OBJN
Online Brazilian Journal of Nursing
ISSN: 1676 - 4285 | www.objnursing.uff.br

Submission: 27-May-2026
Approved: 18-Jul-2026

USE OF *ALLIUM SATIVUM* IN THE MANAGEMENT OF VULVOVAGINAL CANDIDIASIS: A SCOPING REVIEW PROTOCOL

USO DO *ALLIUM SATIVUM* NO MANEJO DA CANDIDÍASE VULVOVAGINAL: PROTOCOLO DE REVISÃO DE ESCOPO

USO DE *ALLIUM SATIVUM* EN EL MANEJO DE LA CANDIDIASIS VULVOVAGINAL: PROTOCOLO DE REVISIÓN DE ALCANCE

Wemerson dos Santos Fontes[1] ORCID: 0000-0003-0415-1079
Adriana Caroci Becker[2] ORCID: 0000-0003-3112-8480
Renata Figueiredo de Oliveira[1] ORCID: 0000-0003-1493-0519
Adelaide Caroci Durkin[3] ORCID: 0000-0002-6113-8922
Lucca Caroci[4] ORCID: 0009-0004-1936-6288
Christiane Borges do Nascimento Chofakian[5] ORCID: 0000-0002-5953-3296

[1] Universidade de São Paulo, Escola de Enfermagem. São Paulo, SP, Brasil.
[2] Universidade de São Paulo, Escola de Artes, Ciências e Humanidades e Escola de Enfermagem. São Paulo, SP, Brasil.
[3] Kettering College, Kettering. Ohio, Estados Unidos.
[4] St. Francis College. Nova Iorque, Estados Unidos.
[5] Universidade de São Paulo, Escola de Artes, Ciências e Humanidades. São Paulo, SP, Brasil.

How to cite: Fontes WS, Becker AC, Oliveira RF, Durkin AC, Caroci L, Chofakian CBN. Use of *Allium sativum* in the management of vulvovaginal candidiasis: scoping review protocol. Online Braz J Nurs. 2026;25(1):e20267034. https://doi.org/10.17665/1676-4285.20267034

RESUMO

Objetivo: Mapear e sintetizar as evidências clínicas disponíveis sobre a utilização do *Allium sativum* no manejo da candidíase vulvovaginal. **Método:** Trata-se de um protocolo de revisão de escopo pautado na metodologia do *Joanna Briggs Institute* (JBI). Serão incluídos estudos primários e literatura cinzenta com mulheres diagnosticadas com candidíase vulvovaginal que investiguem o uso dessa fitoterapia, sem restrição de ano de publicação ou idioma. As buscas serão realizadas nas bases de dados Web of Science, CINAHL, PubMed, Scopus, Embase, Cochrane, LILACS, SciELO, ScienceDirect e Epistemonikos. A seleção dos estudos e a extração dos dados serão executadas por dois revisores independentes. Registro OSF: https://doi.org/10.17605/OSF.IO/2KXGY.
Descritores: Alho; Candidíase Vulvovaginal; Fitoterapia; Revisão de Escopo.

ABSTRACT

Objective: To map and synthesize the available clinical evidence on the use of *Allium sativum* in the management of vulvovaginal candidiasis. **Method:** This is a scoping review protocol based on the Joanna Briggs Institute (JBI) methodology. Primary studies and grey literature involving women diagnosed with vulvovaginal candidiasis that investigate the use of this herbal therapy will be included, without restriction on publication year or language. Searches will be conducted in the Web of Science, CINAHL, PubMed, Scopus, Embase, Cochrane, LILACS, SciELO, ScienceDirect, and Epistemonikos databases. Study selection and data extraction will be performed independently by two reviewers. OSF registration: https://doi.org/10.17605/OSF.IO/2KXGY.
Descriptors: Garlic; Candidiasis, Vulvovaginal; Phytotherapy; Scoping Review.

RESUMEN

Objetivo: Mapear y sintetizar la evidencia clínica disponible sobre el uso de *Allium sativum* en el manejo de la candidiasis vulvovaginal. **Método:** Se trata de un protocolo de revisión de alcance basado en la metodología del Instituto Joanna Briggs (JBI). Se incluirán estudios primarios y literatura gris que involucren a mujeres diagnosticadas con candidiasis vulvovaginal y que investiguen el uso de esta fitoterapia, sin restricción de año de publicación ni de idioma. Las búsquedas se realizarán en las bases de datos Web of Science, CINAHL, PubMed, Scopus, Embase, Cochrane, LILACS, SciELO, ScienceDirect y Epistemonikos. La selección de los estudios y la extracción de datos serán realizadas de forma independiente por dos revisores. Registro en OSF: https://doi.org/10.17605/OSF.IO/2KXGY.
Descriptores: Ajo; Candidiasis Vulvovaginal; Fitoterapia; Revisión de Alcance.

Editors:
Rosimere Ferreira Santana (ORCID: 0000-0002-4593-3715)
Geilsa Soraia Cavalcanti Valente (ORCID: 0000-0003-4488-4912)
Sandra Cristina de Souza Borges Silva (ORCID: 0000-0001-9147-5949)

Publisher:
Escola de Enfermagem Aurora de Afonso Costa – UFF
Rua Dr. Celestino, 74 – Centro, CEP: 24020-091 – Niterói, RJ, Brazil
Journal email: objn.cme@id.uff.br

Corresponding author:
Wemerson dos Santos Fontes
E-mail: wemersonfontes@usp.br

INTRODUCTION

Vulvovaginal candidiasis (VVC) is one of the most prevalent lower reproductive tract infections, affecting approximately 75% of women during their reproductive years, with frequent progression to recurrent clinical conditions[1]. Characterized by the overgrowth of *Candida* spp., with *Candida albicans* accounting for 85% to 90% of cases, followed by non-albicans species such as *C. glabrata* and *C. tropicalis*, the condition manifests as pruritus, erythema, fissures, and curdy discharge, causing severe impacts on patients' quality of life and sexual health[2].

Conventional clinical management using azole antifungals has led to the development of fungal resistance and vaginal dysbiosis[3]. In the face of therapeutic failures and adverse effects, the need to investigate safe and effective alternatives emerges. Within this scenario, natural antifungals gain relevance, aligning with the integrative and non-medicalizing practices of Natural Gynecology[4].

The antifungal activity of *Allium sativum* (garlic) is primarily attributed to allicin, an organosulfur compound capable of altering the integrity of the fungal cell membrane and modulating virulence factors of several species of the genus *Candida*[5]. Recent evidence indicates that garlic-derived compounds can interfere with gene expression associated with cell adhesion, tissue invasion, and biofilm formation—mechanisms directly linked to antifungal resistance and the persistence of vulvovaginal candidiasis[6].

In clinical settings, randomized controlled trials have demonstrated that the use of garlic-based vaginal creams and oral formulations shows promising efficacy in managing the infection, displaying clinical cure rates and symptom reduction comparable to traditional allopathic antifungals, such as clotrimazole and fluconazole[7-8]. However, the fact that the primary *in vivo* evidence available in the literature is concentrated in publications from the mid-last decade[7-8] highlights a significant temporal stagnation in clinical research applied to herbal medicine. This gap compromises the understanding of the actual therapeutic behavior of *Allium sativum* when facing current epidemiological patterns of fungal multidrug resistance and complex vaginal dysbiosis.

Despite these promising clinical findings, the literature on the subject lacks comprehensive systematization. Previous syntheses have been restricted to systematic reviews of effectiveness, focusing on a limited number of randomized controlled trials with strict comparisons to allopathic drugs. This narrow approach neglects the mapping of essential variables for clinical practice, such as observational studies, the diversity of pharmaceutical formulations, posologies, routes of administration, and safety profiles.

To address this methodological and temporal gap, this protocol aims to map and synthesize the available clinical evidence on the use of *Allium sativum* in the management of VVC, regardless of publication year. Mapping the historical landscape of this evidence will provide the necessary foundation for updating guidelines within Integrative and Complementary Health Practices[9]. It is important to note that, despite its ancient and widespread empirical use, garlic-based formulations still lack an official recommendation in health guidelines and protocols for the management of VVC.

Rigorously investigating and understanding its use reveals critical gaps in the literature and opens new possibilities for scientific research with robust evidence to justify, recommend, or contraindicate its use in professional practice, which underpins the development of this protocol.

REVIEW QUESTIONS

Primary question

What is the extent and type of evidence available in the literature regarding the use of *Allium sativum* in the management of VVC?

Secondary questions

What are the pharmaceutical dosage forms and traditional preparations of *Allium sativum* reported in the literature for the management of VVC?

What are the methodological designs of the clinical and observational studies investigating the action of *Allium sativum* against VVC?

What are the clinical and microbiological outcomes (cure rates, symptom reduction, and fungal eradication) associated with the use of *Allium sativum* in the treatment of VVC?

What are the adverse events, contraindications, and safety profiles reported in studies on the vaginal or systemic use of *Allium sativum*?

What gaps in the literature justify conducting new standardized clinical trials?

Inclusion criteria

The formulation of the research question and the structuring of the eligibility criteria for study inclusion and exclusion were based on the PCC mnemonic recommended by the JBI, defining the Population, represented by women with vulvovaginal candidiasis; the Concept, focused on the therapeutic use of *Allium sativum* or its isolated bioactive compounds; and the Context, encompassing any healthcare setting or home-based practices at the global level.

The review will include studies conducted with female human participants presenting with a clinical or laboratory diagnosis of vulvovaginal candidiasis. There will be no restrictions regarding comorbidities, age, skin color, or ethnicity of the participants. Women in any stage of the life cycle will be included, including pregnant women. Studies focusing exclusively on animal models or non-gynecological fungal infections will be excluded.

Concept

This review will include studies exploring the use of *Allium sativum* (garlic) as a therapeutic intervention for the management of VVC. Different traditional preparation methods (*in natura*) and dosages focused on isolated bioactive compounds derived from the plant, particularly allicin, will be considered. Investigations involving topical/vaginal or systemic routes of administration, whether

applied as monotherapy or adjuvant therapy, will be eligible for mapping. Studies evaluating other isolated herbal medicines, without the association or direct presence of *Allium sativum* compounds, will be excluded.

Context

This review will consider investigations conducted across various healthcare levels—encompassing hospitals, clinics, family health units, and community settings—spanning multiple geographical and sociocultural contexts. The mapping will also include reports of home practices based on Natural Gynecology. Integrating these perspectives is essential to capturing ethnopharmacological use and self-care strategies, particularly in regions with limited access to specialized health services[10].

Furthermore, studies conducted in developing countries, where herbal medicine often represents the first line of treatment, will be highlighted in data synthesis to evaluate the economic viability and therapeutic accessibility of the intervention[11]. Finally, to capture the complete historical landscape of the application of this integrative practice against the evolution of fungal multidrug resistance, searches will have no temporal or language restrictions.

Types of evidence sources

Primary quantitative, qualitative, and mixed-methods evidence sources will be eligible for this scoping review. Within the clinical and epidemiological scope, clinical trials, observational studies, case series, and case reports will be included. Grey literature will be covered through the inclusion of master's theses and doctoral dissertations, given the relevance of independent academic research on the topic.

Review articles will not be included in the final sample; however, their reference lists will be actively screened to identify potential primary studies not captured in the initial search. Opinion pieces, editorials, and letters to the editor that do not present structured primary data will be excluded.

Specifically, quantitative designs will encompass randomized controlled trials (RCTs), non-randomized clinical trials, quasi-experimental studies, cohort studies (prospective and retrospective), case-control studies, and analytical cross-sectional studies. Eligible qualitative studies will include research grounded in phenomenology, grounded theory, ethnography, and action research exploring women's experiences, perceptions, and acceptability regarding the use of garlic. Ongoing study protocols identified in clinical trial registries will be mapped to indicate future research trends.

METHOD

This scoping review will follow the Joanna Briggs Institute (JBI) methodology[12] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR)[13]. This protocol is prospectively registered on the Open Science Framework under the identifier https://doi.org/10.17605/OSF.IO/2KXGY, and its development was guided by contemporary JBI guidelines[12]. Any methodological deviations from this protocol during the execution of the study will be transparently reported and justified in the final manuscript.

Search strategy

The search strategy aims to locate published studies and grey literature in the following databases: Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed (NCBI), Scopus, Embase, Cochrane Library, Latin American and Caribbean Health Sciences Literature (LILACS), SciELO, ScienceDirect, Google Scholar, and Epistemonikos. Additionally, grey literature sources will be explored, such as conference proceedings, registered clinical trials in ClinicalTrials.gov[14] and the WHO International Clinical Trials Registry Platform (ICTRP)[15], master's theses and doctoral dissertations from the Brazilian Digital Library of Theses and Dissertations (BDTD)[16] and the CAPES Theses and Dissertations Catalog[17], as well as the first 100 results from the Google Scholar search engine, sorted by relevance.

The search will be conducted in three distinct stages, as recommended by the JBI[12]. The first stage consisted of a limited initial search in PubMed and CINAHL, followed by the mapping of text words contained in the title and abstract of retrieved articles, as well as indexing terms (Medical Subject Headings - MeSH and Health Sciences Descriptors - DeCS). From this initial stage, a preliminary search strategy was structured in PubMed (Table 1). The second stage will involve structuring and applying the main search, combining descriptors and keywords using the Boolean operators AND and OR. This syntax will be adapted to the specificities of each database (MEDLINE via PubMed, Embase, LILACS and BDENF via the Virtual Health Library - VHL, Scopus, Web of Science, and CINAHL). In all databases, filters will be activated to focus exclusively on studies conducted with humans, without publication date restrictions. Finally, the third stage will involve hand-searching the reference lists of all included studies and relevant systematic reviews identified, using the snowballing search technique[18].

The search will have no language restrictions to minimize publication bias and capture evidence from diverse geographical regions. Studies published in languages other than Portuguese, English, or Spanish will be translated using DeepL software[19] or by native translators when necessary. A librarian with expertise in health sciences will be consulted to refine and validate the search strategies before final execution.

Study selection

Following the search, all identified records will be gathered and imported into the Mendeley Reference Manager software[20], in which duplicates will be removed. Duplicate removal will initially be performed automatically by the software and subsequently checked manually by the reviewers to ensure process accuracy.

Table 1 – Preliminary search strategy in PubMed, Embase, Scopus, and CINAHL databases. São Paulo, SP, Brazil, 2026

Database	Search	Search Strategies	Identified records
PubMed (NCBI)	#1	("Garlic"[Mesh] OR garlic[Text word] OR "Allium sativum"[text word] OR allicin[text word]) AND ("Candidiasis, Vulvovaginal"[Mesh] OR "Vulvovaginal Candidiasis"[text word])	10,002
	#2	"Candidiasis, Vulvovaginal"[Mesh] OR "Vulvovaginal Candidiasis"[text word]	4,844
	#3	("Garlic"[Mesh] OR garlic[Text word] OR "Allium sativum"[text word] OR allicin[text word]) AND ("Candidiasis, Vulvovaginal"[Mesh] OR "Vulvovaginal Candidiasis"[text word])	16
Embase	#1	('garlic'/exp OR 'garlic':ti,ab,kw,de,dn,df,mn,tn OR 'allium sativum':ti,ab,kw,de,dn,df,mn,tn OR 'allicin':ti,ab,kw,de,dn,df,mn,tn) AND ('vulvovaginal candidiasis'/exp OR 'vulvovaginal candidiasis':ti,ab,kw,de,dn,df,mn,tn) AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)	08
Scopus	#1	(TITLE-ABS-KEY ((Garlic OR "Allium sativum" OR allicin)) AND TITLE-ABS-KEY ("Vulvovaginal Candidiasis"))	18
CINAHL	#1	MH "Garlic" OR XB (garlic) OR SU (garlic) OR XB "allium sativum" OR SU "allium sativum" OR XB allicin OR SU Allicin AND MH "Candidiasis, Vulvovaginal" OR XB ("vulvovaginal candidiasis") OR SU ("vulvovaginal candidiasis")	11

Source: elaborated by the authors, 2026.

Study screening will occur in two stages. In the first stage, two independent reviewers will evaluate titles and abstracts based on the eligibility criteria; references deemed potentially eligible will be exported to the Rayyan software[21]. In the second stage, the reviewers will read the full text of the pre-selected studies and evaluate their definitive inclusion. Articles excluded at this phase will have their reasons for exclusion duly recorded and reported in the final review. Before screening begins, a pilot test will be conducted with a random sample of 10 titles and abstracts to calibrate inter-rater agreement.

Any disagreement between the two reviewers will be resolved through consensus. If disagreement persists, a third reviewer will be consulted for decision-making. The conflict resolution process will be documented, recording the nature of the disagreement and the rationale for the final decision.

The search and study selection stages will be detailed in the final report and represented in a PRISMA flow diagram[22]. The flow diagram will display the number of records identified, excluded at each phase, and the specific reasons for exclusion during the full-text reading stage, ensuring methodological transparency and reproducibility.

Data extraction

Data will be extracted from the articles by two independent reviewers using a standardized form, developed and adapted from the tool proposed by the JBI for scoping reviews[12]. The form will be constructed using Microsoft Excel software and will undergo iterative validation through a pilot test on three randomly selected studies. Disagreements between extractors will be resolved through consensus or via intervention by a third reviewer. When necessary, authors of primary studies will be contacted via email (up to two attempts) to request additional or unreported information in the manuscript.

The extraction tool may undergo refinements during the iterative review process as the researchers read the studies more deeply. Any modifications to the instrument will be described in the final report. Extracted data will include: (1) Study characteristics: authorship, year of publication, country of origin, methodological design, and sample size; (2) Population characteristics: age group, diagnostic criteria, history of VVC recurrence, and comorbidities; (3) Intervention details: pharmaceutical dosage form/preparation of *Allium sativum*, concentration of active ingredients (if reported), posology, route of administration, and treatment duration; (4) Comparator group (if applicable): type of antifungal, dose, and treatment duration; (5) Evaluated outcomes: clinical and mycological cure rates, relief of specific symptoms, and time to improvement; and (6) Safety profile, including adverse events, documented contraindications, and dropout rates.

As recommended by the JBI methodology for scoping reviews, assessment of risk of bias or methodological quality of the included studies will not be performed, as the objective of this work consists of a broad and descriptive mapping of the evidence, unless strictly necessary for the interpretation of conflicting data.

Data analysis and presentation

Data will be organized to highlight the main findings and identified patterns, presented in charts, tables, or diagrams, accompanied by a narrative synthesis. The narrative approach will elucidate the alignment of the results with the overall objective of the review and the research questions. Findings will be categorized and stratified according to relevant criteria, such as study design, publication year, context, posology, *Allium sativum* formulations, and clinical outcomes.

Data synthesis will be predominantly descriptive and qualitative. Summary charts of evidence will map the different pharmaceutical formulations and their respective reported efficacy. Scatter plots or column/bar graphs may be used to illustrate the temporal, geographical, and methodological distribution of the studies.

For included qualitative studies, a simplified thematic analysis will be performed to categorize patients' perceptions and experiences regarding the use of herbal medicine. The discussion will focus on identifying knowledge gaps, methodological limitations of existing literature, and formulating recommendations for designing future multicenter randomized controlled trials.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

FUNDING

This study was supported by the Coordination for the Improvement of Higher Education Personnel – Brazil (CAPES), Funding Code 001.

USE OF ARTIFICIAL INTELLIGENCE

The artificial intelligence tools Gemini (Google) and DeepL were used exclusively for formatting adjustments, language refinement, and linguistic editing during the preparation of this protocol. No artificial intelligence was used for the generation of original ideas, methodological design, or data analysis. The authors reviewed and edited all submitted content and assume full responsibility for its accuracy and integrity.

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AUTHORSHIP CONTRIBUTIONS

Study design: Fontes WS, Becker AC, Durkin AC, Oliveira RF, Chofakian CBN.
Data collection: Fontes WS, Becker AC, Durkin AC, Oliveira RF, Chofakian CBN.
Data analysis: Fontes WS, Becker AC, Caroci L, Durkin AC, Oliveira RF, Chofakian CBN.
Data interpretation: Fontes WS, Becker AC, Caroci L, Durkin AC, Oliveira RF, Chofakian CBN.
All authors are responsible for the textual writing and critical review of the intellectual content, the final version published, and all ethical, legal, and scientific aspects related to the accuracy and integrity of the study.

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