Exploring the Efficacy of Plantar Reflexology as a Complementary Approach for Headache Management: A Comprehensive Review

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Background: Headaches are a prevalent health issue affecting diverse populations worldwide, driving a growing interest in complementary therapies like reflexology. This review aims to comprehensively evaluate the potential of plantar reflexology as a complementary approach for managing headaches.

Methods: Employing a systematic approach, databases were scoured for studies on plantar reflexology's efficacy in headache management. From 23 initial contenders, three studies meeting the inclusion criteria, two randomized controlled trials and a pilot study, were examined for treatment efficacy and quality.

Results: Our review highlights three primary studies, collectively indicating a significant enhancement in treatment efficacy within the plantar reflexology groups when compared to control groups. These findings suggest that plantar reflexology exhibits potential as an effective complementary therapy for managing headaches. However, in light of these promising results, a more cautious approach is advisable. There is a pressing need for more rigorous and high-quality research to substantiate these outcomes in real-world contexts and applications.

Conclusion: Plantar reflexology emerges as an option within the field of headache management. While its efficacy is promising, the specific mechanisms behind its action require further investigation. Positioned among a range of treatment modalities, plantar reflexology distinguishes itself as a safe and non-invasive alternative. This review underscores the necessity for additional research, encouraging the scientific community to delve into this intriguing avenue for headache relief and expand our comprehension of its potential advantages.

KEYWORDS: Headache management; plantar reflexology; complementary therapy; alternative medicine; pain relief

INTRODUCTION

Headaches are a complex phenomenon, and there are several causes for this condition. Migraine, tension-type headache, and cluster headache are some of the common types of headaches. These types of headaches differ in their symptoms, severity, and duration, and each type of headache requires a different approach to management. In general, non-pharmacological therapies such as relaxation techniques, physical therapy, acupuncture, and reflexology are considered as potential alternative therapies for headache management.[1–3] Reflexology is a complementary therapy that involves the application of pressure to specific points on the feet, hands, or ears, which correspond to specific organs, glands, or body systems.[4,5] The idea behind reflexology is that these points are connected to the central nervous system and other parts of the body, and by stimulating these points, the body can be brought into a state of balance and healing.[5–9] Plantar reflexology, which involves the application of pressure to specific points on the soles of the feet, is one of the popular forms of reflexology.[10,11] Several studies have

investigated the effectiveness of plantar reflexology for headache management.[12,13] These studies have reported significant reductions in headache frequency, intensity, and duration with the application of plantar reflexology. However, the underlying mechanisms of plantar reflexology in headache management are not fully understood.[14–16] This critical review of literature aims to evaluate the efficacy of plantar reflexology as a complementary therapy for headache management. The review includes a systematic search of databases, analysis of published studies, and evaluation of study quality. The results of this review will be useful in guiding health-care providers and patients in their decision-making process regarding the use of plantar reflexology for headache management.[17–19] Overall, this review highlights the potential of plantar reflexology as an effective therapy for headache management. Further research is needed to confirm these findings and elucidate the underlying mechanisms of plantar reflexology in headache management. Despite the need for more research, plantar reflexology remains a safe and non-invasive non-pharmacological therapy for those seeking natural approaches to headache management.[20,21] This review addresses a critical gap in the current literature by providing a comprehensive evaluation of plantar reflexology's effectiveness in headache management. It emphasizes the potential benefits of this complementary therapy while pointing out areas that require further research attention.[22] Ultimately, this review aims to guide health-care providers and patients in making informed decisions regarding the inclusion of plantar reflexology in their headache management strategies. This study aimed to highlight and begin to fill this gap using a scoping review design. The synthesis of clinical data could add significant information for the overall management of healthy and unhealthy adults who suffer from headaches and could stimulate further research in this field.

This scoping review aimed to:

1. evaluate the existing evidence base regarding the use of plantar reflexology as a complementary therapy for headache management, with a focus on the reduction of headache frequency, intensity, and duration and the potential side effects and contraindications associated with its use; and
2. synthesize the current literature to provide a comprehensive overview of the current state of knowledge regarding the effectiveness of plantar reflexology.

METHODS

The present scoping review was conducted following the JBI methodology[23] for scoping reviews. The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR)[24] checklist for reporting was used.

Research Team

To support robust and clinically relevant results, the research team included authors with expertise in evidence synthesis, quantitative and qualitative research methodology, and sports and musculoskeletal rehabilitation.

Review Question

We formulated the following research question: "What is the existing evidence base regarding the use of plantar reflexology as a complementary therapy for headache management, with a focus on the reduction of headache frequency, intensity, and duration and the potential side effects and contraindications associated with its use?"

Eligibility Criteria

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

Population: Subjects of any age who experienced headaches, including tension-type headache and migraine, were included.

Concept: We considered various interventions for headache management, encompassing preventive measures, conservative approaches, and pharmacological treatments, while excluding surgical interventions. However, our primary focus centered on evaluating the effectiveness of plantar reflexology in this context.

Context: This review considered studies conducted in any context. This scoping review included any study design or type

of publication. No time, geographic setting, or language restrictions were applied.

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, and PEDro. Searches were conducted on August 23, 2023, with no date limitation.

(Headache OR Migraine OR "Tension-type headache") AND ("Plantar reflexology" OR Reflexology) AND ("Complementary therapy" OR "Alternative medicine" OR "Pain relief") AND ("Headache management" OR Effectiveness OR Prevention OR "Conservative treatment" OR "Pharmacological treatment" OR Intervention OR "Treatment outcomes")

(Headache OR Migraine OR "Tension-type headache") AND ("Plantar reflexology" OR Reflexology) AND ("Complementary therapy" OR "Alternative medicine" OR "Pain relief") AND ("Headache management" OR Effectiveness OR Prevention OR "Conservative treatment" OR "Pharmacological treatment" OR Intervention OR "Treatment outcomes")

TITLE-ABS-KEY(("Headache" OR "Migraine" OR "Tension-type headache") AND ("Plantar reflexology" OR "Reflexology") AND ("Complementary therapy" OR "Alternative medicine" OR "Pain relief") AND ("Headache management" OR "Effectiveness" OR "Prevention" OR "Conservative treatment" OR "Pharmacological treatment" OR "Intervention" OR "Treatment outcomes"))

(Headache OR Migraine OR "Tension-type headache") AND ("Plantar reflexology" OR Reflexology) AND ("Complementary therapy" OR "Alternative medicine" OR "Pain relief") AND ("Headache management" OR Effectiveness OR Prevention OR "Conservative treatment" OR "Pharmacological treatment" OR Intervention OR "Treatment outcomes")

Study Selection

Once the search strategy has been completed, search results were collated and imported to EndNote V.X9 (Clarivate Analytics, Philadelphia, PA, USA). Duplicates were removed using the EndNote deduplicator before the file containing a set of unique records is made available to reviewers for further processing. The selection process consisted of two levels of screening using Rayyan QCRI online software12: (i) a title and abstract screening and (ii) a full-text selection. For both levels, two authors independently screened the articles, with conflicts resolved by a third author. The entire selection process and reasons for the exclusion were recorded and reported according to the latest published version of the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) 2020[24] flow diagram.

Data Extraction and Data Synthesis

Data extraction was conducted using an ad hoc data extraction form which was developed *a priori*, based on the JBI data extraction tool. Key information (authors, country, year of publication, study design, patients' characteristics, type of intervention and related procedures) on the selected articles was collected. Descriptive analyses were performed, and the results were presented in one way: numerically. Studies identified and included were reported as frequency and percentage, and the description of the search decision process was mapped. In addition, extracted data were summarized in tabular form according to the main characteristics (Tables 1–3).

RESULTS

As presented in the PRISMA 2020 flow diagram (Figure 1), from 23 records identified by the initial literature searches, 21 were excluded and 3 articles were included.

"Effects of feet reflexology versus segmental massage in reducing pain and its intensity, frequency and duration of the attacks in females with migraine: a pilot study"

This study, conducted from November 2013 to November 2015, involved 48 females aged 33–58 years suffering from

TABLE 1. Main Characteristics of the Included Studies

No.	*Author*	*Title*	*Year*	*Country*	*Study Design*
1	Wojciech et al.[18]	Effects of feet reflexology versus segmental massage in reducing pain and its intensity, frequency and duration of the attacks in females with migraine: a pilot study	2017	Poland	Pilot study
2	Safonov and Naprienko[25]	Analysis of the efficacy of reflexology in the complex treatment of chronic migraine	2017	Russian	RCT
3	Imani et al.[17]	Effect of applying reflexology massage on nitroglycerin-induced migraine-type headache: A placebo-controlled clinical trial	2018	Iran	RCT

RCT, randomized controlled trial.

migraine for 2–10 years. It compared the effects of feet reflexology versus segmental massage in reducing migraine pain, intensity, frequency, and duration. Patients were randomized into two groups, with the reflexology group (RG) receiving 10 treatments twice a week, and the segmental massage group receiving 15 treatments three times per week. Pain was assessed using the Visual Analog Scale, and headache characteristics were evaluated before treatment, immediately after treatment, and three months after treatment. Results showed significant improvements in both groups, with statistically significant differences favoring the RG, suggesting that feet reflexology and segmental massage can offer safe alternatives for migraine management, with reflexology showing superior benefits.

"Analysis of the efficacy of reflexology in the complex treatment of chronic migraine"

The study evaluated the impact of various reflexology methods on patients with chronic migraine, involving 84 participants who were divided into groups receiving Su Jok therapy (Su Jok therapy is a type of alternative medicine that originates from traditional Korean medicine. It focuses on stimulating specific points on the hands and feet that correspond to different organs and parts of the body, a non-invasive method that seeks to balance the body's energy and improve overall well-being through these reflex points.), acupuncture, and electroacupuncture and a control group treated with topiramate. The treatments aimed to assess changes in headache frequency, intensity, and the dynamics of comorbid disorders. Results indicated significant improvements in headache frequency and intensity in the RGs compared to the control group, highlighting reflexotherapy's potential as an effective component in treating chronic migraine, advocating for a tailored approach in applying reflexotherapy techniques.

"Effect of applying reflexology massage on nitroglycerin-induced migraine-type headache: A placebo-controlled clinical trial"

In this study, reflexology massage has been found to effectively reduce the intensity of headaches induced by nitroglycerin (NTG). This study involved a total of 75 patients who were divided into three groups: control, intervention, and placebo. In the intervention group, patients received reflexology massage specifically on the foot thumbs, which are believed to be related to headache relief according to reflexology principles. Conversely, the placebo group received massages on unrelated points on the foot. The control group, on the other hand, did not receive any form of massage. The results of the study revealed a statistically significant difference in headache intensity between the three groups. This suggests that reflexology massage, specifically targeting the foot thumbs, can be considered as a viable non-pharmacological option for managing headaches induced by NTG. These findings highlight the potential effectiveness of reflexology massage as an alternative approach to alleviate headache symptoms, offering a non-pharmacological choice for individuals seeking headache relief.

The first item was included for completeness with respect to the Delphi list,[26] but is not included in the final count, which is

TABLE 2. Types of Interventions

Study Title	*Objective*	*Participants*	*Intervention*	*Evaluated Parameters*	*Main Findings*	*Limitations*	*Implications*
Effects of feet reflexology versus segmental massage in reducing pain and its intensity, frequency and duration of the attacks in females with migraine: a pilot study	Investigate the effects of feet reflexology and segmental massage on migraine pain and symptoms	40 females with migraine	Reflexology and segmental massage	Pain intensity, frequency, duration of migraine attacks	Both reflexology and segmental massage reduced pain and improved symptoms in female migraineurs.	Short follow-up period and small sample size	Reflexology and segmental massage can be effective in reducing migraine symptoms. Further research is needed. The study reported no adverse effects of reflexology on patients. It showed reflexology effectively reduced nitroglycerin (NTG)-induced headache intensity without side effects.
Analysis of the efficacy of reflexology in the complex treatment of chronic migraine	Analyze the effectiveness of reflexology in the complex treatment of chronic migraine	84 patients (71.5% women, 28.5% men), aged 18–63 years, diagnosed with chronic migraine	Patients were randomized into four groups—Su Jok (n = 22), acupuncture (n = 22), electroacupuncture (n = 20), and control (n = 20). Topiramate was administered to all groups at a dose of 100 mg daily. Patients were evaluated before treatment and after 4 and 16 weeks from randomization.	Evaluate the effect of various reflexology techniques on clinical indices, analgesic usage, and comorbid disorders in chronic migraine patients	Reflexology showed promise as a complementary therapy for chronic migraine. More research is needed.	Lack of participant details and specific outcome measures	Reflexology may be considered as a complementary therapy for chronic migraine, but more research is required. The study reported no adverse effects of reflexology on patients. It showed that reflexology effectively reduced NTG-induced headache intensity without side effects.
Effect of applying reflexology massage on nitroglycerin-induced migraine-type headache: A placebo-controlled clinical trial	Examine the impact of reflexology massage on NTG-induced migraine-type headache	The study included 75 patients divided into three groups: control, intervention, and placebo groups	Patients received reflexology massage twice for 20 min each, at a 3-h interval. The massage was applied to the upper part of both foot thumbs, which corresponds to the head's reflection point.	Headache intensity after NTG administration	Reflexology massage reduced headache intensity in a clinical trial.	Study details and methodology are not provided.	Reflexology massage may be effective in reducing headache intensity. Further research is needed. The study reported no adverse effects of reflexology on patients. It showed reflexology effectively reduced NTG-induced headache intensity without side effects.

TABLE 3. Summary of the PEDro Scale

Author, Year	*Criteria 1*[a]	*Criteria 2*	*Criteria 3*	*Criteria 4*	*Criteria 5*	*Criteria 6*	*Criteria 7*	*Criteria 8*	*Criteria 9*	*Criteria 10*	*Criteria 11*	*Total*
Wojciech et al., 2017[18]	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	6
Safonov and Naprienko, 2017[25]	Yes	Yes	N/A	Yes	No	No	Yes	No	No	Yes	Yes	6
Imani et al., 2018[17]	Yes	Yes	N/A	Yes	No	No	No	No	No	Yes	Yes	5

[a]PEDro Scale: 1, eligibility criteria were specified; 2, subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received); 3, allocation was concealed; 4, the groups were similar at baseline regarding the most important prognostic indicators; 5, there was blinding of all subjects; 6, there was blinding of all therapists who administered the therapy; 7, there was blinding of all assessors who measured at least one key outcome; 8, measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups; 9, all subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analyzed by "intention to treat"; 10, the results of between-group statistical comparisons are reported for at least one key outcome; and 11, the study provides both point measures and measures of variability for at least one key outcome.
N/A = not applicable.

based on ten criteria, i.e., from requirement 2 to 11. If the criterion is fulfilled, 1 point is awarded, otherwise it has a value of zero. The authors of the PEDro scale18 divide clinical studies into four categories, linked to the score obtained: low quality, when it varies between 0 and 3; medium quality, if it is 4 or 5; high quality, if it is 6–8; and excellent quality, with a score of 9 or 10.

DISCUSSION

The utilization of complementary therapies, feet reflexology[27] and segmental massage, has garnered significant interest in the context of migraine treatment. While there exists a substantial body of evidence substantiating the efficacy of acupuncture, the effectiveness of other complementary interventions[28–34] remains relatively underexplored. Notably, a recent study[18] delved into the effects of feet reflexology and segmental massage, revealing their capacity to modulate relapse and mitigate migraine symptoms immediately after treatment, with sustained effects observed 3 months later. Furthermore, this study highlighted that females with recurring migraines derived superior symptom management health benefits compared to those experiencing sporadic migraines across all parameters. However, it is crucial to acknowledge the study's constraints, encompassing a brief follow-up duration and a limited sample size, thus advocating for robust, long-term investigations with larger cohorts to validate these findings.[18,22,35] Likewise, another study[17] sought to elucidate the efficacy of reflexology massage in managing intravenous NTG-induced headaches among male inpatients in a coronary care unit. The study corroborated the hypothesis that reflexology massage effectively reduces the intensity of NTG-induced headaches. Numerous investigations have indicated the potential of reflexology massage in enhancing physical functionality, improving quality of life, and alleviating disease-related symptoms. While headache intensity following NTG administration demonstrated statistical parity among the three groups prior to reflexology intervention, noteworthy and statistically significant distinctions emerged after the intervention. The integration of complementary therapies[36–38] into

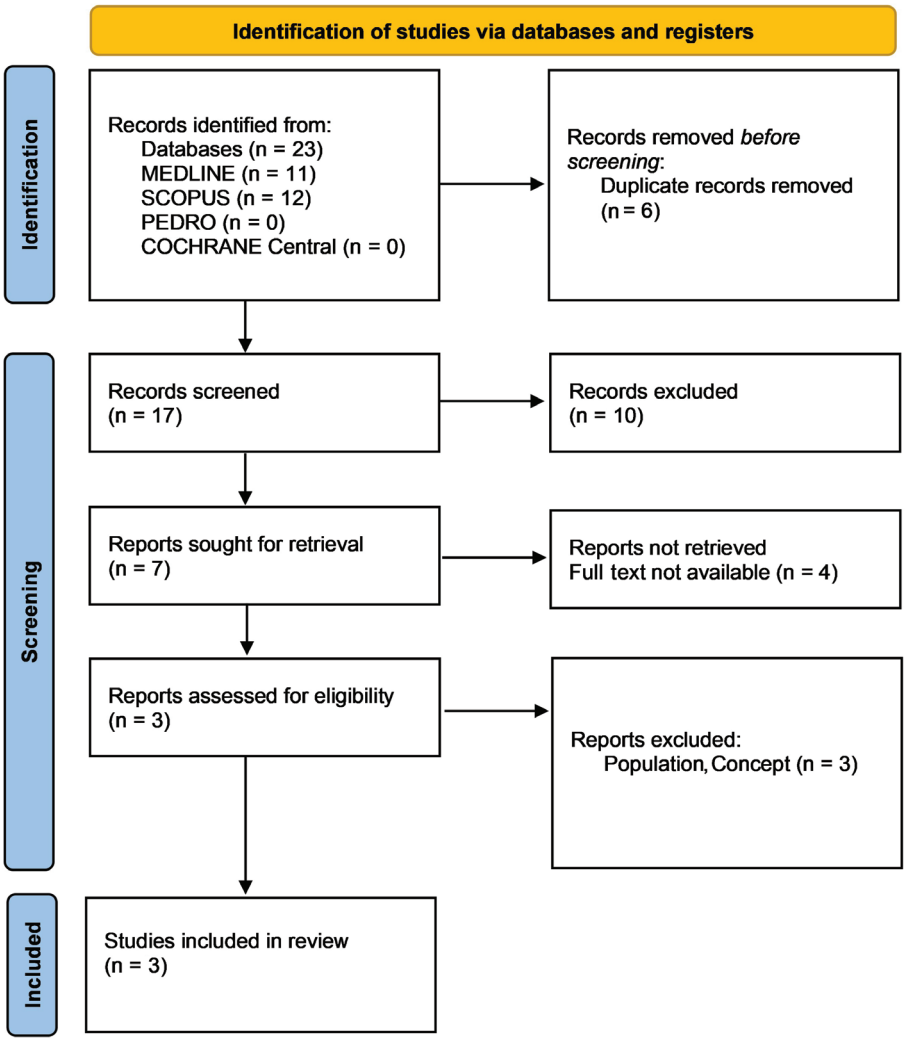

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) 2020 flow diagram.

migraine and headache management presents a secure alternative to pharmacological interventions, conferring valuable health benefits. These therapies offer patients alternatives to traditional medications that may have limitations or adverse effects.[39,40] Moreover, the findings suggest that specific patient subgroups, such as females with recurrent migraines, might experience enhanced benefits from certain complementary therapies. This highlights the potential for personalized treatment approaches in migraine management. Additionally, the inclusion of real-world parameters like symptom reduction, sustained effects, and patient preferences enhances the studies' relevance for health-care practitioners and migraine sufferers.[41] Despite the burgeoning evidence base supporting the efficacy of these therapies, further research is imperative to validate the outcomes and ascertain their impact on distinct migraine subtypes. These studies' outcomes are anticipated to aid health-care practitioners, physiotherapists, and migraine sufferers in making informed therapeutic choices, considering patient preferences and convenience. However, it is important to acknowledge the limitations of these studies. A common limitation in all three studies is the relatively small sample sizes, which might restrict the generalizability of the findings to broader populations. Larger cohorts would provide more robust evidence. One of the studies noted a short follow-up duration, potentially limiting the assessment of the long-term effects and sustainability of the observed benefits.

Longer follow-up periods are needed to confirm the therapies' lasting impact. While these studies incorporated placebo interventions for comparison, placebo effects could have influenced participants' responses, possibly confounding the results. The studies involved different complementary therapies and diverse measurement parameters, potentially leading to methodological heterogeneity that can complicate direct comparisons. Moreover, the studies generally addressed migraines as a whole without distinctively investigating their effects on specific migraine subtypes. This might miss valuable insights into therapy-specific effectiveness for different migraine subgroups. Furthermore, the studies' limited participant diversity and geographical scope might hinder the generalizability of the findings to wider populations and cultural contexts. The reliance on patient-reported outcomes and the lack of blinding in certain cases might introduce bias into the results. Lastly, there might be a potential for publication bias, as studies with positive outcomes are more likely to be published, while those with negative results might not be as widely reported. In conclusion, while these studies demonstrate the potential effectiveness of complementary therapies in ameliorating migraine symptoms and offer a non-pharmacological alternative to conventional medications,[42] they also highlight the need for more extensive, controlled, and rigorous research to establish their effectiveness and mechanisms definitively.

CONCLUSIONS

Reflexology offers potential benefits for migraine management, including reduced migraine intensity, improved symptom management, enhanced physical functionality, better sleep quality, and symptom alleviation. It can be a valuable option for patients who prefer non-pharmacological treatments or face challenges with medications. However, more extensive research is needed to confirm its effectiveness conclusively.

CONFLICT OF INTEREST NOTIFICATION

The authors are doctoral students, clinicians, who have no financial relationships with organizations that might have an interest in the work presented in the last 3 years and have no other relationships or activities that might influence the work presented.

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