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Implementation of Evidence Based Nursing Practice: Lavender Aromatherapy on Anxiety Levels in Hemodialysis Patients

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Abstract

Background: Chronic diseases are a major health and mortality problem worldwide. One such problem is chronic kidney failure. Patients with chronic kidney failure require lifelong renal replacement therapy, such as hemodialysis, which can lead to psychological disorders such as anxiety. One non-pharmacological therapy for anxiety management is lavender aromatherapy.
Objective: This study aims to provide an overview of the impact of applying lavender aromatherapy on anxiety levels in hemodialysis patients through evidence-based nursing practice (EBNP).
Method: This study used a systematic approach by reviewing various articles and literature from three leading health databases, including PubMed, Science Direct, and ProQuest. The selected articles focused on the effect of lavender aromatherapy intervention on anxiety levels in hemodialysis patients.
Results: The review identified one article in the form of a meta-analysis, a systematic review that examined nine studies involving a total of 1,439 participants. The analysis found that lavender aromatherapy was effective in reducing anxiety levels in hemodialysis patients.
Conclusion: The application of lavender aromatherapy has shown significant results in reducing anxiety levels in hemodialysis patients. This therapy, in line with evidence-based nursing principles, can improve patients' psychological well-being through scientifically proven interventions.

Keywords: anxiety, hemodialysis, lavender aromatherapy

Introduction

According to the World Health Organization (WHO), chronic diseases represent a leading cause of mortality and constitute a major global health burden. One of the most significant chronic conditions is chronic kidney disease (CKD), a progressive disorder characterized by a gradual decline in kidney function over time. The most advanced stage of this condition, defined as end-stage renal disease (ESRD), is indicated by a glomerular filtration rate (GFR) of ≤15 ml/min/1.73 m² and typically requires renal replacement therapy, such as dialysis or kidney transplantation (Wardani, 2022). Reports from the United States Renal Data System (USRDS) indicate that the prevalence of ESRD continues to rise steadily, with an annual increase of approximately 20–25% (USRDS, 2020). In Indonesia, the burden of CKD is substantial, affecting an estimated 700,000 individuals, or approximately 3.8% of the total population (Kemenkes, 2019). Furthermore, data from the Indonesian Basic Health Research (Riskesdas) report show that in DKI Jakarta Province, the proportion of patients with ESRD undergoing hemodialysis reached 0.22% of the population (Kemenkes, 2023).

Patients with chronic kidney failure have several treatments available, including hemodialysis, Continuous Ambulatory Peritoneal Dialysis (CAPD), and kidney transplantation. However, most patients prefer the more accessible hemodialysis, which can be used to buy time until a kidney transplant, or for life for thoseineligible for a transplant. Hemodialysis maintains fluid, electrolyte, and acid-base balance and reverses irreversible kidney failure. However, for patients with chronic kidney failure, the hemodialysis process lasts their entire life, potentially causing both physiological and psychological problems (Anisah & Maliya, 2021).

One of the psychological impacts experienced by hemodialysis patients is anxiety. Anxiety is considered a common problem in hemodialysis patients, with a prevalence ranging from 19% to 43% (Nadort et al., 2022). Patients undergoing hemodialysis for less than six months have higher levels of anxiety compared to patients undergoing hemodialysis for more than six months because at this stage the patient has accepted the disease they are suffering from and can face the disease calmly and resignedly (Alfikrie et al., 2020). Anxiety is caused by frequent hospital visits, long waiting times and treatment, feelings of uncertainty about the future, and fear of death. Anxiety is a feeling of apprehension, discomfort, and worry, along with physical symptoms such as sweating, headaches, restlessness, and heart palpitations, which are a response to an unexpected threat (Rakhman et al., 2023). In line with the emotional aspect of anxiety disorders, if not addressed immediately in the long term, it can lead to anxiety disorders and depression (Utarayana et al., 2023).

At present, pharmacological approaches for the management of anxiety commonly involve the use of anxiolytic medications, particularly benzodiazepines such as diazepam and alprazolam. These agents act directly on the central nervous system and are widely used for the short-term reduction of anxiety symptoms. Propranolol, although sometimes utilized in anxiety management, is pharmacologically classified as a beta-blocker and functions primarily as a symptomatic treatment to control the physical manifestations of anxiety rather than as a primary anxiolytic agent. The long-term use of pharmacological therapy alone is generally not recommended due to the potential for dependency and adverse side effects, highlighting the need for complementary or supportive non-pharmacological intervention (So et al., 2020) arious non-pharmacological therapies are beneficial in reducing anxiety, including relaxation techniques, hypnotherapy, guided imagery, biofeedback, psychoprophylaxis, therapeutic touch, hydrotherapy, and distraction techniques (Arly et al., 2024). Among these approaches, relaxation therapy using lavender aromatherapy has emerged as a simple and effective method to help alleviate anxiety.

Aromatherapy has been widely reported as a potential complementary intervention to alleviate various symptoms experienced by patients undergoing hemodialysis, including anxiety. It is a therapeutic nursing modality that utilizes essential oils and aromatic

compounds derived from plants to influence psychological well-being and physiological responses (Karadag & Samancioglu Baglama, 2019). Avender essential oil, in particular, contains several active components such as alpha-pinene, limonene, linalool, linalyl acetate, borneol, and geranyl acetate. Among these, linalool and linalyl acetate are recognized as the primary constituents responsible for the anxiolytic effect of lavender, making it one of the most commonly recommended aromatherapies for anxiety reduction.

Despite the growing body of literature supporting the use of lavender aromatherapy for anxiety management, several important research gaps remain. Previous studies have primarily been conducted in diverse clinical populations, with varying methodologies and inconsistent results. Many of these studies employed small sample sizes, non-experimental designs, or lacked standardized intervention protocols, limiting the generalizability of their findings. Furthermore, evidence specifically addressing the effectiveness of lavender aromatherapy among hemodialysis patients remains limited, particularly within the context of clinical nursing practice in Indonesia. To date, few studies have applied a structured Evidence-Based Nursing Practice (EBNP) approach to evaluate this intervention in real-world hemodialysis settings.

Therefore, further investigation is needed to provide more robust empirical evidence regarding the effectiveness of lavender aromatherapy in reducing anxiety among hemodialysis patients. Based on this rationale, the author, as a student of the Medical Surgical Nursing Specialist Program with a focus on the urinary system, is motivated to implement an Evidence-Based Nursing Practice (EBNP) intervention using lavender aromatherapy to address anxiety experienced by patients undergoing hemodialysis.

Methods

This study was conducted using an Evidence-Based Nursing Practice (EBNP) approach based on a structured literature review. To identify relevant evidence, the researchers performed a comprehensive literature search using several widely recognized databases in the health sciences. National literature was searched through Google Scholar, while international databases included PubMed, Web of Science, and the Cochrane Library. The search strategy focused on studies examining the effectiveness of lavender aromatherapy in reducing anxiety levels among patients undergoing hemodialysis. The initial search process yielded a number of articles related to the topic. After screening based on predefined inclusion criteria, one article was identified as the most relevant and methodologically appropriate source of evidence. The selected article was a systematic review and meta-analysis entitled “Effect of Lavender Aromatherapy on Anxiety and Fatigue in Hemodialysis Patients: A Systematic Review and Meta-Analysis." (Firooz et al., 2024). This review synthesized findings from nine primary studies involving a total of 1,437 participants.

The inclusion criteria applied in the selected review were as follows: (1) randomized controlled trial (RCT) designs evaluating lavender aromatherapy; (2) participants were hemodialysis patients aged 18 years or older; (3) participants experienced anxiety and/or fatigue; and (4) articles were published in English. The reviewed studies were conducted between 2016 and 2022 and involved hemodialysis patients who received lavender aromatherapy as an intervention in the experimental group, while the control groups received standard care.

The systematic review was published in the Iranian Journal of Public Health in March 2024, which has an impact factor of 3.5 and is ranked in Q3. Data synthesis in the review was performed using STATA version 14. The effectiveness of lavender aromatherapy was analyzed using pooled effect sizes with a 95% confidence interval (CI). Heterogeneity among studies was assessed using the I^2 statistic. Because heterogeneity exceeded 50%, a random-effects model was applied to estimate the standardized mean difference (SMD) as the pooled effect size.

Publication bias was evaluated through visual inspection of funnel plots as well as Begg's and Egger's regression tests. The results indicated no significant publication bias (Begg's test: P = 0.22; Egger's test: P = 0.13). A total of nine studies with 513 respondents met the criteria for inclusion in the meta-analysis. The findings demonstrated that lavender aromatherapy had a statistically significant effect in reducing anxiety levels among hemodialysis patients, with a pooled effect size of SMD −2.51 (95% CI: −3.56 to −1.45, Z = 4.67, $p < 0.001$, $I^2 = 89.95$).

As this study utilized secondary data derived from published literature within an EBNP framework, no primary statistical analysis was conducted by the authors. Therefore, all analyses and conclusions were based solely on the critical appraisal and synthesis of evidence reported in the selected systematic review and meta-analysis.

Results

Respondent characteristics

The data analyzed in this study includes respondent characteristics such as age, gender, occupation, education, marital status, and length of HD as detailed in the following table:

Table 1. Patient characteristics (n=10)

Variable	*f*	%
Age		
Late Adulthood (36-45 Years)	5	50.0
Early Elderly (46-55 Years)	5	50.0
Gender		
Man	4	40.0
Woman	6	60.0
Work		
Doesn't work	3	30.0
Private	4	40.0
Housewife	2	20.0
Self-employed	1	10.0
Education		
Elementary School	1	10.0
Junior high school	1	10.0
Senior high school	1	10.0
College	7	70.0
Marital status		
Marry	10	100.0
HD Time		
1 month	2	20.0
2 months	1	10.0
3 months	2	20.0
4 months	4	40.0
5 months	1	10.0

Based on Table 1 above, it is known that half of the respondents (50.0%) were in the late adulthood and early elderly categories. Most of the respondents (60.0%) were female. A small portion of the respondents (40.0%) worked as private employees. Most of the respondents (70.0%) had a college education. In addition, all respondents (100%) were married. Based on the duration of hemodialysis, a small portion of the respondents (40.0%) had undergone HD therapy for 4 months.

Table 2. Frequency distribution of anxiety before (first measurement) and after intervention (third measurement) using STAI-S and STAI-T (n=10)

Variables	*Pre*		*Post*	
	f	%	*f*	%
STAI-S				
a. *No Worries*	0	0.0	0	0.0
b. Mild Anxiety	0	0.0	2	20.0
c. Moderate Anxiety	3	30.0	8	80.0
d. Severe Anxiety	7	70.0	0	0.0
STAI-T				
a. No Worries	0	0.0	0	0.0
b. Mild Anxiety	0	0.0	5	50.0
c. Moderate Anxiety	9	90.0	5	50.0
d. Severe Anxiety	1	10.0	0	0.0

Based on Table 2, the results of the baseline measurement (T0) using the STAI-S showed that the majority of respondents (70.0%) experienced severe anxiety, while 30.0% experienced moderate anxiety. Following the intervention, anxiety levels decreased, as reflected in the post-intervention 2 measurement (T2), where 80.0% of respondents were categorized as having moderate anxiety and 20.0% as having mild anxiety. Similarly, measurements using the STAI-T at baseline (T0) indicated that almost all respondents (90.0%) experienced moderate anxiety, and 10.0% experienced severe anxiety. After the intervention, the results at post-intervention 2 (T2) demonstrated an improvement, with 50.0% of respondents reporting moderate anxiety and 50.0% reporting mild anxiety.

Table 3. The effect of lavender aromatherapy on the anxiety levels of hemodialysis patients based on STAI-S (n=10)

Anxiety STAI-S	Mealn	Mean difference	SE	95% CI		*P-value*
				Lower	Upper	
Pretest	52.2	4.20	0.41	3.25	5.14	0,000
Post Test 1	48.0					
Pre-test	52.2	10.20	0.44	9.19	11.20	0,000
Post test 2	42.0					

Based on Table 3 above, it is known that the difference in the anxiety score using STAI-S before and after being given lavender aromatherapy is 4.20 in the first post-test and 10.20 in the second post-test. The results of the bivalve statistical test were carried out with a p-value of 0.000 ($p \leq 0.05$) in the first post-test and the second post-test, which means that the effect of the application of lavender aromatherapy on the anxiety level of hemodialysis patients using STAI-S is significant.

Table 4. The effect of lavender aromatherapy on the anxiety levels of hemodialysis patients based on STAI-T (n=10)

Anxiety STAI-T	Mealn	Mean difference	SE	95% CI		*P-value*
				Lower	Upper	
Pretest	46.10	3.90	0.75	2.19	5.60	0.001
Post Test 1	42.20					
Pre-test	46.10	8.50	1.08	6.03	10.96	0,000
Post test 2	37.60					

Based on Table 4 above, it is known that the difference in the relative anxiety score using STAI-T before and after being given lavender aromatherapy is 3.90 in the first post-test and 8.50 in the second post-test. The results of the paired t-test in the p-value are 0.000 ($p \leq 0.05$), which means that there is a significant effect of the application of lavender aromatherapy on the anxiety level of hemodialysis patients using STAI-T.

Discussion

An individual diagnosed with a chronic illness is in a critical condition characterized by physical and psychological imbalance. Patients experience anxiety, fear, and other emotional feelings because their usual coping strategies are ineffective. Patients who have been on hemodialysis for a long time will experience lower levels of anxiety compared to those undergoing hemodialysis for the first time. Patients who have undergone hemodialysis are more likely to adapt to their new life and have reached a stage of acceptance (Utarayana et al., 2023).

A person's anxiety level can be assessed using the State Trait Anxiety Inventory (STAI) theory. According to Spielberger (1972), three main elements can influence a person's anxiety: uncertainty, helplessness, and future orientation. The State Trait Anxiety Inventory theory states that anxiety can arise due to an external event that triggers a response in an individual, also known as a stimulus. The stimulus in this EBNP application is chronic kidney disease undergoing hemodialysis. The emergence of a stimulus will cause an individual to assess whether the stimulus is considered dangerous or not. If the stimulus is considered threatening, momentary anxiety will arise, causing an uncomfortable psychological response for the individual. An individual will try to overcome the uncomfortable condition by developing coping mechanisms to reduce the anxiety they experience. Forms of fear, worry, and uncertainty can stimulate stress. If this occurs continuously, it is possible that this can worsen the individual's mental state (Husna et al., 2021). State anxiety is a momentary feeling of anxiety such as feeling tense, worried about the future, and afraid of things that may not happen within a certain period of time (Setyananda et al., 2021). Unlike state anxiety, which is temporary, trait anxiety is generally a persistent feeling of anxiety within an individual. State anxiety arises when an individual experiences a potentially harmful stimulus. Trait anxiety, on the other hand, is more likely to indicate that an individual's personality tends toward anxiety.

Based on the results of the EBNP implementation that has been carried out, the results showed that the STAI-S level has a stronger influence compared to STAI-T. Based on the results of three measurements that have been carried out, a decrease in the STAI-S value in the first measurement (pre-test) was 52.20, decreasing to 48.00 in the second measurement (post-test 1) and to 42.00 in the third measurement (post-test 2), with a p-value of 0.000 in the first and second post-tests. Then based on the first STAI-T measurement (pre test) 46.10 decreased to 42.20 at the time of the second measurement (post test 1) to 37.60 at the third measurement (post test 2) with a p-value of 0.001 at the first post test and 0.000 at the second post test so that it can be concluded that the application of EBNP optimal results are at the third measurement (post test 2) with a p-value of 0.000 by administering an intervention using 100% lavender aromatherapy purchased at the "Bliss Scents" store as much as five drops then dripped into 200 ml of mineral water in a bowl after that ask the patient to inhale for five minutes with a distance of ± 30 cm, this intervention was carried out for one week (according to the patient's HD session schedule) when the patient's last HD session was completed. This is in line with research providing lavender aromatherapy intervention for one week, according to the patient's HD schedule, when the patient's last HD session was completed can reduce the anxiety level of hemodialysis patients with a p-value of 0.000 (Sahin et al., 2021). Then, research has been conducted that shows giving lavender aromatherapy can reduce anxiety levels in hemodialysis patients with a p-value of 0.000 (Telaumbanua et al., 2024). This difference in anxiety levels is attributed to lavender (Lavandula angustifolia) inhalation

aromatherapy, which can make respondents more relaxed during hemodialysis. This is in line with research that found an effect of lavender inhalation aromatherapy on anxiety in chronic kidney failure patients undergoing hemodialysis, with a p-value of 0.000 (Harmawati et al., 2021). Aromatherapy is a non-pharmacological therapy that can provide a relaxing effect (Pinamiranti et al., 2025).

Psychological anxiety can be reduced by relaxing as a distraction from the illness, one of which is using aromatherapy. Aromatherapy is a complementary therapy that has a calming effect in overcoming anxiety. Complementary therapy is related to the value of nursing practice, which is included in the holistic belief of human care, namely nursing as a whole (bio, psycho, social, spiritual, and cultural) that is not only seen in physical conditions but also considers other aspects that aim to heal (Supatmi et al., 2024). The advantage of lavender aromatherapy compared to other aromatherapies is that the main content of lavender flowers is linalyl acetate (26.32%) and linalool (26.12), which have an anxiolytic effect.

The chemical compounds in lavender aromatherapy essential oil can influence brain function through the nervous system associated with the sense of smell. This response stimulates increased neurotransmitter activity, which is associated with the recovery of psychological states (such as emotions, feelings, and thoughts). The aromatic ingredients used stimulate the autonomic nervous system, which controls the involuntary movements of the respiratory system. The neurons responsible for smell are the olfactory cells lining the olfactory epithelium at the back of the nasal passages. These receptors are activated when lavender aromatherapy is inhaled. The scent message is sent to the brain, which then forwards the message to the hypothalamus to identify the scent. The odor is interpreted by various neurons and transmitted to the limbic system and hypothalamus to be processed into electrical impulses. The limbic system has two parts, namely the hippocampus (the place where smells are recognized and remembered) and the amygdala (the place that is the center of emotional control). It can improve mood so that it can increase alpha waves in the brain, which trigger the release of serotonin and endorphin hormones. This regulation will make you relax, and pleasant smells will stimulate the thalamus to release enkephalin, which has a calming effect (Agustin et al., 2020).

Based on direct observations during the intervention, most patients displayed more relaxed facial expressions and more positive verbal responses. Patients reported that inhaling lavender aromatherapy made them feel calmer and more relaxed due to the gentle scent. This aligns with holistic nursing principles, which emphasize the importance of addressing the patient's psychological and spiritual aspects to support optimal healing. Nurses' impressions also showed positive results. Several nurses stated that patients who had undergone aromatherapy sessions appeared more relaxed. In fact, according to observations from the DPJP (Physician in Charge of Services), the implementation of this intervention appeared to contribute positively to patients' emotional stability. The findings suggest that lavender aromatherapy may help in reducing anxiety-related discomfort and potentially minimize psychological distress experienced by hemodialysis patients. However, these effects should be interpreted with caution, as they are based on a limited sample and a pre–post design without a control group. Within the framework of Evidence-Based Nursing Practice (EBNP), this intervention may be considered as a complementary nursing strategy to support anxiety management in clinical settings. While the results indicate potential benefits in enhancing patient comfort and emotional readiness, the intervention should be viewed as supportive rather than definitive in preventing anxiety-related complications. Further rigorous studies with larger samples and controlled designs are required to confirm its effectiveness and to determine its broader applicability in routine hemodialysis care.

Conclusion

The critical appraisal indicated that lavender aromatherapy demonstrates potential benefits in reducing anxiety levels among hemodialysis patients, with positive effects observed on both psychological and physiological aspects. The implementation of Evidence-Based Nursing Practice (EBNP) resulted in the development of a practical and applicable Standard Operating Procedure (SOP) that can be feasibly integrated into routine nursing care. In clinical application, patients generally reported feeling calmer and more relaxed, and the healthcare team observed improved emotional stability and cooperation. The most notable improvement in anxiety levels was identified at the third measurement point (post-intervention 2), suggesting a progressive response to the intervention.

Conflict of Interest

There is no conflict of interest in this research.

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