knowledge with diverse treatment approaches are all necessary for this. Despite the fact that multiple studies have already been published that addressed a variety of LBP treatment options, the evidence for effectiveness of those treatments is still quite inadequate. Therefore, the goal of this systematic review of RCTs was to determine how well the muscle energy technique works for chronic low back pain patients in terms of pain intensity and disability.

Materials and Methods

Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) checklist guidelines were followed [10].

Search strategy

Using seven separate databases (Pub Med, Embase, The Cochrane Library, Scopus, Science Direct, clinicaltrials.gov, and Ovid), a thorough literature search was conducted in relevant peer-reviewed journals published between 2008 and 2022.

After deduplication, titles were screened and potentially relevant articles were identified by analysing associated abstracts. Study information was abstracted from full texts of articles included in the study. Through manual searches of cited references for related papers retrieved, further publications were identified (snowball referencing).

The above searches used the PICO (P- patient or problems; I- intervention; C- comparison of interventions; O- outcome measurement) strategy.

P: Subjects (age = 18 - 70 years) with CLBP more than 3 months

I: Muscle energy technique

C: other intervention techniques, or control

O: Pain and functional disability.

For database searches, the broad key terms used were (muscles energy technique) AND (chronic low back pain OR CLBP) and only research articles were retrieved and reviewed.

Inclusion criteria: (1) Randomized Control Trials (RCTs) investigating the effectiveness of MET in patients with CLBP (2) Articles published in English language (3) Research carried out in the period of 2008 - 2015 (4) Original publications with adequate detail to determine the critical information of the research studies. (2) Subjects 18 - 70 years old (male or female) with CLBP more than 3 months.

Exclusion criteria: (1) Studies published in languages other than English or before 2000 (2) Studies in subjects < 18 years of age and CLBP less than 3 months (3) Studies not related to the study (4) Studies without results or not providing sufficient data (5) Protocols, guidelines, editorials, book chapters, letter to editor, reviews and metanalysis (6) Animal studies (7) Study designs other than RCTs.

Data extraction and synthesis

A typical Excel spreadsheet was used to extract the data. Table 1 provides an overview of the salient features of the included studies. Authors, publication year, sample size, age, gender, participants, number of treatments and duration of treatment, MET protocol, assessment tool for pain and functional disability, and key findings were abstracted for each included study.

Study quality assessment

The quality of selected studies was assessed using the PEDro classification scale [11]. Using the PEDro classification scale, two researchers independently assessed the methodological quality of each included study. Disagreements between the two reviewers were resolved by discussion and consensus.

The PEDro classification scale is a reliable indicator of the methodological quality of clinical trials [11]. Its ten item scores are added up to provide a total score that ranges from 0 to 10. Each included study's methodological quality was assessed as high (≥ 7/10), medium (4 - 6/10), or low (≤ 3/10) based on the PEDro score.

Results

Identification and description of included studies

There were 4,514 citations in all, of which 93 were from PubMed, 157 were from Embase, 19 were from The Cochrane Library, 79 were from Ovid, 3944 from Scopus, 05 from clinicaltrials.gov, and 217 were from Science Direct. Of these, 346 duplicate cases were excluded. After screening the titles and abstracts of 4,168 studies, 3,726 records were eliminated. The final 442 articles met the requirements for full-text review. Out of 442 full texts, 425 were eliminated after applying the exclusion criteria, and 17 articles were included for the final qualitative analysis. The flow diagram shows the search strategy (Figure 1).

Characteristics of the included studies

Seventeen RCTs were identified up to October 2022 that were published between 2011 and 2022. The studies included 817 participants in total, with sample size ranging from 10 to 125. Out of the 17 studies that were included, the age of the subjects ranged between 18 - 60 years, and interventions were done between 2 days to 12 weeks. Table 1 summarizes the key demographic and clinical characteristics of each included study. Of the included 17 studies that were published from 08 countries, 05 were from Egypt, 04 were from India, 2 each from Iran, Nigeria and one each from Brazil, Poland, Thailand and Pakistan.

Effectiveness of MET on pain intensity and disability for chronic low back patients

All the 17 studies reported the effectiveness of MET in reducing the pain intensity level, improvement in lumbar spine ROM, and reduction in function disability level. These studies evaluated the effectiveness of MET with various different interventions, and several research included more than one comparison group. When associated to or compared with MET, the activities that the various groups carried out were: Cranial sacral therapy (CST); McKenzie extension exercise program (MEE); sensory motor training (SMT); high velocity

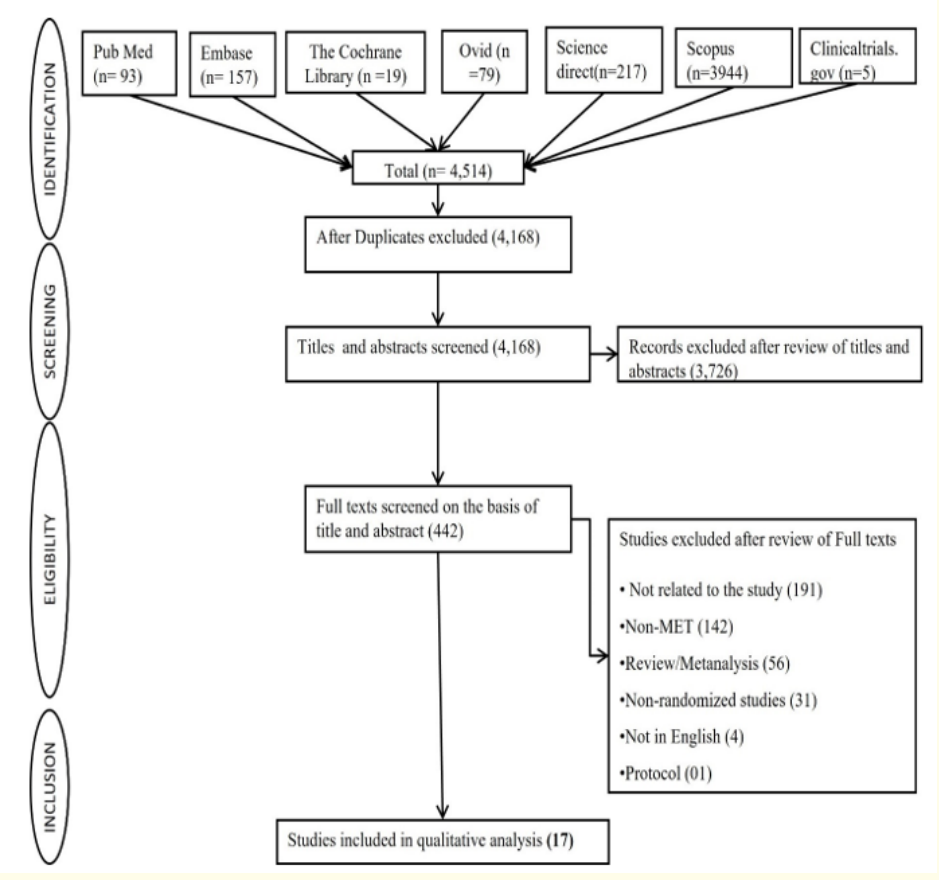

Figure 1: *PRISMA flow chart illustrating the process of inclusion of articles in the study.*

Reference	Year	Country	Sample size	Age	Gender	Number of treatments	Duration of treatment	Interventions associated with the MET	Assessment tools	Duration of LBP	Key findings of the study
Dhinkaran., *et al.* [17]	2011	India	30 MET + CE = 15 TENS + CE = 15	33.4 ± 2.1	Male (9) Female (21)	6	6 days	Stretching, strengthening and ergonomic advice; TENS	VAS; ODI	≥3 months	MET is somewhat more effective than traditional physiotherapy at increasing functional capacity and reducing discomfort.

Bindra., *et al*. [18]	2012	India	30 MET = 15 US + TENS + ME = 15	41 ± 7.61	Male (6) Female (24)	6	6 days	US; TENS	VAS; RODI	≥6 months	Both groups improved VAS and RODI
Ellythy., *et al*. (a) [13]	2012	Egypt	40 MET + SPT = 20 MFR + SPT = 20	30-55 years	Both male and female	12	4weeks	USPT; TENS; MFR	MPQ; ODI	≥3 months	Both groups improved MPQ and ODI
Ellythy., *et al*. (b) [14]	2012	Egypt	30 MET + SPT = 15 SCS + SPT = 15	30-50 years	Both male and female	12	4weeks	USPT; SCS	MPQ; ODI	≥3 months	Both groups are effective in improving pain and functional disability
Szulc., *et al*. [3]	2015	Poland	60 McKenzie and MET = 20 McKenzie = 20 Standard Physio-therapy = 20	44 years (mean)	Both male and female	5 cycles per day	10 days	McKenzie method	VAS; ODI	>12 months	McKenzie method with MET had the best therapeutic outcomes. McKenzie method, both alone and combined with MET decreased ODI and alleviated pain
Akodu., *et al*. [12]	2017	Nigeria	69 MET = 17 SE = 17 MET + SE = 18 ESS = 17	MET: 48.0 ± 10.1 SE: 45.1 ± 10.9 MET + SE: 49.6 ± 8.6 ESS: 47.5 ± 9.0	Male (53%) Female (47%)	16	8 weeks	CSE; ESS	VAS; MODQ	≥3 months	All participants had improved outcomes following intervention.
Elshinnawy., *et al*. [23]	2019	Egypt	90 Group A = 30 Group B (MET) = 30 Group C (control) = 30	30-50 years	Both male and female	12	4weeks	Kinesio taping and conventional therapy	VAS	≥3 months	MET and kinesio taping with conventional therapy improves pain and trunk range of motion

Fahmy., *et al*. [22]	2019	Egypt	40 MET = 20 MEE = 20	MET: 33.2 ± 6.6 MEE: 30.1 ± 6.8	Male (22) Female (18)	12	3weeks	MEE	VAS; ODI	≥3 months	Following therapy, there was a substantial reduction in pain and functional impairment ratings, as well as a significant improvement in lumbar range of motion in both groups.
Ghasemi., *et al*. (a) [24]	2020	Iran	45 MET = 15 CST = 15 SMT = 15	20-40 years	Both male and female	10	5weeks	CST: SMT	VAS; ODI	≥6 months	All groups improved pain and functional disability; MET and SMT methods were effective in balance control, and postural control by CST.
Ghasemi., *et al*. (b)g [25]	2020	Iran	45 MET = 15 CST = 15 SMT = 15	20-40 years	Both male and female	10	5weeks	CST; SMT	VAS; ODI	≥6 months	All groups improved pain, depression, functional disability, and quality of life
Patel., *et al*. [21]	2020	India	20 MTN = 10 MET = 10	25-40 years	Both male and female	5	2 weeks	MTN	VAS; ODI	≥6 months	MTN and MET improved pain and disability. Both the technique showed the equally improvement on hamstring tightness

Sturion., *et al*. [20]	2020	Brazil	10 MET = 5 HVLA = 5	35-55years	10 males	3	3weeks	HVLA	NPRS; SF-MPQ; RMDQ	≥3 months	Both improved NPRS, and were effective in reducing back pain immediately and 15 days later
Wahyuddin., *et al*.	2020	Thailand	21 MET = 11 LSE = 10	18-60 years	Male (5) Female (16)	1	2 days	LSE	VAS; ODI	≥3 months	MET and LSE alone in single session might not be intensive enough to improve movements and decrease disability.
Ahmed., *et al*. [1]	2021	Nigeria	125 DSE+MET = 41 DSE = 39 CON = 45	20-55 years	Male (80) Female (45)	24	12weeks	DSE	NPRS; ODI; OMPSQ	≥6 months	All groups improved NPRS, OMPSQ and ODI. MET plus DSE interventions were superior to DSE and convention physiotherapy for all outcome measures, except for functional disability
Bhosale and Burungale [19]	2021	India	35 Experimental group = 18 Control = 17	22-38 years	Male (16) Female (19)	6	2weeks	MRT	NPRS; ODI	≥3-6 months	Combined effect of interventions was found to be effective
Tubassam., *et al*. [15]	2021	Pakistan	40 MET = 20 SCS = 20	25-40 years	Male (17) Female (23)	10	2weeks	SCS	NPRS, ODI	NA	Both METS and SCS significantly improved pain and functional disability

Gendy., *et al*. [16]	2022	Egypt	87 Pilate group = 29 MET = 29 Control = 29	20-60 years	Male (27) Female (60)	12	4weeks	PME	VSR; VAS; RMDQ; ROM	≥3 months	All individuals in the three groups improved to varying degrees, with PME showing the most increase over MET.

Table 1: *Characteristics of included studies.*

and low amplitude technique (HLVA); Strain-counter strain technique (SCS); Dynamic Stabilization Exercise (DSE); Lumbar stabilization exercise (LSE); Conventional physiotherapy intervention; Core stability exercise; (SE); Proprioceptive Neuromuscular Facilitation (FNP); Static stretching in hamstring flexibility (SS); transcutaneous electrical stimulation (TENS); therapeutic ultrasound (US); therapeutic exercise program (USPT); myofascial release (MRF); Pilate mat exercise (PME); Kinesio taping; stretching and strengthening exercises (SSE), etc. The Oswestry Impairment Index (ODI), the Roland Morris Disability Questionnaire (RMDQ), and the Oswestry Disability modified (MODQ) were used to evaluate functional disability. Scales such the VAS, NPS, NRS, SF-MPQ, QBPDS, MPI, and OMPSQ were used to assess the intensity of LBP.

Ahmed., *et al*. [1] examined the impact of a combination of DSE and MET on specific biopsychosocial outcomes in the treatment of CLBP in comparison to DSE alone or traditional physiotherapy. Patients were divided into three groups: DSE Plus MET (n = 41), DSE alone (n = 39), or traditional physiotherapy (n = 45) using a random number generator approach. Over the course of 12 weeks, interventions were given twice a week. The research outcomes demonstrated within-group improvements in all intervention groups over time ($p < 0.001$). MET with DSE led to greater improvements in pain intensity, lumbar ROM, activity limitations/participation restrictions, and health status. For all outcome measures, the MET plus DSE therapies outperformed DSE and traditional physiotherapy, with the exception of functional impairment ($p = 0.590$). It was observed that using MET and DSE together is safe and effective in treating individuals with chronic NSLBP.

In a study of 69 individuals with CLBP, Akodu., *et al*. [12] compared the effects of MET and CSE on pain, disability, and range of motion. Using computer-generated numbers, subjects were divided into four separate groups at random. Group 4 acted as the control and got stretching exercises and back care guidance while groups 1 and 2 received MET, CSE, MET and CSE, and group 3 received only CSE. According to studies, the four groups' clinical outcomes-pain, functional impairment, and lumbar range of motion-improved post-intervention ($p < 0.05$). The MET and CSE group combined to generate better clinical results in terms of pain, functional impairment, and range of motion.

Ellythy [13] evaluated how well manual therapy modalities affected individuals with CLBP in terms of outcome metrics. To create two equivalent therapy groups, 40 patients with persistent low back pain were randomly allocated. The first group (Group A) undertook a four-week programme of targeted physical therapy together with post-isometric relaxation (PIR) to address their muscular energy. The second group (group B) went through a four-week myofascial release treatment in addition to a targeted physical therapy programme. The results of this experiment provide credence to the idea that integrating certain manipulation methods into patients' daily activities might significantly lessen their pain and functional impairment. Additionally, Ellythy [14] compared the effects of SCS method and MET on outcome metrics in individuals with persistent low back pain. The two equal treatment groups for the thirty chronic low back pain

patients were chosen at random. A four-week regimen of muscular energy therapy was administered to the first group (n = 15). The second group (n = 15) completed a strain counter strain therapy regimen for four weeks. The findings demonstrated that individuals with persistent low back pain can reduce pain and functional impairment using both MET and SCS approaches.

Tubassam and colleagues [15] performed a quasi-experimental trial on 40 participants who reported trigger point-related low back pain. There were two groups of participants: group A (MET) and group B (SCS). For two weeks, Group B received treatment with strain counter-strain method and moist heat therapy whereas Group A received treatment with muscular energy techniques and moist heat therapy. CLBP patients spurred on by trigger points in the quadratus lumborum experienced considerable pain relief and decreased functional impairment after undergoing METS or SCS. The post-treatment NPRS scores for Group A (MET) and Group B (SCS) were 3.20 ± 1.16 vs. 4.55 ± 1.20 respectively.

In patients with CLBP, Gendy., *et al*. [16] highlighted the advantages of PME and MET on pain intensity, functional impairment, trunk range of motion, and flexibility. After therapy, the ROM, VAS, VSR, and Ronald score all showed varying degrees of improvement as well as statistically significant variations with big size effects. Chronic non-specific low back pain can be effectively treated using a variety of therapeutic techniques, however, the Pilate Mat exercise approach produced superior outcomes.

In 60 participants with LBP, Szulc and colleagues [3] evaluated the effectiveness of a combined McKenzie technique and Muscle Energy Technique (MET) therapy. The McKenzie technique with MET, the McKenzie method alone, or 10 days of routine physiotherapy were given to the patients at random. The highest treatment results came from the McKenzie approach enhanced with MET. The cervical, thoracic, and lumbar spine's mobility returned to normal. Implementing the McKenzie approach led to a considerable decline in the Oswestry Disability Index, a significant reduction in pain (VAS), and a significant reduction in the extent of the spinal disc herniation, both when used alone and in conjunction with MET.

When managing low back pain caused by SI joint dysfunction, Dhinkaran and colleagues [17] compared MET and traditional physiotherapy. The subjects were allocated into two groups at random: Group A (n = 15), which received MET and remedial exercises, and Group B (n = 15) (TENS and corrective exercises were given). The study's findings demonstrated that MET is relatively significant compared to traditional physiotherapy, such as TENS with corrective exercises, in increasing functional capacity and reducing discomfort. In order to examine the relative effectiveness of MET and conventional therapy for treating persistent low back pain caused by sacroiliac joint dysfunction (SIJD) [18]. In the MET group, the SIJD-related apparent functional leg length difference could be nearly normalised. Both groups had nearly identical outcomes in terms of the decrease of pain and impairment.

Bhosale and Burungale [19] evaluated the combined effects of myofascial release therapy, the muscular energy technique, and stretching of the quadratus lumborum muscle in CLBP patients. Two groups were split into an experimental group and a control group for this investigation. Patients with CLBP have found that a combination of Myofascial release, MET, and quadratus lumborum stretching is useful in treating their condition.

Sturion., *et al*. [20] evaluated the effects of two osteopathic manipulative treatments on trunk neuromuscular postural control and clinical low back complaints in male employees with CLBP. 10 male candidates with CLBP were divided into two groups at random: HVLA or MET. Large clinical differences were seen between the immediate and 15-day pain reduction effects of both strategies ($p < 0.01$). The neuromuscular activity and postural balance tests, which are additional factors, did not show any differences between groups or times.

The impact of muscular energy method and neural tissue mobilisation on hamstring tightness in CLBP was reported by Patel., *et al*. [21] 52 patients with CLBP and hamstring tightness participated in this comparative investigation. According to the study, both muscle energy method and neural tissue mobilisation relieve hamstring tightness in persistent low back pain. Fahmy., *et al*. [22] studied 40 pa-

tients with persistent mechanical low back pain to assess the effectiveness of an extension exercise programme vs MES. Patients were allocated into two equal groups by random selection: group A underwent a spinal extension exercise programme, whereas group B received MES. Both groups' post-treatment pain and functional impairment scores significantly decreased, although group B's improvement was more pronounced. Both groups' lumbar range of motion significantly increased after therapy, although group A's improvement was more pronounced.

Elshinnawy., *et al*. [23] looked at how MET and kinesiotaping affected individuals with chronic low back dysfunction in terms of pain intensity and spinal mobility. Participants were divided into three groups; group A received kinesiotaping, as well as conventional therapy; group B received kinesiotaping, as well as MET and conventional therapy; and group C received MET and conventional therapy. Results revealed that adding MET and kinesiotaping to traditional treatment seems to reduce pain and increase trunk range of motion.

In patients with NSCLBP, Ghasemi., *et al*. [24] examined the impact of MET, CST, and SMT on postural control. The findings of this study demonstrated that all three techniques-CST, MET, and SMT-are successful in improving postural control in NSCLBP patients, albeit it appears that CST is more successful in improving balance parameters. Standing on one leg with one eye closed while using CST has a larger impact on balance. Additionally, it was shown that the effects of CST persisted even after follow-up. Additionally, Ghasemi and his colleagues [25] evaluated the effects of MET, CST, and SMT on patients' levels of pain, disability, depression, and quality of life. In the groups SMT, CST, and MET, substantial VAS, BDI, ODI and SF-36 changes were noted. In the CST group, the changes in VAS, BDI, ODI and SF-36 at post-treatment and follow-up periods were considerably different from those in the SMT group, and in the MET group, the changes were significantly different from those in the CST group.

For the first time, Wahyuddin and colleagues [26] evaluated patients with probable facet joint origin persistent LBP to assess the immediate effects of MET and LSE. Twenty-one low back pain patients were enlisted, and they were then randomly allocated to either MET or LSE therapy. Only pain scores showed a minor clinically meaningful change following the treatments when the groups were collapsed, but neither lumbar mobility or disability scores.

Quality assessment of included studies

All of the studies that were included were evaluated by two reviewers independently. Two out of seventeen studies (11.8%) had low methodological quality, ten studies (58.8%) had medium methodological quality and thus moderate risk of bias, whereas five studies (29.4%) were of high quality (Table 2).

Discussion

According to estimates ranging between 30 - 80% of the general population, LBP is a major cause of disability with a high global prevalence [4]. Up to 90% of people will experience LBP at some point in their lifetime, and up to 50% will experience it more than once. The burden of LBP is reported to be higher in lower and middle-income countries like Africa since the frequency of the condition has been linked to poorer socioeconomic status and lower levels of education [7]. The prognosis following an acute bout of LBP is poor, as 60 - 80% of patients will still have recurrence or persistence of their LBP symptoms [27]. 70% of people can have chronic low back pain (CLBP), especially those who are older and more economically active [27]. CLBP may also result in other socioeconomic issues including long-term incapacity and time away from work, which raises the absenteeism rate for adult employees [5]. The frequency of CLBP among workers might reach 27% for women and 24% for men. However, some data indicates that the incidence of back discomfort among male workers between the ages of 35 and 55 might reach 28% [1,2,4,5].

The multifaceted cause of chronic low back pain necessitates multimodal therapy. Evidence of treatment results shouldn't be restricted to diagnostic imaging alone; rather, it should primarily represent how well a patient is functioning, how much pain they are experiencing,

Author	Year	Random Allocation	Concealed Allocation	Similarity at the baseline	Subject blinding	Therapist blinding	Assessor blinding	More than 85% follow-up for at least one key outcome	Intention-to-treat analysis	Between-group statistical comparison for at least one key outcome	Point and variability measures for at least one key outcome	Overall Score	Quality of studies
Dhinkaran., *et al*. [17]	2011	Y	N	N	N	N	N	N	N	N	Y	2/10	Low
Bindra., *et al*. [18]	2012	Y	N	N	N	N	N	N	N	Y	N	2/10	Low
Ellythy., *et al*. (a) [13]	2012	Y	N	Y	N	N	N	N	N	Y	Y	4/10	Medium
Ellythy., *et al*. (b) [14]	2012	Y	N	Y	N	N	N	N	N	Y	Y	4/10	Medium
Szulc., *et al*. [3]	2015	Y	Y	N	N	Y	N	Y	N	Y	Y	6/10	Medium
Akodu., *et al*. [12]	2017	Y	N	Y	N	N	N	Y	N	Y	Y	5/10	Medium
Elshinnawy., *et al*. [23]	2019	Y	Y	Y	Y	N	N	Y	N	Y	Y	7/10	High
Fahmy., *et al*. [22]	2019	Y	N	Y	N	N	N	Y	N	Y	Y	5/10	Medium
Ghasemi., *et al*. (a) [24]	2020	Y	N	Y	N	N	N	Y	N	Y	Y	5/10	Medium
Ghasemi., *et al*. (b)g [25]	2020	Y	N	Y	N	N	N	Y	N	Y	Y	5/10	Medium
Patel., *et al*. [21]	2020	Y	N	Y	N	N	N	N	N	Y	Y	4/10	Medium
Sturion., *et al*. [20]	2020	Y	Y	Y	N	N	N	Y	Y	Y	Y	7/10	High
Wahyuddin., *et al*.	2020	Y	N	Y	N	Y	Y	Y	N	Y	Y	7/10	High
Ahmed., *et al*. [1]	2021	Y	Y	Y	Y	N	Y	Y	N	Y	Y	8/10	High

Bhosale and Burungale [19]	2021	Y	N	Y	N	N	N	Y	N	Y	Y	5/10	Medium
Tubassam., *et al*. [15]	2021	Y	N	N	N	N	N	Y	N	Y	Y	4/10	Medium
Gendy., *et al*. [16]	2022	Y	Y	Y	Y	Y	N	Y	N	Y	Y	8/10	High

Table 2: *Summary of methodological quality assessment based on the PEDro classification scale.*

how much they move, and how their motor function is returning to normal [2,3]. The ongoing search for new effective treatment modalities is spurred by low back pain's high occurrence and inconsistent diagnostic and therapeutic processes. Integrating the knowledge with other therapy modalities and treating the patient holistically appears to be linked to successful outcomes.

Motor control issues and greater postural instability may be linked to chronic low back pain [28]. People with CLBP frequently have decreased stabilising muscle function and coordination [28]. Manual physiotherapy with manipulative spine treatment is recommended by international guidelines as a non-drug intervention in the management of non-specific low back pain as a therapeutic indication for restoring function [29]. This therapy is indicated as an essential therapeutic component linked to exercise in certain nations, while it is regarded a primary treatment choice in others [30].

The MET is one of the proposed manipulative osteopathic methods [31]. The purpose is to regain movement and function, and they are employed to lessen discomfort [32]. A muscle contraction inhibits or reduces the excitability of the motor neurons that innervate the antagonist muscle in MET, which is an active or passive technique that uses reciprocal inhibition physiological mechanisms [31-34]. This method can be utilised to free up constrained articulations and lessen discomfort and impairment [32,33]. During application to patients, MET is characterised by vigorous, voluntary muscular contractions and relaxations coupled with the therapist's passive movement [31-33]. Therefore, a physiological process of reciprocal inhibition may help to relieve joint and muscle sprains, which would then enhance range of motion [33]. In patients with CLBP, MET dramatically lowers pain intensity levels. Both spinal and supraspinal processes may be responsible for the analgesic effects of MET. During an isometric contraction, both muscle and joint mechanoreceptors are activated. This causes localised activation of the periaqueductal grey, which is involved in the descending regulation of pain, and sympatho-excitation induced by somatic efferents. The simultaneous gating of nociceptive impulses in the dorsal horn caused by mechanoreceptor stimulation then causes nociceptive inhibition in the dorsal horn of the spinal cord. By blocking the smaller diameter nociceptive neuronal input at the spinal cord level, MET may be able to reduce pain by stimulating joint proprioceptors through the generation of joint movement or the stretching of a joint capsule [13,14]. According to systematic review and meta-analysis, Coulter., *et al*. [35] reported that manipulation and mobilisation therapy for the treatment of CLBP, MET looks safe, is probably to lessen discomfort, and is likely to enhance specific functions for patients with CLBP.

There are few studies examining the efficacy of MET for NSLBP, either alone or in conjunction with other therapeutic activities (especially trunk stability exercises) [1,31]. According to a Cochrane evaluation, MET has potential for treating chronic NSLBP and is considered safe when used in conjunction with other therapy methods [31]. To improve therapeutic outcomes for the management of CLBP, however, and to determine if these advantages can be sustained over the long term, more study utilising a sound approach is required [31]. Additionally, a recent scoping review we conducted revealed that the majority of studies that have looked at the effects of MET in CLBP lack

methodological rigour, making it impossible to determine whether MET is effective when combined with other therapeutic modalities for the treatment of CLBP [1].

In comparison to DSE alone or conventional therapy, the technique of combining DSE and MET was more effective in reducing pain and correcting lumbar mobility deficits. It also indicated the best satisfaction based on better health status. Studies showing that manual therapy and therapeutic exercises have the significant effect on pain levels, lumbar mobility, and general health status in individuals with chronic NSLBP [8,36] confirm this conclusion. Niemistö., *et al*. [37] added that the MET, which is utilised to rectify any biomechanical dysfunctions in the lumbar or pelvic regions, may have contributed to the improvement in mobility.

According to this review, individuals with CLBP reported less discomfort after using the muscle energy approach. This result supports earlier research [1,2,17,22,23,30]. They also found that using the muscular energy approach helped patients with low back pain to feel less pain in their own trials. According to Chaitow [33], the pain reduction caused by MET is based on neurophysiology. This happens as a result of the agonist muscle's stretch receptors, known as Golgi tendon. These receptors prevent additional muscular contraction in response to overstretching of the muscle. The Golgi tendon organ is activated by a powerful muscular contraction in response to an equivalent counterforce. An inhibitory motor neuron is encountered by the afferent nerve impulse from the Golgi tendon when it reaches the dorsal root of the spinal cord. Restoring the muscles to their maximum stretch length reduces the increased tension in the afflicted muscles, along with the discomfort and dysfunction that follows [2,3,15]. According to Greenman [38], the MET is a regulated manual treatment approach that uses varying levels of intensity in relation to the operator's clearly shown counterforce. This technique can be employed in situations when high velocity with low amplitude is contraindicated because there is no thrusting involved. In this review, we found that MET alone or in conjunction with other interventions can be beneficial to patients with CLBP.

Conclusion

MET is a multifunctional approach that is often used to treat joint dysfunction, muscular discomfort, and tightness in the muscles as well as to increase range of motion. This study revealed that in those with chronic low back pain, MET significantly reduces the amount of function disability, improves lumbar spine range of motion, and decreases pain intensity. Therefore, it is recommended that physiotherapists manage patients with CLBP by using MET effectively.

Bibliography

1. Ahmed UA., *et al*. "Effects of dynamic stabilization exercises and muscle energy technique on selected biopsychosocial outcomes for patients with chronic non-specific low back pain: a double-blind randomized controlled trial". *Scandinavian Journal of Pain* 21.3 (2021): 495-511.

2. Gk S., *et al*. "Effectiveness of muscle energy technique in patients with nonspecific low back pain: a systematic review with meta-analysis". *European Journal of Physical and Rehabilitation Medicine* (2022).

3. Szulc P., *et al*. "Impact of McKenzie Method Therapy Enriched by Muscular Energy Techniques on Subjective and Objective Parameters Related to Spine Function in Patients with Chronic Low Back Pain". *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research* 21 (2015): 2918-2932.

4. Hoy D., *et al*. "The global burden of low back pain: estimates from the Global Burden of Disease 2010 study". *Annals of the Rheumatic Diseases* 73.6 (2014): 968-974.

5. Wu A., *et al*. "Global low back pain prevalence and years lived with disability from 1990 to 2017: estimates from the Global Burden of Disease Study 2017". *Annals of Translational Medicine* 8.6 (2020): 299.

6. D'hooge R., *et al*. "Lumbar muscle dysfunction during remission of unilateral recurrent nonspecific low-back pain: evaluation with muscle functional MRI". *The Clinical Journal of Pain* 29.3 (2013): 187-194.

7. Hartvigsen J., *et al*. "What low back pain is and why we need to pay attention". *Lancet London England* 391.10137 (2018): 2356-2367.

8. Foster NE., *et al*. "Prevention and treatment of low back pain: evidence, challenges, and promising directions". *Lancet London England* 391.10137 (2018): 2368-2383.

9. Campbell P., *et al*. "Conceptual overlap of psychological constructs in low back pain". *Pain* 154.9 (2013): 1783-1791.

10. Knobloch K., *et al*. "Preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement and publication bias". *Journal of Cranio-Maxillofacial Surgery* 39.2 (2011): 91-92.

11. De Morton NA. "The PEDro scale is a valid measure of the methodological quality of clinical trials: a demographic study". *Australian Journal of Physiotherapy* 55.2 (2009): 129-133.

12. Ak A Sra A As O. "Comparative effects of muscle energy technique and core stability exercise in the management of patients with non-specific chronic low back pain". *Low Back Pain* (2017): 8.

13. Ellythy MA. "Efficacy of muscle energy technique versus myofascial release on function outcome measures in patients with chronic low back pain". *Bulletin of Faculty of Physical Therapy* 17.1 (2012): 51-57.

14. Ellythy MA. "Efficacy of muscle energy technique versus strain counter strain on low back dysfunction". *Bulletin of Faculty of Physical Therapy* 17.2 (2012): 29-35.

15. Tubassam S., *et al*. "Effectiveness of Muscle Energy Technique Versus Strain Counter Strain Technique on Trigger Points of Quadratus Lumborum among Low Back Pain Patients". *Pakistan Journal of Medical and Health Sciences* 15.8 (2021): 2451-2453.

16. Gendy M., *et al*. "Pilate mat exercise versus muscle energy technique on chronic non specific low back pain". *International Journal of Health Sciences* 6 (2022): 3570-3583.

17. Dhinkaran M., *et al*. "Comparative Analysis of Muscle Energy Technique and Conventional Physiotherapy in Treatment of Sacroiliac Joint Dysfunction". *The Indian Journal of Physiotherapy and Occupational Therapy* 5.4 (2011): 127-130.

18. Bindra S., *et al*. "A Study on the Efficacy of Muscle Energy Technique as Compared to Conventional Therapsy in Chronic Low Back Pain Due to Sacroiliac Joint Dysfunction". *The Indian Journal of Physiotherapy and Occupational Therapy* 6.1 (2012).

19. Bhosale SV and Burungale M. "Effectiveness of Myofascial Release, Muscle Energy Technique and Stretching of Quadrartus Lumborum Muscle in Patients with Non-Specific Low Back Pain". *Journal of Ecophysiology and Occupational Health* (2021): 132-141.

20. Sturion LA., *et al*. "Comparison between high-velocity low-amplitude manipulation and muscle energy technique on pain and trunk neuromuscular postural control in male workers with chronic low back pain: A randomised crossover trial". *South African Journal of Physiotherapy* 76.1 (2020): 1420.

21. Patel SY., *et al*. "Comparison of Neural Tissue Mobilization and Muscle Energy Technique on Hamstring Tightness in Chronic Low Back Pain". *Medico Legal Update* 20.2 (2020): 375-379.

22. Fahmy E., *et al*. "Efficacy of spinal extension exercise program versus muscle energy technique in treatment of chronic mechanical low back pain". *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery* 55.1 (2019): 77.

23. Elshinnawy AM., *et al*. "The effect of Muscle Energy Techniques versus cross (X) technique kinesio taping to treat chronic low back dysfunction". *International Journal of Therapy and Rehabilitation* 26.2 (2019): 1-8.

24. Ghasemi C., *et al*. "Comparative study of muscle energy technique, craniosacral therapy, and sensorimotor training effects on postural control in patients with nonspecific chronic low back pain". *Journal of Family Medicine and Primary Care* 9.2 (2020): 978-984.

25. Ghasemi C., *et al*. "Comparison of the effects of craniosacral therapy, muscle energy technique, and sensorimotor training on non-specific chronic low back pain". *Anaesthesia, Pain and Intensive Care* 24.5 (2020): 532-543.

26. Wahyuddin W., *et al*. "Immediate effects of muscle energy technique and stabilization exercise in patients with chronic low back pain with suspected facet joint origin: A pilot study". *Hong Kong Physiotherapy Journal: Official Publication of the Hong Kong Physiotherapy Association Limited = Wu li Chih Liao* 40.2 (2020): 109-119.

27. Majid K and Truumees E. "Epidemiology and Natural History of Low Back Pain". *Seminars in Spine Surgery* 20.2 (2008): 87-92.

28. Shigaki L., *et al*. "Effects of Holding an External Load on the Standing Balance of Older and Younger Adults with and Without Chronic Low Back Pain". *Journal of Manipulative and Physiological Therapeutics* 40.4 (2017): 284-292.

29. Koes BW., *et al*. "An updated overview of clinical guidelines for the management of non-specific low back pain in primary care". *European Spine Journal* 19.12 (2010): 2075-2094.

30. Qaseem A., *et al*. "Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline from the American College of Physicians". *Annals of Internal Medicine* 166.7 (2017): 514-530.

31. Franke H., *et al*. "Muscle energy technique for non-specific low-back pain". *Cochrane Database of Systematic Reviews* 2 (2015): CD009852.

32. Hamilton L., *et al*. "The effects of high-velocity, low-amplitude manipulation and muscle energy technique on suboccipital tenderness". *The International Journal of Osteopathic Medicine* 10.2 (2007): 42-49.

33. Herrington LL Chaitow. "Muscle Energy Techniques (third edition".), Elsevier, Churchill-Livingstone, New York, NY (2006): 346. CD included, Price £42.99, ISBN: 10 0443101140. Man Ther - MAN THER (2008): 13.

34. Rubinstein SM., *et al*. "Spinal manipulative therapy for acute low-back pain". *Cochrane Database of Systematic Reviews* 9 (2012): CD008880.

35. Coulter ID., *et al*. "Manipulation and mobilization for treating chronic low back pain: a systematic review and meta-analysis". *The North American Spine Society Open Access Journal* 18.5 (2018): 866-879.

36. Zafereo J., *et al*. "Regional manual therapy and motor control exercise for chronic low back pain: a randomized clinical trial". *Journal of Manual and Manipulative Therapy* 26.4 (2018): 193-202.

37. Niemistö L., *et al*. "A randomized trial of combined manipulation, stabilizing exercises, and physician consultation compared to physician consultation alone for chronic low back pain". *Spine* 28.19 (2003): 2185-2191.

38. Greenman's Principles of Manual Medicine (Point (Lippincott Williams and Wilkins)) - PDF Drive (2022).

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