NLJ

NurseLine Journal

Volume 9, Issue 1, May 2024

p-ISSN: 2540-7937
e-ISSN: 2541-464X

THE EFFECTIVENESS OF MASSAGE IN REDUCING FATIGUE IN HEMODIALYSIS PATIENTS: A SYSTEMATIC REVIEW

Heru Nurinto[1], Agung Waluyo[2]*, Sri Yona[3]
[1]Master of Nursing Student, Faculty of Nursing, University of Indonesia, Depok, Indonesia
[2,3]Medical Surgical Nursing Department, Faculty of Nursing Universitas Indonesia, Depok, Indonesia

***Corresponding Author:**
Agung Waluyo
Medical Surgical Nursing Department, Faculty of Nursing Universitas Indonesia, Depok, Indonesia
agungwss@ui.ac.id

Article Info:
Submitted: 08-02-2024
Revised: 22-04-2024
Accepted: 26-04-2024

http://doi.org/10.19184/nlj.v9i1.46611

ABSTRACT

End Stage Renal Disease (ESRD) is the final stage of chronic kidney failure, which requires kidney replacement therapy, one of which is hemodialysis. A common symptom in hemodialysis patients is fatigue. Massage is one of several interventions that can overcome fatigue problems. This study aims to determine the effectiveness of massage in reducing fatigue in hemodialysis patients. This research uses a systematic review approach. The literature search came from five databases: Pubmed, Scopus, Science Direct, ClinicalKey, and SpringerLink. Apart from that, researchers also conducted a manual search. The keywords used are massage, fatigue, and hemodialysis. The literature search results obtained 337 articles from databases and 4 from manual search. Then, screening was carried out using the criteria for articles published from 2014-2023, open access, full-text articles, original articles with a Randomized Controlled Trial (RCT) or quasi-experimental design, discussing massage interventions and reducing fatigue in hemodialysis patients. The results of the article screening obtained seven articles, and a critical appraisal was carried out using the JBI Critical Appraisal Checklist, and all of them were suitable for review. The results showed that various types of massage effectively reduced fatigue in hemodialysis patients. The various massages in question are foot massage, foot reflexology and back massage, hand massage, lower back and lower leg massage using olive oil, aromatherapy massage, and slow stroke back massage. Massage is effective in reducing fatigue in hemodialysis patients. Future research can examine the type of massage that most effectively reduces fatigue in hemodialysis patients.

Keywords:
Fatigue, Hemodialysis, Massage, Systematic review

BACKGROUND

Chronic Kidney Disease (CKD) is characterized by kidney damage for three months or more so that the kidneys cannot excrete metabolic waste or adequately regulate fluid and electrolyte balance (LeMone et al., 2016). Chronic kidney disease can progress to terminal renal failure or End Stage Renal Disease (ESRD). The end-stage renal disease occurs when the GFR is less than 15 ml/min/1.73 m2; in this condition, renal replacement therapy (dialysis or transplantation) is needed to maintain life (Lewis et al., 2014). According to the United States renal data system, end-stage renal disease results in nearly 87% of these patients undergoing renal replacement therapy, with hemodialysis being the most widely used in 2017 (Saran et al., 2018). New patients undergoing hemodialysis in Indonesia until 2018 amounted to 66,433 people, and active patients undergoing hemodialysis in Indonesia amounted to 132,142 people (Badan Penelitian dan Pengembangan Kesehatan, 2019).

The characteristic sign and symptom of ESRD is the presence of uremia syndrome. In uremia, fluid and electrolyte balance is disturbed, renal and endocrine regulation and function are impaired, and the accumulation of waste products essentially affects other organ systems. Manifestations of uremia include nausea, apathy, weakness, and fatigue (LeMone et al., 2016). Patients on maintenance hemodialysis are usually less physically active; as a result, patients are plagued by various uncomfortable symptoms, such as pain, depression, and fatigue (Pu et al., 2019).

Fatigue is one of the most common symptoms experienced by people with chronic renal failure. It is estimated that the prevalence of fatigue ranges from 60% to 97% for patients receiving long-term renal replacement therapy (Wang et al., 2015). Fatigue, according to Matura et al. (2018), is defined as excessive, debilitating, and sustained fatigue that can reduce the ability to function and perform daily activities. Fatigue is a problem that needs early intervention. If fatigue is not intervened promptly, it will negatively impact the patient's quality of life and also be life-threatening (Cecen & Lafci, 2022). Fatigue is a problem that needs early intervention. If fatigue is not intervened promptly, it will negatively impact the patient's quality of life and also be life-threatening (Cecen & Lafci, 2022). Fatigue also shows a significant correlation with the risk of cardiovascular disease and suicide, which substantially increases mortality in patients receiving dialysis (Wang et al., 2015). Meanwhile, if fatigue is overcome, it will positively impact the patient. According to Jhamb et al. (2013), improving fatigue levels in end-stage renal disease populations can positively impact patient well-being and survival.

Exercise, relaxation, yoga, acupressure, hypnosis, reflexology, aromatherapy, and massage are some of the interventions for fatigue (Cecen & Lafci, 2022). One of the popular interventions is massage. According to Ooi et al. (2018), massage therapy is the most popular complementary and alternative medicine therapy. Massage is a series of manual procedures performed systematically on body tissues, aiming to affect the nervous, musculoskeletal, skin, and circulation systems (Nahamin et al., 2016). Hand and foot massage has been shown to reduce fatigue in patients undergoing hemodialysis (Cecen & Lafci, 2021). This study aims to determine the effectiveness of massage in reducing fatigue in hemodialysis patients.

METHODS

This study used a systematic review approach using the PICO framework (Schardt et al., 2007) to formulate research questions (Table 1). The research question in this systematic review is whether massage effectively reduces fatigue in hemodialysis patients.

The researcher conducted a literature search on five databases, namely Pubmed, Scopus, Science Direct, ClinicalKey, and SpringerLink, using the keywords massage, fatigue, and hemodialysis. The researcher also conducted a manual search. The literature search obtained 337 articles from the database and 4 from manual search, as described in table 2.

Articles were obtained by screening with the inclusion criteria of published articles from 2014 - 2023, open access, full-text articles, original articles with Randomized Controlled Trial (RCT) or quasi-experimental designs, discussing massage intervention and fatigue reduction in hemodialysis patients.

Data extraction

The process of screening articles to obtain articles for systematic review is shown in the PRISMA flowchart, which can be seen in Figure 1. The final results of screening articles were based on title, abstraction, and inclusion criteria, and 7 articles were obtained.

The seven articles were then subjected to critical appraisal, 5 using the JBI critical appraisal checklist for randomized controlled trials and 2 using

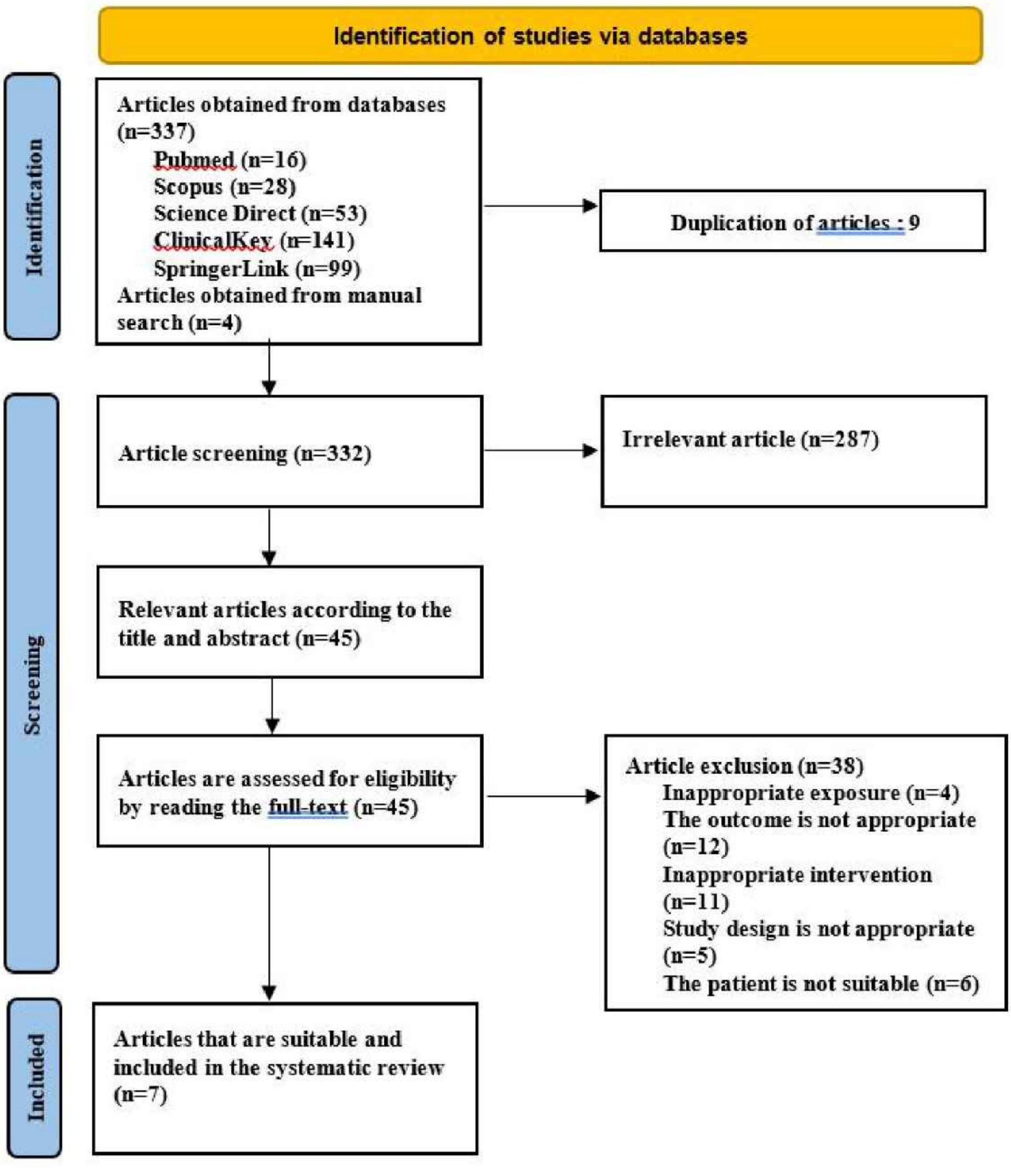

Figure 1. PRISMA Flowchart

the JBI critical appraisal checklist for quasi-experimental trials (Barker et al., 2023). To allow quality comparison across the various study designs, the percentage of positive assessments of checklist questions for JBI assessment tools was calculated for each of the included studies. Quality ranking was allocated as low (less than 33%), medium (33-66%) or high (over 66%) (Al-Qahtani, 2022). The result was that all articles had high grades (over 66%) and could be reviewed (Tables 3 and 4). The researcher then extracted data from the 7 articles, which can be seen in table 5.

The data extracted from the included studies were as follows: (1) Title, Author, publication time, and country; (2) Research purposes; (3) Research design and sample; (4) Types of massage; (5) Dura-

tion, frequency, and intensity of intervention; (6) Outcome and instrument; and (7) Result. Data extraction can be seen in table 5.

RESULTS

Characteristics of the Article

The articles used in this systematic review were published from 2016-2022, and most of the studies were conducted in Iran. The articles consisted of 5 randomized controlled trials (RCTs) and 2 quasi-experimental studies. The types of massage interventions reviewed in this article include foot massage, foot reflexology, The types of massage interventions reviewed in this article include foot massage, foot reflexology back massage, hand massage, lower back and lower leg massage using olive oil, aromatherapy massage, and slow-stroke back massage.

Several measures were used in these studies to assess the level of fatigue in patients undergoing hemodialysis. These measurements used the Fatigue Severity Scale (FSS), Visual Analogue Scale for Fatigue (VASF), Rhoten Fatigue Scale (RFS), and Functional Assessment of Chronic Illness Therapy-fatigue (FACIT-fatigue). The duration of intervention in this study varied, with 8 minutes, 10 minutes, 15 minutes, 20 minutes, and 30 minutes. The frequency of intervention was 2 times per week and 3 times per week. The duration of the intervention was 3 weeks, 4 weeks to 2 months. This can be seen in Table 5.

Characteristics of Respondents in the Article

In seven studies, 703 patients joined. In both control and intervention groups, the average age of the respondents was in the late adult age group. The majority were male. Table 6 is an overview of the characteristics of respondents from seven studies.

DISCUSSION

This systematic review provides an overview of the specific forms of massage applied, including the type, duration, and frequency of massage. These findings may enable health workers to implement interventions to reduce fatigue in hemodialysis patients. The study included 5 RCTs and 2 quasi-experimental involving 703 subjects. This current study focused on assessing the effectiveness of massage in reducing fatigue in hemodialysis patients.

The systematic review of 7 studies demonstrated that massage of various types was effective in significantly decreasing fatigue in patients receiving hemodialysis. The various massages in question are foot massage, foot reflexology and back massage, hand massage, lower back and lower leg massage using olive oil, aromatherapy massage, and slow stroke back massage. In all studies, using massage intervention was able to reduce fatigue. This is in accordance with Cecen & Lafci, (2022), which states that by stimulating sensitive receptors in the skin and subcutaneous tissue, massage provides muscle relaxation, accelerates blood and lymph circulation, ensures the removal of waste metabolism such as

Table 1. Framework PICO

P (Population)	I (Intervention)	C (*Compare*)	O (*Outcome*)
Hemodialysis Patients	*Massage*	Non *Massage*	*Fatigue*

Table 2. Literature Search Keywords

Database	Keywords	Result
Pubmed	'massage' AND 'fatigue' AND 'hemodialysis'	16
Scopus	'massage' AND 'fatigue' AND 'hemodialysis'	28
Science Direct	'massage' AND 'fatigue' AND 'hemodialysis'	53
ClinicalKey	'massage' AND 'fatigue' AND 'hemodialysis'	141
SpringerLink	'massage' AND 'fatigue' AND 'hemodialysis'	99
Manual Search	'massage' AND 'fatigue' AND 'hemodialysis'	4

Table 3. JBI Critical Appraisal Checklist for Randomized Controlled Trials

No	JBI Critical Appraisal Checklist for Randomized Controlled Trials	Habibzadeh et al., 2020	Unal & Akpinar, 2016	Cecen & Lafci, 2021	Lazarus et al., 2020	Varaei et al., 2021
1	Was true randomization used for the assignment of participants to treatment groups?	Yes	Yes	Yes	Yes	Yes
2	Was allocation to treatment groups concealed?	Yes	Yes	Yes	Yes	Yes
3	Were treatment groups similar at the baseline?	No	Yes	Yes	Yes	Yes
4	Were participants blind to treatment assignment?	Yes	Unclear	Unclear	Unclear	Yes
5	Were those delivering the treatment blind to treatment assignment?	No	Unclear	Unclear	Unclear	Unclear
6	Were treatment groups treated identically other than the intervention of interest?	Yes	Yes	Yes	Yes	Yes
7	Were outcome assessors blind to treatment assignment?	No	Unclear	Unclear	Unclear	Yes
8	Were outcomes measured in the same way for treatment groups?	Yes	Yes	Yes	Yes	Yes
9	Were outcomes measured in a reliable way?	Yes	Unclear	Yes	Yes	Yes
10	Was follow-up complete, and if not, were differences between groups in terms of their follow-up adequately described and analyzed?	Yes	Yes	Yes	Yes	Yes
11	Were participants analyzed in the groups to which they were randomized?	Yes	Yes	Yes	Yes	Yes
12	Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes
13	Was the trial design appropriate and were any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	Yes	Yes	Yes	Yes	Yes
	Total Yes	10	9	10	10	12
	%	76,92%	69,23%	76,92%	76,92%	92,30%

BUN, creatinine, uric acid, lactic acid, and has a relaxing effect and increases energy by stimulating the parasympathetic nervous system. With its psycho-sedative effect, it also reduces fatigue.

In some of these studies, there are massage interventions that are better at reducing fatigue than other types of massage, like the research of Ahmadidarrehsima et al. (2018), which compared foot reflexology with a slow-stroke back massage. The group that received foot reflexology significantly reduced fatigue levels compared to the slow-stroke back massage group ($p<0.0001$). Then, in Unal & Akpinar's research (2016), which compared foot reflexology with back massage, based on the results of the study, compared to back massage, foot reflexology was considered more effective in reducing fatigue in he-

Table 4. JBI Critical Appraisal Checklist for Quasi-Experimental

No	JBI Critical Appraisal Checklist for Quasi-Experimental	Ahmadidar rehsima et al., 2018	Khamid & Rakhmawati, 2022
1	Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	Yes	Yes
2	Were the participants included in any comparisons similar?	No	No
3	Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Yes	Yes
4	Was there a control group?	No	No
5	Were there multiple measurements of the outcome both pre and post intervention/exposure?	Yes	Yes
6	Was follow-up complete, and if not, were differences between groups in terms of their follow-up adequately described and analyzed?	Yes	Yes
7	Were the outcomes of participants included in any comparisons measured in the same way?	Yes	Yes
8	Were outcomes measured in a reliable way?	Yes	Yes
9	Was appropriate statistical analysis used?	Yes	Yes
	Total Yes	7	7
	%	77,80%	77,80%

modialysis patients.

In another study, it was mentioned that massage intervention was able to reduce fatigue levels better than interventions other than massage. This was conveyed by Varaei et al. (2021) who compared aromatherapy massage with aromatherapy inhalation. The results showed that the effect of aromatherapy massage on reducing fatigue was stronger than the effect of aromatherapy inhalation. The results showed that the effect of aromatherapy massage on reducing fatigue was stronger than the effect of aromatherapy inhalation.

Of the various massage interventions in this article review, aromatherapy massage is the best intervention in reducing fatigue levels in hemodialysis patients. This can be seen based on the research design of the aromatherapy massage intervention conducted by Varaei et al. (2021) was conducted with a randomized controlled trial (RCT) design and in this study, it was very clearly stated that the outcome assessor did not know the treatment action. While other studies do not clearly convey that the outcome assessor does not know the treatment action. Then the respondents in this study were also many, namely 96 respondents who were divided into 3 groups, aromatherapy inhalation group (n = 32), aromatherapy massage group (n = 32), and control group (n = 32). Massage intervention in the form of olive oil massage studied by Lazarus et al. (2020) is also good at reducing fatigue, because using oil can soften the skin and affect skin flexibility. According to Habibzadeh et al. (2020), the use of oil in massage can reduce fatigue. This may be due to the softening, strengthening, and watering properties of this material, which can affect the elasticity of the skin's collagen fibers. Several measures were used to assess the level of fatigue in patients undergoing hemodialysis in these studies. These measurements used the Fatigue Severity Scale (FSS), Visual Analogue Scale for Fatigue (VASF), Rhoten Fatigue Scale (RFS), and Functional Assessment of Chronic Illness Therapy-fatigue (FACIT-fatigue). The instrument that is often used in several studies is the Fatigue Severity Scale (FSS). Based on research by Schwid et al. (2002), the FSS shows good internal consistency, test-retest reliability, and responsiveness to therapy effects. The FSS has a high-reliability value, with a Cronbach alpha coefficient of 0.88, and has been used to assess fatigue levels associated with various medical conditions, particularly in patients with End Stage Renal Disease (Ann, 2008).

The advantage of these studies is that there

Table 5. Data Extraction

No	Title / Author / Year / Country	Research purposes	Research design and sample	Types of massage	Duration, frequency, and intensity of intervention	Outcome and instrument	Result
1	Effects of Foot Massage on Severity of Fatigue and Quality of Life in Hemodialysis Patients: A Randomized Controlled Trial / Habibzadeh et al., 2020 / Iran	To explore the impact of foot massage with chamomile oil and almond oil on the skin on the fatigue level and quality of life of hemodialysis patients	Randomized controlled trial, 120 respondents were divided into 4 groups: foot massage group with chamomile oil (n=30). Foot massage group with almond oil (n=30), foot massage group without oil (n=30), and control group without intervention (n=30)	Foot massage	Duration 20 minutes, 3 times every week for 2 months	Fatigue, Fatigue Severity Scale (FSS)	The mean fatigue score after foot massage in all intervention groups was significantly lower than the control group (P=0,005)
2	The effect of foot reflexology and back massage on hemodialysis patients' fatigue and sleep quality / Unal & Akpinar, 2016 / Turki	To determine the effectiveness of foot reflexology and back massage in optimizing sleep quality and reducing fatigue in hemodialysis patients	Randomized controlled trial, 105 respondents were divided into 3 groups; foot reflexology group (n=35), back massage group (n=35), control group did not get intervention (n=35)	Foot reflexology and back massage	Duration 30 minutes, 2 times every week for 4 weeks	Fatigue, Visual Analogue Scale for Fatigue (VASF)	Foot reflexology and back massage were shown to reduce fatigue in hemodialysis patients. Compared to back massage, foot reflexology is considered more effective (P=0,000)

3	The effect of hand and foot massage on fatigue in hemodialysis patients: A randomized controlled trial / Cecen & Lafci, 2021 / Turki	To determine the effect of hand massage and foot massage on fatigue in hemodialysis patients	Randomized controlled trial, 82 respondents divided into 3 groups; Hand massage group (n=27), foot massage group (n=27), control group (n=28).	Hand massage and foot massage	Duration 8 minutes, 3 times every week for 4 weeks	Fatigue, Visual Analogue Scale for Fatigue (VASF)	In the intergroup comparison, the mean fatigue scores of the hand massage and foot massage groups decreased after treatment compared to the control group (P=0,001)
4	The effects of an olive-oil massage on hemodialysis patients suffering from fatigue at a hemodialysis unit in southern India – a randomized controlled trial / Lazarus et al., 2020 / India	To determine the effect of massage using olive oil on fatigue in patients undergoing hemodialysis	In a randomized controlled trial, 200 respondents were divided into 2 groups: the olive-oil massage group (n=100) and the control group: routine care (n=100).	Olive oil massage (lower back and lower leg massage using olive oil)	Duration not stated, frequency 2 times every week for 8 weeks	Fatigue, Fatigue Severity Scale (FSS)	Olive-oil massage (lower back and lower leg massage using olive oil) significantly decreased fatigue in patients undergoing hemodialysis (P=0,000)

5	Comparison of the effects of inhalation and massage aromatherapy with lavender and sweet orange on fatigue in hemodialysis patients: a randomized clinical trial / Varaei et al., 2021 / Iran	To compare the effects of inhalation and massage aromatherap y with lavender and sweet orange on fatigue in hemodialysis patients	In a randomized controlled trial, 96 respondents were divided into 3 groups: the aromatherapy inhalation group (n=32), the aromatherapy massage group (n=32), and the control group (n=32).	Aromathera py massage	Duration: 20 minutes aromatherap y inhalation, 10 minutes aromatherap y massage, 3 times every week for 8 weeks	Rhoten Fatigue Scale (RFS)	The aromatherapy intervention was effective in reducing fatigue in hemodialysis patients, although the effect of aromatherapy massage on fatigue was stronger than the effect of inhalation aromatherapy (P<0.001)
6	Effect of foot reflexology and slow stroke back massage on the severity of fatigue in patients undergoing hemodialysis: A semi-experimental study / Ahmadidarrehsi ma et al., 2018/ Iran	To determine the impact of foot reflexology and slow stroke back massage on the degree of fatigue in patients undergoing hemodialysis	Quasi-Experimental, 52 respondents were divided into 2 groups: foot reflexology group (n=26), and slow-stroke back massage group (n=26)	Foot reflexology and slow-stroke back massage	Duration 10 minutes, 2 times every week for 3 weeks	Fatigue, Fatigue Severity Scale (FSS)	The mean fatigue score decreased with foot reflexology massage and slow stroke back massage. After the intervention, fatigue in the group receiving foot reflexology was significantly reduced compared to the slow-stroke back massage group (p<0.0001)

7	The Influence of Feet Reflexology and Back Massage on Hemodialysis Patients' Fatigue / Khamid & Rakhmawati, 2022 / Indonesia	To determine the effects of foot reflexology and back massage on fatigue scores in patients undergoing hemodialysis therapy	Quasi-Experimental, 48 respondents were divided into 2 groups: foot reflexology and back massage group (n=24), control group (n=24)	Foot reflexology and back massage	Duration not stated, frequency 2 times every week for 4 weeks.	Fatigue, Fatique Assamen Scale (FAS)	Foot reflexology and back massage effect on reducing fatigue in hemodialysis patients (P=0,001)

Table 6. Overview of respondents

Characteristics	Groups	Articles							
		Habibzadeh et al., 2020	Unal & Akpinar, 2016	Cecen & Lafci, 2021	Lazarus et al., 2020	Varaei et al., 2021	Ahmadidarrehsima et al., 2018	Khamid & Rakhmawati, 2022	Mean/ number
Ages									
Mean (year)	Intervention 1	55,2	RG: 51,74	HM: 53,07	NA	NA	47,04	55,46	52,502
	Intervention 2		MG: 53,89	FM: 59,96	NA	NA			54,31
	Control		57,37	55,36	NA	NA	47,42	55,42	54,154
Sex									
Male	Intervention 1	30	RG: 19	HM: 17	59	55	15	14	703
	Intervention 2	30	MG: 16	FM: 9					
	Intervention 3	30	-						
	Control	30	20	13	68		21	14	
Female	Intervention 1	-	RG: 16	HM: 10	41	41	11	10	
	Intervention 2	-	MG: 19	FM: 18					
	Intervention 3	-							
	Control	-	15	15	32		5	10	
Total		120	105	82	200	96	52	48	

NA = Not Available
RG = Foot Reflexology Group
MG = Back Massage Group
HM = Hand Massage
FM = Foot Massage

is a new approach to treatment methods that do not cause fatigue complications, namely with massage (Habibzadeh et al., 2020). The findings of this study support the idea that foot massage can be used as a nursing care method to reduce patients' hemodialysis problems. Another advantage is that various massage options can be chosen according to the patient's needs, Another advantage is that various massage options can be chosen according to the patient's needs when it is not possible to do a foot massage, you can choose an alternative hand massage or back massage, all of which according to some of these studies can reduce the level of fatigue. The weakness in some of these studies is that there is one study whose sample allocation is not appropriate, namely in the research of Cecen & Lafci (2021), where the number of respondents allocated to the intervention group is not the same as the control group. Another limitation of this study is that the psychological state of patients during questionnaire completion may have influenced responses to the questionnaire. A further weakness is that in this study, other factors that may affect patient fatigue were not controlled.

CONCLUSION

Massage is effective in reducing fatigue in hemodialysis patients. Future research can examine the type of massage that is most effective in reducing fatigue in hemodialysis patients.

REFERENCES

Ahmadidarrehsima, S., MohammadPourhodki, R., Ebrahimi, H., Keramati, M., Dianatinasab, M., 2018. Effect of foot reflexology and slow stroke back massage on the severity of fatigue in patients undergoing hemodialysis: A semi-experimental study. J Complement Integr Med 15, 1-6. https://doi.org/10.1515/jcim-2017-0183

Al-Qahtani, S., Jalal, Z., Paudyal, V., Mahmood, S., & Mason, J. 2022. The Role of Pharmacists in Providing Pharmaceutical Care in Primary and Secondary Prevention of Stroke: A Systematic Review and Meta-Analysis. Healthcare (Basel, Switzerland), 10(11), 2315. https://doi.org/10.3390/healthcare10112315

Ann, B., Wellard, S., Caltabiano, M., 2008. Levels of fatigue in people with ESRD living in far North Queensland. J Clin Nurs 17, 90-98. https://doi.org/10.1111/j.1365-2702.2007.02042.x

Badan Penelitian dan Pengembangan Kesehatan, 2019. Laporan Nasional Riskesdas 2018. Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan (LPB), Jakarta.

Barker, T. H., Stone, J. C., Sears, K., Klugar, M., Leonardi-Bee, J., Tufanaru, C., Aromataris, E., & Munn, Z. 2023. Revising the JBI quantitative critical appraisal tools to improve their applicability: an overview of methods and the development process. JBI evidence synthesis, 21(3), 478–493. https://doi.org/10.11124/JBIES-22-00125

ÇEÇEN, S., LAFCI, D., 2022. Integrated Treatment Methods Applied for Fatigue in Hemodialysis Patients. Bezmialem Science 10, 523-528. https://doi.org/10.14235/bas.galenos.2021.5188

Çeçen, S., Lafc?, D., 2021. The effect of hand and foot massage on fatigue in hemodialysis patients: A randomized controlled trial. Complement Ther Clin Pract 43. https://doi.org/10.1016/j.ctcp.2021.101344

Habibzadeh, H., Dalavan, O.W., Alilu, L., et al. 2020. Effects of foot massage on severity of fatigue and quality of life in hemodialysis patients: A randomized controlled trial. Int J Community Based Nurs Midwifery 8, 92-102. https://doi.org/10.30476/IJCBNM.2020.81662.0

Jager, K.J., Kovesdy, C., Langham, R., Rosenberg, M., Jha, V., Zoccali, C., 2019. A single number for advocacy and communication-worldwide more than 850 million individuals have kidney diseases. Nephrology Dialysis Transplantation 34, 1803-1805. https://doi.org/10.1093/ndt/gfz174

Jhamb, M., Liang, K., Yabes, J., et al. 2013. Prevalence and correlates of fatigue in chronic kidney disease and end-stage renal disease: are sleep disorders a key to understanding fatigue?. American journal of nephrology, 38(6), 489-495. https://doi.org/10.1159/000356939

Lazarus, E.R., Deva Amirtharaj, A., Jacob, D., Chandrababu, R., Isac, C., 2021. The effects of an olive-oil massage on hemodialysis patients suffering from fatigue at a hemodialysis unit in southern India - a randomized controlled trial. J Complement Integr Med 18, 397-403. https://doi.org/10.1515/jcim-2019-0338

LeMone, P., Karen M.B., Gerene, B., 2016. Buku Ajar Keperawatan Medikal Bedah?: Gangguan Eliminasi Edisi 5, EGC, Jakarta.

Lewis, S.L., Bucher, L., Dirksen, S.R., Heitkemper, M.M, 2014. Medical-Surgical Nursing?: Assessment and Management of Clinical Problems. Elsevier Mosby, Missouri.

Matura, L.A., Malone, S., Jaime-Lara, R., Riegel, B., 2018. A Systematic Review of Biological Mechanisms of Fatigue in Chronic Illness. Biol Res Nurs 20, 410-421. https://doi.org/10.1177/1099800418764326

Nahamin, M., Akbarbegloo, M., Habibipur, Z., 2016. The Impact of Slow-Stroke Back Massage on Anxiety Among Patients Receiving Hemodialysis: A Randomized Clinical Trial. Modern Care Journal In Press. https://doi.org/10.17795/modernc.10273

Ooi, S.L., Smith, L., Pak, S.C., 2018. Evidence-informed massage therapy - an Australian practitioner perspective. Complement Ther Clin Pract 31, 325-331. https://doi.org/10.1016/j.ctcp.2018.04.004

Pu, J., Jiang, Z., Wu, W., Li, L., Zhang, L., Li, Y., Liu, Q., Ou, S., 2019. Efficacy and safety of intradialytic exercise in haemodialysis patients: A systematic review and meta-analysis. BMJ Open 9. https://doi.org/10.1136/bmjopen-2017-020633

Saran, R., Robinson, B., Abbot, K.C., et al. 2018. US Renal Data System 2017 Annual Data Report: Epidemiology of Kidney Disease in the United States. American Journal of Kidney Diseases 71, A7. https://doi.org/https://doi.org/10.1053/j.ajkd.2018.01.002

Schardt, C., Adams, M. B., Owens, T., Keitz, S., & Fontelo, P. 2007. Utilization of the PICO framework to improve searching PubMed for clinical questions. BMC medical informatics

and decision making, 7, 16. https://doi.org/10.1186/1472-6947-7-16

Soliman, A.R., Fathy, A., Roshd, D., 2012. The growing burden of end-stage renal disease in Egypt. Ren Fail 34, 425-428. https://doi.org/10.3109/0886022X.2011.649671

Unal, K.S., Balci Akpinar, R., 2016. The effect of foot reflexology and back massage on hemodialysis patients' fatigue and sleep quality. Complement Ther Clin Pract 24, 139-144. https://doi.org/10.1016/j.ctcp.2016.06.004

Varaei, S., Jalalian, Z., Yekani Nejad, M.S., Shamsizadeh, M., 2021. Comparison the effects of inhalation and massage aromatherapy with lavender and sweet orange on fatigue in hemodialysis patients: A randomized clinical trial. J Complement Integr Med 18, 193-200. https://doi.org/10.1515/jcim-2018-0137

Wang, S.Y., Zang, X.Y., Liu, J.D., et al. 2015. Psychometric properties of the functional assessment of chronic illness therapy-fatigue (FACIT-fatigue) in Chinese patients receiving maintenance dialysis. J Pain Symptom Manage 49, 135-143. https://doi.org/10.1016/j.jpainsymman.2014.04.011