VIMS Journal of Physical Therapy

[REVIEW ARTICLE]

Mechanical Diagnosis and Therapy in Patients with Extremity Problems: A Systematic Review

Dr. Mrudula Shete (PT)[1], Dr. Deepak Anap (PT)[2]
[1]Post Graduate Student, [2]Professor & HOD, Department of Musculoskeletal Physiotherapy,
D.V.V.P. F.'s College of Physiotherapy, Ahmednagar.

ABSTRACT :

Background: Mechanical Diagnosis and Therapy (MDT) is used in the treatment of extremity problems. It is an effective approach in cases of spinal conditions for target population. Availability of the reliable data like RCT and systematic review is a key factor to determine the precise clinical problem and to direct an appropriate intervention.

Objectives: The primary aim of this systematic review is to assess the methodological quality of well-designed RCTs related to the MDT classification and treatment for extremity problems.

Design: Systematic review.

Method: Electronic search on various data bases was done. The level of evidence was determined considering the methodological quality of the studies.

Results: 1 RCT was included and it met the criteria for high quality. After the assessment of RCT according to the CONSORT guidelines it was found that out of 25 checklist points; 4 methodological faults were found in assessed RCT. Those were; a) sample size determination, b) Blinding after assessment c) Generisability of the trial findings d) Where the full trial protocol can be accessed.

Conclusion: The current systematic review found strong evidence of benefits of MDT approach for extremity problems (knee joint). But there was limited evidence in other extremity joints.

Introduction:

Various health care professionals such as general practise physicians, physiotherapists, chiropractors and osteopaths daily come across the mechanical disorders affecting the soft tissues and bones of the human extremities. 1 The duration of impairment, pain or disability can vary from a few days in the case of minor injury to months or even years in some conditions.[1] It's hard to justify the relapse of the condition in many patients even after successful completion of the previous treatments.

One of the major causes encountered by the researchers is the lack of patient education. 1 According to the researcher's patients may need education and advice about the most effective way or returning to full function following soft tissue trauma. [1]

Very often, dubious efficacy of treatments only detracts from the importance of the patient's role in this recovery. For the complete recovery to occur, it is also necessary for the patient to understand that the recovery of function can only commence following adequate healing and repair, and requires an appropriate rehabilitation process. These processes may take time, but recovery is impossible without the patient's active involvement.

Another issue suspected by the clinicians and other health professionals is the diagnosis in musculoskeletal cases. It is still in infancy1. Hence within spinal problems specific diagnoses have been replaced by broad, non –specific categories and it is very well accepted i.e. Mechanical Diagnosis and Therapy. The system comprises both assessment and intervention components. [2]

*Corresponding author
Dr. Mrudula G. Shete (PT)
E-mail: mrudulaganesh30@gmail.com
D.V.V.P. F.'s College of Physiotherapy, Ahmednagar.

Copyright 2021, VIMS Journal of Physical Therapy. This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

In peripheral problems, specific diagnostic criteria are used more widely with an underlying assumption of reliability, which is, however, barely endorsed by the studies available. Validity, reliability and uniformity of the tests used to make these diagnoses is often proved to be poor.[3] The tests that are commonly used make diagnosis in musculoskeletal disorders are neither proven to be reproducible nor to measure what is intended. [1]

The diagnoses are suspected to be an untrustworthy base upon which to establish treatment protocols. This can be one of the reasons why clinicians come across the persistent musculoskeletal problems, which are resistant to treatment, is very common.

The lack of long-term follow-up and the withdrawal of patients from therapy generate the illusion of therapeutic efficacy for many interventions. However, for a vast number of patients, the reality is persistent pain and functional limitations. [1]

The only intervention that consistently does appear to be able to confer benefit is a self-management approach using exercise and behavioural modification. The problems of diagnosis of non-specific mechanical disorders of the spine is well documented. In order to overcome those difficulties, an alternative system of classifying spinal disorders was proposed by McKenzie.

McKenzie system is based on the symptomatic and mechanical responses of patients to various repeated movements or static loading forces (that is, a mechanical evaluation). Hence it allows the classification of patients into broad rather than tissue-specific categories, and thus leads to the treatment.1 Rather than seeking to make a diagnosis, this approach identifies a disease by means of its signs and symptoms. Thus the McKenzie system concentrates on syndrome identification.

A syndrome is a group of symptoms and a pattern of responses characteristic or a particular problem. 1 The system is now widely used to classify and treat patients with mechanical spinal disorders. There are 4 syndromes described by McKenzie-Derangement, Dysfunction, Postural and Others.1

A reliability study that distributed 25 patient vignettes printed on MDT extremity assessment forms to 96 highly trained MDT therapists worldwide had 92% agreement on the classifications of the vignettes, with a kappa value of 0.83.[4]

A key characteristic of the system that has shown potential as a prognostic indicator of musculoskeletal pain is directional preference. Directional preference is defined as the rapid and lasting improvement of a patient's symptoms with positioning or movement in one specific direction.1 Based on the patients' symptomatic response to the loading strategies, the clinician is able to formulate a provisional classification and provide directed treatment.

MDT has previously demonstrated moderate to substantial inter-rater reliability in the musculoskeletal assessment of the spine ($\kappa = 0.6–0.84$), shoulder ($\kappa = 0.9$), and extremities ($\kappa = 0.7–0.83$) among MDT trained clinicians. [5]

In spite of the availability of literature, there is paucity of well-designed RCT in extremity joints. So, the primary aim of this systematic review is to assess the methodological quality of well-designed RCTs related to the MDT classification and treatment for extremity problems.

Materials and Methods:

Inclusion Criteria For Study Selection:

Type of Studies:

This study only included randomized controlled trials (RCTs) related to MDT intervention for extremity problems. Any other studies, such as review, animal studies, case reports, case series, letters, comments, non-clinical trials, non-RCTs, and quasi-RCTs studies were excluded. Studies included any other PT management for extremity problems along with MDT were excluded.

Type of Participants:

Both males and females (180) patients with knee osteoarthritis of age (mean=64 years), P4 pain scale score (mean=23), KOOS pain score (mean=46) and KOOS function score (mean=51) were included in the study.

Type of Interventions:

Intervention included MDT derangement exercises for MDT responders, evidence-based exercises for non-responders and control group received no exercises for OA Knee.

Type of Outcome Measurements:

Outcomes measures used for OA Knee P4 Pain scale and Knee injury and Osteoarthritis Outcome (KOOS) Score were used.

Study Selection and Data Extraction:

Study Selection:

Review researcher independently selected all literatures by screening titles and abstracts based on the predefined eligibility criteria. All potential eligible studies were further assessed by reading the full texts. RCT were selected on the basis of CONSORT guidelines 2010.

Data Extraction:

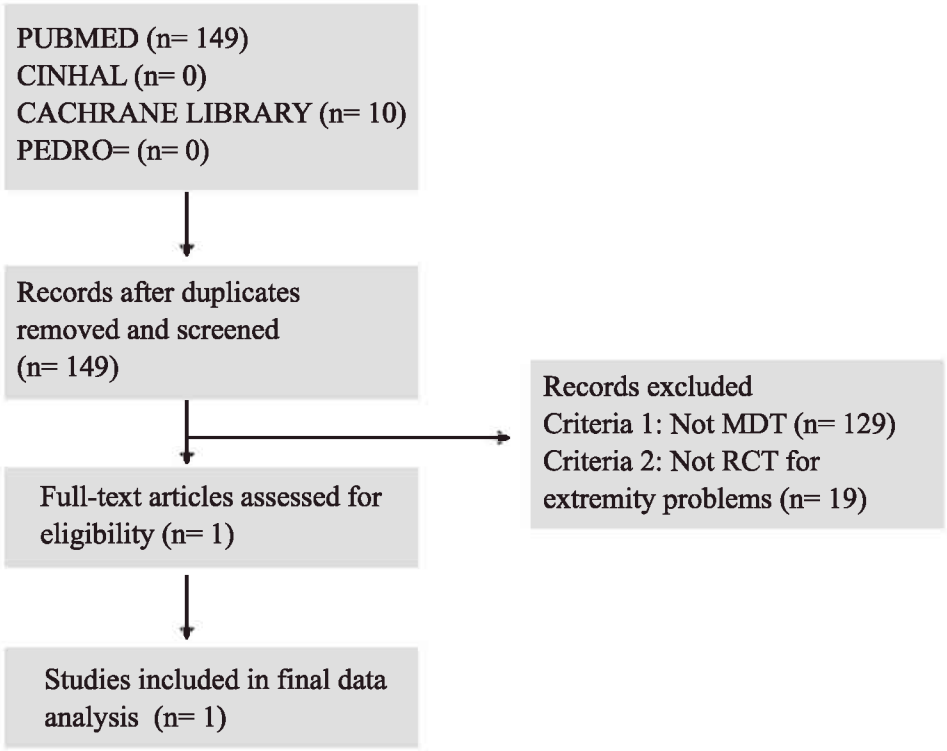
A systematic search was performed to identify potential RCTs on MDT intervention in extremity problems. These electronic databases include MEDLINE, EMBASE, CINAHL, PubMed, Scopus and Cochrane library from inception to August 2021 in English language. The search terms include "MDT", "EXTREMITIES", "RCT".

Quality Assessment:

The CONSORT guidelines (2010) were used to assess the quality of included RCTs by review researcher. CONSORT statement, which is an evidence-based, minimum set of recommendations for reporting randomized trials. It offers a standard way for authors to prepare reports of trial findings, facilitating their complete and transparent reporting, and aiding their critical appraisal and interpretation. The CONSORT Statement comprises a 25-item checklist and a flow diagram. The checklist items focus on reporting how the trial was designed, analysed, and interpreted; the flow diagram displays the progress of all participants through the trial.[6]

Table 1: Summary of study

Author	Richard Rosedale, PT, Dip MDT1 • Ravi Rastogi, PT, MSc, Cred MDT1 • Stephen May, PT, PhD2 Bert M. Chesworth, PhD3 • Frank Filice, PT, Cred MDT1 • Sean Willis, PT, Cred MDT1 James Howard, MD, FRCSC4 • Douglas Naudie, MD, FRCSC4 • Shawn M. Robbins, PT, PhD5
Title	Efficacy of Exercise Intervention as Determined by the McKenzie System of Mechanical Diagnosis and Therapy for Knee Osteoarthritis: A Randomized Controlled Trial
Sample, Age, Characteristics	Patients with knee OA (n = 180) were randomized to an exercise intervention group or a control group. Mean age was 64 years, mean weight 86 kg, mean P4 pain scale score was 23.
Aim	To examine the efficacy of exercise intervention in patients with knee osteoarthritis (OA), as directed by Mechanical Diagnosis and Therapy (MDT) assessment, and, secondarily, to explore outcomes between MDT assessment–defined subgroups within the exercise group
Findings	The exercise intervention group had significantly improved P4 scores (mean difference, –6; 95% CI: –8, –3), KOOS pain scores (mean difference, 9; 95% CI: 5, 13), and KOOS function scores (mean difference, 11; 95% CI: 7, 15) compared to those of the control group at 2 weeks. At 3 months, the exercise intervention group had significantly improved KOOS pain scores (mean difference, 7; 95% CI: 3, 11) and KOOS function scores (mean difference, 5; 95% CI: 1, 9) compared to controls.



Discussion:

This is the first systematic review exploring RCTs for Mechanical Diagnosis and Therapy in extremity joint problems. The level of evidence was assessed for one randomised control trial. The CONSORT (Consolidated Standards of Reporting Trials) 2010 guideline is intended to improve the reporting of parallel-group randomized controlled trial (RCT), enabling readers to understand a trial's design, conduct, analysis and interpretation, and to assess the validity of its results.

After the assessment of RCT according to the CONSORT guidelines it was found that out of 25 checklist points; 4 methodological faults were found in assessed RCT. Those were; a) sample size determination, b) Blinding after assessment c) Generisability of the trial findings d) Where the full trial protocol can be accessed

MDT involves mechanical loading strategies to examine symptomatic and mechanical change. There were no efforts taken to minimize the effect of assessment by the first assessor on the assessment by the second assessor by confirming consistent patient responses during the assessment with the second assessor by a researcher in the assessed RCT. Similarly, those didn't respond to directional preference was included in non-responder group but not in any other syndrome defined by McKenzie.

It is thought that an offset load applied to the capsule and other pain producing structures in a symptom- and fissure-specific direction of movement would apply a reductive force or load onto displaced content, redirecting it back toward its more physiologic central location. The symptom-generating structures and/or free nerve endings are consequently mechanically decompressed, resulting in a lessening of nociceptive stimuli and the centralization of pain.[2] This is specified by the directional preference established for a particular patient. The prevalence of derangement in the extremity problems is found to be highest (89.2%) among all the syndromes described by McKenzie.[7]

Hiroski Takasaki et. al stated that there was a strong evidence of acceptable inter-examiner reliability of MDT classification for extremity problems when vignettes were used but there was a limited evidence of acceptable inter-examiner reliability of MDT classification for extremity problems when real patients were assessed in the concurrent reliability design.5 This suggests that future studies with more RCTs should be conducted as there is scarcity data on real patients.

The overall benefits of MDT approach of assessment and diagnosis is a) Patient centric approach b) Demonstration about the benefits of appropriate positions, and exercise on their symptoms, and the provocative influence of the opposite movements

and postures c) Self-management about maintaining the improved symptoms d) Regaining full activity without symptom recurrence

Limitations:

Major limitation of this systematic review is this systematic review includes a single randomised control trial as there is only single RCT is reported for extremity problems. Another limitation is there no further classification of non-responder group in other syndromes.

Another limitation is; in MDT, a provisional classification can be changed through follow-up examinations (Supp, 2015; Heidar Abady et al., 2015, Werneke et al (1999)) reported the number of sessions required to detect clear symptomatic responses in people with back and extremity problems which was not examined in the reported RCT.

One of the major limitations is the small sample size and the lack of regular long-term follow-up. Patients were assessed at 2 weeks and at 3 months. The adherence to exercise at regular intervals was not assessed.

References:

1. Levine D. The Human Extremities: Mechanical Diagnosis and Therapy. Physical Therapy. 2001 Sep 1;81(9):1597.
2. Heidar Abady A. Application of The McKenzie System Of Mechanical Diagnosis And Therapy In Patients With Shoulder Disorders.2018.
3. Schellingerhout JM, Verhagen AP, Thomas S, Koes BW. Lack of uniformity in diagnostic labeling of shoulder pain: time for a different approach. Manual therapy. 2008 Dec 1;13(6):478-83.
4. May S, Ross J. The McKenzie classification system in the extremities: a reliability study using McKenzie assessment forms and experienced clinicians. Journal of manipulative and physiological therapeutics. 2009 Sep 1;32(7):556-63
5. Takasaki H, Okuyama K, Rosedale R. Inter-examiner classification reliability of mechanical diagnosis and therapy for extremity problems–systematic review. Musculoskeletal Science and Practice. 2017 Feb 1;27:78-84.
6. Moher D, Jones A, Lepage L, Consort Group, CONSORT Group. Use of the CONSORT statement and quality of reports of randomized trials: a comparative before-and-after evaluation. Jama. 2001 Apr 18;285(15):1992-5.
7. Maccio JR, Carlton L, Levesque K, Maccio JG, Egan L. Directional preference of the extremity: a preliminary investigation. Journal of Manual & Manipulative Therapy. 2018 Oct 20;26(5):272-80.
8. Rosedale R, Rastogi R, May S, Chesworth BM, Filice F, Willis S, Howard J, Naudie D, Robbins SM. Efficacy of exercise intervention as determined by the McKenzie system of mechanical diagnosis and therapy for knee osteoarthritis: a randomized controlled trial. journal of orthopaedic & sports physical therapy. 2014 Mar;44(3):173-A6.
9. Aytona MC, Dudley K. Rapid resolution of chronic shoulder pain classified as derangement using the McKenzie method: a case series. Journal of Manual & Manipulative Therapy. 2013 Nov 1;21(4):207-12.