

Complementary Therapies for Reducing Anxiety in Hemodialysis Patients: A Systematic Review

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ABSTRACT

This study discusses the effectiveness of complementary therapies in reducing anxiety in patients with chronic kidney disease (CKD) undergoing hemodialysis (HD). Through a systematic review of 32 out of 6,711 articles obtained from various databases (2015–2025), it was found that therapies such as Benson relaxation, lavender aromatherapy, music therapy, acupressure, guided imagery, spiritual interventions (dhikr and reading the Qur'an), as well as technologies like Virtual Reality (VR) and brain stimulation (tDCS), are effective in reducing anxiety. These therapies encompass physical, psychological, spiritual, and technological aspects. Although promising, further research is needed to support their clinical implementation.

INTRODUCTION

Chronic kidney disease (CKD) is defined as kidney damage or a reduction in the glomerular filtration rate (GFR) below 60 mL/min/1.73 m² for at least three months, regardless of its underlying cause (Yonata *et al.*, 2022; Mazharulhaq *et al.*, 2023; Zhu *et al.*, 2024). Additionally, CKD can be identified by albuminuria of ≥ 30 mg per 24 hours or the presence of kidney abnormalities, such as hematologic disorders, structural anomalies, polycystic kidney disease, or dysplasia (Chen, Knicely and Grams, 2019; Elendu *et al.*, 2023). On a global scale, CKD affects approximately 840 million individuals, with a prevalence exceeding 10% in 2017 (Jager *et al.*, 2019; Francis *et al.*, 2024; Lok, Yuo and Lee, 2025).

The number of CKD patients in stages 3–5 is expected to reach 4 million by 2036 (Evans *et al.*, 2022). While the prevalence of kidney failure requiring hemodialysis (HD) or peritoneal dialysis (PD) continues to rise, reaching 823 cases per million population based on recent estimates (Bello *et al.*, 2024). This number is expected to continue to grow, reaching around 5.4 million cases by 2030 (Campo *et al.*, 2022).

According to the 2018 Basic Health Research (Riskesdas) of the Republic of Indonesia, the prevalence of chronic kidney failure in Indonesia increased from 2% in 2013 to 3.8% in 2018, reaching a total of 713,783 patients, reflecting a 1.8% rise (Riskesdas, 2018). Along with the growing number of chronic kidney failure patients, the demand for hemodialysis therapy in Indonesia has also risen. In 2018, there were 66,433 new patients undergoing hemodialysis, while the number of active patients receiving this treatment reached 132,142 (Indonesian Renal Registry, 2018). Hemodialysis serves as a replacement therapy for patients with kidney failure, functioning to remove excess metabolic waste or uremic toxins from the blood, including water, sodium, potassium, hydrogen, urea, creatinine, uric acid, and other substances. This process occurs through a semipermeable membrane via diffusion, osmosis, and ultrafiltration (UF) mechanisms while preserving essential substances such as glucose, electrolytes, and amino acids (Swarnalatha and Kumar, 2015; Hidayah *et al.*, 2021; Raharjo *et al.*, 2022; Sari and Aminah, 2023).

The hemodialysis procedure typically lasts between three and four hours. It is performed three times a week in developed countries, whereas in developing countries, it is generally conducted twice a week (Ali *et al.*, 2021). However, more than 50% of hemodialysis patients experience psychiatric problems related to psychological challenges, such as stress, depression, and anxiety, which complicate their disease management (Alkhaqani, 2022). A study by Qawaqzeh *et al.*, (2023) showed that chronic kidney failure patients undergoing HD showed high levels of anxiety and depression, which were influenced by factors such as comorbidities, type of vascular access, fatigue, fear, and financial status. Factors predicting anxiety and depression included creatinine levels, fatigue, duration of HD, number of dialysis sessions, blood urea nitrogen levels, and age. Anxiety has a significant negative impact on the health and quality of life of patients undergoing HD, associated with poorer clinical outcomes, decreased adherence to treatment, and impaired nutritional habits that have the potential to increase mortality (Kimmel and Cukor, 2019; Delgado-Domínguez *et al.*, 2021).

Good mental health in hemodialysis patients is reflected in their ability to accept the disease, manage complications, handle stress, adopt effective coping strategies, and receive adequate social support, all of which influence their psychological well-being. A high level of disease acceptance, a healthy coping style, and strong social support are positively associated with better mental health conditions (Wen *et al.*, 2023). The management of depression and anxiety in hemodialysis patients can be achieved through pharmacological treatments or non-pharmacological and complementary interventions (Muhith *et al.*, 2024). One of the complementary therapies used to reduce anxiety in hemodialysis patients is mindfulness therapy (Lin and Cheifetz, 2018; Yuwono, Wardani and Prasetyo, 2024), Relaxation training (Gorji, Davanloo and Heidari Gorji, 2014), Psychological intervention (Yan *et al.*, 2025), Music therapy (Kamila, Maliya and Kristini, 2023). Many patients prefer complementary therapies because they realize that this therapy has no side effects, can relieve symptoms, and does not interact with ongoing medical treatments (Ceyhan *et al.*, 2017).

Based on these findings, this study aims to conduct a systematic literature review to explore and evaluate the effectiveness of complementary therapies in reducing anxiety in hemodialysis patients.

LITERATURE REVIEW

Complementary Therapies

Complementary therapies are treatments or therapies that are used as a complement to conventional medical treatment, not as a substitute. These therapies aim to improve the physical, mental, and emotional well-being of patients, often used to reduce symptoms, improve quality of life, or help cope with the side effects of primary treatment.

Anxiety

Anxiety is a psychological condition characterized by feelings of restlessness, excessive worry, tension, or fear of something that has not happened or is considered a threat, either real or imagined. Anxiety is a normal response of the body to stress, but if it occurs continuously, excessively, or interferes with daily activities, it can become a health problem that needs to be addressed.

Hemodialysis

Hemodialysis is a medical procedure used to replace kidney function in patients with chronic or acute kidney failure, especially when the kidneys are no longer able to filter waste and excess fluid from the blood effectively.

METHODOLOGY

The steps of a systematic review are to explore comparative questions, identify relevant articles, assess the quality of the studies, and summarize and interpret the results. The research question of this review is how complementary therapies reduce anxiety in chronic kidney failure patients undergoing hemodialysis.

Data Sources and Search Strategy

The researcher collected information from the Google Scholar, ProQuest, EBSCO, ScienceDirect, and PubMed databases in March 2025. The keywords used in this study are: "Complementary Therapies" OR "Therapy, Complementary" OR "Complementary Medicine" OR "Therapies, Alternative" AND "Anxiety" AND "Renal Dialysis" OR "hemodialysis"—inclusion and exclusion criteria to ensure suitability with the research objectives. Inclusion criteria include literature that focuses on chronic kidney failure patients undergoing hemodialysis, discusses complementary therapies to reduce anxiety, is published between 2015 and 2025, and uses quantitative research methods. English-language articles are also one of the selection criteria. On the other hand, articles that do not discuss hemodialysis patients, published before 2015, or are literature reviews and preliminary investigations will be excluded from the review.

Study Selection and Data Extraction

The initial step in study selection involves establishing a logical framework using the PICO model to determine relevant keywords based on inclusion criteria. The components of PICO are as follows: P (Population) - Hemodialysis patients experiencing anxiety, I (Intervention) - Complementary therapy, C (Comparison) - Standard care or no complementary treatment, and O (Outcome) - Reduction in anxiety levels measured using standardized assessment tools. Reference management software, Mendeley, is utilized to organize and filter data by entering relevant database directories. Any detected duplicates are merged. Valid papers are stored in a "potential folder" if they meet the title and abstract selection criteria. The designated reviewer (M) independently examines the folder to determine which studies qualify for inclusion in the review. Reviewers (M) then extract information from each selected study independently. The extracted data include study characteristics (year of publication, language, and country), participant characteristics (number of participants and type of intervention), intervention details (training and duration), and study outcomes related to anxiety reduction.

Synthesis Data

The data synthesized in a systematic review consists of findings from individual studies relevant to the research question, specifically the implementation of complementary therapies to reduce anxiety. The authors present the main results by summarizing key findings from the included studies. This synthesis highlights that most reviews acknowledge heterogeneity by outlining various criteria for implementing complementary therapies.

Quality Assessment

Reviewers (RMs) evaluate the quality of articles in the journals they choose to review. Using the JBI critical appraisal tool.

RESULTS AND DISCUSSION

Articles were obtained from Google Scholar, ProQuest, EBSCO, ScienceDirect, and PubMed with specific inclusion criteria, covering the period 2015–2025, full-text access, journal type, and quantitative and mixed methods, resulting in 6,711 articles. After eliminating 19 duplicates through Mendeley, 6,692 articles remained. Initial screening based on title, abstract, and relevance excluded 5,328 articles due to inappropriate design, topic, language, or population. A total of 1,364 articles proceeded to the full-text access stage, but 1,201 of these were unavailable, leaving 163 articles for eligibility assessment. After further review, 131 articles were eliminated due to the inappropriateness of the study concept, and finally, 32 articles were included in the systematic review.

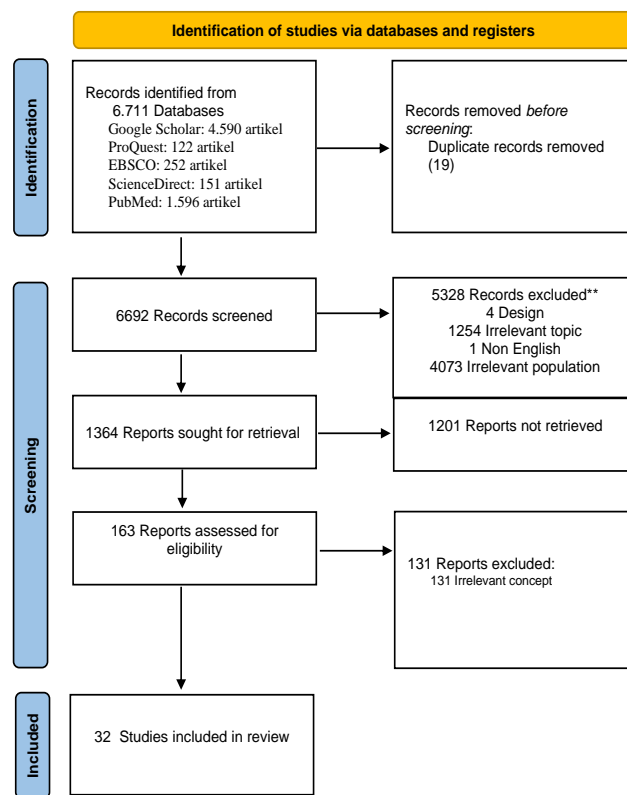


Figure 1. PRISMA flow diagram

Study Characteristics

Participants

The ages of respondents ranged from 18–77 years, with the majority in the range of 46–65 years. The mean age of the intervention group varied from 50.75 ± 18.02 to 61.85 ± 7.93 years, while the control group had a mean age between 54.61 ± 5.89 to 63.00 ± 9.80 years.

Number of Participants

The literature from these 32 articles was analyzed, involving a total of 2,062 respondents.

Country

This study was conducted in various countries, including the Middle East, such as Iran, Turkey, and Egypt; Southeast Asia, such as Indonesia and Malaysia; Europe, including Poland, Hungary, and Spain; and Latin America, especially Brazil.

Measurement Tools

Among the 32 reviewed articles, the State-Trait Anxiety Inventory (STAI) was the most commonly used anxiety measurement tool, appearing in 8 studies. This was followed by the Hospital Anxiety and Depression Scale (HADS), used in 7 studies, and the Hamilton Anxiety Rating Scale (HARS), utilized in 5 studies. Additionally, both the Beck Anxiety Inventory (BAI) and the Depression Anxiety Stress Scale (DASS-21) were employed in 4 studies each.

Other measurement tools, such as the Covi Anxiety Scale, Visual Analogue Scale (VAS), State Anxiety Inventory (SAI), Zung Self-Rating Anxiety Scale (ZSRAS), and the Hamilton Rating Scale for Anxiety, were used in a smaller number of studies. Despite the variation in instruments, all tools included in the review are relevant and appropriate for assessing anxiety levels in respondents.

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
1	Holy Qur'an Recitation	(Babamohamadi <i>et al.</i> , 2015)	Iran	60 Patient.	The intervention group listened to a recording of Surah Yasin recited by Qari Shateri for 20 minutes (5 minutes before + 15 minutes during dialysis), 3x/week for 1 month. The control group received no intervention – evaluation after 1 month.	Average age 53 years.	Listening to the recitation of the Qur'an was proven to be effective in reducing anxiety in hemodialysis patients, with a significant decrease compared to the control group (F = 15.5, p = 0.0002, Cohen's d = 1.03).	STAI
2	Virtual Reality Exercises on Anxiety	(Turoń-Skrzypińska <i>et al.</i> , 2023)	Poland	85 Patient.	The intervention group performed VR exercises with NefroVR for 20 minutes during hemodialysis, while the control group only underwent hemodialysis without intervention.	Intervention age 57 years and control 62 years.	Low-intensity virtual reality cycling training for 3 months was effective in reducing Beck and GAD-7 scores (p < 0.001), while the control group experienced an increase in	General Anxiety Disorder-7 (GAD-7)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
							GAD-7 scores (p = 0.002).	
3	Guided Imagery	(Afshar <i>et al.</i> , 2018)	Iran	70 Patient.	The intervention group received GI therapy 6x a week for 4 weeks. They listened to a GI guidance CD for 25 minutes per session. The control group received only routine care without relaxation therapy.	18-70 years	Analysis of covariance showed significant differences in status anxiety (p < 0.001). Guided imagery was effective in reducing anxiety.	State-Trait Anxiety Inventory (STAI)
4	Spiritual Care	(Durmuş and Ekinci, 2022)	Türkiye	71 Patient.	The intervention group received an intensive spirituality training program for 8 weeks (total of 16 sessions, 2 times/week for 20-30 minutes). The control group continued with the standard treatment protocol without additional intervention and post-test (after the 16th session).	The average age of patients was 56.09 ± 12.66 years.	Post-intervention anxiety scores in the experimental group were lower than those in the control group. Changes in the experimental group were significant (p < 0.05), while those in the control group were not significant (p > 0.05).	Hospital Anxiety and Depression Scale (HADS)
5	Education and Art Therapy with Telehealth Method	(Mollaoğlu <i>et al.</i> , 2024)	Türkiye	60 Patient.	The intervention group received an education program, art therapy, and intensive monitoring for 3 months, while the control group received only usual care. Both groups were evaluated periodically.	Age 46-65 years	Beck anxiety scores did not differ initially between IG and CG but decreased significantly in IG at the second measurement (P = 0.04), indicating the effectiveness of the intervention in reducing anxiety.	Beck Anxiety Inventory (BAI)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
6	Progressive Muscle Relaxation	(Kusnanto <i>et al.</i> , 2019)	Indonesia	105 Patient.	Group 1: Performing Progressive Muscle Relaxation (PMR) twice a week for 1 month. Group 2: Performing PMR once a week for the same duration. Control Group: No PMR intervention.	> 18 years	Mann-Whitney U test showed a significant effect on anxiety ($p = 0.004$). PMR intervention is effective in reducing anxiety in hemodialysis patients.	Covi Anxiety Scale.
7	Echinacea (EP107TM)	(Haller <i>et al.</i> , 2025)	Hungary	24 Patient.	The intervention group received Echinacea EP107™ tablets (40 mg/day) for 6 weeks, while the control group received a placebo. Evaluations were performed at the end of treatment (day 42) and follow-up (day 49).	Age 43.3 ± 1.9 years.	This study showed that Echinacea was effective in reducing anxiety more quickly than placebo. HADS-A scores decreased significantly on days 16 and 28, with severe anxiety disappearing at the end of the intervention. HAM-A scores were also reduced in both groups, but anxiety improved more quickly in the Echinacea group.	Hospital Anxiety and Depression Scale-anxiety subscale HADS-A and HAM-A
8	Inhaled Lavender	(Ozen <i>et al.</i> , 2023)	Türkiye	24 Patient.	The intervention group received aromatherapy inhalation (3 drops of a mixture of lavender and almond oil in a ratio of 1:10) dripped onto sterile gauze. The control group received	Average control 63 years and intervention 56.77 years.	Lavender aromatherapy reduced anxiety in the intervention group ($P < .05$), while the control group showed no significant changes.	Visual Analogue Scale (VAS) dan STAI

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
					no intervention during the study but will be given similar aromatherapy after the survey is completed for one week and evaluated 4.			
9	Guided Imagery	(Beizae <i>et al.</i> , 2018)	Iran	80 Patient.	Hemodialysis patients were given Guided Imagery therapy 3x/week for a month, compared to a control group that only received regular care.	The mean age of participants was 47.21 ± 8.34 years.	After the intervention, the levels of anxiety and depression in the intervention group were significantly lower than in the control group ($p = 0.030$; $p = 0.001$).	HADS
10	Movie Watching	(Morais, Moreira and Winkelmann, 2020)	Brazil	61 Patient.	The experimental group watched comedy films 2x/week for 6 weeks (2 hours/session) during hemodialysis, while the control group received only standard care.	Mean age 61.7 ± 13.9 years.	The intervention group experienced a significant decrease in anxiety ($p < 0.001$), while the control group showed no significant change ($p = 0.016$).	Hamilton Anxiety Scale
11	Acupressure	(Hmwe <i>et al.</i> , 2015)	Malaysia	108 Patient.	The experimental group received acupressure therapy 3x/week for 4 weeks (15 minutes/session) at specific points (Yin Tang, Shenmen, Taixi), while the control group only received standard care.	The mean age of participants was 58.08 ± 11.4 years.	The intervention group (acupressure) experienced a significant decrease in anxiety/insomnia ($p < 0.001$), while the control group did not experience any significant changes ($p = 0.133$). Acupressure is effective in reducing anxiety in patients.	DASS-21

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
12	Lavender Aromatherapy	(Şahin, Tokgöz and Demir, 2021)	Turki	74 Patient.	The experimental group received lavender steam inhalation (5 drops in 200 cc of hot water) for 5 minutes per session, performed 3 times a week with a standard protocol (eyes closed, deep breathing, and covered with a cloth). The control group underwent an identical procedure using olive oil as a placebo.	Intervention group: 50.75 ± 18.02 years. Placebo group: 53.62 ± 11.03 years.	The intervention group showed a significant decrease in STAI anxiety scores at the second follow-up ($p < 0.05$). In contrast, the difference with the placebo group at the first follow-up was not significant ($p > 0.05$). Lavender inhalation has the potential to be a safe and effective method to reduce anxiety in hemodialysis patients.	STAI
13	Lavender Aromatherapy	(Menekli and Durmaz, 2021)	Turki	80 Patient.	The experimental group received lavender aromatherapy through massage and inhalation for 6 weeks. The massage was performed on the pruritic area every HD session for 7-15 minutes, while inhalation used lavender-scented cotton before bedtime. The control group only underwent routine care without additional therapy. Effectiveness was assessed after 6 weeks.	Age 41-55 years	Anxiety score (AI) in the intervention group decreased significantly after intervention ($p=0.003$) and was substantially different from the control group ($p=0.003$). Lavender aromatherapy is effective in reducing anxiety in hemodialysis patients.	State Anxiety Inventory (SAI)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
14	Lavender Oil Application Via Inhalation	(Şentürk and Kartin, 2018)	Turki	34 Patient.	The intervention group received lavender aromatherapy by inhalation for 1 week. The control group was not given any intervention.	The intervention group was predominantly aged 42-52 years, while the control group was predominantly aged 53-65 years.	The total and subdimension scores of the Hamilton Anxiety Scale differed significantly between the intervention and control groups ($P < 0.001$). Lavender inhalation was shown to be effective in reducing anxiety.	Hamilton Anxiety Assessment Scale
15	Music Therapy	(Gulcek and Aylaz, 2022)	Turki	120 Patient.	The intervention group received music therapy of maqam "Rast" and "Ussak" for 3 weeks, three times a week, 30 minutes each during hemodialysis. The control group only underwent routine care without music therapy.	Average age 25-64 years	Music therapy significantly decreased situational anxiety in hemodialysis patients compared to the control group.	State and trait anxiety scale
16	Acupressure	(Suandika <i>et al.</i> , 2021)	Indonesia	96 Patient.	The intervention group received acupressure at the original acupuncture points (K1, ST36, SP6) for 4 weeks, three times a week, during the first 2 hours of hemodialysis. The control group received acupressure at the sham points without therapeutic effect by the same method.	Age >18 years	Acupressure was shown to significantly reduce anxiety in hemodialysis patients compared to the control group (HADS: 7.653 vs 14.968; $p = 0.000$).	HADS
17	Music	(Haghi, Zadeh and Vafayee, 2019)	Iran	25 Patient.	The intervention group received classical and	Average age 31-60 years	The average anxiety score of patients	Beck anxiety inventory (BAI)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
					modern music therapy for 4 weeks, three times a week, 30 minutes each during hemodialysis. The control group only received routine care without music therapy. Evaluation after 12 sessions		before the intervention reached 19.6% and decreased to 14.48% after the intervention, with a statistically significant decrease ($P < 0.05$).	
18	Lavender Oil Inhalation versus Acupressure	(El-abdeen <i>et al.</i> , 2022)	Egypt	66 Patient.	Intervention group A received lavender oil inhalation for 4 weeks, three times a week, for 20 minutes after 1 hour of hemodialysis. Intervention group B received acupressure at three specific points for 15 minutes per session. The control group received only routine care without additional intervention. Anxiety after 4 weeks	average age 69.4 \pm 9.8.	Elderly anxiety scores decreased significantly after intervention, with lavender aromatherapy being more effective than acupressure ($p = 0.001$).	Geriatric Anxiety Scale
19	Aromatherapy	(Setyawan, Syahruramdhani and Setyaningrum, 2022)	Indonesia	32 Patient.	The intervention group received lavender aromatherapy for 15 minutes in each hemodialysis session for three sessions. Lavender-scented cotton was placed under the patient's nose to be inhaled commonly. The control group only underwent	Average age 46-59 years.	The parametric t-test showed a significant decrease in pre-post values in the intervention group ($p = 0.001$). The delta difference between the control and intervention groups was also important ($p = 0.001$).	Zung-Self Rating Anxiety Scale (ZSRAS)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
					hemodialysis without additional intervention. Evaluation at the third session.		Lavender aromatherapy is effective in reducing anxiety.	
20	Dhikr	(Anggun <i>et al.</i> , 2021)	Indonesia	32 Patient.	The intervention group underwent dhikr therapy before and after hemodialysis with a specific dhikr sequence, done verbally or silently. The control group only underwent hemodialysis procedures without dhikr.	Average age 46-55 years.	The results showed that dhikr therapy significantly reduced anxiety levels in hemodialysis patients ($p < 0.05$). The decrease in anxiety in the experimental group was more significant than in the control group.	Hospital Anxiety and Depression Scale
21	Benson Relaxation Technique	(Otaghi <i>et al.</i> , 2016)	Iran	70 Patient.	The intervention group received Benson's Relaxation Therapy for 15 minutes twice daily for 4 weeks, with one session in the hospital and one independent session at home. The control group received only routine care without relaxation therapy.	The average age was 62.29 ± 8.51 years.	Benson relaxation is effective in reducing anxiety in hemodialysis patients ($p < 0.05$).	Depression Anxiety Stress Scale (DASS) 21
22	Comparing the Effect of Acupressure and Foot Reflexology	(Dehghanmehr <i>et al.</i> , 2020)	Iran	60 Patient.	The intervention group underwent acupressure therapy at the P6 point (8 minutes) or reflexology at the solar plexus point (10 minutes per foot) three times a week for 4 weeks. The	Reflexology (42.75 ± 8.8 years), acupressure (39.20 ± 11.32 years), and control (40.85 ± 6.15 years).	The experimental group showed a significant decrease in anxiety after the intervention ($P < 0.001$), while the control group did not experience any significant changes.	State-Trait anxiety inventory (STAI)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
					control group received only routine care.		Acupressure and reflexology are effective in reducing anxiety in hemodialysis patients.	
23	Eye Movement Desensitization And Reprocessing	(Rahimi <i>et al.</i> , 2019)	Iran	90 Patient.	The intervention group underwent EMDR therapy during hemodialysis three times a week for 2 weeks over 4 weeks. Sessions lasted 30–45 minutes according to Shapiro's protocol. The control group received routine care only.	Mean age was 51.52 ± 11.134 years.	Before the intervention, the mean anxiety scores did not differ significantly between groups (P = 0.10). After the intervention, the anxiety scores decreased substantially in the intervention group (P = 0.001), indicating the effectiveness of EMDR in reducing anxiety.	Hospital anxiety and depression scale
24	Benson's Relaxation	(Kiani, Zadeh and Shahrakipour, 2017)	Iran	105 Patient.	The intervention group received Benson relaxation technique training in three group sessions (60 minutes) and individual instruction in the first week. Patients practiced twice daily for 4 weeks, with monitoring via checklists and phone calls. The control group received routine care only.	Rata-rata usia peserta adalah 42,73 ± 12,16 tahun.	Benson relaxation was effective in reducing anxiety in hemodialysis patients (P = 0.001), while there was no significant change in the control group.	Spielburger anxiety evaluation questionnaire
25	Humor	(Borzoe <i>et al.</i> , 2022)	Iran	63 Patient.	The intervention group underwent humor therapy for one month with six sessions	The mean age of participants in the intervent	After the intervention, state anxiety scores decreased significantly in	State-Trait Anxiety Inventory (STAI)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
					(120 minutes per session) in the group. The sessions included funny video screenings, competitions with prizes, and interactive humor sharing. The control group received only routine care. Anxiety evaluation was conducted after 3 weeks.	ion and control groups was 61.85 ± 7.93 and 54.61 ± 5.89 years, respectively.	the intervention group ($P < 0.001$), while in the control group it increased ($P = 0.227$). Humor therapy is effective in reducing state anxiety in hemodialysis patients.	
26	Resilience Training	(Amirkhani <i>et al.</i> , 2021)	Iran	57 Patient.	The intervention group underwent 12 resilience training sessions through workshops guided by clinical psychologists using lecture, discussion, role-playing, and peer training methods. The control group did not receive training during the study but received a workshop after the survey was completed. The evaluation was conducted one week after the intervention.	Average age 40–70 years.	Patient anxiety scores decreased significantly in the intervention group ($P < 0.001$) but did not change significantly in the control group ($P > 0.05$). Resilience training is practical as a non-pharmacological method to reduce anxiety in hemodialysis patients.	Depression Anxiety Stress Scale (DASS) 21
27	Listening to Music	(Midilli, Ergin and Yilmaz, 2017)	Türkiye	46 Patient.	The experimental group listened to music for 30 minutes during hemodialysis using earphones, with the music of Maqam Hicaz and Nihavend from the	The mean age of patients in this study was 59.00 ± 16.09 years.	There was a significant difference in anxiety scores between the two groups ($p < 0.05$). In the intervention group, anxiety scores decreased	State Trait Anxiety Inventory (STAI)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
					TUMATA group. The control group only underwent hemodialysis procedures without music, with anxiety and vital signs measured at the same time.		significantly at 30 minutes of dialysis ($z=-3.821$, $p=0.000$). The results showed that music is effective in reducing anxiety in hemodialysis patients.	
28	Differences Between the Effects of The Benson Relaxation Technique and Deep Breath	(Krismiadi, Wihastuti and Ismail, 2023)	Indonesia	52 Patient.	The intervention group received Benson relaxation therapy and deep breathing for 4 weeks. Benson relaxation was performed twice daily for 15–20 minutes, both during hemodialysis and at home, with audio and written guidance. Training was provided in three group sessions in the first week. The control group received standard care only.	The Benson relaxation group had more participants in the 45–59 age category, while the deep breathing relaxation group had more participants in the 60–74 age category.	Benson relaxation is more effective than deep breathing relaxation in reducing anxiety in hemodialysis patients ($p = 0.000 < 0.05$).	Hamiton Rating Scale For Anxiety
29	Aromatherapy Using the Damask Rose Essential Oil	(Dehkordi <i>et al.</i> , 2017)	Iran	60 Patient.	The intervention group received aromatherapy with Damascus rose oil for one month, performed at every hemodialysis session. The control group received only standard care.	The mean age of the control group was 58.2 ± 12.6 years, and the mean age of the intervention group was 58.9 ± 13.4 years.	After intervention, anxiety decreased significantly in the damask rose aromatherapy group ($P \leq 0.05$) but not in the control group. Conclusion: Damask rose inhalation aromatherapy is effective in reducing anxiety in	Depression Anxiety Stress Scale (DASS) 21

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
							hemodialysis patients.	
30	Live Music	(Soliva <i>et al.</i> , 2024)	Spanish	90 Patient.	The intervention group received live music therapy for four weeks, with twice-weekly sessions of 30-45 minutes in the hemodialysis room. The music played covered a variety of genres, including classical, popular, and spiritual. The control group received only standard care.	In the intervention group (IG), the average age in the first Monday, Wednesday, and Friday sessions was 70.41 years, while in the second Tuesday, Thursday, and Saturday sessions, it was higher, at 77.75 years. Meanwhile, in the control group (CG), the average age in the second Monday, Wednesday, and Friday sessions was recorded at 73.12 years, and in the first Tuesday, Thursday, and Saturday sessions, it was the highest, at 79.21 years.	The intervention group listening to music experienced a significant decrease in anxiety (-5.35; $p < 0.001$), while the control group experienced an increase in anxiety over time.	Hospital Anxiety and Depression Scale (HAD)

No	Intervention	Author and Year	Country	Number of Respondents	Duration	Age	Findings	Measuring instrument
31	Lavender Aromatherapy	(Setyaningrum and Setyawan, 2023)	Indonesia	32 Patient.	Intervention Group: Received lavender aromatherapy through inhalation by dropping essential oil on cotton buds. Control Group: Did not receive aromatherapy.	Average age 46-59	The study findings showed a significant decrease in pre-post scores in the intervention group ($p = 0.001$). The difference in delta scores between the control and intervention groups was also important ($p = 0.001$). Lavender aromatherapy has been shown to be effective in reducing anxiety.	Zung-Self Rating Anxiety Scale (ZSAS)
32	Transcranial Direct Current Stimulation (tDCS)	(Ebrahimi and Azizi, 2022)	Iran	30 Patient.	Patients in the experimental group received two mA transcranial direct current stimulation (tDCS) electrical stimulation for 10 20-minute sessions per week. The control group received no intervention.	-	The anxiety score after the intervention was also significantly lower than before the intervention in the experimental group ($p < 0.001$), while in the control group, there was no significant difference ($p > 0.05$). Electrical brain stimulation has been shown to be effective in reducing anxiety and stress in hemodialysis patients.	Anxiety and Stress Questionnaire (DASS-21)

Anxiety is one of the most common psychological problems experienced by hemodialysis (HD) patients, which can worsen physical conditions and overall quality of life (Delgado-Domínguez *et al.*, 2021). The development of

holistic nursing encourages the use of complementary therapies based on bio-psycho-socio-spiritual as a safe and effective non-drug alternative to reduce anxiety (Wijaya *et al.*, 2022; Caballero-Gallardo, Quintero-Rincón and Olivero-Verbel, 2025). In this systematic review, various scientific evidences were reviewed to evaluate the effectiveness of complementary therapies in supporting anxiety reduction in hemodialysis patients.

Relaxation and Breathing Techniques

Breathing relaxation techniques aim to enhance alveolar ventilation, support effective gas exchange, prevent pulmonary atelectasis, and improve cough efficiency. These techniques also help alleviate both physical and emotional stress by reducing pain levels and anxiety. Additionally, they contribute to lowering systolic and diastolic blood pressure and promoting better sleep quality in dialysis patients (Muhith *et al.*, 2024). Benson relaxation and progressive muscle relaxation are the two most widely studied relaxation techniques. Benson relaxation, either alone or in combination with other complementary therapies, such as spiritual therapy, is effective in reducing anxiety in HD patients. This technique combines deep breathing and soothing words to reduce emotional burden and improve health (Cahyanti *et al.*, 2023). This technique is effective in reducing anxiety and providing calm and comfort to respondents (Samfriati, Friska and S, 2020). In addition, (Otaghi *et al.*, 2016; Kiani, Zadeh and Shahrakipour, 2017) reported that intervention twice a day for four weeks provided optimal results in significantly reducing anxiety.

Krismiadi *et al.*, (2023) also found that Benson Relaxation was more effective than deep breathing techniques. In addition, Eltafianti *et al.*, (2022) supported the evidence of the effect of Benson relaxation on reducing anxiety in hemodialysis patients. Meanwhile, progressive muscle relaxation performed twice a week for one month, as studied by Kusnanto *et al.*, (2019), was shown to reduce anxiety significantly. After progressive muscle relaxation, the parasympathetic nervous system is activated and releases acetylcholine in the ganglion. Acetylcholine then binds to nicotinic receptors on the muscle membrane in the postsynaptic area, which stimulates muscarinic receptors. This helps reduce anxiety and makes muscles and mental conditions more relaxed and comfortable (Carisa and Wahyuni, 2022).

Therefore, relaxation and breathing techniques such as Benson Relaxation, progressive muscle relaxation, and deep breathing can be effective non-pharmacological intervention alternatives to reduce anxiety, increase calmness, and support mental well-being in hemodialysis patients.

Aromatherapy

Aromatherapy, particularly with lavender oil, has been proven effective in alleviating anxiety among hemodialysis (HD) patients. Research by Ozen *et al.*, (2023) demonstrated that inhaling lavender oil over 12 sessions significantly reduced anxiety and enhanced patient comfort. Similarly, other studies (Setyawan, Syahruramdhani and Setyaningrum, 2022; Setyaningrum and Setyawan, 2023) found that applying three drops of lavender oil on a cotton bud

and placing it 1 cm below the nose for 15 minutes, followed by a 10-minute break, effectively decreased anxiety levels in HD patients. Additionally, Salsabila et al., (2025) reported similar findings, showing that inhaling lavender oil through a diffuser for 30 minutes was beneficial in reducing anxiety.

Further studies (Şentürk and Kartın, 2018; Menekli and Durmaz, 2021; Şahin, Tokgöz and Demir, 2021), support the effectiveness of lavender aromatherapy in lowering anxiety and improving sleep quality, whether administered through inhalation or massage. Apart from lavender, damask rose oil has also been found to have anxiolytic effects, as reported by Dehkordi *et al.*, (2017). Findings from Simanjuntak et al., (2023) reinforce the effectiveness of lavender aromatherapy in reducing anxiety in chronic kidney failure patients before undergoing hemodialysis procedures. Aromatherapy is a complementary therapy that utilizes essential oils derived from flowers, leaves, stems, fruits, roots, or resins. These oils can be administered through inhalation or topical application. When inhaled, essential oils stimulate the nervous system via the olfactory nerve, triggering the release of neurotransmitters in the brain. This response plays a crucial role in regulating psychological well-being, including emotions, thoughts, and mood (Agustina, Meirita and Fajria, 2019; Sundara *et al.*, 2022). Moreover, aromatherapy has been shown to alleviate stress and anxiety while enhancing sleep quality and emotional well-being (Mahalaksmi *et al.*, 2024), further expanding its potential as a complementary intervention to help HD patients manage anxiety.

Music and Humor Therapy

Music therapy aims to reduce negative emotions and physical symptoms and improve psychological well-being. Music can calm, inspire, energize, and reduce anxiety by relaxing the mind and minimizing stress (Ji *et al.*, 2019; Auliya and Yudiarto, 2023). Humor therapy is also effective in reducing stress and anxiety and can be applied in various fields, such as health, counseling, and education (Arifiati and Wahyuni, 2020). Research by Morais et al., (2020) shows that watching comedy films during dialysis sessions can help reduce anxiety. Borzoe et al., (2022) found that humor therapy, such as watching funny shows, can reduce anxiety levels.

Another study by Yulianto et al., (2024) supports the effectiveness of education in the form of explanations about the patient's condition and humor therapy (Javanese jokes) in reducing family anxiety levels in the Emergency Room (IGD). In addition (Midilli, Ergin and Yilmaz, 2017; Haghi, Zadeh and Vafayee, 2019) reported that listening to music during the hemodialysis process also had a positive impact on reducing anxiety. Another study by Soliva et al., (2024) found that live music played by professional musicians significantly reduced patient anxiety. Similar findings were reported by Gulcek & (Aylaz, 2022) who revealed that music therapy with traditional melodies was effective in reducing anxiety. In conclusion, music therapy, either through recordings or live performances, as well as humor, is a valuable and enjoyable approach to help HD patients manage anxiety.

Acupressure

Acupressure is a non-invasive, safe, and cost-effective therapy that can be self-administered after proper training. Specific acupressure points have been identified to help alleviate anxiety, promote relaxation, and influence pathological mechanisms associated with depression (Novianti and Safitri Muchtar, 2021). This therapy has been shown to effectively reduce symptoms of depression, anxiety, and stress in both elderly individuals and hemodialysis (HD) patients (Komariah *et al.*, 2021). Studies have demonstrated that acupressure applied to specific points, such as K1 (Yongquan) and ST36 (Zusanli), is effective in lowering anxiety levels. Research conducted by (Hmwe *et al.*, 2015; Dehghanmehr *et al.*, 2020; Suandika *et al.*, 2021) found that acupressure performed three times a week for four weeks resulted in significant anxiety reduction. Additionally, Siasari *et al.*, (2020) reported that acupressure at P6 (Neiguan) was particularly effective in alleviating anxiety symptoms. However, a comparative study by El-abdeen *et al.*, (2022) suggested that lavender aromatherapy was more effective than acupressure in reducing anxiety. These findings highlight that while acupressure is a valuable complementary therapy for managing anxiety in HD patients, aromatherapy may offer superior benefits in some instances.

Guided Imagery

Guided imagery therapy allows patients to create and receive suggestions from themselves through the subconscious threshold or relaxed state by following finger movements as instructed. This therapy is a verbal communication art designed to enter suggestions independently, helping patients reduce their anxiety (Safitri and Tresya, 2023). A study by Afshar *et al.*, (2018) showed that conducting guided imagery six times a week for four weeks can significantly reduce anxiety. Beizae *et al.*, (2018) also found that a frequency of three times a week for four weeks had a similar effect in reducing anxiety. These findings indicate that mental relaxation techniques such as guided imagery can be a helpful strategy in managing anxiety in HD patients.

Spiritual Intervention

Spiritual therapy is an alternative treatment that uses prayer and dhikr to increase self-confidence and optimism, as well as reduce the psychological impact of stress and anxiety. This helps patients adapt to physical conditions during hemodialysis that can be psychologically stressful (Faizal and Putri, 2021; Kurniasih, Kurnia and Istiqomah, 2021). Research by Babamohamadi *et al.*, (2015) reported that listening to the recitation of the Qur'an is effective in reducing anxiety in patients. found that dhikr also has a significant effect in reducing anxiety.

In addition, research by (Durmuş and Ekinçi, 2022) showed that spiritual care carried out for 16 sessions provided effective results in reducing anxiety levels. These results are supported by research (Nurrohmah and Rinaldi, 2022) that spiritual therapy can reduce anxiety in the elderly. These findings emphasize

the importance of a spiritual approach in anxiety management in hemodialysis (HD) patients.

Modern Technology and Interventions

Technology-based interventions, such as Virtual Reality (VR) and Transcranial Direct Current Stimulation (tDCS), have shown promising potential in reducing anxiety in hemodialysis (HD) patients. Research by Turoń-Skrzypińska et al., (2023) found that VR training using the NefroVR system for 20 minutes was effective in reducing anxiety in HD patients. The effect of VR on anxiety can be explained through two mechanisms, namely exposure and distraction (Yulianti and Mulyono, 2021). In addition, Ebrahimi & Azizi, (2022) reported that tDCS, which involves giving mild electrical stimulation to the brain, was able to reduce anxiety significantly.

Eye Movement Desensitization and Reprocessing (EMDR) therapy, studied by Rahimi et al., (2019), has also been shown to be effective in reducing anxiety in HD patients by processing adverse events experienced by clients. Saccadic movement in EMDR stimulates the brain to release anxiety into the conscious mind (Renata and Satrianta, 2020). These findings suggest that technology-based interventions can be an innovative alternative to anxiety management.

Herbal Interventions

The use of herbal interventions, such as Echinacea EP107™ extract, has also shown potential in reducing anxiety in hemodialysis (HD) patients. research conducted by Haller et al., (2025) found that Echinacea EP107™ extract was effective in reducing psychological anxiety in hemodialysis patients, although it did not affect somatic symptoms of anxiety. This extract significantly reduced anxiety compared to placebo, supporting the use of herbal therapies to manage anxiety in HD patients by suppressing pro-inflammatory cytokines and oxidative stress. Echinacea works by activating CB1 receptors in the brain, increasing the effects of GABA, decreasing glutamate, and increasing serotonin and stabilizing the autonomic system to create relaxation.

Other Interventions

Some additional interventions, such as art therapy and resilience training, have also been shown to be effective in reducing anxiety. Research conducted by Mollaoğlu et al., (2024) showed that art therapy combined with telehealth-based education was effective in reducing anxiety in patients. In addition, Amirkhani et al., (2021) showed that resilience training, which included workshops, role-playing, and group discussions, was effective in reducing anxiety while improving the quality of life of HD patients. These findings enrich the non-pharmacological intervention options for managing anxiety in hemodialysis patients.

CONCLUSIONS AND RECOMMENDATIONS

Based on the literature review conducted, it can be concluded that various interventions are effective in reducing anxiety in hemodialysis (HD) patients.

Relaxation techniques such as Benson Relaxation and Progressive Muscle Relaxation (PMR) have been shown to be significant in reducing anxiety levels. Aromatherapy, especially with lavender oil, has demonstrated consistency in reducing anxiety and increasing patient comfort. Music therapy, either through recordings or live performances, also has a positive effect in reducing anxiety. In addition, interventions such as acupuncture, guided imagery, and spiritual approaches (such as dhikr and reading the Qur'an) also contribute to anxiety management. Technology-based interventions, such as Virtual Reality (VR) and Transcranial Direct Current Stimulation (tDCS), as well as herbal therapies such as Echinacea extract, have shown promising potential. Other interventions, such as art therapy, humor therapy, and resistance training, have also had positive impacts.

Overall, the combination of physical, psychological, spiritual, and technological approaches can be a comprehensive strategy to reduce anxiety in HD patients. The selection of interventions can be tailored to the patient's individual preferences and needs to achieve optimal results. These findings confirm that complementary therapies can be a practical and holistic approach to reduce anxiety in HD patients and improve their quality of life and psychological well-being. However, further studies with stronger designs, larger sample sizes, and longer intervention durations are needed to strengthen the evidence and optimize the application of complementary therapies in clinical practice.

FURTHER STUDY

Future studies should aim to strengthen the evidence base for the use of complementary therapies in reducing anxiety among hemodialysis (HD) patients. To achieve this, more high-quality randomized controlled trials (RCTs) are needed to validate the effectiveness of specific interventions and compare different types of therapies, such as spiritual versus technological approaches. Research involving larger and more diverse sample sizes is also essential to ensure the generalizability of findings across various populations and healthcare settings. Additionally, studies should assess the long-term effects of these interventions by extending the duration of therapy and incorporating follow-up periods to evaluate sustained outcomes on anxiety and overall quality of life. Exploring the effectiveness of multimodal interventions—combinations of two or more therapies—could reveal synergistic effects that offer greater benefits than single interventions. It is equally important to consider patient-centered approaches that investigate individual preferences, adherence, and acceptance of complementary therapies to enhance clinical applicability. Moreover, cost-effectiveness analyses are necessary to determine the economic feasibility of integrating these therapies into routine clinical practice. Finally, further research should explore the physiological and psychological mechanisms behind the observed benefits to provide a deeper understanding of how these interventions alleviate anxiety. These directions will help optimize the implementation of complementary therapies and support their role in holistic care for HD patients.

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