



IMPACT OF PHYSIOTHERAPY STRATEGIES IN THUMB CARPOMETACARPAL JOINT OSTEOARTHRITIS FOR UNLOCKING FUNCTIONAL RELIEF- FROM PAIN TO POWER: A SYSTEMATIC REVIEW

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ABSTRACT :

Background

Thumb carpometacarpal joint osteoarthritis (CMC OA) is a prevalent condition marked by progressive deterioration of joint cartilage. It commonly affects aging individuals, leading to pain at the base of the thumb, muscle weakness, and morning stiffness, all of which hinder hand function and daily activities. Grip strength and lateral pinch movements are particularly impacted, affecting independence and self-care.

Aim

This review aims to assess the effectiveness of physiotherapy interventions in managing thumb CMC OA, focusing on pain relief, functional improvement, grip strength, and overall quality of life.

Method

Following PRISMA guidelines, a thorough literature search was conducted using databases such as Scopus, Google Scholar, and PubMed. Studies published in English within the last five years, including randomized controlled trials, controlled trials, and prospective studies, were considered. Case reports, non-controlled trials, and duplicate articles were excluded. After rigorous screening, five relevant studies were selected from an initial pool of twelve.

Results

The review highlights various physiotherapy approaches, including proprioceptive exercises, prefabricated CMC-MCP immobilization splints, ischemic compression for myofascial trigger points in the first dorsal interosseus, strengthening exercises, and a self-management program known as the OA Thumb-Based Therapy Trial. These interventions demonstrated improvements in pain relief, pinch and grip strength, and overall quality of life. Combining conservative treatments with additional therapies yielded better outcomes in managing pain and enhancing functional abilities in individuals with CMC OA.

Conclusion

Physiotherapy plays a vital role in alleviating pain, restoring grip strength, and improving quality of life in individuals with thumb CMC OA. The findings support the integration of physiotherapy strategies into clinical practice for effective management of this condition. Further research is necessary to refine these interventions and tailor them to individual patient needs.

Keywords: Carpometacarpal Osteoarthritis, Physiotherapy, Functional Relief

INTRODUCTION

Thumb carpometacarpal joint (CMCJ) osteoarthritis is a degenerative condition affecting the base of the thumb, where the first metacarpal bone articulates with the trapezium bone of the wrist. The progressive breakdown of cartilage leads to pain, stiffness, limited range of motion, and muscle weakness, significantly impairing fine motor skills and grip strength.

This condition is particularly prevalent among older adults, especially post-menopausal women, and is expected to become more common due to aging populations and repetitive hand movements in daily life. While surgical options exist for advanced cases, non-invasive treatments are often preferred due to their lower risk and shorter recovery time.

Physiotherapy has emerged as a key component in managing thumb CMCJ osteoarthritis, offering various conservative treatment approaches. Despite the availability of multiple interventions, questions remain regarding their comparative effectiveness and optimal combinations. This systematic review aims to consolidate current evidence on physiotherapy strategies for thumb CMCJ osteoarthritis, evaluating their impact on pain relief, joint mobility, strength, and functional outcomes. By synthesizing existing studies, this review seeks to provide insights into how physiotherapy can facilitate recovery and enhance hand function.

NEED FOR STUDY-

Thumb CMCJ osteoarthritis is a widespread and debilitating condition, particularly among older adults and post-menopausal women. Given its increasing prevalence due to aging and repetitive hand movements, this review aims to assess the effectiveness of physiotherapy interventions in reducing pain, improving joint mobility, enhancing strength, and optimizing functional outcomes.

AIM-

To evaluate the impact of physiotherapy interventions on pain reduction and functional improvement in individuals with thumb CMC OA.

REVIEW OBJECTIVES

- To identify and analyze published literature addressing physiotherapy strategies for managing thumb CMCJ osteoarthritis.
- To examine studies focusing on the functional status of individuals with thumb CMCJ osteoarthritis.

METHODOLOGY

- The review will follow a rigorous and transparent methodology to ensure the findings are reliable and can inform clinical practice.
- Methodological framework and tenets proposed by **Arksey and O'Malley**

The review stages were organized into the following steps:

identifying the research question,

identifying relevant studies,

study selection,

charting the data (data extraction);

collating, summarizing and reporting the results

IDENTIFYING RELEVANT STUDIES

- A comprehensive literature search was conducted to identify studies evaluating the effectiveness of physiotherapy strategies in the management of thumb CMCJ osteoarthritis.
- The search will be carried out in multiple electronic databases, including databases such as PubMed, Cochrane Library, Scopus, and Google Scholar will be searched using keywords like "thumb CMC OA," "physiotherapy," "manual therapy," "exercise therapy," "splinting," and "joint mobilization."
- The search includes studies published in last five years to capture the most recent evidence. Keywords and medical subject headings (MeSH) terms were used in combination to ensure a comprehensive search

Quality Assessment

Each included study will be assessed for methodological quality using tools like the **Cochrane Risk of Bias tool** or the **PEDro Scale** (Physiotherapy Evidence Database scale).

STUDY SELECTION

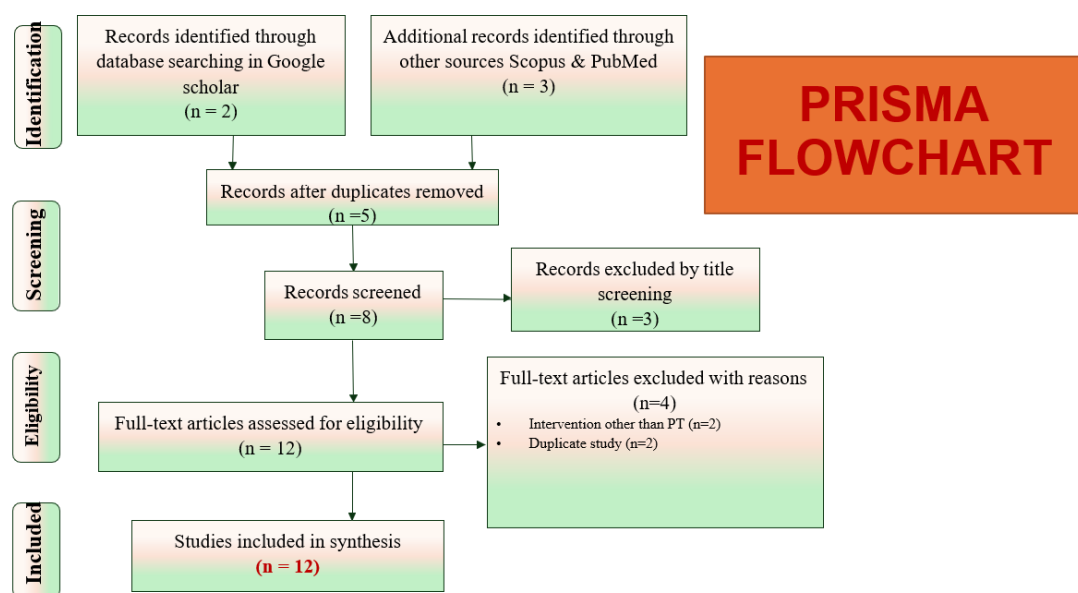
Inclusion Criteria:

- Studies involving patients diagnosed with thumb CMC OA
- Research assessing physiotherapy interventions such as manual therapy, exercise programs, splinting, or thermal modalities
- Randomized controlled trials (RCTs), cohort studies, and observational studies

Exclusion Criteria:

- Studies focusing on surgical or pharmaceutical treatments
- Non-English publications or studies with insufficient data
- Duplicate and non-relevant articles, case reports, and non-controlled trials

PROCEDURE



CHARTING THE DATA

- The data extraction sheet was developed and piloted on five studies to determine its consistency and alignment with the purpose of the study.

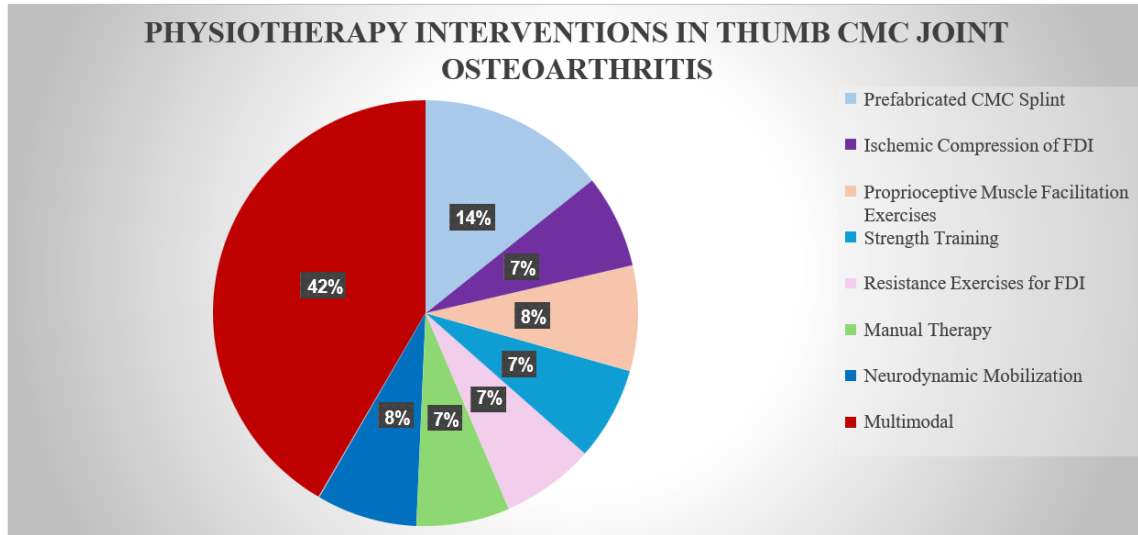
Author & Year	State	Research Source	Study Objective	Participant characteristics	Study Design	Primary outcomes	Secondary Outcomes	Intervention Studied	Intervention	ICF Domain
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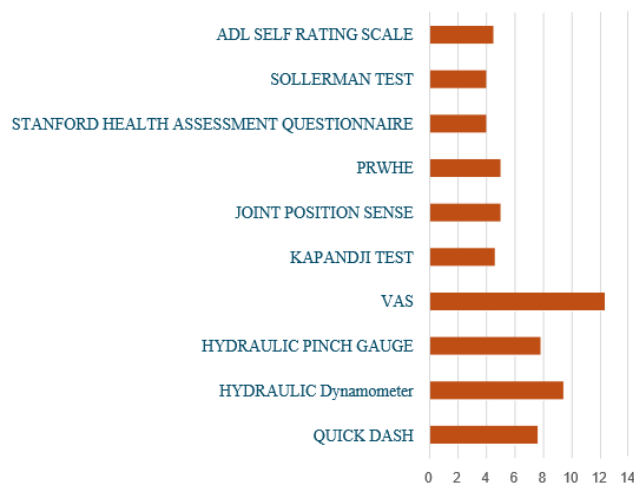
Prefabricated CMC splint	Ischemic compression of FDI	Proprioceptive Muscle Facilitation exercises	Strength Training	Resistance exercises for FDI	Manual Therapy	Neurodynamic Mobilization	Multimodal (heat + exercises + Spints + Joint Protection)
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COLLATION, SUMMARIZING & REPORTING RESULTS

- The charted data were discussed to identify trends and breadth in the literature.
- Results are summarized quantitatively and qualitatively



COMMON OUTCOME MEASURES



- Main outcome measures used for functional status are Quick DASH, PRWHE(Patient Rated wrist and hand evaluation), Sollerman test of hand function, ADL Self Rating scale.
- Main outcome measures used for Pain are VAS, Stanford health assessment questionnaire, ADL Self Rating scale.
- Main outcome measures used for Power are Hydraulic dynamometer, hydraulic Pinch gauge.

DISCUSSION

- The findings from this systematic review underscore the effectiveness of physiotherapy interventions in managing **thumb carpometacarpal joint (CMCJ) osteoarthritis**, a condition that significantly impacts functional performance and quality of life.
- Given the rising prevalence of thumb CMCJ osteoarthritis, particularly in postmenopausal women, effective management strategies are crucial. This review highlights how physiotherapy, through various approaches such as exercise therapy, manual therapy, splinting, Proprioceptive muscle facilitation exercises, strength training, joint protection and ergonomic modifications, can offer substantial relief by addressing pain, restoring joint mobility, improving strength, and enhancing functional capabilities in women population which will help them to serve better in activities of daily living.
- The findings from this review describe the diversity of physiotherapy strategies available to manage this condition.

- The evidence suggests that there is no single approach but rather a combination of interventions that is Multimodal (heat + exercises+ splints+ Joint Protection) that may offer optimal outcomes for pain, function, and grip strength.
- The efficacy of the prefabricated CMC-metacarpophalangeal(MCP) immobilization , Splinting, generally found to be helpful, showed more varied results. Some studies indicated that splints could effectively reduce pain by limiting joint motion during high-demand tasks, while others reported mixed benefits, suggesting that splinting may be more effective when combined with other physiotherapy interventions.
- Manual therapy, also contributed to pain reduction. These therapies likely help by improving joint mechanics and reducing muscle tension, which may contribute to increased comfort and improved range of motion.
- Strengthening exercises, such as those targeting the intrinsic and extrinsic muscles of the hand, were consistently shown to improve grip and pinch strength, which are key factors in the ability to perform activities of daily living (ADLs). In addition, the combination of proprioceptive neuromuscular facilitation exercises and strength training presents a comprehensive approach to address both sensorimotor deficits and muscle function.
- The benefits of ischemic compression on trigger points in the first dorsal interossei emphasize the role of muscle and soft tissue interventions.

CONCLUSION

Physiotherapy remains a cornerstone of non-surgical management for thumb CMC Joint osteoarthritis, offering functional relief, pain reduction, and improved quality of life for affected individuals through tailored interventions, physiotherapy can significantly enhance the outcomes of individuals struggling with this common and often debilitating condition.

LIMITATIONS

Many of the studies had small sample sizes, which limits the generalizability of the findings.

- There was considerable variability in the physiotherapy techniques used across studies, making direct comparisons difficult.
- Long-term follow-up data were scarce, so the sustainability of the interventions' effects remains unclear.
- Most studies focused on short-term outcomes, with limited data on long-term functional improvements or quality of life.
- More high-quality, large-scale trials with long-term follow-up are needed to confirm the durability of these interventions and to better inform clinical guidelines for the management of this condition

CLINICAL IMPLICATIONS

1. The heterogeneity in treatment responses across different patients highlights that a one-size-fits-all approach may not be the most effective.
2. In clinical practice, the choice of intervention should be individualized, considering the patient's specific presentation, functional goals, and the available evidence for achieving the best outcomes.

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