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Exploring the Efficacy of Physiotherapy in Conservative Management of Hallux Valgus: A Scoping Review of Randomized Clinical Trials

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Abstract

Background. This study evaluates the effectiveness of physiotherapy in treating hallux valgus, a common foot deformity, focusing on various treatment approaches.

Aim. To evaluate the efficacy of physiotherapy interventions in the conservative management of hallux valgus through a critical review of existing randomized clinical trials.

Methods. Employing a scoping review methodology, this study examined the efficacy of various physiotherapeutic techniques for hallux valgus through an analysis of five recent studies. This approach allowed for the exploration and synthesis of evidence on targeted exercises, manual therapy, and the use of support devices, alongside comparisons with other treatment modalities.

Results. The findings suggest significant improvements in pain reduction and foot functionality through physiotherapy. The comparison with other treatments highlighted physiotherapy as an effective alternative or complementary approach.

Conclusions. The studies underscore the importance of physiotherapy in the conservative management of hallux valgus, emphasizing the need for personalized treatment plans. Future research should focus on developing standardized treatment protocols and investigating long-term outcomes to enhance clinical practice and patient care.

Keywords: hallux valgus; physiotherapy; foot deformity; exercise therapy; manual therapy

1. INTRODUCTION

Hallux valgus, a progressive foot deformity characterized by abnormal angulation of the big toe, is a widespread orthopedic issue significantly impacting patient quality of life (Erjanti et al., 2024; Padovano et al., 2023). Conservative treatment, particularly physiotherapy, has garnered interest as a non-invasive alternative to surgery (Tedeschi, 2023i, 2023g, 2024b, 2024a). Given the diversity of physiotherapeutic treatments and the promising results highlighted in studies by du Plessis et al. (2011) and Kharazmi et al. (2020), as well as Abdalbary (2018) and Anaforoglu Külünkoglu et al. (2021), this review critically analyzes randomized clinical trials to identify effective physiotherapy interventions for hallux valgus. By addressing the literature's gaps in protocol standardization and result consistency, this work aims to synthesize evidence that can guide clinical practice, offering evidence-based recommendations for non-invasive management strategies(Abdalbary, 2018; du Plessis et al., 2011; Kharazmi et al., 2020;

Külünkoğlu et al., 2021; Oztarsu & Oksuz, 2023). The physiotherapeutic treatment includes a wide range of approaches, such as manual and manipulative therapy, supportive devices, specific exercises, and mobilization techniques. Studies like those by du Plessis et al. (2011) and Kharazmi et al. (2020) have explored these methods' effectiveness, showing promising results in pain reduction and foot functionality improvement. Further, research by Abdalbary (2018) and Anaforoglu Külünkoglu et al. (2021) investigated combinations of exercises and devices, like toe separators and electrical stimulations. Despite the variety of proposed physiotherapeutic treatments, current literature still presents significant gaps in protocol standardization and result consistency(Nix et al., 2013; Tedeschi et al., n.d.; Tedeschi, 2023h, 2023e; Tedeschi & Giorgi, 2023). This review aims to fill these gaps, providing a critical analysis of RCT results to outline a clear picture of physiotherapy's effectiveness in conservative (De Michele et al., 2023; Erjanti et al., 2024; Padovano et al., 2023; Tedeschi, 2023c, 2023f, 2023b, 2023a, 2023d) hallux valgus treatment. Through this approach, it intends to offer evidence-based guidance for clinicians and patients, contributing to optimizing therapeutic strategies in this field. The need for an in-depth evaluation of physiotherapeutic interventions in hallux valgus is imperative. This review, based on methodological criteria and detailed analysis of randomized clinical trials, aims to make a significant contribution to the existing literature (Turolla et al., 2023), guiding more effective and individualized treatment for patients with this common foot deformity.

2. METHODS

The present scoping review was conducted following the JBI methodology(*Peters: Joanna Briggs Institute Reviewer's Manual, JBI – Google Scholar*, n.d.)for scoping reviews. Following the JBI methodology for scoping reviews, we utilized the Appendix 11.1 JBI template for the detailed extraction of evidence source characteristics and results. This structured approach enabled a comprehensive assessment of included studies, focusing on population, concept, context, and types of evidence. Furthermore, to ensure the quality and relevance of the evidence, which facilitated a rigorous evaluation of each article's methodological integrity and findings. The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR)(Tricco et al., 2018) Checklist for reporting was used.

Review question

The following research question was formulated: In persons with hallux valgus, how effective are physiotherapy interventions in conservative management, compared to other interventions or no interventions, in improving clinical outcomes?

Eligibility criteria

Studies were eligible for inclusion if they met the following Population, Concept, and Context (PCC) criteria.

This scoping review is focused on studies that exclusively involve randomized controlled trials (RCTs) assessing physiotherapy-based interventions for individuals diagnosed with hallux valgus, irrespective of age, gender, and severity of the condition. The interventions of interest include manual therapy, exercises, and the use of orthotic devices, among other non-surgical treatments, conducted within clinical settings to evaluate the effectiveness, safety, and outcome measures of physiotherapy treatments for hallux valgus.

Exclusion criteria

Studies that did not meet the specific PCC criteria were excluded.

Search strategy

An initial limited search of MEDLINE was performed through the PubMed interface to identify articles on the topic and then the index terms used to describe the articles were used to develop a comprehensive search strategy for MEDLINE. The search strategy, which included all identified keywords

and index terms, was adapted for use in Cochrane Central, Scopus, PEDro. In addition, grey literature (e.g., Google Scholar, direct contacts with experts in the field) and reference lists of all relevant studies were also searched. Searches were conducted on 23 November 2023 with no date limitation.

("hallux valgus" AND "physiotherapy" AND ("randomized controlled trial" OR "clinical trial") AND ("manual therapy" OR "exercise therapy" OR "orthotics" OR "non-surgical treatment") AND ("effectiveness" OR "outcome assessment" OR "pain management")

Study selection

The process outlined employs a systematic approach for selecting studies in a scoping review. Initially, search results were gathered and refined using EndNote, with duplicate entries being removed. The screening process involved two stages: first, a review of titles and abstracts, followed by a full-text evaluation. Both steps were conducted independently by two reviewers, with any disagreements resolved by a third reviewer. The selection process was carried out in accordance with PRISMA 2020 guidelines to ensure transparency and reliability. This structured methodology was designed to identify studies that directly addressed the research question, ensuring a comprehensive and systematic review.

Data extraction and data synthesis

Data extraction for the scoping review was performed using a form adapted from the JBI tool, capturing essential information such as authorship, country and year of publication, study design, patient characteristics, outcomes, interventions, procedures, and other relevant data. Descriptive analyses were carried out on the extracted data, with results presented numerically to illustrate the distribution of studies. The review process was systematically outlined for transparency, and the data were summarized in tables to facilitate comparison and a clearer understanding of the key aspects and findings of the studies.

3. RESULTS

As presented in the PRISMA 2020 flow diagram (Figure 1), from 113 out of the records identified through the initial literature searches, 108 were excluded, resulting in the inclusion of 5 articles (Table 1).

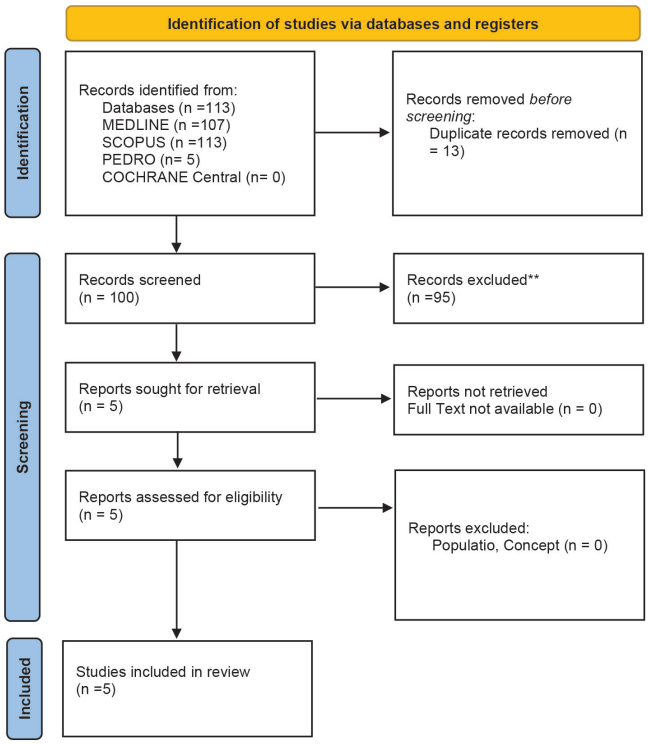

Figure 1. **Preferred reporting items for systematic reviews and meta-analyses 2020 (PRISMA) flow-diagram**

Titles of the included articles:

1. Morne du Plessis et al., 2011 – Manual and manipulative therapy compared to night splint for symptomatic hallux abducto valgus: An exploratory randomised clinical trial.
2. Abdalbary, 2018 – Foot Mobilization and Exercise Program Combined with Toe Separator Improves Outcomes in Women with Moderate Hallux Valgus at 1-Year Follow-up.
3. Kharazmi et al., 2020 – Effects of dry needling on symptomatic hallux valgus: A randomized single blind clinical trial.
4. Külünkoğlu et al., 2021 – A comparison of the effectiveness of splinting, exercise, and electrotherapy in women patients with hallux valgus: A randomized clinical trial.
5. Oztarsu & Oksuz, 2023 – Comparison of the effects of progressive supervised and home program exercise therapy in mild-moderate hallux valgus.

Table 1. **Main characteristics of included studies**

Author	Study Type	Number of participants, gender, and age (yrs.)	Methods	Results	Statistical Data & Clinical Effect Size
Morne du Plessis et al. (2011)	RCT	N=30; 26–64	MMT vs. night splint	Both treatments reduced pain and improved foot function. MMT benefits sustained up to one month	The post hoc power analysis indicated an effect size (ES) of 0.33 with a recommended future trial sample size of 204 participants to achieve satisfactory power (≥80%).
Abdalbary (2018)	RCT	N= 56 Females TG 45.7 ± 6.8 CG 45.5 ± 6.2	3-month treatment with exercises and toe separator	Significant improvements in pain, AOFAS scores, and radiographic angles	The study provided detailed statistical outcomes, demonstrating significant improvements in pain, AOFAS scores, ankle range of motion, hallux muscle strength, and radiographic angles with $P < 0.001$ for all comparisons post-treatment and at one-year follow-up, indicating a highly significant improvement in the treatment group compared to control.
Kharazmi et al. (2020)	RCT	N=30 Females 25-60	dry needling treatment vs. placebo	Improvement in joint alignment; no significant difference in pain or function	Significant findings include a decrease in the hallux valgus angle (HVA) in the treatment group ($P<0.001$), with no significant differences in pain intensity and foot function between the treatment and control groups ($P>0.05$).

Author	Study Type	Number of participants, gender, and age (yrs.)	Methods	Results	Statistical Data & Clinical Effect Size
Külünkoğlu et al. (2021)	RCT	N=60 Females 8–60	SP, EX, EL groups	SP group showed greater improvements in angles and pain scores	Statistical analysis showed significant changes in hallux valgus angles and foot health-related quality of life measures across all treatment groups ($p \leq 0.001$), with the splinting group showing greater improvements in certain metrics compared to exercise and electrotherapy groups.
Oztarsu & Oksuz (2023)	RCT	TG 43.06 ± 12.16 HPG 39.33 ± 8.77	supervised vs. home 8 weeks	Significant improvements in HV angle, pain, balance, and function in both groups.	With no significant difference in mean age between the two groups ($p = 0.372$). The study demonstrated a statistically significant decrease in right and left foot adduction angles after treatment in both groups, indicating the effectiveness of both supervised and home-based physiotherapy interventions in managing HV. Specific statistical data include a significant decrease in adduction angles with F values of 7.638 ($p = 0.009$) for the right foot and 7.486 ($p = 0.010$) for the left foot, showing a moderate effect size ($\eta^2 = 0.193$ for right foot, $\eta^2 = 0.190$ for left foot), suggesting the clinical relevance of the physiotherapy interventions.

Legend: RCT: Randomized Clinical Trial, AOFAS: American Orthopaedic Foot & Ankle Society scores, BMI: Body Mass Index, EL: Electrotherapy Group, ES: Effect Size, EX: Exercise Group, HVA: Hallux Valgus Angle, HV: Hallux Valgus, MMT: Manual and Manipulative Therapy, SP: Splinting Group

Morne du Plessis et al. (2011) investigated the effectiveness of manual and manipulative therapy (MMT) compared to a night splint in treating mild to moderate hallux valgus (HAV). It involved a randomized trial with 30 participants. While no significant differences were found between groups, the MMT group maintained their improvements at the one-month follow-up, unlike the night splint group.

Sahar Ahmed Abdalbary (2018) focused on the effect of a combined program of foot mobilization, exercises, and a toe separator on moderate hallux valgus in women. Involving 56 women, the study reported significant improvements in pain, functionality, and radiographic measures in the treatment group.

Kharazmi AS et al. (2020) examined the impact of dry needling on individuals with symptomatic hallux valgus. Conducted on 30 women, it found a notable reduction in the valgus angle of the big toe in the treated group but no significant differences in pain or foot functionality.

Külünkoğlu BA et al. (2021) compared the effectiveness of a night splint, exercises, and electrotherapy in women with hallux valgus. Conducted on 60 women, the study showed that all three treatments were effective, with the night splint group experiencing the most significant improvements.

Oztarsu et al. (2023) compared an exercise program for hallux valgus conducted under a physiotherapist's supervision versus at home. The findings indicated more significant improvements in foot adduction angle, pain, and navicular height in the supervised group.

4. DISCUSSION

The descriptive analysis of five recently published studies focusing on RCTs strongly supports the effectiveness of physiotherapy in treating hallux valgus. This approach involved an examination of study designs, participant characteristics, physiotherapy interventions (such as manual therapy, exercises, and the use of orthotic devices), and outcome measures including pain reduction and functional improvement. By synthesizing this information, we aimed to draw conclusions about the effectiveness of various physiotherapy techniques in the conservative management of hallux valgus, identifying trends, gaps, and areas for future research within the collected data. These studies, examining various physiotherapeutic approaches including targeted exercises, manual therapy, and the use of support devices, have highlighted significant results in reducing pain and improving foot functionality(Abdalbary, 2018; du Plessis et al., 2011; Kharazmi et al., 2020; Külünkoğlu et al., 2021; Oztarsu & Oksuz, 2023). Additionally, the comparison with other treatments has revealed that physiotherapy can serve both as an effective alternative and complement to other therapeutic modalities (Kwolek et al., 2023; Sacli Eksilmez et al., 2023). Significantly, the short-term results have been well documented, but the data also highlight the need to consider long-term benefits, especially in relation to a consistent commitment to the proposed exercise regime. One of the main limitations identified concerns the lack of standardization in treatment protocols and the need for more prolonged and in-depth studies to better understand the effectiveness of physiotherapy over time. In the analysis, it is clear that these studies support the use of physiotherapy as a conservative treatment for hallux valgus, highlighting immediate benefits and the potential for long-term improvement. However, it is crucial that future research focuses on optimizing treatment protocols and exploring personalized approaches, taking into account the various clinical presentations of hallux valgus (Andreo-García et al., 2023; Ozkunt et al., 2022). This in-depth examination suggests the importance of a more systematic and personalized treatment approach in the field of physiotherapy for hallux valgus, with a strong incentive for future research to integrate standardized protocols and personalized treatments based on the specific clinical needs of each patient.

Strengths:

- The studies collectively demonstrate the efficacy of various physiotherapeutic approaches for hallux valgus, highlighting significant improvements in pain reduction and foot functionality.
- The comparison with other treatments shows physiotherapy as a viable alternative or complement, broadening treatment options.
- The research brings attention to the importance of long-term benefits and the potential sustainability of physiotherapy outcomes with consistent exercise regimes.

Limitations:

- A notable limitation is the lack of standardized treatment protocols across studies, posing challenges in generalizing results.
- The need for more prolonged, in-depth studies to better understand long-term effectiveness and patient-specific outcomes is evident.
- The research indicates a gap in exploring personalized treatment approaches that consider the varying clinical presentations of hallux valgus, suggesting a direction for future research.

Clinical Practice Implications:

The findings from these studies suggest that physiotherapy should be considered a key component in the conservative management of hallux valgus. Clinicians can integrate various physiotherapeutic techniques, such as targeted exercises and manual therapy, into patient care plans. Emphasis on personalized treatment approaches is encouraged, considering individual patient needs and clinical presentations. The research also highlights the importance of developing standardized treatment protocols to enhance consistency and effectiveness in clinical practice. Additionally, practitioners should focus on educating patients about the long-term commitment required for sustained benefits, emphasizing the importance of adherence to exercise regimes.

5. CONCLUSIONS AND PERSPECTIVES

The analysis of recent studies confirms the effectiveness of physiotherapy in treating hallux valgus, emphasizing the need for personalized, patient-specific approaches in clinical practice. Future research should focus on standardizing treatment protocols and further exploring long-term benefits to enhance patient care and outcomes.

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Kineziterapijos veiksmingumas konservatyviai gydant *hallux valgus*: atsitiktinių imčių klinikinių tyrimų apžvalga

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Santrauka

Tyrimo pagrindimas. Šiame tyrime nagrinėjamas kineziterapijos veiksmingumas gydant *hallux valgus* – dažnai pasitaikančią pėdos deformaciją, analizuojant įvairius gydymo metodus.

Tikslas. Įvertinti kineziterapijos metodų veiksmingumą konservatyviame *hallux valgus* gydyme, kritiškai analizuojant esamus atsitiktinių imčių klinikinius tyrimus.

Metodai. Naudojant apžvalgos metodiką, tyrime išanalizuoti penki naujausi atsitiktinių imčių klinikiniai tyrimai, nagrinėjantys kineziterapinių metodų, tokių kaip tiksliniai pratimai, manualinė terapija ir pagalbinių priemonių naudojimas, veiksmingumą bei jų palyginimą su kitais gydymo būdais.

Rezultatai. Rezultatai rodo reikšmingą skausmo silpnėjimą ir pėdos funkcionalumo pagerėjimą taikant kineziterapiją. Palyginus su kitais gydymo metodais, kineziterapija išsiskiria kaip veiksminga alternatyva arba papildomas gydymo būdas.

Išvados. Tyrimai pabrėžia kineziterapijos svarbą konservatyviame *hallux valgus* gydyme, akcentuojant individualizuotų gydymo planų poreikį. Ateities tyrimuose siūloma plėtoti standartizuotus gydymo protokolus ir tirti ilgalaikį kineziterapijos poveikį siekiant pagerinti klinikinę praktiką ir pacientų priežiūrą.

Reikšminiai žodžiai: hallux valgus, kineziterapija; pėdos deformacija, pratimų terapija, manualinė terapija.

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