Review Article

Efficacy of Benson's Relaxation Technique on Stress and Pain Among Patients Undergoing Maintenance Hemodialysis: A Systematic Review

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Abstract

Introduction: Stress and pain are high among patients undergoing hemodialysis. Benson's Relaxation technique affected a wide range of physical and psychological signs and symptoms among patients undergoing hemodialysis.

Objective: To evaluate the effectiveness of Benson's Relaxation Technique in reducing stress and pain among patients undergoing maintenance hemodialysis.

Materials and Methods: A systematic review of randomized controlled trials was conducted. A systematic literature search was carried out from 2000 to 2023. Searched databases included EBSCO-Host "Academic Search, Cochrane, CINAHL, Health Business, MEDLINE, Psychology and Behavioral Sciences, SPORTDiscus", PubMed, Ovid, and Google Scholar. The Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines were conducted. RCTs were critically appraised using the Cochrane's Risk of Bias Tool. Four RCTs met the inclusion criteria and included in this review since they were applicable to practice.

Results: Four randomized controlled trials were identified supporting the use of Benson's relaxation technique as a nursing treatment in managing stress and pain among patients undergoing maintenance hemodialysis, as it achieved a significant decrease in stress and pain scores. The overall quality of the randomized controlled trials was judged to be low to relatively moderate.

Conclusions: Most of the randomized controlled trials lacked details on intervention adherence. It is recommended to conduct additional longitudinal randomized controlled trials in different countries with bigger sample sizes, to provide more evidence for generalizing outcomes.

Keywords

Relaxation therapy, stress, pain, hemodialysis, RCTs

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Introduction

Kidney failure, also called end-stage renal disease (ESRD), is defined as the last stage of chronic kidney disease (CKD). When the kidneys fail, that means they are not functioning sufficiently to sustain life and replacement therapy is required (Kalantar-Zadeh et al., 2021). The standard recommended kidney replacement therapies are hemodialysis (HD), peritoneal dialysis, and renal transplantation (Saran et al., 2020). HD is considered the best ESRD management method; nearly 86.9% of ESRD patients in the United States are treated in this way (Saran et al., 2020). However, HD is a stressful experience for ESRD patients (Kara, 2018) and,

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while it boosts their survival chances, it might be a source of stress for patients undergoing maintenance hemodialysis (PUMH) (Morowatisharifabad et al., 2020).

Once ESRD patients begin receiving HD, they often experience ongoing stress because of time limits, functional constraints, dietary constraints, and medication-linked side effects (Nikkhah et al., 2020; Özkan & Taylan, 2022; Wang & Chen, 2012). Of a sample of PUMH, 77.3% reported severe to extremely severe stress (Senmar et al., 2020). Earlier research revealed that 56% of PUMH faced severe levels of stress, while 27% had extreme levels, 14% had moderate levels, and 3% had mild levels (Joseph et al., 2017). Around 56.2% of PUMH reported that their stress was related to their disease (Gemmell et al., 2016). PUMH generally experience at least one physiological and psychosocial stressor (Soponaru et al., 2016; Tchape et al., 2018). The most frequently reported physiological stress factors were exhaustion (97%) and arteriovenous fistula (88%). Regarding psychosocial stressors, hospital transportation (99.5%) and treatment costs (99.5%) were the most reported (Tchape et al., 2018). The significant changes to their daily lives mean that ESRD may bring individuals chronic symptoms, Stress and Pain (S&P), in addition to the essential HD treatment (Beng et al., 2019).

Pain is one of the most prevalent complaints among PUMH (Fleishman et al., 2018; Jhamb et al., 2020), with varying estimates of 74.4% (Sadigova et al., 2020) to 82% experiencing it (Fleishman et al., 2018). Furthermore, around 75% of PUMH reported that their pain was related to ineffective pain management (Jhamb et al., 2020). The pain intensity among PUMH (7.2 ± 2.2) has been rated as mild in 6.1% of cases, moderate in 43.3%, and severe in 50.5% (Dreiher et al., 2021). A Systematic Review (SR) assessing the prevalence of pain in patients with CKD reported that the overall prevalence rate for pain was 60%, with 48% experiencing chronic pain and 10% neuropathic pain. Pain prevalence appears to be higher among dialysis patients (63%) than kidney transplant patients (46%) (Lambourg et al., 2021).

S&P are connected in various ways, a relation that has been established and acknowledged (Melzack, 1999). S&P function as warning signals to identify any potentially harmful incidents (Abdallah & Geha, 2017; Chen et al., 2021). Experiencing pain leads to the development of stress (Chen et al., 2021). An individual suffering from either stress or pain might subsequently experience both, which implies a vicious cycle and a complex relationship (Abdallah & Geha, 2017; Chen et al., 2021). Physiological stressors include pain from needle sticks and the muscle cramps due to HD treatment (Al Nazly et al., 2013). One study reported a positive association between S&P levels among PUMH ($r = 0.563$) (Heidari Gorji et al., 2014).

Since S&P are clearly endemic among PUMH, healthcare providers use diverse methods to control the associated symptoms, including pharmacological and non-pharmacological interventions. There is apparently increasing interest in the use of non-pharmacological interventions, which can often be more cost-effective, particularly compared to analgesics (Zins et al., 2018). Numerous PUMH have expressed a keenness to use therapies that do not feature pharmacology, such as the Benson's Relaxation Technique (BRT), an intervention that has supported to be effective (Akyol et al., 2011; Zins et al., 2018). BRT, one of the most useful and familiar non-pharmacological interventions, was first developed by Dr. Herbert Benson in 1975 (Benson & Klipper, 1975).

The definition of the BRT is a person's capability to stimulate the release of chemicals and brain signals in their body that slow their muscles and organs while increasing the blood flow to their brain (Benson & Klipper, 1975). It is a form of meditation that utilizes the parasympathetic nervous system to reduce the individual's reactions to stress (Benson & Klipper, 1975). BRT reduces the sympathetic nervous system's activity, thus lowering the body's oxygen consumption (Benson & Klipper, 1975). The consequent muscle relaxation results in a relaxed sensation (Benson & Klipper, 1975). Once this state has been attained, the parasympathetic system takes over, which calms the participants and helps them to eliminate common symptoms like S&P, fatigue, anxiety, and depression (Elsayed et al., 2019).

Significance of the Study

S&P are clearly endemic among PUMH, and several Randomized Controlled Trials (RCTs) evaluating the efficacy of BRT in various settings have reported a significant decrease in stress levels (Annal & Dhandapani, 2019; Borzoee et al., 2020; Jourabchi et al., 2020; Mohammadi & Parandin, 2019; Parmar & Tiwari, 2021) and pain (Fitri et al., 2020; Mohammadi & Parandin, 2019; Molazem et al., 2021; Parmar & Tiwari, 2021; Titi et al., 2021). Moreover, an extensive array of bodily and psychological signs and symptoms such as S&P, anxiety, and depression may be affected by BRT (Elsayed et al., 2019). An SR evaluating the efficacy of BRT in alleviating anxiety and depression among PUMH revealed that BRT significantly reduced anxiety but not depression, which is associated with stress (Abu Maloh et al., 2022). Thus, the aim of the SR was to evaluate the effectiveness of BRT in reducing S&P among PUMH.

Methods

Aims

This SR aimed to evaluate the effectiveness of BRT in reducing S&P among PUMH.

Design

An SR of RCTs was conducted by following the PRISMA guidelines (Moher et al., 2009). In the current SR, the

PICOS criteria - Population (PUMH), Intervention (BRT), Comparator (Control group), Outcome (S&P), and Study (RCTs) - were employed when considering the development of the research questions. This review protocol was registered in PROSPERO.

Search Methods

The identification of RCT designs referring to "BRT" (intervention) for "PUMH" (population) between January 2000 and April 2023 was achieved by performing a systematic literature search, thereby extracting relevant and recent research. PubMed, Ovid, EBSCO Host (Academic Search, Cochrane, CINAHL, Health Business Elite, MEDLINE, the Psychology and Behavioral Sciences Collection, SPORTDiscus), and Google Scholar were included as the search databases. The search terms included "Benson's relaxation", "Benson's response", "Benson's technique", "Benson's training", "Benson's relaxation technique", "pain", "pain perception", "stress", "perceived stress", "hemodialysis", "haemodialysis", "dialysis", "renal dialysis", and "RCTs". The truncation operator '*' and the Boolean operators 'OR' and 'AND' were used to extract suitable research articles. The search strategy is given in table 1.

Inclusion Criteria

Studies featuring: (1) BRT; (2) PUMH 18 years of age or older as participants; (3) BRT to measure stress or pain; (4) RCTs; and (5) publications in English formed the inclusion criteria.

Exclusion Criteria

The exclusion criteria were studies that involved: (1) comparative design that used BRT versus other alternative therapies; (2) pharmacological interventions (i.e., other than comparative studies); and (3) peritoneal dialysis or kidney transplants.

Search Outcomes

A total of 144 studies were identified from the initial searching based on PRISMA guidelines. After the duplicates were removed, 77 studies were left to be screened by their titles and abstracts. A total of 63 studies were excluded; 42 used other relaxation techniques (not BRT), 16 studies were not in English, and five were discussion articles, reviews, or case reports. Subsequently, 14 studies involved full-text assessment, and 10 were excluded; two studies were not RCTs and 10 incorporated BRT but did not measure pain or stress. As a result, four RCTs met the eligibility criteria and were involved in this SR. The PRISMA flow diagram is presented in Figure 1.

The titles and abstracts identified using the research strategy were independently screened and reviewed by six authors. Articles that met the eligibility criteria were carried forward to the following step. After that, the full-text articles were assessed independently by the authors according to the eligibility criteria. Furthermore, any duplicated articles were removed. Finally, the seventh senior author approved the final RCTs to include in the SR.

Quality Appraisal

The RCTs were assessed using the Cochrane's Risk of Bias (RoB) in randomized trials (RoB 2) tool. The RCT quality checks referred to the RoB due to the process of randomization or any deviation from the planned interventions, the outcome data being absent, the outcome measurement, the choices about the reported findings, and the RoB in general. In the RoB judgment, *low*, *some concerns*, and *high* are the options as responses. Table 2 contains the RCT quality assessment using RoB 2.

Data Abstraction

The senior seventh author approved the attributes of the RCTs, which the other six authors then extracted independently. Overall, the review featured four RCTs. The basic characteristics comprised the authors' names, publication years, places of origin, purposes of studies, research designs and settings, sampling, sample sizes, interventions, measures and outcome measures, limitations, and strengths. A summary of the reviewed data from these papers is presented in table 3.

Data Synthesis

Three RCTs did not give a sufficient description of blinding and were adjudged to have low RoB, although they deviated from their planned intervention (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Rambod et al., 2013). Meanwhile, RoB was adjudged to be high in the fourth work, which failed to describe in sufficient detail the randomization process, nonconformity to the intended interventions, absent outcome data, and measurement of the outcomes (Otaghi et al., 2016). This insufficient description of details meant that every category had an RoB rating of *some concerns*. The work failed to give descriptions of the way that PUMH were randomly assigned to the treatment group or control group, explanations for participant attrition, or details about the participant- and staff-blinding process and the assessors of the outcomes. Thus, an overall high RoB rating was allocated to this study. Additionally, clinical trials were not registered by any of the RCTs (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016; Rambod et al., 2013). However, all the reviewed RCTs were applicable to practice.

Table 1. Search Strategy Results of Benson's Relaxation Technique on Stress and Pain among Patients Undergoing Maintenance Hemodialysis.

Database	Search Item	Result
EBSCO Host: "Academic Search, CINAHL, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Cochrane Methodology Register, Health Business Elite, MEDLINE, Psychology and Behavioral Sciences Collection, SPORTDiscus".	("Benson's relaxation" **OR** "Benson's response" **AND** "hemodialysis") ("Benson's technique" **OR** "Benson's training" **AND "**haemodialysis") ("Benson's relaxation technique" **AND "**dialysis" **OR** "renal dialysis") ("Benson's relaxation " **AND "**Hemodialysis" **AND** "RCTs") ("Benson's relaxation" **OR** "Benson's response" **AND "**pain") ("Benson's technique" **OR** "Benson's training" **AND "**pain") ("Benson's relaxation technique" **AND "**hemodialysis" **AND** "pain perception") ("Benson's relaxation" **OR** "Benson's response" **AND "**stress") ("Benson's technique" **OR** "Benson's training" **AND "**stress") ("Benson's relaxation technique" **AND** "hemodialysis" **AND** "perceived stress")	84
PubMed	("Benson's relaxation" **OR** "Benson's response" **AND** "hemodialysis") ("Benson's technique" **OR** "Benson's training" **AND "**haemodialysis") ("Benson's relaxation technique" **AND "**dialysis" **OR** "renal dialysis") ("Benson's relaxation " **AND "**Hemodialysis" **AND** "RCTs") ("Benson's relaxation" **OR** "Benson's response" **AND "**pain") ("Benson's technique" **OR** "Benson's training" **AND "**pain") ("Benson's relaxation technique" **AND "**hemodialysis" **AND** "pain perception") ("Benson's relaxation" **OR** "Benson's response" **AND "**stress") ("Benson's technique" **OR** "Benson's training" **AND "**stress") ("Benson's relaxation technique" **AND** "hemodialysis" **AND** "perceived stress")	14
ProQuest Central	("Benson's relaxation" **OR** "Benson's response" **AND** "hemodialysis") ("Benson's technique" **OR** "Benson's training" **AND "**haemodialysis") ("Benson's relaxation technique" **AND "**dialysis" **OR** "renal dialysis") ("Benson's relaxation " **AND "**Hemodialysis" **AND** "RCTs") ("Benson's relaxation" **OR** "Benson's response" **AND "**pain") ("Benson's technique" **OR** "Benson's training" **AND "**pain") ("Benson's relaxation technique" **AND "**hemodialysis" **AND** "pain perception") ("Benson's relaxation" **OR** "Benson's response" **AND "**stress") ("Benson's technique" **OR** "Benson's training" **AND "**stress") ("Benson's relaxation technique" **AND** "hemodialysis" **AND** "perceived stress")	3
Science Direct	("Benson's relaxation" **OR** "Benson's response" **AND** "hemodialysis") ("Benson's technique" **OR** "Benson's training" **AND "**haemodialysis") ("Benson's relaxation technique" **AND "**dialysis" **OR** "renal dialysis") ("Benson's relaxation " **AND "**Hemodialysis" **AND** "RCTs") ("Benson's relaxation" **OR** "Benson's response" **AND "**pain") ("Benson's technique" **OR** "Benson's training" **AND "**pain") ("Benson's relaxation technique" **AND "**hemodialysis" **AND** "pain perception") ("Benson's relaxation" **OR** "Benson's response" **AND "**stress") ("Benson's technique" **OR** "Benson's training" **AND "**stress") ("Benson's relaxation technique" **AND** "hemodialysis" **AND** "perceived stress")	5
Sage Journals	("Benson's relaxation" **OR** "Benson's response" **AND** "hemodialysis") ("Benson's technique" **OR** "Benson's training" **AND "**haemodialysis") ("Benson's relaxation technique" **AND "**dialysis" **OR** "renal dialysis") ("Benson's relaxation " **AND "**Hemodialysis" **AND** "RCTs") ("Benson's relaxation" **OR** "Benson's response" **AND "**pain") ("Benson's technique" **OR** "Benson's training" **AND "**pain") ("Benson's relaxation technique" **AND "**hemodialysis" **AND** "pain perception") ("Benson's relaxation" **OR** "Benson's response" **AND "**stress") ("Benson's technique" **OR** "Benson's training" **AND "**stress") ("Benson's relaxation technique" **AND** "hemodialysis" **AND** "perceived stress")	7
Ovid	("Benson's relaxation" **OR** "Benson's response" **AND** "hemodialysis") ("Benson's technique" **OR** "Benson's training" **AND "**haemodialysis") ("Benson's relaxation technique" **AND "**dialysis" **OR** "renal dialysis") ("Benson's relaxation " **AND "**Hemodialysis" **AND** "RCTs")	30

(continued)

Table 1. Continued.

Database	Search Item	Result
Google Scholar	("Benson's relaxation" **OR** "Benson's response" **AND "**pain") ("Benson's technique" **OR** "Benson's training" **AND "**pain") ("Benson's relaxation technique" **AND "**hemodialysis" **AND** "pain perception") ("Benson's relaxation" **OR** "Benson's response" **AND "**stress") ("Benson's technique" **OR** "Benson's training" **AND "**stress") ("Benson's relaxation technique" **AND** "hemodialysis" **AND** "perceived stress") ("Benson's relaxation" **OR** "Benson's response" **AND** "hemodialysis") ("Benson's technique" **OR** "Benson's training" **AND "**haemodialysis") ("Benson's relaxation technique" **AND "**dialysis" **OR** "renal dialysis") ("Benson's relaxation " **AND "**Hemodialysis" **AND** "RCTs") ("Benson's relaxation" **OR** "Benson's response" **AND "**pain") ("Benson's technique" **OR** "Benson's training" **AND "**pain") ("Benson's relaxation technique" **AND "**hemodialysis" **AND** "pain perception") ("Benson's relaxation" **OR** "Benson's response" **AND "**stress") ("Benson's technique" **OR** "Benson's training" **AND "**stress") ("Benson's relaxation technique" **AND** "hemodialysis" **AND** "perceived stress")	1

Results

Study Characteristics

All four RCTs applied BRT for the intervention group, while the control group was given routine care (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016; Rambod et al., 2013). The studies evaluated the impact of BRT on stress (Mahdavi et al., 2013; Otaghi et al., 2016), pain (Rambod et al., 2013), or S&P together (Heidari Gorji et al., 2014). The impacts of BRT on stress were evaluated by three RCTs (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016), while its effects on pain were assessed by two (Heidari Gorji et al., 2014; Rambod et al., 2013).

None of the RCTs reported any information about achieving a certain pain or stress score in the participant inclusion criteria (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016; Rambod et al., 2013). For the participant exclusion criteria, three RCTs omitted PUMH with physical disabilities or limitations (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Rambod et al., 2013). Three RCTs excluded anyone with any co-morbidities (Rambod et al., 2013) or those other than diabetes and HTN (Heidari Gorji et al., 2014; Mahdavi et al., 2013).

In terms of psychiatric disorders and medicines, two RCTs excluded PUMH with any previous history of psychiatric disorders and those on regular tranquilizers or sedatives that affect mental health (Heidari Gorji et al., 2014; Mahdavi et al., 2013). In terms of unpleasant events, two RCTs excluded participants who had experienced emotional upheavals, such as a family death or a divorce (Otaghi et al., 2016; Rambod et al., 2013).

Samples and Settings

All four RCTs included in this SR were conducted in Iran, with sample sizes of 75 to 88 participants. The mean age ranged from (47.98 ± 12.53) to (62.29 ± 8.51) years; 18 years was the minimum age and 86 years was the maximum (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016; Rambod et al., 2013). Three RCTs reported having 55–61% male participants (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Rambod et al., 2013), while one had equal numbers of females and males (50% each) (Otaghi et al., 2016).

Inclusion and Exclusion Criteria for Participants

Measurement tools and outcome measures. Two RCTs used the Depression, Anxiety, and Stress Scale (DASS21) to measure the level of stress (Mahdavi et al., 2013; Otaghi et al., 2016), one RCT used the Pain Numeric Rating Scale to measure pain intensity (Rambod et al., 2013), and the remaining RCT assessed S&P together using the Short-Form McGill Pain Questionnaire and the Depression, Anxiety, and Stress Scale-(DASS21) to explore the outcome measures for the severity of S&P and the correlation between them (Heidari Gorji et al., 2014). All the RCTs revealed that the outcome measurement tools' validity and reliability had been established and confirmed in earlier studies (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016; Rambod et al., 2013). However, a calculation was undertaken of the Pain Numeric Rating Scale's reliability in one RCT, revealing a Cronbach's alpha coefficient value of $(a = 0.94)$ (Rambod et al., 2013).

Intervention Adherence

The BRT intervention was conducted in hospital HD units and continued at home (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016; Rambod et al., 2013). One RCT reported the intervention adherence measures in detail

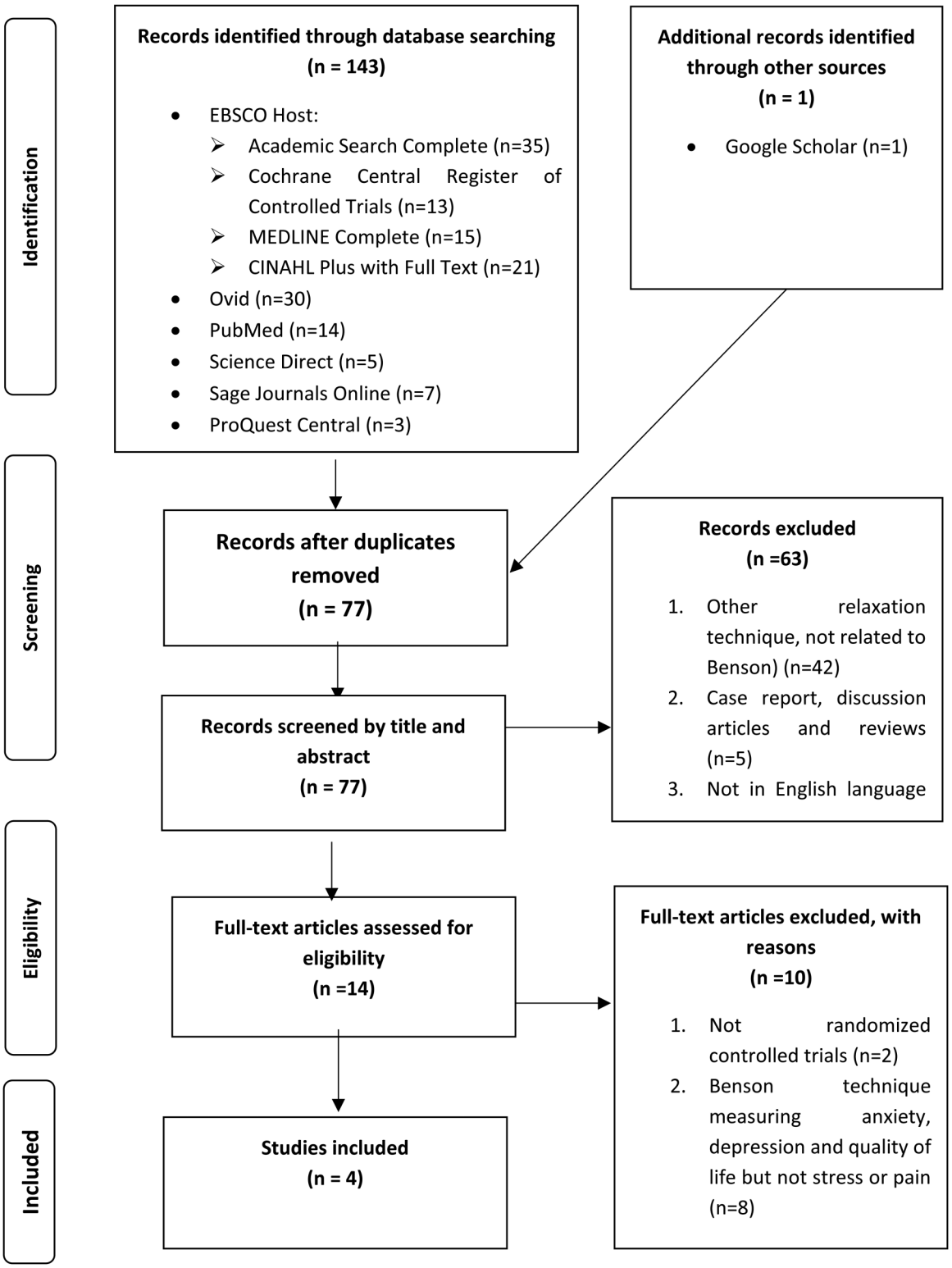

Figure 1. Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) Flow Chart. Search results and study selection procedures.

(Rambod et al., 2013), but these were lacking in the remaining three RCTs, which failed to specify if the interventions were carried out prior to, during, or after HD treatment (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016). Effective learning among PUMH was investigated in two studies, in which the patients received a CD

Table 2. The Cochrane's Risk of Bias in Randomized Trials (ROB 2) Assessing the Selected Studies.

Author	Risk of bias	Overall risk of bias judgment
(Rambod, Sharif et al., 2013).	-Bias due to deviations from the intended interventions.	Low risk of bias
(Heidari Gorji et al., 2014).	-Bias due to deviations from the intended interventions.	Low risk of bias
(Mahdavi et al., 2013).	-Bias due to deviations from the intended interventions.	Low risk of bias
(Otaghi et al., 2016).	-Bias arising from the randomization process. -Bias due to deviations from the intended interventions. - Bias due missing outcome data - Bias in measurement of the outcome.	High risk of bias

featuring BRT and later undertook a training practice to assess their learning (Mahdavi et al., 2013; Rambod et al., 2013). Furthermore, caregivers were instructed to direct PUMH to perform BRT properly throughout the study period in two RCTs (Heidari Gorji et al., 2014; Mahdavi et al., 2013). Meanwhile, the guaranteed effectiveness of BRT in terms of learning in PUMH was another type of detail lacking in one RCT (Otaghi et al., 2016).

To make it easier for the PUMH to comply with the procedures, one study required them to complete a self-reporting Performance Record Form (PRF) every day, and the HD center was visited weekly by the interventionist to aid the PUMH in performing BRT; the researcher collected the self-reporting forms (Rambod et al., 2013). In two RCTs, caregivers were told to give directions to the PUMH so that they could perform BRT. Intervention compliance was ensured by contacting the PUMH every day by phone and reminding them about when the therapy should be performed (Heidari Gorji et al., 2014; Mahdavi et al., 2013). On the other hand, one study lacked details about PUMH compliance with the BRT intervention (Otaghi et al., 2016).

Efficacy of BRT Intervention

The assessments of the four RCTs provided evidence that BRT was efficacious in reducing S&P in PUMH (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016; Rambod et al., 2013). Two RCTs reported a significant difference in the lower stress scores obtained pre and post-intervention ($p < 0.001$) in the intervention group (Mahdavi et al., 2013), and in all the intervals (immediately after, after two weeks, and one and two months after the intervention) (Otaghi et al., 2016). In one study, the mean pain scores of each group were significantly different ($p = 0.01$), suggesting that the intervention group had experienced a significant fall in their pain intensity mean scores (Rambod et al., 2013). Finally, the last study reported a significant difference in the S&P score reductions pre and post-intervention ($p < 0.001$), and a correlation between S&P ($r = 0.563$) was found ($p < 0.000$) (Heidari Gorji et al., 2014).

Discussion

Iran was the research location for every reviewed RCT. Small to moderate sample sizes were employed, which might prevent the full generalizability of the findings (Heidari Gorji et al., 2014; Mahdavi et al., 2013; Otaghi et al., 2016; Rambod et al., 2013). Therefore, the authors suggest conducting additional RCTs in other countries using larger sample sizes, as well as offering further evidence with which the outcomes can be generalized, thus increasing their usefulness in terms of the likely implications for evidence-based practice. No significant differences were identified in the baseline attributes of the two groups, which supports their internal validity. Furthermore, all the RCTs included a power calculation and reported the reliability and validity of the measures, supporting their internal consistency. However, no study contained a theoretical explanation of why BRT interventions could be linked to stress or pain. The quality of the results might be improved through a more robust theoretical method, which would enhance the intervention and study design.

The inclusion criteria are key features used to classify participants as eligible for a study using a reliable and uniform method (Patino & Ferreira, 2018). If certain stress or pain scores are attained, this enables the detection and classification of enrolled participants who are actually experiencing stress or pain. Not actively assessing certain stress or pain scores could lead to an inaccurate understanding of the impacts of BRT on S&P and undermine the quality of the findings. Diverse tools can be used to measure S&P levels as part of the inclusion criteria for participants, such as the Perceived Stress Scale, Anxiety and Stress Scale, Stress Overload Scale, Pain Numeric Rating Scale, Brief Pain Inventory, McGill Pain Questionnaire, and Visual Analog Scale. The efficacy of BRT in relieving anxiety and depression was evaluated in one SR, which stated that if particular anxiety or depression scores were attained, any PUMH genuinely experiencing anxiety and depression could be detected and classified. This would prevent inaccurate results concerning the influence of BRT on anxiety and depression (Abu Maloh et al., 2022).

The exclusion criteria prevent ineligible participants from being involved in a study. PUMH commonly suffer from various comorbidities (Cha & Han, 2020), diabetes and HTN being the most common (Cha & Han, 2020; Lee et al., 2018). The presence of comorbidities could affect S&P among PUMH as well as the effectiveness of BRT, which may qualify the findings. Moreover, the use of

Table 3. Overview of all Included Studies in Systematic Review.

Author /Country	Purpose	Design	Sample & Setting	Intervention	Measures	Outcomes	+Strengths & -Limitations
(Rambod, Sharif et al., 2013). Iran	Evaluating the effect of Benson relaxation technique in relieving pain and improving quality of life in hemodialysis patients.	Randomized controlled trial.	Sample: N = 86 Intervention (n = 41) Control (n = 40) With 5 drop outs. Convenience sampling Sex: Males (n = 53) Females (n = 33) Mean age: 49.07 years (SD = 13.31) for intervention 50.72 years (SD = 11.68) for control. No significant group differences. Setting: Two hemodialysis units in Namazi and Shahid Faghihi hospital affiliated to Shiraz University of Medical Sciences, Shiraz.	Intervention group was instructed by interventionist verbally describe the technique then they listened to audiotape of technique twice a day for 20 min each time for 8 weeks. Also, a CD on relaxation was given to patients to ensure their effective learning. Control group had standard care.	Pain numeric rating scale.	A significant difference in mean pain scores between groups (p = 0.01). Mean score of pain intensity had significantly decreased within intervention group.	+Participants with physical limitations were excluded from the study. -No report of inclusion criteria for participants in achieving a certain pain or stress score. +Excluded anyone with co-morbidity. +Excluded participants with physical disability. -No report of participants on use of medicines affecting ones mental health (on regular tranquillizer or sedative drugs). -No report of participants with history of psychiatric disorders. + Excluded participants with emotional upheaval such as death or divorce of family member or any problem affecting negatively their mood during the previous month. -Stress was not measured. -No theory. +Intervention duration was for 8 weeks. +Provided reliability and validity for measures. +Provided power analysis.

(continued)

Table 3. Continued.

Author /Country	Purpose	Design	Sample & Setting	Intervention	Measures	Outcomes	+Strengths & -Limitations
(Heidari Gorji et al., 2014). Iran	Evaluating the impact of Benson relaxation method on stress, anxiety and pain perception of hemodialysis patients.	Randomized controlled trial	Sample: N = 88 Intervention (n = 40) Control (n = 40) With 8 drop outs. Convenience sampling Sex: Males (n = 44) Females (n = 36) Mean age: 47.98 years (SD = 12.53). No significant group differences. Setting: Imam Khomeini and Fatemeh Zahra Hospitals in the Mazandaran city.	Intervention group watched video to learn Benson relaxation method, as well as caregiver, in the Hemodialysis center. Technique performed twice a day for 15 min each time for 4 weeks. Control group had standard care.	McGill Pain Questionnaire -Short form. Depression, Anxiety, Stress Scale - (DASS21) Questionnaire.	A significant difference in pain and stress was found between two-time frames before and after intervention ($p < 0.001$). A correlation between pain and stress ($r = 0.563$ was found ($p < 0.000$).	-Lacked detail if video was played before, during, or after hemodialysis sessions. -No report of inclusion criteria for participants in achieving a certain pain or stress score. +Excluded anyone with co-morbidity except diabetes and hypertension. +Excluded participants with physical disability. +Excluded participants on regular tranquillizer or sedative drugs. +Excluded participants that had a previous history of psychiatric disorders. -Intervention duration was for 4 weeks. -No theory. +Measured pain and stress. +Provided the correlation between pain and stress. +Provided reliability and validity for measures. +Provided power analysis.
(Mahdavi et al., 2013). Iran	Evaluating the impact of Benson relaxation method on stress, anxiety and	Randomized controlled trial.	Sample: N = 80 Intervention (n = 40) Control (n = 40) Convenience sampling	Intervention group watched video to learn Benson relaxation method, as well as caregiver, in	Depression, Anxiety, Stress Scale - (DASS21) Questionnaire.	A significant difference in stress was found between two-time frames before and after	-Lacked detail if video was played before, during, or after hemodialysis sessions. -No report of

(continued)

Table 3. Continued.

Author /Country	Purpose	Design	Sample & Setting	Intervention	Measures	Outcomes	+Strengths & -Limitations
	depression of hemodialysis patients.		Sex: Males (n = 44) Females (n = 36) Mean age: 47.98 years (SD = 12.53). No significant group differences. Setting: Imam Khomeini and Fatemeh Zahra Hospitals in the Mazandaran city.	the Hemodialysis center. Also, a CD was provided and caregiver was asked to observe and guide patients to practice correctly. Technique performed twice a day for 15 min each time for 4 weeks. Control group had standard care.		intervention ($p < 0.001$).	inclusion criteria for participants in achieving a certain stress score +Excluded anyone with co-morbidity except diabetes and hypertension. +Excluded participants with physical disability. +Excluded participants on regular tranquillizer or sedative drugs. +Excluded participants that had a previous history of psychiatric disorders. -Pain was not measured. -Intervention duration was for 4 weeks. -No theory. +Provided reliability and validity for measures. +Provided power analysis.
(Otaghi et al., 2016). Iran	Evaluating the effect of Benson relaxation on stress, anxiety and depression of hemodialysis patients.	Randomized controlled trial with repeated measures.	Sample: N = 75 Intervention (n = 35) Control (n = 35) With 5 drop outs. Sex: Males (n = 35) Females (n = 35) Mean age: 62.29 years (SD = 8.51). No significant group differences. Setting: Province of Ilam.	Intervention group was advised by the interventionist to perform Benson's relaxation technique. Technique performed twice a day for 15 min each time for 8 weeks. Control group had standard care.	Depression, Anxiety, Stress Scale - (DASS21) Questionnaire.	A significant difference in stress scores was found in all intervals immediately after, two weeks later, one and two months after intervention ($p < 0.005$).	-Lacked detail if technique performance was performed before, during, or after hemodialysis sessions. -No report of inclusion criteria for participants in achieving a certain stress score. -No report of co-morbidities. - No report of Participants with physical

(continued)

Table 3. Continued.

Author /Country	Purpose	Design	Sample & Setting	Intervention	Measures	Outcomes	+Strengths & -Limitations
							disabilities. +Excluded participants that a death of a family occurs. -No report of participants on use of medicines affecting ones mental health (on regular tranquillizer or sedative drugs). -No report of participants with history of psychiatric disorders. -Pain was not measured. -No theory. +Intervention duration was for 8 week and was conducted at five intervals before, immediately after, two weeks later, one and two months after intervention +Provided reliability and validity for measures. +Provided power analysis.

tranquilizers or sedative drugs could cause a reduction in S&P levels (Mehta et al., 2018). This might conceal or make imprecise the results indicating the relative efficacy of BRT, affecting the quality of the overall outcomes. An SR reported that the use of tranquilizers or sedatives could mask the efficacy of BRT in relieving anxiety and depression (Abu Maloh et al., 2022).

PUMH experiences muscle weakness and exhibits poor physical activity (Roshanravan et al., 2017). Promoting adherence to an intervention among participants with physical limitations or disabilities is challenging, as is maintaining physical participation among participants with such issues (Smith & Wightman, 2019). Consequently, when dealing with participants who have physical limitations or disabilities, special precautionary and adherence steps should be taken (Roshanravan et al., 2017; Smith & Wightman, 2019). An intervention could impact their disability status, while intervention non-adherence could influence the quality of the findings. The SARC-F questionnaire is an appropriate tool for detecting impaired physical function and the risk of physical limitations in PUMH (Yamamoto et al., 2019).

Emotional upheavals can affect the quality of the findings and increase the level of S&P that patients experience. Such situations could affect the capability of the participants to focus on or practice the BRT. Thus, it is essential that the impacts of such events are eliminated to obtain precise findings about the S&P-related efficacy of BRT in PUMH. Major

events and life scenarios can be detected using various tools, such as the Social Readjustment Rating Scale, Stressful Life Event Questionnaire, Life Events Inventory, and Stressful Life Events Screening Questionnaire. Participants facing serious life events and situations, like emotional upheavals or unpleasant occurrences, can be identified through these tools (Abu Maloh et al., 2022).

Adherence is an essential part of the efficacy of complementary therapies, and enhancing participant adherence is a crucial concern for intervention studies and clinical practitioners (Zheng et al., 2014). All the reviewed RCTs revealed that BRT was performed at HD units and continued at home. However, the time frame is crucial for PUMH, and the HD sessions and BRT intervention delivery must be coordinated to enhance the intervention's consistency and adherence. Additionally, it is essential to organize events with management and healthcare providers when applying the BRT practice to avoid any influences or disconnects that might affect the workflow, cause staff interruptions, or reduce compliance with the intervention among PUMH. Non-adherence of PUMH to the BRT intervention may explain why one set of participants' depression scores did not fall significantly (Abu Maloh et al., 2022).

Participant compliance and effective treatment learning are essential to the efficacy of the intervention (Jankowska-Polańska et al., 2018). There are different ways of providing effective learning and ensuring participant compliance. The studies reviewed contained several of these, such as brochures or CDs about how to perform BRT; asking the caregiver to direct the participant to undertake BRT; making daily phone contact with a participant; issuing texts to remind the participants; sending a BRT-related video; and having the participants complete a relaxation registration checklist outlining the durations, times, and dates of the relaxation process. Effective communication and good relationships between healthcare providers and patients improve the effective learning of the latter and their intervention compliance (Sibiya, 2018). Not ensuring effective BRT learning and compliance among PUMH may also explain why their depression scores were not significantly reduced (Abu Maloh et al., 2022).

Different forms of physiological and psychosocial stressors are experienced by PUMH (Elgamal & Saleh, 2019; Tchape et al., 2018). The former include feeling tired, arterial and venous stick, loss of body functions, joint stiffness, muscle cramps, nausea, and vomiting (Elgamal & Saleh, 2019; Tchape et al., 2018). Examples of psychosocial stressors are transport to the hospital, treatment costs, physical activity restrictions, impaired social life, limitations on food and drinks, dialysis duration and procedures, being dependent on medical staff, being frequently hospitalized, and suffering from disturbed sleep (Elgamal & Saleh, 2019; Tchape et al., 2018). To identify which types of stressors are found among PUMH, the use of the Hemodialysis Stressor Scale has been suggested (Dang et al., 2018). Identifying stress types could influence the selection and efficacy of an intervention and guide the selection of suitable stress measurement tools. Different tools can be used to measure stress among PUMH, for example, the Perceived Stress Scale, the Stress Overload Scale, and the Depression, Anxiety, and Stress Scale.

PUMH report various types of pain, the most important of which (in terms of clinical management) are HD-related (Brkovic et al., 2016) and chronic pain (Ghonemy et al., 2016). A SR reported that PUMH experiences acute, chronic, and neuropathic pain, as well as myalgia (dos Santos et al., 2021). Measuring the type of pain but not its intensity (or vice-versa) can misdirect the intervention, so it is essential to assess the type and severity of pain, which affects the selection and efficiency of the intervention. Furthermore, this can guide the selection of appropriate pain measurement tools (Gregory, 2019). Comprehensive pain assessment tools (which assess all dimensions of pain) are ideal. Various measurement tools can be used to measure pain among PUMH, for example, the Brief Pain Inventory, McGill Pain Questionnaire, Pain Management Index, Edmonton Symptom Assessment System, and Visual Analog Scale (Upadhyay et al., 2014). It is recommended to use two or more methods to evaluate the clinical importance of improvements in or worsening of pain as a research outcome measure (Van Boekel et al., 2017).

S&P are two different but interrelated processes that entail many conceptual and physiological interactions. The concepts of S&P clearly overlap and, when taken together, they offer an opportunity for theoretical and experimental exchanges between fields of study (Abdallah & Geha, 2017). Therefore, assessing S&P together in one study may improve the efficiency of the intervention and enhance the quality of the findings.

BRT was revealed to have the positive effect of decreasing S&P levels among PUMH. Some studies reported that BRT lowered stress (Annal & Dhandapani, 2019; Borzoee et al., 2020; Jourabchi et al., 2020; Mohammadi & Parandin, 2019; Parmar & Tiwari, 2021) and pain levels (Fitri et al., 2020; Mohammadi & Parandin, 2019; Molazem et al., 2021; Parmar & Tiwari, 2021; Titi et al., 2021). A SR revealed that BRT provided a beneficial effect by decreasing the anxiety scores of PUMH but it did not reduce depression (Abu Maloh et al., 2022).

A low to relatively moderate RoB overall was adjudged to apply to the RCTs identified in the search. In general, they managed to address the key methodological principles but did not outline their participant- or personnel-blinding steps because of the forms of intervention adopted. Therefore, performance bias may have been unavoidable. Reporting and registering future RCTs using the CONSORT checklist would help to minimize the RoB.

Limitations

This SR faced several limitations. Firstly, only four RCTs were included due to the eligibility criteria, which may be

insufficient for such a broad topic. Secondly, no theoretical base was available to lead the methodological design for BRT for S&P in PUMH. Thirdly, the setting of all four RCTs was Iran, which limits the generalizability of the outcomes and qualifies the results. Fourthly, the sample sizes ranged from small to moderate, which threatens the generalizability and validity of the findings. Fifthly, the same sample was utilized by two RCTs and it is possible to confirm this through the mean and standard deviation of different variables (Heidari Gorji et al., 2014; Mahdavi et al., 2013). Lastly, this SR did not use the GRADE certainty ratings to evaluate the quality of evidence for the included RCTs. Therefore, it is recommended to conduct additional well-designed RCT on the same topic internationally with larger sample sizes. Furthermore, a connection of a new theory/theoretical design is highly recommended in another systemic review addressing a higher number of RCTs.

Strengths

This SR has possible strengths. Firstly, a meticulous search process was conducted. Secondly, this SR of RCTs followed the PRISMA guidelines. Thirdly, the RCTs of this SR were assessed using the Cochrane's Risk of Bias (RoB). Lastly, there are limited SR about the same topic.

Nursing Practice and Future Research Implications

This SR encourages healthcare organization management teams to implement BRT among PUMH and advises healthcare professionals on how to deliver it. This could positively affect PUMH if it is used as a nursing intervention during regular HD sessions, potentially improving S&P clinical outcomes and increasing service user satisfaction. PUMH can receive BRT from nurses as a daily care nursing treatment in their HD sessions, which might usefully influence patients and healthcare professionals. Additionally, this SR might encourage researchers to carry out further well-designed RCTs in different countries, as well as advanced research on the effects of BRT on S&P in PUMH.

Conclusions

Although a lack of adherence to the intervention details and a judgment of low to relatively moderate overall quality applied to the majority of the RCTs, every RCT showed that BRT as a nursing intervention could reduce S&P among PUMH. Further longitudinal RCTs across different countries would augment the evidence indicating that BRT is efficacious in reducing S&P among PUMH.

List of abbreviations

ESRD	End-Stage Renal Disease.
HD	Hemodialysis.
PUMH	Patient Undergoing Maintenance Hemodialysis.
S&P	Stress and Pain.
BRT	Benson's Relaxation Technique.
RCTs	Randomized controlled trials.
SR	Systematic Review.
CKD	Chronic Kidney Disease.

Authors' Contributions

Conception & Design; [1]H.I.A.M,[2] K.L.S, [3]S.C.C, [4]S.I.F.I, [5]K.G.S, [6]D.I.A.M, [7]M.E.A.R. Data analysis; [1]H.I.A.A.M, [2]K.L.S, [3]S.C.C, [4]S.I.F.I, [5]K.G.S, [6]D.I.A.M, [7]M.E.A.R. Interpretation of data; [1]H.I.A.A.M, [2]K.L.S, [3]S.C.C, [4]S.I.F.I, [7]M.E.A.R. Drafting & revising work; [1]H.I.A.A.M, [2]K.L.S, [3]S.C.C, [4]S.I.F.I, [5]K.G.S, [6]D.I.A.M, [7]M.E.A.R. All authors approved the final version.

Availability of Data and Materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Review

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Supplemental Material

Supplemental material for this article is available online.

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