

The Use of Aromatherapy in Reducing Stress Levels among Hemodialysis Patients: A Scoping Review

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ABSTRACT

Background: Patients with chronic kidney disease (CKD) undergoing hemodialysis are vulnerable to stress and psychological disturbances due to the long-term, repetitive, and lifelong nature of the treatment. Aromatherapy is a non-pharmacological intervention that has been applied in various clinical settings to support psychological well-being. However, the scientific evidence regarding the use of aromatherapy for stress management in hemodialysis patients remains fragmented and has not been systematically mapped.

Methods: This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology and reported following the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines. Literature searches were performed in PubMed, Scopus, and Google Scholar databases. Study selection was based on predefined inclusion and exclusion criteria. Data from included studies were extracted and analyzed descriptively to map study characteristics, intervention contexts, types of aromatherapy, and reported psychological outcomes.

Results: A total of six studies met the inclusion criteria and were included in this scoping review. The included studies demonstrated variability in study design, types of essential oils used, methods of aromatherapy administration, and psychological outcome measurement instruments. Aromatherapy was predominantly administered via inhalation before or during hemodialysis sessions. Reported outcomes primarily focused on stress, anxiety, and other psychological aspects relevant to patients' experiences during hemodialysis.

Conclusion: This scoping review indicates that aromatherapy has been used as a supportive non-pharmacological intervention for stress management among hemodialysis patients; however, the available evidence remains limited and heterogeneous. Variations in intervention methods and reported outcomes highlight the need for further research using more standardized designs and a specific focus on hemodialysis populations to strengthen the evidence base in nursing practice.

Keywords: Aromatherapy; stress; hemodialysis; chronic kidney disease; scoping review

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INTRODUCTION

Chronic kidney disease (CKD) is a major non-communicable disease that has shown a significant increase globally and constitutes an important component of the worldwide burden of non-communicable diseases. The World Health Organization (WHO) reports that approximately 9% of the global population lives with chronic kidney disease, indicating that this condition represents a major public health concern requiring comprehensive policy attention and preventive strategies. Data from the Global Burden of Disease Study 2023 estimate that approximately 788 million adults aged over 20 years are affected by chronic kidney disease, with a global prevalence reaching 14.2%. Most individuals with CKD are in the early to moderate stages, which often remain undetected due to the asymptomatic nature of the disease in its initial phases. Moreover, CKD is ranked as the ninth leading cause of death worldwide, accounting for approximately 1.48 million deaths annually, and is closely associated with the increasing prevalence of non-communicable disease risk factors such as diabetes mellitus, hypertension, and elevated body mass index ¹.

In Indonesia, the burden of chronic kidney disease has also demonstrated an upward trend. Findings from the Indonesian Health Survey (Survei Kesehatan Indonesia, SKI) 2023 indicate that the prevalence of CKD among individuals aged over 15 years is 0.18%, corresponding to approximately

638,178 people. The prevalence increases with advancing age, with the highest proportion observed among individuals aged 75 years and older. In addition, the proportion of individuals with CKD who have undergone or are currently receiving hemodialysis therapy nationally reaches 21.1%, with the highest proportion found in the productive age group of 25–34 years. These findings suggest that CKD is not only a health problem among older adults but also imposes a substantial burden on the productive population².

Patients with end-stage chronic kidney disease generally require hemodialysis as a long-term renal replacement therapy. Hemodialysis is performed routinely, continuously, and throughout the patient's lifetime, resulting in not only physical consequences but also significant psychological distress. Hemodialysis sessions typically last several hours and involve dependence on dialysis machines and substantial lifestyle adjustments, which frequently trigger psychological stress. Patients undergoing hemodialysis often experience various psychological and social challenges, including depression, irritability, and reduced self-esteem. These challenges are further exacerbated by discomfort during dialysis procedures and limitations in maintaining social roles and occupational activities³.

Evidence suggests that the majority of patients with chronic kidney disease experience moderate levels of stress, particularly among those who have undergone hemodialysis therapy for more than 24 months. Previous analyses have demonstrated a significant association between the duration of hemodialysis therapy and stress levels among patients with chronic kidney disease ($p < 0.05$). This condition highlights stress as a major psychological issue that contributes substantially to the reduced quality of life experienced by hemodialysis patients⁴.

In nursing practice, a holistic and adaptive approach is required to enhance patient comfort during long-term therapies. One non-pharmacological intervention that has been widely explored in the literature is aromatherapy. Aromatherapy has been reported to promote relaxation, improve comfort, and reduce anxiety and stress through stimulation of the limbic system, which plays a central role in emotional regulation. Several studies have shown that inhalation of essential oils can enhance mental well-being and reduce negative psychological parameters. Inhalation aromatherapy using various essential oils has been shown to significantly improve mental well-being among healthcare professionals. Additionally, the use of aromatherapy in hemodialysis patients has been associated with improved sleep quality and reduced anxiety levels^{5,6}.

Despite these promising findings, the literature addressing the use of aromatherapy among hemodialysis patients demonstrates considerable variability in terms of the types of essential oils used, modes of administration, intervention duration, and measured psychological outcomes. Some studies employ combinations of multiple essential oils, whereas others focus on a single type of oil, resulting in heterogeneous findings^{7–9}. This variability indicates that the scientific evidence related to the use of aromatherapy in hemodialysis patients remains scattered and has not yet been comprehensively mapped.

Therefore, a scoping review is needed to identify and map the available scientific evidence regarding the use of aromatherapy in stress management among hemodialysis patients. This scoping review aims to provide an overview of the types of aromatherapy used, intervention characteristics, and reported stress-related outcomes in the literature, while also identifying research gaps that may inform future studies.

METHODS

This study employed a scoping review design to map the available scientific evidence regarding the use of aromatherapy in stress management among patients undergoing hemodialysis. A scoping review approach was selected because it allows for the identification, examination, and synthesis of a broad range of research evidence without restriction to specific study designs. The scoping review process was conducted systematically and transparently, following the methodological framework originally proposed by Arksey and O'Malley, further refined by Levac et al., and guided by the Joanna Briggs Institute (JBI) methodology. The reporting of this scoping review adheres to the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines.

1. Step One: Research Question

The scoping review was guided by a single primary research question, formulated using the Population, Concept, and Context (PCC) framework to map evidence related to the use of aromatherapy in stress management among hemodialysis patients within healthcare settings. The research question was as follows: “How is aromatherapy used in the management of stress among hemodialysis patients based on the existing literature?”

2. Step Two: Identification of Relevant Studies

The second stage aimed to identify studies relevant to the research question through a systematic and comprehensive literature search to ensure optimal coverage of available evidence related to the use of aromatherapy in stress management among hemodialysis patients. Literature searches were conducted using electronic databases, including PubMed, Scopus, and Google Scholar, covering publications from 2020 onwards. The search strategy was developed by combining relevant keywords and Medical Subject Headings (MeSH) terms, adapted to the indexing systems of each database. The search terms included hemodialysis, chronic kidney disease, aromatherapy, essential oils, and stress. These terms were combined using Boolean operators (AND, OR) to broaden or narrow the search results in accordance with the objectives of the scoping review. An example of the search strategy used in PubMed was as follows: (hemodialysis OR “renal dialysis” OR “chronic kidney disease”) AND (aromatherapy OR “essential oils”) AND (stress OR psychological stress OR anxiety).

In addition, reference lists of relevant articles were manually screened to identify additional studies that potentially met the inclusion criteria. All retrieved articles were collected and managed using reference management software to remove duplicates prior to further screening.

3. Step Three: Selection of Studies and Data Management Process

The third stage involved the selection of studies to determine eligibility based on predefined inclusion and exclusion criteria. Study selection was conducted in a stepwise manner to ensure relevance to the review objectives and research question. Initially, all retrieved articles were screened by title and abstract to assess their relevance to the topic of aromatherapy use in stress management among hemodialysis patients. Articles deemed irrelevant, duplicated, or not meeting the inclusion criteria at this stage were excluded. Articles that passed the title and abstract screening were subsequently subjected to full-text review. Full-text screening was performed to ensure alignment with the Population, Concept, and Context (PCC) components and to confirm that the studies reported aromatherapy as an intervention and included stress-related outcomes among hemodialysis patients.

The inclusion criteria for this scoping review were as follows: (i) studies involving patients with chronic kidney disease undergoing hemodialysis; (ii) studies exploring the use of aromatherapy as a non-pharmacological intervention; (iii) studies reporting outcomes related to stress or psychological aspects associated with stress; (iv) studies published in English or Indonesian; and (v) primary research articles with quantitative, qualitative, or mixed-methods designs.

A total of 107 records were identified from the three electronic databases: PubMed (10 records), Scopus (7 records), and Google Scholar (90 records). Records retrieved from Google Scholar were further screened to ensure inclusion of peer-reviewed journal articles, while theses, conference proceedings, and non-journal publications were excluded. During the initial screening, duplicates and records with titles irrelevant to the inclusion criteria were removed, resulting in 28 records eligible for title and abstract screening. Of these, 17 records were excluded due to a lack of relevance to the population, concept, or outcome of interest. Consequently, 11 articles proceeded to full-text assessment for eligibility. At the full-text review stage, five articles were excluded because they did not meet the inclusion criteria, primarily due to the absence of clearly reported stress-related outcomes or the lack of aromatherapy as the primary intervention. Ultimately, six studies met all inclusion criteria and were included in this scoping review. The study selection process is presented in a PRISMA Extension for Scoping Reviews (PRISMA-ScR) flow diagram.

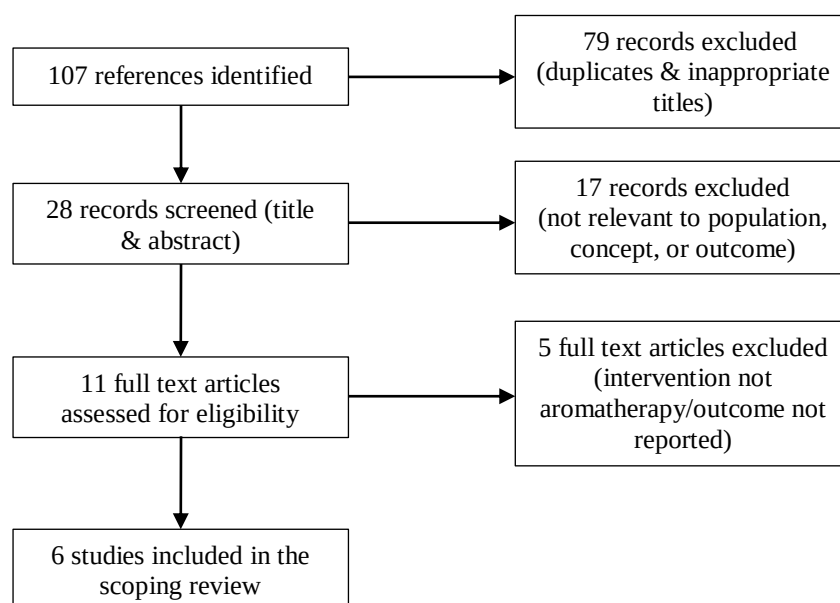


Figure 1. PRISMA Diagram

4. Step Four: Charting the Data

At this stage, data were extracted from all included studies and organized into a data extraction table. The data charting process aimed to systematically organize and map key information from each included study, facilitating the identification of study characteristics, variations in aromatherapy interventions, and reported stress-related outcomes. The extracted data included author(s) and year of publication, country of study, study objectives, study design, participant characteristics and sample size, type and method of aromatherapy administration, stress measurement instruments, main findings related to stress, and study limitations. This stage was essential to ensure consistency in data extraction and to support systematic evidence mapping in the scoping review..

5. Step Five: Collating, Summarizing and Reporting Results

In the final stage, the extracted data from all included studies were collated and summarized to map patterns and characteristics of the available scientific evidence. The extracted data were organized using spreadsheet software (Microsoft Excel) to facilitate data grouping and analysis. A thematic analysis approach was applied to identify, analyze, and describe key patterns emerging from the literature. Findings were grouped based on similarities in characteristics, including types of aromatherapy used, intervention methods and duration, and reported psychological outcomes, particularly stress among hemodialysis patients. The results of the scoping review are presented in tabular form and descriptive narrative to provide a comprehensive overview of the scope and characteristics of the available research. This approach aims to map existing evidence, identify research gaps, and inform future research directions and the development of evidence-based nursing practice..

RESULTS

A total of six studies were included in this scoping review, comprising quantitative studies and studies using mixed methods. All included studies were conducted among patients with chronic kidney disease undergoing hemodialysis in healthcare facilities. Each of the six studies explicitly reported the use of aromatherapy as a non-pharmacological intervention and assessed psychological outcomes related to stress or anxiety experienced by patients during hemodialysis^{10–15}.

Characteristics of Included Studies

The included studies demonstrated considerable variability in research design and participant characteristics. Most studies employed quantitative approaches with pre- and post-intervention measurements, while several studies combined quantitative methods with observational designs. Sample

sizes and study durations varied across studies, reflecting differences in clinical settings and research contexts in which the studies were conducted ^{10,13}.

Context and Administration of Aromatherapy

Aromatherapy was administered within the context of hemodialysis care, either before or during the hemodialysis procedure. The intervention was delivered in hemodialysis units as part of supportive care accompanying routine dialysis treatment. Several studies reported the administration of aromatherapy during hemodialysis sessions, whereas others described its application prior to the initiation of the procedure ^{11,14}.

Types and Methods of Aromatherapy

The types of aromatherapy used across the included studies involved various essential oils, including citrus-based essential oils such as *Citrus sinensis*, as well as other essential oils commonly applied in clinical aromatherapy practice. Inhalation was the most frequently reported method of administration. There was notable variation in the duration of exposure, frequency of intervention, and concentration of essential oils used among the studies ^{12,15}.

Reported Psychological Outcomes

All included studies reported psychological outcomes related to stress, anxiety, or patients' emotional states during hemodialysis treatment. The measurement instruments used to assess psychological outcomes varied across studies, reflecting differences in methodological approaches to evaluating stress and anxiety. Despite this variability, all six studies consistently assessed psychological outcomes relevant to the objectives of this scoping review ^{10,11}.

Table 1. Summary of Included Studies

No	Author, Source Country	Study Aim	Study Design	Participants & Sample Size	Key Findings	Limitations
1.	Şentürk & Tekinsoy Kartın (2018), Turki	To examine the use of essential oil inhalation on psychological outcomes in patients undergoing hemodialysis	Quasi-experimental	Patients with chronic kidney disease undergoing hemodialysis (sample size not specified in abstract)	Aromatherapy inhalation was reported to be associated with changes in anxiety levels and sleep-related outcomes among hemodialysis patients	Single-center study and short intervention duration
2.	Mannucci et al. (2018), Italy	To summarize clinical applications of citrus essential oils in healthcare settings	Systematic review	Human clinical studies involving citrus essential oils	Citrus essential oils were reported to be used in various clinical contexts related to anxiety and mood outcomes	Not specific to hemodialysis population
3.	Musa et al. (2022), Jordan	To assess physiological and psychological stress responses in patients receiving hemodialysis	Quantitative observational study	Adult patients undergoing maintenance hemodialysis (sample size reported in full text)	Hemodialysis patients exhibited measurable stress responses during treatment	Did not evaluate aromatherapy as an intervention
4.	Irawan & Suhartini (2023), Indonesia	To identify the relationship between duration of hemodialysis and stress levels	Cross-sectional study	Patients with chronic kidney disease undergoing hemodialysis (sample size reported in study)	Stress levels were reported across different durations of hemodialysis treatment	Observational design limits causal interpretation

5.	Qotrunnada et al. (2024), Indonesia	To explore the use of citrus inhalation aromatherapy on anxiety in hemodialysis patients	Quasi-experimental	Hemodialysis patients receiving routine treatment (sample size reported in study)	Inhalation aromatherapy was reported to be associated with changes in anxiety levels	Limited sample size and single setting
6.	Nascimento et al. (2025), Brazil	To examine the effects of sweet orange (<i>Citrus sinensis</i>) essential oil inhalation on anxiety and mood	Experimental study	Adult participants in clinical settings (sample size reported in study)	Sweet orange essential oil inhalation was reported to be associated with mood and anxiety-related outcomes	Population not specific to hemodialysis patients

Table 1 presents a summary of the key characteristics of the included studies, including authorship, country of origin, study aims, research design, participant characteristics, main findings related to stress or anxiety, and reported study limitations. This summary highlights both the diversity of study designs and the shared focus on psychological outcomes associated with aromatherapy use in hemodialysis settings.

Based on the six included studies, aromatherapy has been reported as a non-pharmacological intervention within healthcare settings, including among patients with chronic kidney disease undergoing hemodialysis. Several studies directly involved hemodialysis patients and reported psychological outcomes such as stress and anxiety, while other studies provided contextual evidence regarding the use of aromatherapy in relevant clinical populations^{11,14,15}.

The most commonly reported method of aromatherapy administration was inhalation, applied either before or during hemodialysis sessions. This approach suggests that aromatherapy is utilized as a supportive intervention that is relatively easy to implement within routine hemodialysis care. The use of aromatherapy in this context is primarily aimed at alleviating stress and anxiety commonly experienced by patients undergoing long-term hemodialysis treatment¹⁰.

The types of essential oils used varied across studies, with citrus-based essential oils, including *Citrus sinensis*, frequently reported. Previous studies have documented the use of citrus essential oils in clinical contexts related to mood and anxiety regulation, although not all studies were conducted specifically among hemodialysis populations^{12,15}.

Overall, the findings of this scoping review indicate that aromatherapy has been explored and applied as a supportive intervention for stress management among hemodialysis patients. However, variations in study design, intervention methods, and outcome measurement instruments suggest that the existing evidence remains limited and heterogeneous, underscoring the need for further focused and standardized research^{10,11}.

DISCUSSION

This scoping review aimed to map the available scientific evidence regarding the use of aromatherapy in stress management among patients with chronic kidney disease undergoing hemodialysis. Based on six included studies, aromatherapy has been explored as a supportive non-pharmacological intervention across various healthcare contexts, with a primary focus on psychological outcomes such as stress and anxiety.

The findings of this review indicate that aromatherapy is most commonly administered through inhalation and applied either before or during hemodialysis procedures. This approach aligns with the characteristics of hemodialysis therapy, which is routine, time-consuming, and often associated with psychological distress. Previous studies have shown that hemodialysis patients frequently experience heightened levels of stress and anxiety during treatment sessions, making easily implementable supportive interventions particularly relevant in nursing practice^{10,13}.

The types of essential oils used across the reviewed studies varied considerably, including citrus-based essential oils such as *Citrus sinensis* as well as other essential oils commonly utilized in clinical aromatherapy. This variability suggests that there is currently no standardized protocol

regarding the selection of essential oils for use among hemodialysis patients. These findings are consistent with previous reports indicating that citrus essential oils have been applied in various clinical settings to influence mood and anxiety, although their application specifically in hemodialysis populations remains limited^{12,15}.

The psychological outcomes reported in the included studies predominantly focused on stress and anxiety, reinforcing the importance of psychological well-being as a key component of the hemodialysis experience. However, substantial variation was observed in the instruments used to measure stress and anxiety across studies, reflecting differences in conceptual approaches to psychological assessment. This methodological heterogeneity limits direct comparison of findings and highlights that the existing evidence is largely descriptive in nature.

In addition, several of the included studies were not conducted exclusively among hemodialysis populations but provided contextual evidence relevant to clinical aromatherapy and psychological outcomes. While these studies contribute to a broader understanding of aromatherapy use in healthcare, they underscore the limited availability of direct evidence focused specifically on hemodialysis patients. This gap emphasizes the need for future research with stronger methodological designs and clearer population focus.

Overall, the discussion highlights that aromatherapy has been explored as a supportive intervention for stress management in hemodialysis settings. However, heterogeneity in study design, types of essential oils, intervention protocols, and outcome measurement instruments indicates that current evidence should be interpreted with caution. As such, the findings of this scoping review primarily serve as an initial mapping of existing evidence rather than a basis for causal inference regarding intervention effectiveness.

These findings provide a foundation for future studies aimed at developing and evaluating more structured aromatherapy interventions tailored to hemodialysis patients. Future research should prioritize standardized intervention protocols, consistent outcome measures, and robust study designs to strengthen the evidence base and support the integration of aromatherapy into evidence-based nursing practice for hemodialysis care.

LIMITATIONS

This scoping review has several limitations that should be considered when interpreting the findings. First, the number of included studies was relatively limited, resulting in an evidence base that remains preliminary. In addition, the reviewed studies exhibited substantial variability in research design, types of essential oils used, methods of aromatherapy administration, and instruments used to measure psychological outcomes. This heterogeneity limits the ability to directly compare findings across studies. Second, several of the included studies were not conducted exclusively among hemodialysis patient populations. Although these studies provide conceptually relevant insights into the use of aromatherapy in clinical settings, some findings are indirect and may not fully reflect the specific experiences of patients undergoing hemodialysis. Third, in accordance with the objectives and methodological characteristics of scoping reviews, this review did not include a formal assessment of methodological quality or risk of bias of the included studies. Consequently, the findings should not be interpreted as evidence of causal relationships or intervention effectiveness.

Finally, limitations were also identified in the reporting quality of some studies, particularly regarding incomplete information on intervention duration, aromatherapy concentration, and sample size. Therefore, the results of this scoping review should be interpreted with caution and primarily used as a foundation for evidence mapping and the planning of future research..

CONCLUSION

This scoping review maps the available scientific evidence regarding the use of aromatherapy in stress management among patients with chronic kidney disease undergoing hemodialysis. Based on six included studies, aromatherapy has been applied as a supportive non-pharmacological intervention in various healthcare contexts, with primary attention to psychological outcomes such as stress and anxiety.

The findings indicate substantial variability in the types of aromatherapy used, methods of administration, and outcome measurement instruments across studies. This variability reflects the absence of standardized intervention protocols for the use of aromatherapy in hemodialysis care. Furthermore, a proportion of the available evidence remains limited and does not exclusively focus on hemodialysis populations.

Overall, this scoping review provides an initial overview of the scope and characteristics of research related to aromatherapy and stress among hemodialysis patients. The findings may inform future research by highlighting the need for more focused study designs, standardized intervention protocols, and consistent psychological outcome measures to strengthen the evidence base in hemodialysis nursing practice.

AUTHOR CONTRIBUTIONS

The first author contributed to the conception and design of the study, literature searching and selection, data extraction and analysis, and manuscript drafting. The second author contributed to data interpretation and critical revision of the manuscript. All authors reviewed and approved the final manuscript for publication.

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DISCLOSURE

The authors declare that there are no conflicts of interest related to the conduct or publication of this study.

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