

Review Article

Lower limb lymphoedema-related mental depression: A systematic review and meta-analysis of non-cancer-related studies

Tegene Atamenta Kitaw^{a,*}, Addisu Getie^b, Solomon Gebremichael Asgedom^d, Molalign Aligaz Adisu^a, Befkad Derese Tilahun^a, Alemu Birara Zemariam^a, Addis Wondmagegn Alamaw^a, Abebe Merchaw Faris^a, Tesfaye Engdaw Habtie^a, Melesse Abiye Munie^a, Eyob Shitie Lake^c, Gizachew Yilak^a, Mulat Ayele^c, Molla Azmeraw^a, Biruk Beletew Abate^{e,f}, Ribka Nigatu Haile^a

^a Department of Nursing, College of Health Science, Woldia University, Woldia, Ethiopia

^b Department of Nursing, College of Medicine and Health Sciences, Debre Markos University, Debre Markos, Ethiopia

^c Department of Midwifery, College of Health Science, Woldia University, Woldia, Ethiopia

^d Department of Surgical Nursing, School of Nursing, College of Health Sciences and Comprehensive Specialized Hospital, Aksum University, Axum, Ethiopia

^e School of Population Health, Curtin University, Bentley, WA, Australia

^f College of Medicine and Health Sciences, Woldia University, Woldia, Ethiopia

ARTICLE INFO

Keywords:

Lower limb
Lymphoedema
Mental depression

ABSTRACTS

Background: Lower limb lymphoedema, characterized by persistent swelling in the legs due to lymphatic dysfunction, not only imposes a physical burden but is also associated with significant mental depression. While emerging research suggests a strong link between lower limb lymphoedema and depression, the extent of the problem remains underexplored. This study aims to investigate the relationship between lower limb lymphoedema and mental depression through a meta-analysis of existing studies.

Methods: A comprehensive search was conducted across databases including PubMed, MEDLINE, EMBASE, International Scientific Indexing, Web of Science, and Google Scholar. Study quality was assessed using the Joanna Briggs Institute (JBI) critical appraisal tool. A weighted inverse variance random-effects model was used for pooled estimates, along with subgroup analysis, heterogeneity assessment, publication bias testing, and sensitivity analysis. The prediction interval was computed to estimate where future observations may fall. The review protocol was registered in PROSPERO (CRD42024541596).

Results: Thirteen studies involving 3503 patients with lower limb lymphoedema due to lymphatic filariasis, podoconiosis, or leprosy were included. The pooled estimate of depression related to lower limb lymphoedema was 38.4 % (95 % CI: 26.3 %, 50.5 %). High heterogeneity ($I^2 = 81.48$ %) highlighted significant variability among the studies. Depression was more prevalent among leprosy patients (38.1 %) and podoconiosis patients (36.4 %), showing little difference between the two. However, the prevalence was notably lower among those with lymphatic filariasis (22.4 %). A higher prevalence of depression was found in Africa (39.4 %) compared to other regions (36.1 %).

Conclusion: Patients with lower limb lymphoedema experience disproportionately high rates of mental depression compared to the general population. Integrating mental health assessment and treatment into care packages for lymphoedema management is essential, with special attention needed for leprosy patients.

Introduction

Lower limb lymphoedema, characterized by the accumulation of fluid and tissue swelling in the legs, arises from various etiologies,

including lymphatic filariasis, podoconiosis, and leprosy [1,2]. Lymphatic filariasis, caused by parasitic worms transmitted through mosquito bites, affects millions worldwide and is a leading cause of lower limb lymphoedema in endemic regions [3]. Podoconiosis, a non-

* Corresponding author.

E-mail address: tegene2013@gmail.com (T.A. Kitaw).

<https://doi.org/10.1016/j.gloepi.2024.100180>

Received 27 August 2024; Received in revised form 20 December 2024; Accepted 21 December 2024

Available online 25 December 2024

2590-1133/© 2024 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

infectious form of lower limb lymphoedema prevalent in highland areas of tropical Africa, results from prolonged exposure to irritant soil particles [4]. Leprosy, caused by *Mycobacterium leprae*, can lead to nerve damage and subsequent lymphatic dysfunction, contributing to lower limb lymphoedema in affected individuals [5].

Lower limb lymphoedema is a chronic condition requiring prolonged management and self-care, which can be challenging to uphold [6]. It can affect the quality of life, function, and body appearance. When associated with depression, this condition can further exacerbate the decline in overall quality of life [7,8]. The consequences of lower limb lymphoedema extend beyond physical manifestations to encompass significant mental health implications, including an increased risk of mental depression [9]. The physical disability linked to lower limb lymphoedema, patients, their families, and communities endure substantial mental health and psychosocial burdens. These burdens can encompass mental distress [10], depression [11], stigma [12], and reduced economic productivity [13].

The chronic nature of lower limb lymphoedema, coupled with its associated physical discomfort, social stigma, and functional limitations, can lead to psychological distress and contribute to the development or exacerbation of mental depression among affected individuals [14]. The severity of mental depression in the context of lower limb lymphoedema can vary widely, ranging from mild to severe, and may significantly impact the individual's overall well-being and quality of life [15]. It can manifest as persistent sadness, loss of interest in previously enjoyable activities, feelings of worthlessness or hopelessness, and difficulty in coping with daily challenges related to their condition [16]. The coexistence of physical and mental health challenges creates a complex interplay that can further exacerbate the overall burden experienced by affected individuals and their families [17].

While the physical manifestations of these conditions have been extensively studied, their psychological ramifications, particularly the potential association with mental depression, remain relatively under-explored. Thus, this systematic review and meta-analysis aim to shed light on the extent of mental depression among those suffering from lower limb lymphoedema, emphasizing the need for a holistic approach to treatment that addresses both physical and psychological aspects of the disease.

Methods

Protocol development and registration

This review was designed in accordance with preferred methods of reviewing available Systematic Review and Meta-analysis (SRM) studies and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [18,19]. First, a similar review was checked on PROSPERO, and no similar studies were found. The protocol of this review was subsequently summarized and registered in PROSPERO (CRD42024541596). This systematic review and meta-analysis focused on a systematic synthesis of existing studies on the lower limb lymphoedema related-mental depression.

Search strategy and information sources

A comprehensive literature search was conducted for studies reporting mental depression among patients with lower limb lymphoedema secondary to lymphatic filariasis, podoconiosis, and leprosy in the Embase, Web of Science, PubMed, Scopus, International Scientific Indexing (ISI), and Google Scholar databases, using the PICO framework. Combinations of keywords and MeSH terms were used to retrieve the studies. Additionally, the snowballing technique was employed to gather further studies from the citation lists of articles found in the available databases. Gray literature and manual searches were also performed to identify unindexed, unpublished, or under-researched articles. The search strategies were developed using concepts and key

search terms. To systematically identify relevant literature for this review, a search strategy encompassing two main concepts was employed: lower limb lymphoedema, mental depression, and the specific diseases associated with lower limb lymphoedema (i.e., lymphatic filariasis, podoconiosis, and leprosy). For the first concept, key search terms included "lower limb lymphoedema," "lymphatic filariasis," "podoconiosis," and "leprosy." The second concept was represented by terms such as "mental depression," "depression," "psychological distress," and "mental health."

Literature searches were independently conducted by two authors (TAK and RNH). Any inconsistencies were resolved by agreement. In cases where articles had incomplete information, the primary authors of the respective articles were contacted. The search terms "OR" and "AND" were used independently and/or in combination. Additionally, the 'related articles' and 'cited by' features of the PubMed database were used to identify articles from the included studies.

Eligibility criteria

Inclusion criteria

Studies written in English that reported on mental depression related to lower limb lymphoedema were included. To be considered for this systematic review and meta-analysis, each study needed to meet the following key inclusion criteria. Condition: The outcome of interest should be measured as the lower limb lymphoedema related-mental depression. Context: Setting can be anywhere. Observational studies were eligible. Population: patients with lower limb lymphoedema secondary to lymphatic filariasis, podoconiosis and leprosy. All population group can be included without age restrictions.

Exclusion criteria

Articles were excluded for one of the following reasons: [1] they did not measure the outcome of interest for this systematic review and meta-analysis, [2] they were written in languages other than English, or [3] they were narrative reviews, expert opinions, case reports, editorials, correspondences, abstracts, or methodological studies.

Data extraction and management

Two reviewers independently conducted the data extraction using a standardized extraction form. First, the title and abstract were screened and selected, followed by a review of the full texts. In cases of disagreement, discussions with other reviewers were held to determine the final selection of articles to include in this review. After the systematic search was completed, potentially eligible articles were imported into EndNote 21, and duplicates were removed if two or more articles shared common characteristics. The structured data were extracted into a Microsoft Excel spreadsheet. The extracted data included the following: [1] study identification (last name of the primary author and year of publication), [2] setting, [3] sample size, [4] study design, [5] age range of participants, [6] cause of lower limb lymphoedema, and [7] the number of patients who developed mental depression. Additionally, the percentage of mental depression in each study was calculated by dividing the number of participants who developed mental depression by the total sample size. The corresponding author was contacted when any difficulties were encountered during data extraction.

Measurement criteria

Mental depression. The Patient Health Questionnaire (PHQ-9) is a widely used tool to screen and classify depression. A total score of less than 10 indicates no depression, while a score of 10 or higher is considered indicative of mental depression.

Lower limb lymphoedema. A difference of ≥ 2 cm between the affected

and unaffected limb at specific anatomical points (e.g., mid-calf, ankle) is indicative of lymphoedema.

Risk of bias assessment

The Joanna Briggs Institute (JBI) critical appraisal tool was used to assess the methodological quality of the studies included in this systematic review and meta-analysis. Two independent reviewers evaluated each study using a series of “Yes,” “No,” or “Unclear” questions. Any disagreements were resolved through consensus among the authors and an independent reviewer to ensure objectivity. A scoring system was applied: 1 for “Yes,” 0 for “No,” and U for “Unclear.” Final scores were converted into percentages for risk-of-bias ranking: $\leq 49\%$ (high), 50–69% (moderate), and $> 70\%$ (low). Only studies scoring at least 50% (indicating moderate or low risk of bias) were included. In cases of ongoing disputes, individual ratings were averaged. The quality of each primary study’s results was documented in a dedicated column within the data extraction form for further analysis.

Statistical analysis

The data extraction was completed in Microsoft Excel, and the data were then imported into STATA version 17 software for analysis. Qualitative and narrative methods were employed to summarize the estimates of the included studies. When two or more estimates on the same topic were found, the range of the estimate and/or the pooled estimate was used. The standard error was computed using the binomial distribution formula. The overall estimate of mental depression was pooled using a random effects model [20]. Additionally, the pooled estimates were presented using a forest plot. Cochrane’s Q statistics (chi-square), inverse variance (I^2), and p -values were computed to assess the level of heterogeneity between studies [21]. An I^2 of 0% indicated true homogeneity, while 25%, 50%, and 75% represented low, moderate, and high heterogeneity, respectively [22,23]. Subgroup analysis was performed based on publication year, study quality (JBI quality score), country of the study, and the cause of lymphoedema. A leave-one-out (sensitivity) meta-analysis was conducted to determine the effect of a

single study on the overall pooled estimate. A funnel plot was constructed, and Egger’s regression test was used to assess publication bias [24].

Prediction interval

The prediction interval was computed to estimate the variation we can expect in the results of a new study if it were randomly selected from the same group of studies included in the current analysis. This interval helps us understand how much the combined result might vary depending on the specific study included [25].

Patient and public involvement

Not applicable.

Results

A total of 145 records were retrieved from various database search engines. Ninety-one of them were excluded due to duplication through the EndNote citation manager. Of the remaining 54 records, 35 were excluded after a detailed review of the titles and abstracts. The remaining 19 records were deemed potentially eligible for inclusion. After thoroughly reviewing the full texts of these 19 articles, 6 studies were removed due to quality concerns, as their outcome estimates differed from the outcome of interest. Ultimately, 13 eligible studies [15,26–36] were included in this systematic review and meta-analysis to estimate the global prevalence of mental depression related to lower limb lymphoedema (Fig. 1).

Characteristics of the original studies

All included studies were published from 2012 onward. This systematic review and meta-analysis incorporated a total of 3503 patients with lymphoedema resulting from lymphatic filariasis, podoconiosis, or leprosy to estimate the prevalence of mental depression. All studies were

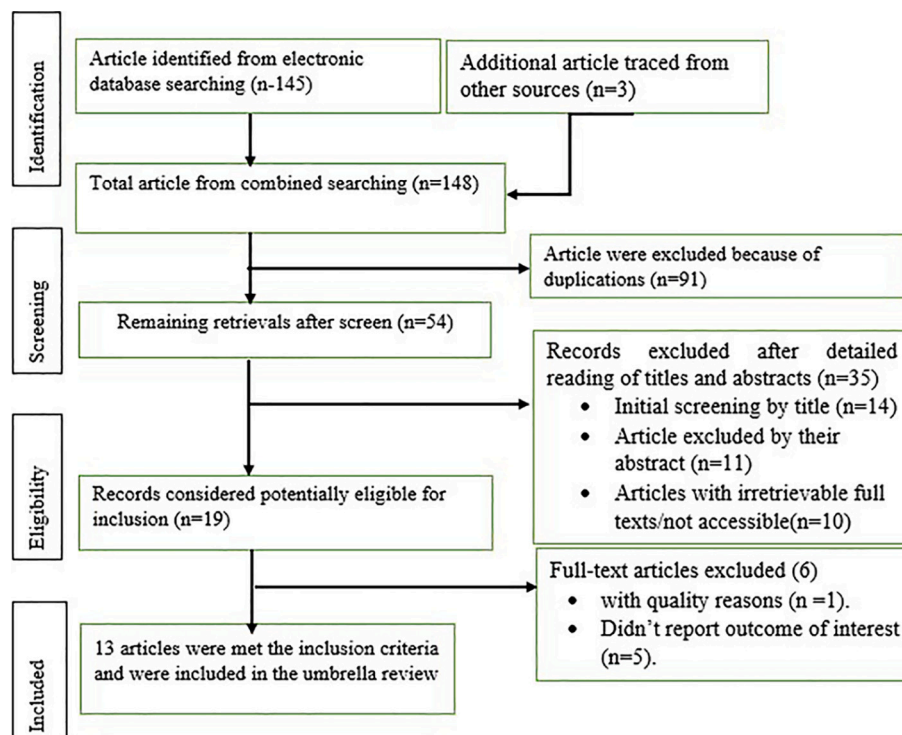


Fig. 1. Flow chart diagram describing selection of studies for systematic review and meta-analysis of lower limb lymphoedema related-mental depression, 2024.

observational, with the majority [9] conducted on the African continent. All studies utilized a cross-sectional design. All studies use Patient Health Questionnaire (PHQ-9). None of the studies utilized the Hospital Anxiety and Depression Scale (HAD) (Table 1).

Quality of the included studies

This systematic review and meta-analysis adhered to rigorous methodological standards, employing the Joanna Briggs Institute's (JBI) critical appraisal tool to assess the quality of the included cross-sectional and cohort studies. The lowest quality score recorded was 62.5 %. A detailed evaluation revealed that only one study was classified as having moderate quality based on the JBI assessment for cross-sectional studies.

The extent of mental depression

This meta-analysis identified significant heterogeneity across the studies ($I^2 = 81.48\%$, p -value < 0.001 , $H^2 = 4.68$, and $T^2 = 0.05$). Consequently, a random-effects model using the restricted maximum likelihood method was applied to estimate the pooled prevalence of mental depression. The results from the 13 studies revealed that the pooled estimate of lower limb lymphedema-related mental depression was 38.4 % (95 % CI: 26.3 %, 50.5 %) (Fig. 2).

Prediction interval

A prediction interval indicates the potential variation in the results of a new study if it were randomly selected from the same group of studies used in the current analysis. In other words, it reflects the range of possible outcomes for a new study on the same topic, providing insight into how much the combined result might vary depending on the specific study included [25]. In this systematic review and meta-analysis, the prediction interval for the pooled estimate of lower limb lymphedema-related mental depression was (11.9 %, 88.7 %). This suggests that if a new study were added, the effect size would likely fall within this range.

Publication bias

Substantial publication bias was assessed objectively using both Begg's and Egger's tests. Both Begg's and Egger's tests revealed no publication bias with p -values of 0.8 and 0.7, respectively. A symmetrical distribution of funnel plots was also observed (Fig. 3).

Subgroup analysis

Subgroup analysis was conducted using publication year, study

quality (JBI quality score), country, and cause of limb lymphedema. This analysis revealed significant differences in the prevalence of mental depression among different patient groups. Depression was more prevalent among leprosy patients (38.1 %) and podoconiosis patients (36.4 %), showing little difference between the two. However, the prevalence was notably lower among those with lymphatic filariasis (22.4 %). Furthermore, the analysis highlighted a noteworthy observation: a higher prevalence of lower limb lymphedema-related mental depression was identified in Africa compared to other regions (39.4 % vs. 36.1 %) (Fig. 4).

Sensitivity analysis

A leave-one-out analysis was conducted to assess the influence of individual studies on the overall effect size estimate. This approach involves excluding one study at a time and performing the meta-analysis on the remaining ($n-1$) studies. If the confidence interval of the excluded study does not include the overall effect size estimate (θ), it suggests that the study has a significant impact on the overall effect size [37]. In this study, the overall effect size estimate (θ) is 38.4 %, and it falls within the confidence interval of all included studies. Therefore, omitting any single study does not significantly affect the overall effect size estimate (Table 2).

Discussion

This systematic review and meta-analysis aimed to estimate lower limb lymphedema-related mental depression. Our analysis revealed that 38.4 % (95 % CI: 26.3 %, 50.5 %) of patients with lower limb lymphedema experience mental depression. Notably, mental depression was more prevalent in leprosy patients (38.1 %) compared to individuals with podoconiosis (36.4 %) and lymphatic filariasis (22.4 %). Additionally, our findings indicated a higher prevalence of mental depression related to lower limb lymphedema in Africa (39.4 %) compared to other regions.

Lower limb lymphedema-related mental depression found to be 38.4 %. The findings of this systematic review and meta-analysis underscore the significant burden of mental depression experienced by individuals with lower limb lymphedema. The high prevalence rate indicates that mental health issues are pervasive among this patient population and warrant greater attention from healthcare providers and policymakers. The coexistence of mental depression alongside physical symptoms of lymphedema can exacerbate the overall burden on affected individuals, leading to reduced quality of life and impaired functional outcomes.

One notable observation from this study is the variation in depression prevalence among different causes of lower limb lymphedema. The prevalence of depression among individuals with leprosy (38.1 %) and

Table 1

Summary of the key characteristics of the studies included in this systematic review and meta-analysis, 2024.

First Author	Year	Study setting	Age group included	Sample size	Mental depression	JBI* (%)
Semrau	2019	Cameroon	15–65	83	32	75
Barakat	2019	Egypt	20–65	100	65	87.5
Ali	2020	Ethiopia	18–75	251	119	100
Bartlett	2016	Ethiopia	15–65	269	34	100
Abebaw	2022	Ethiopia	15–65	403	243	87.5
Govindasamy	2021	India	18–74	220	73	100
Barrett	2023	Malawi	18–65	311	73	75
Sharma	2022	Nepal	22–95	119	15	87.5
Van Dorst	2020	Nepal	18–65	142	105	87.5
Bakare	2015	Nigeria	18–65	235	46	87.5
Obindo	2017	Nigeria	18–65	98	19	100
Semrau	2020	Rwanda	18–65	1143	783	100
Su	2012	Taiwan	65–85	129	32	75
Total				3503	1639	

NB: *Joanna Briggs Institute.

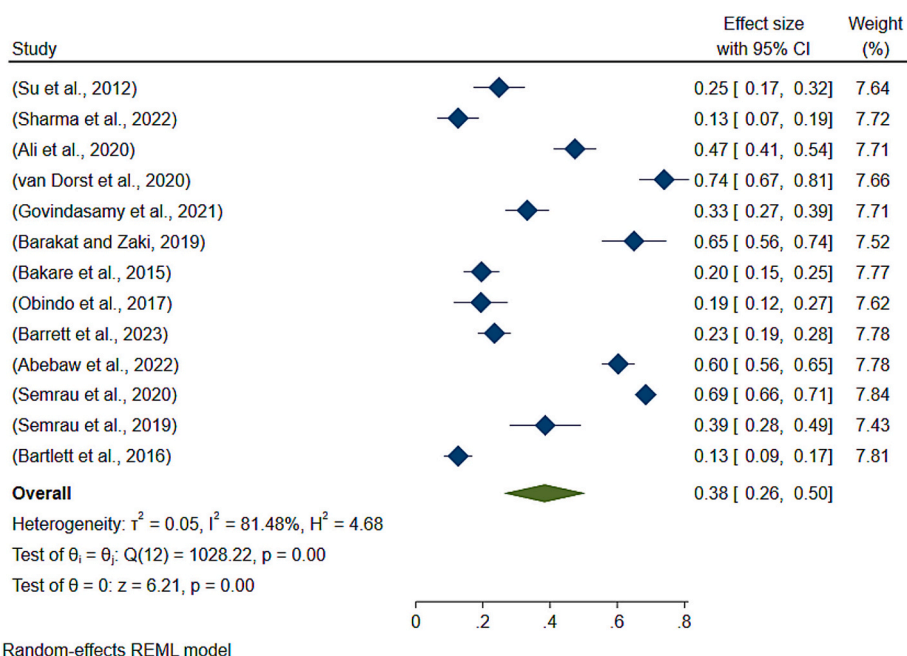


Fig. 2. A forest plot showing the pooled estimate of lower limb lymphedema-related mental depression, 2024.

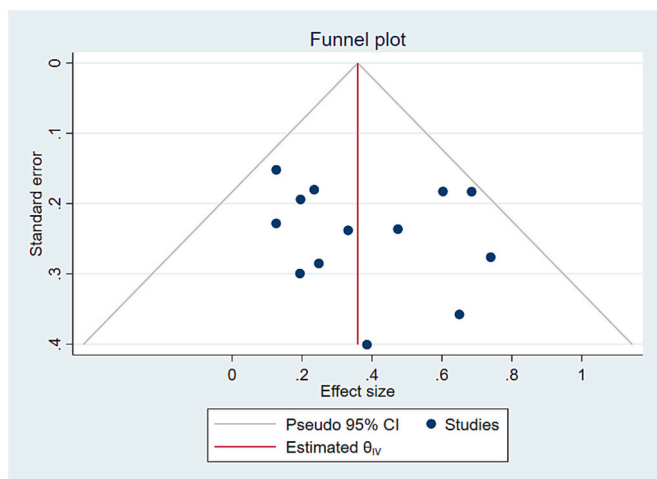


Fig. 3. Funnel Plots Showing Publication Bias in the Meta-Analysis of Lower Limb Lymphedema-Related Mental Depression, 2024.

podoconiosis (36.4 %) shows minimal difference, indicating comparable psychological impacts. However, the prevalence among those with filariasis is notably lower, suggesting differing mental health burdens. The higher prevalence of depression among leprosy patients compared to those with podoconiosis and lymphatic filariasis highlights the need for tailored interventions to address the unique challenges faced by individuals with specific underlying conditions. Understanding the factors contributing to this disparity, such as disease severity, stigma, and socio-economic factors [34,35], is crucial for developing targeted approaches to mental health support in these populations.

Furthermore, geographic disparities in depression prevalence highlight the influence of contextual factors on mental health outcomes in lower limb lymphedema patients. The higher prevalence of depression in Africa compared to other regions may be attributed to the high burden of lower limb lymphedema. For example, from 17 countries with evidence of podoconiosis, 13 countries were from Africa. Tropical African countries bear the highest disease burden from global [38]. Combination of cultural, social, and healthcare system factors, limited mental

health services, healthcare workers holding stigmatizing views, and lacking essential knowledge about lymphoedema, as well as socio-economic inequalities [39,40], are some of the factors that may contribute to the observed disparities. Addressing these structural barriers and implementing culturally sensitive interventions is essential for improving mental health outcomes in affected populations.

Depression rates in individuals with lower limb lymphedema related to podoconiosis, leprosy, and lymphatic filariasis in our study were notably high, similar to findings in cancer-related lymphedema studies [41]. Our study highlights that non-cancer-related lymphedema carries a substantial risk of mental health challenges. Specifically, the prevalence of depression among non-cancer patients in our review 38.4 % was higher than, the 29.7 % [42] reported in cancer-related studies, suggesting that the psychosocial impacts of lower limb lymphedema extend beyond cancer-related mental depression. One of the key strengths of this study is its focus on non-cancer-related lower limb lymphoedema, an area that has been underexplored in the literature. While cancer-related lymphoedema has been extensively studied, few studies have examined the psychological and quality of life impacts of non-cancer-related lower limb lymphoedema, as noted in previous research [41,43]. Our study contributes to bridging this gap by providing insights into the mental health implications of this condition. Despite the contributions of this study, several limitations should be acknowledged. The included studies may vary in terms of methodology, sample size, and diagnostic criteria, which could introduce heterogeneity and affect the accuracy of the pooled estimates. This study was unable to pool age and gender differences due to the lack of detailed reporting on these variables in most included studies. Additionally, the reliance on published literature may lead to publication bias, wherein studies with statistically significant findings are more likely to be published, potentially overestimating the prevalence of mental depression. Future research should aim to overcome these limitations through standardized methodologies, larger sample sizes, and comprehensive assessments of mental health outcomes.

Conclusions

This systematic review and meta-analysis findings underscore the substantial burden of mental depression among patients with lower limb

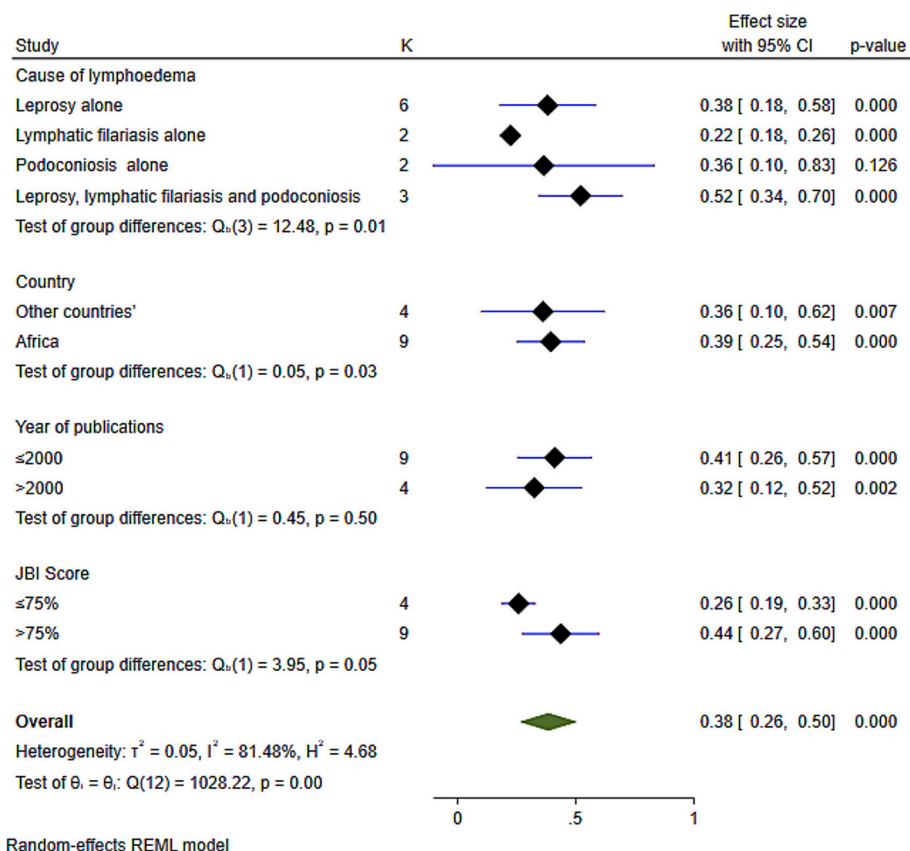


Fig. 4: Subgroup analysis of estimate of lower limb lymphedema-related mental depression, 2024.

Table 2

Leave one out meta-analysis to explore the influence one study on the overall pooled estimate of lower limb lymphedema-related mental depression, 2024.

First Author	Effect size	[95 % CI]
Su	0.39	[0.266, 0.524]
Sharma	0.41	[0.282, 0.529]
Ali	0.38	[0.246, 0.507]
Van Dorst	0.35	[0.239, 0.470]
Govindasamy	0.39	[0.257, 0.519]
Barakat	0.36	[0.239, 0.485]
Bakare	0.40	[0.272, 0.527]
Obindo	0.39	[0.272, 0.527]
Barrett	0.39	[0.267, 0.525]
Abebaw	0.37	[0.240, 0.491]
Semrau	0.36	[0.238, 0.478]
Semrau	0.38	[0.252, 0.515]
Bartlett	0.41	[0.282, 0.529]
Theta	0.38	[0.263, 0.505]

lymphedema, with nearly 38.4 % experiencing this condition. This prevalence is significantly higher than that found in the general population, where an estimated 3.8 % experience depression [44]. Under-scoring the importance of integrating psychosocial interventions into packages of care for the management of lower limb lymphedema. Notably, the prevalence varies across different underlying causes, with leprosy patients showing the highest rates. Additionally, the study highlights a concerning trend of higher mental depression prevalence in Africa compared to other regions.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Funding

There was no funding source for this study.

CRediT authorship contribution statement

Tegene Atamenta Kitaw: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Addisu Getie:** Writing – review & editing, Writing – original draft, Visualization, Software, Project administration, Formal analysis, Data curation. **Solomon Gebremichael Asgedom:** Writing – review & editing, Visualization, Validation, Software, Data curation, Conceptualization. **Molalign Aligaz Adisu:** Data curation, Formal analysis, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. **Befkad Derese Tilahun:** Data curation, Formal analysis, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Alemu Birara Zemariam:** Formal analysis, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Addis Wondmagegn Alamaw:** Formal analysis, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Abebe Merchaw Faris:** Conceptualization, Data curation, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **Tesfaye Engdaw Habtie:** Data curation, Investigation, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. **Melesse Abiye Munie:**

Conceptualization, Funding acquisition, Investigation, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Eyob Shitie Lake:** Conceptualization, Data curation, Investigation, Software, Writing – original draft, Writing – review & editing. **Gizachew Yilak:** Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Mulat Ayele:** Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Molla Azmeraw:** Conceptualization, Data curation, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Biruk Beletew Abate:** Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Ribka Nigatu Haile:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

There is no financial and nonfinancial conflict of interest.

Data availability statement

The datasets used and/or analyzed during the current study available from the corresponding author (TAK) on reasonable request.

Acknowledgments

Not applicable.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.gloepi.2024.100180>.

References

- [1] Sleigh BC, Manna B. Lymphedema. StatPearls. Treasure Island (FL): StatPearls Publishing Copyright © 2024. StatPearls Publishing LLC; 2024.
- [2] Dellar R, Ali O, Kinfe N, Mengiste A, Davey G, Bremner S, et al. Effect of a community-based holistic care package on physical and psychosocial outcomes in people with lower limb disorder caused by lymphatic filariasis, Podoconiosis, and leprosy in Ethiopia: results from the EndPoINT pilot cohort study. *Am J Trop Med Hyg* 2022;107(3):624–31.
- [3] Lourens GB, Ferrelli DK. Lymphatic filariasis. *Nurs Clin* 2019;54(2):181–92.
- [4] Tekola-Ayele F, Yeshanehe WE. Podoconiosis: tropical lymphedema of the lower legs. *Dermatology and allergology-principles and practice*. 1st ed. Hong Kong: iConcept Press Ltd; 2014. p. 14.
- [5] Mungroo MR, Khan NA, Siddiqui R. *Mycobacterium leprae*: pathogenesis, diagnosis, and treatment options. *Microb Pathog* 2020;149:104475.
- [6] Martin J, Doyle N, McCarroll M. Preliminary development of a leg lymphoedema self-care adherence questionnaire. *J Lymphoed* 2021;16(1).
- [7] Mercier G, Pastor J, Moffatt C, Franks P, Quéré I. LIMPRINT: health-related quality of life in adult patients with chronic edema. *Lymphat Res Biol* 2019;17(2):163–7.
- [8] Greene A, Meskeel P. The impact of lower limb chronic oedema on patients' quality of life. *Int Wound J* 2017;14(3):561–8.
- [9] Fu MR, Ridner SH, Hu SH, Stewart BR, Cormier JN, Armer JM. Psychosocial impact of lymphedema: a systematic review of literature from 2004 to 2011. *Psycho-oncology* 2013;22(7):1466–84.
- [10] Mousley E, Deribe K, Tamiru A, Tomczyk S, Hanlon C, Davey G. Mental distress and podoconiosis in northern Ethiopia: a comparative cross-sectional study. *Int Health* 2015;7(1):16–25.
- [11] Bartlett J, Deribe K, Tamiru A, Amberbir T, Medhin G, Malik M, et al. Depression and disability in people with podoconiosis: a comparative cross-sectional study in rural northern Ethiopia. *Int Health* 2016;8(2):124–31.
- [12] Tora A, Franklin H, Deribe K, Reda AA, Davey G. Extent of podoconiosis-related stigma in Wolaita zone, Southern Ethiopia: a cross-sectional study. *Springerplus*; 2014. p. 647.
- [13] Tekola F, Mariam DH, Davey G. Economic costs of endemic non-filarial elephantiasis in Wolaita zone, Ethiopia. *Trop Med Int Health* 2006;11(7):1136–44.
- [14] Williams AF, Moffatt CJ, Franks PJ. A phenomenological study of the lived experiences of people with lymphoedema. *Int J Palliat Nurs* 2004;10(6):279–86.
- [15] Barrett C, Chiphwanya J, Chaponda L, Matipula DE, Turner JD, Taylor MJ, et al. Mental health conditions in people affected by filarial lymphoedema in Malawi: prevalence, associated risk factors and the impact of an enhanced self-care intervention. *Int Health* 2023;15(Supplement_3):iii14–27.
- [16] Monteiro AJ, de Labra C, Losa-Iglesias ME, Dias A, Becerro-de-Bengoa-Vallejo R, Silva-Migueis H, et al. Depressive symptoms and their severity in a sample with lymphedema: a case-control investigation. *Front Psychol* 2023;14:1202940.
- [17] Borman P. Lymphedema diagnosis, treatment, and follow-up from the view point of physical medicine and rehabilitation specialists. *Turk J Phys Med Rehabil* 2018; 64(3):179.
- [18] Aromataris E, Fernandez R, Godfrey CM, Holly C, Khalil H, Tungpunkom P. Summarizing systematic reviews: methodological development, conduct and reporting of an umbrella review approach. *JBI Evid Implement* 2015;13(3): 132–40.
- [19] von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. Strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Bmj* 2007;335(7624): 806–8.
- [20] Borenstein M, Hedges LV, Higgins JP, Rothstein HR. A basic introduction to fixed-effect and random-effects models for meta-analysis. *Res Synth Methods* 2010;1(2): 97–111.
- [21] Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *Bmj* 2003;327(7414):557–60.
- [22] Ioannidis JP. Interpretation of tests of heterogeneity and bias in meta-analysis. *J Eval Clin Pract* 2008;14(5):951–7.
- [23] Higgins JP, Thompson SG. Quantifying heterogeneity in a meta-analysis. *Stat Med* 2002;21(11):1539–58.
- [24] Egger M, Smith GD, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. *Bmj* 1997;315(7109):629–34.
- [25] Spinelli LM, Pandis N. Prediction interval in random-effects meta-analysis. *Am J Orthod Dentofacial Orthop* 2020;157(4):586–8.
- [26] Su TW, Wu LL, Lin CP. The prevalence of dementia and depression in Taiwanese institutionalized leprosy patients, and the effectiveness evaluation of reminiscence therapy—a longitudinal, single-blind, randomized control study. *Int J Geriatr Psychiatry* 2012;27(2):187–96.
- [27] Sharma P, Shakya R, Singh S, Bhandari AR, Shakya R, Amatya A, et al. Prevalence of anxiety and depression among people living with leprosy and its relationship with leprosy-related stigma. *Indian J Dermatol* 2022;67(6):693–8.
- [28] Ali O, Deribe K, Semrau M, Mengiste A, Kinfe M, Tesfaye A, et al. A cross-sectional study to evaluate depression and quality of life among patients with lymphoedema due to podoconiosis, lymphatic filariasis and leprosy. *Trans R Soc Trop Med Hyg* 2020;114(12):983–94.
- [29] van Dorst M, van Netten WJ, Waltz MM, Pandey BD, Choudhary R, van Brakel WH. Depression and mental wellbeing in people affected by leprosy in southern Nepal. *Glob Health Action* 2020;13(1):1815275.
- [30] Govindasamy K, Jacob I, Solomon RM, Darlong J. Burden of depression and anxiety among leprosy affected and associated factors—a cross sectional study from India. *PLoS Negl Trop Dis* 2021;15(1):e0009030.
- [31] Bakare A, Yusuf A, Habib Z, Obembe A. Anxiety and depression: a study of people with leprosy in Sokoto. *NorthWestern Nigeria J Psychiatry S* 2015;1:2–7.
- [32] Obindo J, Abdulmalik J, Nwefoh E, Agbir M, Nwoga C, Armiya'u A, et al. Prevalence of depression and associated clinical and socio-demographic factors in people living with lymphatic filariasis in plateau state, Nigeria. *PLoS Negl Trop Dis* 2017;11(6):e0005567.
- [33] Abebaw A, Atnafu A, Worku N, Hagos A. Health-related quality of life and associated factors among adult podoconiosis patients in Debre Elias district northwest, Ethiopia. *PLoS Negl Trop Dis* 2022;16(9):e0010673.
- [34] Semrau M, Davey G, Bayisenge U, Deribe K. High levels of depressive symptoms among people with lower limb lymphoedema in Rwanda: a cross-sectional study. *Trans R Soc Trop Med Hyg* 2020;114(12):974–82.
- [35] Semrau M, Davey G, Beng AA, Ndongmo WPC, Njouendou AJ, Wanji S, et al. Depressive symptoms amongst people with Podoconiosis and lower limb Lymphoedema of other cause in Cameroon: a cross-sectional study. *Trop med. Infect Dis* 2019;4(3).
- [36] Bartlett J, Deribe K, Tamiru A, Amberbir T, Medhin G, Malik M, et al. Depression and disability in people with podoconiosis: a comparative cross-sectional study in rural northern Ethiopia. *Int Health* 2016;8(2):124–31.
- [37] Colditz GA, Brewer TF, Berkey CS, Wilson ME, Burdick E, Fineberg HV, et al. Efficacy of BCG vaccine in the prevention of tuberculosis. Meta-analysis of the published literature. *Jama* 2004;271(9):698–702.
- [38] World Health Organization. Podoconiosis (non-filarial lymphoedema). 2023.
- [39] Nicholas A, Joshua O, Elizabeth O. Accessing mental health Services in Africa: current state, efforts, challenges and recommendation. *Ann Med Surg (Lond)* 2022; 81:104421.
- [40] Dellar R, Ali O, Kinfe M, Tesfaye A, Fekadu A, Davey G, et al. Knowledge, attitudes and practices of health professionals towards people living with lymphoedema caused by lymphatic filariasis, podoconiosis and leprosy in northern Ethiopia. *Int Health* 2022;14(5):530–6.
- [41] Bowman C, Piedalue KA, Baydoun M, Carlson LE. The quality of life and psychosocial implications of cancer-related lower-extremity lymphedema: a systematic review of the literature. *J Clin Med* 2020;9(10).
- [42] Mete Civelek G, Akinci MG, Dalyan M. Evaluation of sleep quality, depression, and quality of life in patients with breast Cancer related lymphedema. *Lymphat Res Biol* 2023;21(3):289–95.
- [43] Chima C, Murray B, Moore Z, Costello M, George S. Health-related quality of life and assessment in patients with lower limb lymphoedema: a systematic review. *J Wound Care* 2022;31(8):690–9.
- [44] World Health Organization. Depressive disorder (depression). 2023.