



INTRADIALYTIC EXERCISE, COGNITIVE BEHAVIORAL THERAPY, AND DEEP BREATH RELAXATION FOR QOL IN HEMODIALYSIS PATIENTS: SYSTEMATIC REVIEW

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ABSTRACT

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Chronic kidney disease (CKD) patients undergoing continuous hemodialysis (HD) experience decreased daily physical activity, lower tolerance to exercise and poorer health-related quality of life. Thus, HD patients need interventions that focus on their physical and psychological characteristics to improve their quality of life. This study aims to discuss the effectiveness of intradialytic exercise, cognitive behavior therapy and deep breath relaxation in improving the quality of life of hemodialysis patients. The study used a systematic literature review design to identify articles on intradialytic exercise, cognitive behavior therapy and deep breath relaxation from 2019-2023 was obtained from PubMed, ScienceDirect and Google Scholar. Seven studies found that intradialytic exercise enhances CKD patients' quality of life during hemodialysis. Four studies noted cognitive behavioral therapy's positive impact on physiological aspects, enhancing patients' well-being. Additionally, six studies observed deep breath relaxation's beneficial effects on physiological parameters, ultimately enhancing patients' quality of life during hemodialysis. Intradialytic exercise, cognitive behavior therapy and deep breath relaxation are effective in improving the quality of life of hemodialysis patients. Furthermore, these three interventions helped accelerate the medical approach to chronic kidney disease.

Keywords:

Cognitive behavior therapy, Deep breath relaxation, Hemodialysis, Intradialytic exercise, Quality of life

BACKGROUND

Chronic Kidney Disease (CKD) is a disease with a poor prognosis that causes the loss of renal function and progresses to the end stages of renal disease (ESRD) (Evans et al., 2022). Approximately 5.1 million ESRF patients worldwide; rely on renal replacement therapy for better survival, that is either peritoneal dialysis, hemodialysis, or kidney transplantation, and this number is expected to double in the next decade (Hamed & Aziz, 2020). Hemodialysis (HD) is the most common invasive and complex form of renal replacement therapy (Canaud et al., 2020). Nevertheless, the rapid improvement in HD techniques has recently contributed to an increase in the survival of CKD patients, on the other hand resulting in a variety of physical and mental complications, which may contribute to a decline in patients' quality of life (QoL) (Kim et al., 2022).

QoL is identified as a vital health outcome for studies evaluating the quality of healthcare, assessing the influence of illness and analyses of cost-effectiveness (Khatib et al., 2018). Lower quality of life scores are associated with a significant risk of hospitalization and mortality (Ravera et al., 2021), because changing how individuals perceive and evaluate their lives and illnesses may lead them to not adhere to treatment (Hagemann et al., 2019). Since the patient is at high risk of fatality, QoL becomes an important component as it is a parameter of successful intervention.

Studies focusing on the QoL of patients with CKD were published in online databases. For example, intradialytic exercise (IDE) has demonstrated a positive effect on the overall health and hospitalization rate of HD patients (Albadr et al., 2020). IDE could benefit patients undergoing hemodialysis in improving most domains of generic HRQOL (Hu et al., 2022). IDE has shown to have positive effects in HD patients; this was evident from the results of previous studies where IDE improved the efficiency of dialysis (Kt/V) (Vogiatzaki et al., 2022; Malini et al., 2022), VO₂ max (Amalia et al., 2022), and QoL (Sovatzidis et al., 2020).

Related to cognitive behavior therapy (CBT) in CKD, several studies were completed. Astuti & Utami (2021) used CBT for treating depression in chronic kidney disease patients and have shown that depression decreased in patients with CKD. CBT has shown an encouraging effect on depressive symptoms and mental summary of QoL among HD patients (Ling et al., 2020). CBT therapy is very effective as it produces positive outcomes to patients, im-

proves QoL and coping skills, treats problematic behavior and improves the illness disorder (Greenberg et al., 2019).

In addition to these two therapies, several studies have been conducted regarding deep breath relaxation in CKD. Deep breathing relaxation can lower anxiety, sleep quality, and fatigue in HD patients (Krismiadi et al., 2023). Deep breathing relaxation could become beneficial in reducing fatigue associated with HD (Eroglu & Metin, 2022). Deep breathing, according to other studies, maintains a balance between the sympathetic and vagal systems and, as a result, improves heart rate (Jensen et al., 2022). Deep breathing also helps individuals with advanced heart illness, as well as improving fatigue, sleep, and overall QoL (Rashid et al., 2023).

The evaluation results of existing studies used IDE, CBT and deep breathing relaxation as separate treatments in patients with CKD. However, the combination of these treatments was not addressed in any of the studies. Many studies did not combine treatment with CBT or deep breathing relaxation; they used IDE only. In fact, the combination accelerates the alleviation of clinical symptoms caused by dialysis. By controlling negative thoughts and reducing hopelessness and anxiety, it also improves QoL. Therefore, this study aims to evaluate the effectiveness of intradialytic exercise, cognitive behavior therapy, and deep breath relaxation in improving the QoL of HD patients in hospital. The findings of this study are expected to help nurses in managing HD patients' health conditions related to QoL.

METHODS

Research design: The study used a systematic literature review design to identify articles on intradialytic exercise, cognitive behavior therapy and deep breath relaxation in HD patients. This systematic review and meta-analysis followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The search involves online databases including PubMed, ScienceDirect and Google Scholar.

Search methods: The search criteria were studies on IDE, CBT and deep breath relaxation on HD, written in English, review studies are the primary source, whole research design and 2019-2023 publications. Keywords were as follows: 'intradialytic exercise,' 'CBT for hemodialysis,' 'deep breath relaxation for hemodialysis,' 'intradialytic exercise for hemodialysis,' 'CBT for HD,' 'deep breath relaxation for HD,' 'Quality of life intradialytic exercise HD,

'intradialytic, CBT and deep breath relaxation for HD patients' quality of life'.

Inclusion and exclusion criteria: The eligibility criteria for this systematic review were experimental studies, studies on IDE, CBT and deep breath relaxation interventions on HD, and study sites in any country. Exclusion criteria for this systematic review included studies whose participants were other than experimental studies and whose participants were not renal failure patients. Improved quality of life was the outcome assessed in this systematic review.

Data extraction: This systematic review examined the effectiveness of IDE, CBT and deep breath relaxation interventions in improving the quality of life of hemodialysis patients in hospitals. Therefore, the data extracted for this systematic review included study location, participant characteristics, intervention description, duration, outcome instruments, and safety protocols.

Quality appraisal: The study used a PRISMA protocol (Park et al., 2022). The authors also assessed the risk of bias in each study using The Joanna Briggs Institute (JBI) Critical Appraisal tool for use in JBI Systematic Reviews (Munn et al., 2023).

Data analysis: The methodology employed for data analysis within this study entails the utilization of narrative synthesis, a comprehensive approach aimed at elaborating and amalgamating research findings through qualitative summarization and synthesis.

RESULTS

Search Result

Based on the results of a literature search through publications in three databases: researchers found 509 articles that matched these keywords. The search results were then checked for duplication, and inclusion and exclusion were carried out according to the criteria while assessing the feasibility of the studies. Ultimately, 17 articles were obtained, which deserved discussion in this study (Figure 1). Fourth, 17 papers comparing and contrasting intradialytic exercise and CBT were considered (Table 1).

Characteristics of The Selected Studies

Seventeen studies were found, with seven focusing on the effectiveness of intradialytic exercise in enhancing the quality of life (QoL) for CKD patients undergoing HD. Additionally, four studies investigated how cognitive behavioral therapy benefits the physiological aspects of HD patients, consequently improving their QoL. Furthermore, six studies ex-

plored the positive impact of deep breath relaxation techniques on the physiological well-being of HD patients, leading to enhancements in their QoL.

Characteristics of The Selected Studies

Overall, the articles obtained examined patients with HD using various research methods, namely 10 studies using randomized controlled trials, 6 studies using quasi-experimental studies, and 1 study using single-blind clinical trials. There were 11 studies that used comparison therapy and 6 studies that did not use it.

The countries studied are Taiwan (Chang et al., 2022; Moeinzadeh et al., 2022), Indonesia (Suhardjono et al., 2019; Rochmawati et al., 2022; Krismiadi et al., 2023; Sutinah & Azhari, 2020; Sari et al., 2023), Brazil (do Valle et al., 2020), India (Valsaraj et al., 2021; Grover et al., 2022; Kharbteng et al., 2020), Korea (Kim et al., 2022), USA (Shirazian et al., 2023), China (Liao et al., 2020), Iran (Zhianfar et al., 2020; Aliakbari et al., 2021), Egypt (Hamed & Aziz, 2020).

DISCUSSION

The level of daily physical activity and physical performance in HD patients is much less than in healthy individuals, especially on dialysis days, and this sedentary lifestyle is associated with higher morbidity and mortality and they are less driven towards exercises (Moeinzadeh et al., 2022; Grover et al., 2022; do Valle et al., 2020). Physical activity results in better pulmonary, physical function, and well-being. The within group (pre- to post-intervention) comparison of VO₂ max, QoL, sleep questionnaire, and rate of perceived exertion showed significant difference (Grover et al., 2022). Chang et al. (2022) reported that there is emerging evidence in support of intradialytic exercise improving health-related quality of life for patients on HD. Kidney Disease and Quality of Life (KDQOL) and recovery time could improve in HD patients after 12 week intradialytic cycling exercise (Moeinzadeh et al., 2022). Suhardjono et al. (2019) also found that patients who performed the twice-a-week intradialytic aerobic or combination physical exercise programs for 12 weeks exhibited significantly improved strength of their lower extremities and physical components of the dialysis QoL index. Intradialytic exercise is effective in increasing frailty, the value of dialysis adequacy in terms of Kt/V, urea retention rate values, reducing blood pressure, physical capacity, maximal oxygen consumption, sleep quality and improving QoL and fatigue

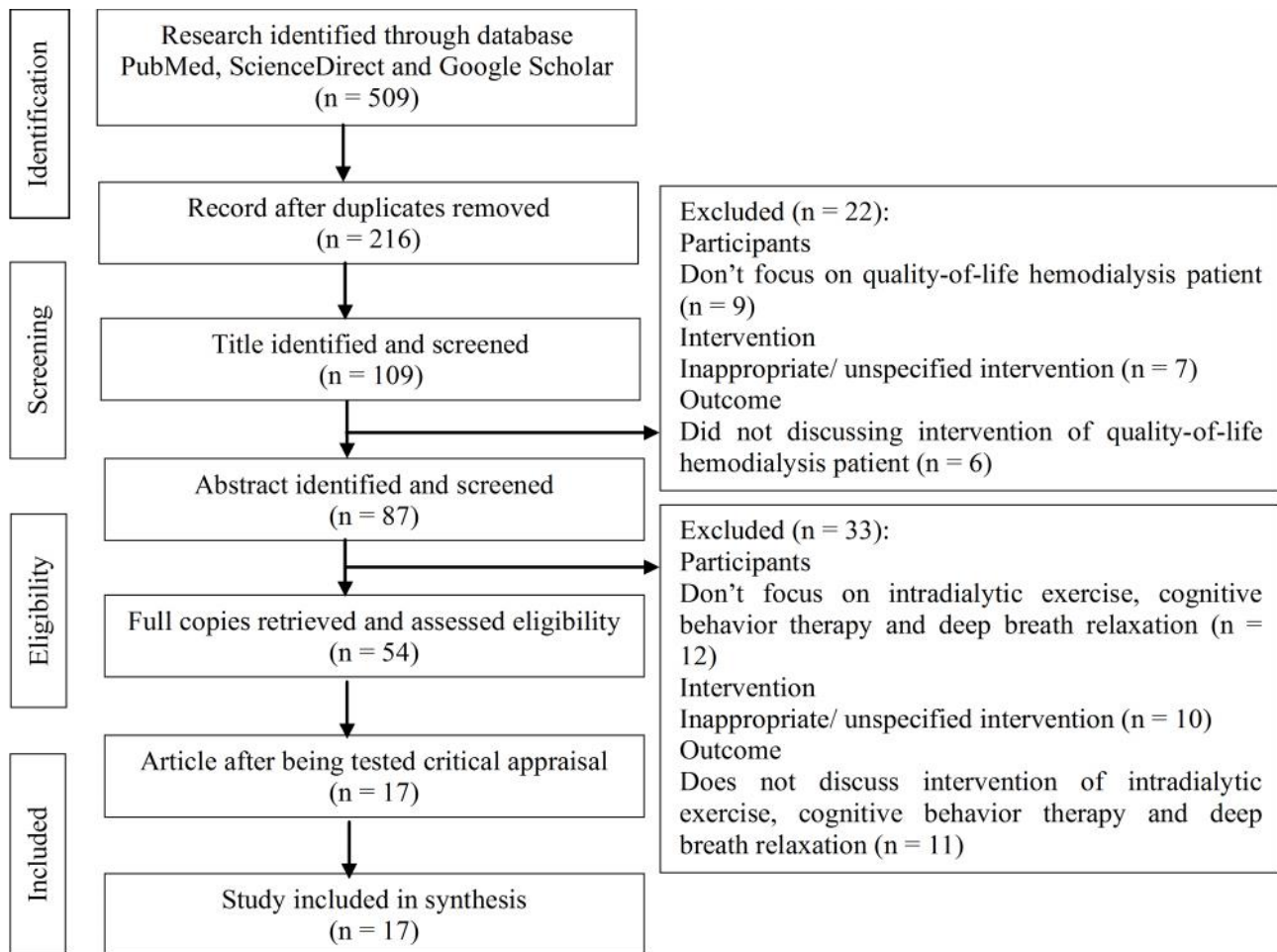


Figure 1. Article Selecting Process Used a PRISMA protocol

(Rochmawati et al., 2022; do Valle et al., 2020; Grover et al., 2022; Kim et al., 2022).

While HD techniques contribute to improved survival of CKD patients, they also result in various physical and mental/psychological complications, which may contribute to a decrease in patients' QoL (Gültekin et al., 2022). To improve the treatment effect of hemodialysis patients, in addition to IDE, many intervention regimens have also been used for hemodialysis patients, such as education, psychology, and continuing care. The assessment contents include negative emotions, QoL and some other clinical indicators (Liao et al., 2020). Cognitive behavioral intervention is a widely used psychotherapy among psychological care interventions. It can effectively alleviate anxiety and depression of HD patients and improve their QoL and renal function (Liao et al., 2020). And a simple CB-based behavioral-education can improve QoL and self-care in patients on HD (Shirazian et al., 2023). Moreover, CBT may potentially safeguard the cognitive functions of patients from degeneration. Empirical evidence suggests that CBT is effective in mitigating cognitive impairments

(Zhianfar et al., 2020). Integrating CBT with renal replacement therapy, such as HD, appears to be a logical approach to enhance the overall welfare of the patient (Valsaraj et al., 2021). Additionally, the aforementioned four studies on the implementation of CBT demonstrate a rise in QoL and a reduction in depression, both of which are indicative of QoL (Zhianfar et al., 2020; Valsaraj et al., 2021).

Another promising intervention to improve the QoL of patients with HD is deep breath relaxation. Deep breathing exercises maximize the amount of oxygen supplied to the tissues resulting in production of more energy leading to reduction in levels of fatigue. Reduction in oxidative stress, increase of cellular energy and elasticity of blood vessels and improved circulation are the benefits of deep breathing relaxation techniques (P & Lobo, 2021). Deep breath relaxation can reduce anxiety, sleep quality, and fatigue because it uses spiritual values that can improve the QoL of HD patients (Krismiadi et al., 2023; Sutinah & Azhari, 2020; Sari et al., 2023). Hamed & Aziz (2020) also found that performing deep breathing exercises for twenty minutes, twice

Table 1. The Research Journal

No	Author and year of publication	Country	Research Design	Intervention	Comparison therapy (If any)	Outcome
1	Chang et al. (2022)	Taiwan	A randomized controlled trial	Intradialytic Exercise	Usual Care	Intradialytic exercise improves QOL
2	Moeinzadeh et al. (2022)	Taiwan	A randomized controlled trial	Intradialytic cycling exercise	Received no exercise plan	Intradialytic exercise improves QOL
3	Suhardjono et al. (2019)	Indonesia	A randomized controlled trial	Intradialytic exercise	No exercise	Intradialytic exercise improves PCS of QOL
4	Rochmawati et al. (2022)	Indonesia	Quasi-experimental design	Motion exercise	None	Positive effect on QOL
5	do Valle et al. (2020)	Brazil	A randomized controlled trial	Intradialytic resistance training	Lower limb stretching exercises	Positive effect on QOL
6	Grover et al. (2022)	India	Quasi-experimental design	Intradialytic exercises (IDE)	None	Positive effect on QOL
7	Kim et al. (2022)	Korea	A randomized controlled trial	Intradialytic aerobic exercise program	The education session	Intradialytic exercise improves PCS of QOL
8	Shirazian et al. (2023)	USA	A randomized controlled trial	Cognitive behavioral strategies	Daily care	CBT improves QOL
9	Liao et al. (2020)	China	A randomized controlled trial	Nursing intervention of cognitive behavioral therapy	Conventional care	CBT improves QOL
10	Zhianfar et al. (2020)	Iran	A randomized controlled trial	Multifaceted educational intervention of cognitive behavioral therapy	Daily care	CBT improves QOL
11	Valsaraj et al. (2021)	India	A randomized controlled trial	Cognitive behaviour therapy	Regular maintenance	CBT led to significant improvements in QOL
12	Krismiadi et al. (2023)	Indonesia	A quasi-experimental pre-post test	Benson relaxation technique and deep breath	Benson relaxation techniques	Deep breath relaxation improves QOL
13	Sutinah & Azhari (2020)	Indonesia	Quasi-experimental design	Relaxation breathing	None	Deep breath relaxation in reducing fatigue (parameter of QOL)

per day for a full month; can reduce maintenance HD patients' fatigue level. And research conducted

by Kharbteng et al. (2020), which explains that breathing training programs carried out for four weeks

14	Sari et al. (2023)	Indonesia	Quasi-experimental design	AROM with deep breathing exercise	The hospital program	Deep breath relaxation improves QOL
15	Hamed & Aziz (2020)	Egypt	Randomized Quasi-experimental Study	Deep breathing exercise training	Routine care	Deep breath relaxation in reducing fatigue (parameter of QOL)
16	Aliakbari et al. (2021)	Iran	A single-blind clinical trial	Breathing exercise	None	Deep breath relaxation improves physical and mental health (parameter of QOL)
17	Kharbteng et al. (2020)	India	A randomized controlled trial	A breathing training program	None	Deep breath relaxation improves QOL

can improve the physical performance and QoL of HD patients.

The breathing training program will also stimulate impulses to the thalamus, which are then forwarded to the sensory processing area in the neocortex (frontal lobe) to increase a positive mood. Feelings of relaxation and calm will stimulate the limbic system to release neurotransmitters in the form of serotonin, dopamine, and melatonin, while the hypothalamus will release endorphins (Hamed & Aziz, 2020). Increased endorphins can affect the decrease in cortisol which has an impact on feeling relaxed, reducing tension, increasing feelings of pleasure, making a person more comfortable, and launching oxygen delivery to the muscles so that it can reduce levels of fatigue, anxiety, stress, and depression which will affect the QoL of patients (Neto et al., 2020; Al Naamani et al., 2021). And deep and silent breathing lowered respiratory rate and dyspnea enhanced VO₂max. These exercises can be a useful tool for improving physical and mental health in these people, and they come at no cost to them. These breathing exercises are also simple to conduct because these patients are unable to participate in out-of-home sporting activities due to their physical limitations (Aliakbari et al., 2021).

The discussion underscores the profound impact of interventions like intradialytic exercise, cognitive behavioral therapy (CBT), and deep breath relaxation on enhancing the quality of life (QoL) for individuals undergoing hemodialysis (HD). Intradialytic exercise programs have demonstrated significant improvements in physical capacity, sleep quality, and overall QoL, while also mitigating frailty and reducing blood pressure. CBT interventions have proven effective in alleviating anxiety, depression, and enhancing cognitive functions, thereby contributing to improved QoL. Similarly, deep breath relaxation

techniques have shown promise in reducing anxiety, fatigue, and enhancing sleep quality through the release of neurotransmitters and endorphins. These interventions offer accessible and feasible strategies to address both the physical and psychological aspects of HD patients' conditions, ultimately aiming to improve their overall well-being and treatment outcomes.

The study's strengths lie in its comprehensive review of interventions targeting the quality of life (QoL) in hemodialysis (HD) patients, encompassing intradialytic exercise, cognitive behavioral therapy (CBT), and deep breath relaxation. By drawing from multiple studies, it adopts an evidence-based approach, enhancing the reliability and validity of its conclusions. Additionally, the study offers practical implications by highlighting accessible strategies to address both the physical and psychological aspects of HD patients' conditions.

However, several limitations should be noted. Firstly, there's a lack of direct evidence on the combined effects of these interventions, necessitating further research to explore their synergistic impacts. Secondly, the heterogeneity among studies in methodology, patient populations, and outcome measures may limit the generalizability of findings. Despite these limitations, the study provides valuable insights into potential avenues for improving the QoL of HD patients through integrated interventions.

Thus, the need for research that combines intradialytic exercise, cognitive behavioral therapy (CBT), and deep breath relaxation has significant potential for enhancing the quality of life (QoL) in hemodialysis (HD) patients. Each intervention individually improves various aspects of QoL-physical capacity, mental well-being, and treatment satisfaction. Together, they address both physical and psychological dimensions simultaneously. Intradialytic

exercise improves physical capacity and sleep quality, while CBT alleviates anxiety, depression, and enhances cognitive functions. Deep breath relaxation reduces anxiety, fatigue, and enhances sleep quality. However, implementing combined therapies requires careful planning and coordination among healthcare professionals, tailored to individual patient needs. Further research, including randomized controlled trials, is needed to evaluate their long-term efficacy and benefits for HD patients.

CONCLUSION

Intradialytic exercise, cognitive behavior therapy and deep breath relaxation are effective in improving the quality of life of hemodialysis patients. Furthermore, these three interventions helped accelerate the medical approach to chronic kidney disease.

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