

Effectiveness of Relaxation Techniques on Sleep Quality and Quality of Life in Menopausal Women: A Systematic Review

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Abstract

Background: Menopause is a physiological transition associated with hormonal changes that may cause sleep disturbances and reduced quality of life. Relaxation techniques have emerged as safe non-pharmacological interventions.

Objective: To systematically evaluate the effectiveness of relaxation techniques on sleep quality and quality of life in menopausal women.

Methods: This systematic review followed PRISMA 2020 guidelines. PubMed, Scopus, and Google Scholar were searched for studies published from January 2020 to March 2026 using relevant keywords. Eligible studies included randomized controlled trials, quasi-experimental, and observational studies involving menopausal women receiving relaxation-based interventions. Two reviewers independently conducted study selection and data extraction. Findings were synthesized narratively following SWiM principles.

Results: Ten studies involving 20 to 1002 participants were included. Interventions comprised progressive muscle relaxation, mindfulness, yoga, and health education combined with relaxation techniques. Most studies reported significant improvements in sleep quality, including reduced insomnia and PSQI scores, as well as improvements in quality of life measured by SF-36 and MENQOL. Combined interventions generally showed greater effects than single modalities. However, standardized effect sizes and confidence intervals were not reported.

Conclusion: Relaxation techniques may improve sleep quality and quality of life in menopausal women. However, the certainty of evidence remains low due to methodological heterogeneity, lack of formal risk of bias assessment, and absence of quantitative synthesis. Further high-quality randomized controlled trials with standardized reporting are needed.

Keywords

Menopause; Relaxation Techniques; Sleep Quality; Quality of Life; Nonpharmacological Therapy

Introduction

Menopause is a natural biological transition characterized by the permanent cessation of menstruation due to declining ovarian function and estrogen levels. This phase typically occurs between 45 and 55 years of age and is accompanied by a wide range of physiological, psychological, and social changes that can significantly affect women's health and well-being.¹ The global increase in life expectancy has resulted in a growing population of postmenopausal women, making menopause-related health issues an important public health concern.²

Sleep disturbances are among the most prevalent symptoms experienced during menopause, with global prevalence estimates ranging from 40% to 60% among menopausal women.³ These disturbances commonly include insomnia, difficulty initiating and maintaining sleep, frequent nocturnal awakenings, and non-restorative sleep.^{3,4} The pathophysiology of sleep disturbances during menopause is multifactorial, involving hormonal fluctuations, vasomotor symptoms such as hot flashes and night sweats, and psychological factors including anxiety and depression.³ Chronic sleep impairment has been associated with adverse outcomes such as reduced cognitive function, impaired emotional regulation, and increased risk of cardiovascular and metabolic diseases.⁵ Consequently, poor sleep quality is recognized as a major determinant of reduced quality of life in menopausal women, affecting physical, psychological, and social domains.⁶

Quality of life during menopause is a multidimensional construct influenced by biological adaptation, psychological resilience, and social support systems.⁷ Empirical evidence suggests that sleep disturbances act as a central mediator linking menopausal symptoms with reduced quality of life, contributing to increased stress, decreased productivity, and impaired interpersonal relationships.^{6,9} Large-scale observational studies further indicate that menopausal sleep disturbances are associated with broader health burdens, including metabolic dysregulation and decreased mental well-being.⁹ These findings highlight the importance of identifying effective interventions that target both sleep quality and overall quality of life in this population.

Pharmacological approaches, including hormone therapy and sedative medications, are commonly used to manage menopausal symptoms and sleep disturbances.³ However, long-term use is associated with potential adverse effects such as increased risks of breast cancer, cardiovascular disease, thromboembolic events, and drug dependence.¹⁰ These limitations underscore the need for safer, sustainable, and patient-centered non-pharmacological interventions.

Relaxation techniques have emerged as promising non-pharmacological strategies for managing menopausal symptoms.¹¹ These include progressive muscle relaxation (PMR), mindfulness-based interventions, yoga, and other mind-body approaches aimed at reducing physiological arousal and psychological stress.¹² From a conceptual perspective, relaxation techniques operate through a biopsychophysiological mechanism, involving downregulation of sympathetic nervous system activity, enhancement of parasympathetic tone, and reduction of stress-related hormones such as cortisol.¹³ This mechanism provides a theoretical framework linking relaxation interventions with improvements in sleep regulation and emotional stability.¹²

Several primary studies and recent systematic reviews have examined the effectiveness of non-pharmacological interventions, including relaxation techniques, in improving sleep outcomes in menopausal women.³ However, the existing evidence remains heterogeneous and fragmented, with substantial variability in study design, intervention protocols, duration, and outcome measures.⁹ Moreover, previous reviews have predominantly focused on sleep outcomes without simultaneously integrating quality of life as a co-primary outcome, resulting in an incomplete understanding of the overall impact of relaxation techniques.

In addition, there is ongoing uncertainty regarding the magnitude, consistency, and comparative effectiveness of different relaxation techniques, particularly when used as standalone interventions versus combined approaches. Variations in methodological quality and the inclusion of heterogeneous populations across studies further limit the interpretability and generalizability of findings. This gap highlights the need for a focused and methodologically transparent systematic review that specifically targets menopausal populations and integrates both sleep quality and quality of life outcomes.

Based on these considerations, the research question of this study was formulated using the PICO framework as follows: in menopausal women (Population), do relaxation techniques (Intervention), compared with no intervention or standard care (Comparison), improve sleep quality and quality of life (Outcomes)?

The objective of this systematic review was to evaluate and synthesize the available evidence on the effectiveness of relaxation techniques, including progressive muscle relaxation, mindfulness, and related approaches, in improving sleep quality and quality of life among menopausal women. It was hypothesized that relaxation techniques would result in clinically meaningful improvements in sleep quality and quality of life compared with control or baseline conditions.

Methods

This study employed a systematic review design to identify, evaluate, and synthesize evidence on the effectiveness of relaxation techniques in improving sleep quality and quality of life among menopausal women. The review process was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure transparency, methodological rigor, and reproducibility.¹⁴

A review protocol was developed a priori to define the research question, eligibility criteria, and analytical approach; however, the protocol was not registered in PROSPERO. This is acknowledged as a limitation and may affect methodological transparency.

A comprehensive literature search was conducted in three electronic databases, namely PubMed, Scopus, and Google Scholar, to identify relevant studies in the fields of clinical medicine, public health, and nursing. The search covered articles published between January 2020 and March 2026, and the final search was conducted in March 2026. In addition to database searching, manual screening of reference lists from eligible studies was performed to identify additional relevant articles.

The inclusion of Google Scholar was intended to increase sensitivity of the search; however, to mitigate potential selection bias, only peer-reviewed journal articles with full-text availability were considered. Grey literature was not systematically searched, and this limitation is acknowledged.

The search strategy combined Medical Subject Headings (MeSH) terms and free-text keywords using Boolean operators. The core search string was structured as follows: ("menopause" OR "postmenopausal women") AND ("relaxation techniques" OR "progressive muscle relaxation" OR "mindfulness" OR "yoga" OR "meditation") AND ("sleep quality" OR "insomnia" OR "quality of life").

Eligibility criteria were defined a priori to ensure relevance and methodological appropriateness. Studies were included if they: (1) involved menopausal or postmenopausal women; (2) evaluated relaxation-based interventions such as progressive muscle relaxation, mindfulness, yoga, or related techniques; (3) reported outcomes related to sleep quality and/or quality of life; (4) used validated measurement instruments; and (5) employed randomized controlled trial, quasi-experimental, or observational study designs. Studies were excluded if they were systematic reviews, meta-analyses, narrative reviews, editorials, case reports, conference abstracts without full text, non-human studies, or studies involving non-menopausal populations. Studies involving non-menopausal populations that were initially identified were excluded from the primary synthesis to ensure population specificity and reduce indirectness bias.

The study selection process was conducted in multiple stages. First, all identified records were imported and duplicates were removed. Second, titles and abstracts were screened based on eligibility criteria. Third, full-text articles were assessed for eligibility. Screening was conducted independently by two reviewers, and disagreements were resolved through discussion and consensus; a third reviewer was consulted when necessary.

The selection process is summarized narratively to facilitate reproducibility. A total of 1,500 records were identified (PubMed: 350; Scopus: 450; Google Scholar: 700). After duplicate removal, 950 records were screened. Of these, 800 were excluded. A total of 150 full-text articles were assessed, and 140 were excluded for predefined reasons. Finally, 10 studies were included in the qualitative synthesis.

Data extraction was performed using a standardized data extraction form to ensure consistency. Extracted variables included study characteristics (author, year, country), study design, sample size, participant characteristics, type of intervention, duration and frequency, comparator, outcome measures, and key findings. Data extraction was conducted independently by two reviewers to minimize extraction bias.

Operational definitions of key variables were established prior to extraction, where sleep quality was defined as outcomes measured using validated instruments such as the Pittsburgh Sleep Quality Index (PSQI), and quality of life was defined as multidimensional constructs measured using validated tools such as the Short Form-36 (SF-36) or Menopause-Specific Quality of Life questionnaire (MENQOL).

The primary outcomes were sleep quality and quality of life. The PSQI has demonstrated good reliability and validity in clinical populations, while SF-36 and MENQOL are widely used instruments for assessing health-related quality of life in menopausal women.^{6,15}

Risk of bias assessment was conducted to evaluate the methodological quality of the included studies. Randomized controlled trials were assessed using the Cochrane Risk of Bias 2 (RoB 2) tool, which evaluates bias across domains including randomization process, deviations from intended interventions, missing outcome data, measurement of outcomes, and selection of reported results.¹⁶ Observational studies were assessed using the Newcastle–Ottawa Scale (NOS), which evaluates selection, comparability, and outcome domains.¹⁷

Each study was independently assessed by two reviewers, and discrepancies were resolved through discussion and consensus. Studies were categorized as low, moderate, or high risk of bias based on overall domain assessments.

Similarly, the certainty of evidence was not evaluated using the GRADE framework, which limits the ability to classify the strength of recommendations derived from this review.

Data synthesis was conducted using a narrative approach due to substantial heterogeneity in study design, intervention types, duration, and outcome measures. The synthesis followed the Synthesis Without Meta-analysis (SWiM) guideline, grouping studies based on type of intervention and outcomes assessed. Patterns, consistencies, and differences across studies were analyzed systematically.

Meta-analysis was not performed due to clinical and methodological heterogeneity and the absence of sufficiently homogeneous quantitative data. Effect size measures and confidence intervals were not consistently reported across included studies; therefore, quantitative pooling and comparative statistical synthesis were not feasible.

Publication bias was not formally assessed (e.g., funnel plot or Egger's test) due to the limited number and heterogeneity of included studies. Ethical approval was not required for this study because it involved secondary analysis of previously published data and did not include direct human participation.

Results

The study selection process was conducted systematically in accordance with the predefined inclusion and exclusion criteria. A total of 1,500 records were identified from PubMed, Scopus, and Google Scholar. After removal of duplicate records, 950 records were screened based on their titles and abstracts, of which 800 were excluded. Subsequently, 150 full text articles were assessed for eligibility, and 140 were excluded for reasons including failure to meet the inclusion criteria, inappropriate or missing outcome measures, residual duplication, low methodological relevance, or inaccessible full text. Finally, 10 studies met the eligibility criteria and were included in the qualitative synthesis. The complete study selection process is presented in Figure 1.

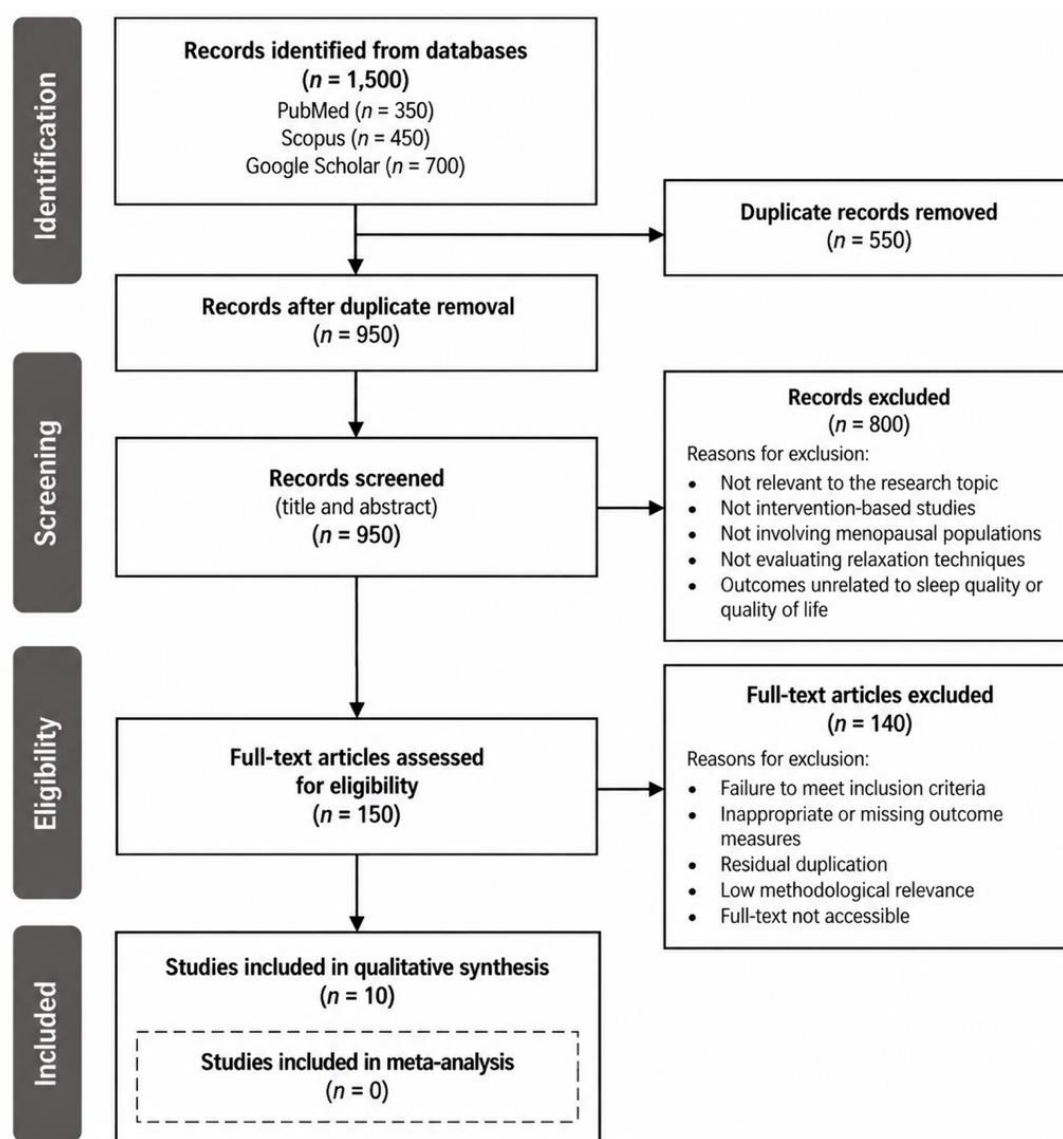


Figure 1. PRISMA 2020 Flow Diagram of the Study Selection Process

All included studies met the predefined inclusion criteria and specifically involved menopausal or perimenopausal populations, thereby reducing indirectness bias. To provide a structured overview of the included studies, their characteristics are summarized in Table 1.

Table 1. Characteristics of Included Studies

Author (Year)	Design & Sample	Intervention	Outcome Measures	Main Findings
Bais et al. (2021) ⁴	Comparative; n=42 menopausal women	Pilates vs PMR (6 months)	MENQOL	Both improved QoL; Pilates showed greater improvement
Anthoni et al. (2022) ¹⁸	Quasi-experimental; n=20	PMR	DASS-42	Reduced stress, anxiety, depression
Zhou et al. (2021) ¹⁹	Observational; n=467	None	PSQI, SAS, SDS	Anxiety (17.86%) and depression (5.36%) mediated sleep
Andriani et al. (2023) ²⁰	Interventional; n=17 menopausal women	PMR	Sleep questionnaire	Significant improvement (p = 0.000)
Liu et al. (2020) ¹²	RCT; n=51	PMR	STAI, SRSS	Improved sleep and anxiety (p < 0.001)
Harorani et al. (2020) ²¹	RCT; n=80	PMR	STAI, SMHSQ	Improved sleep (p < 0.05)
Birmingham et al. (2022) ⁵	Cohort; n=1002	None	Sleep/metabolic	Poorer sleep in postmenopause
Pelit Aksu et al. (2022) ²²	RCT; n=108	HE + PMR vs PMR	WHIIRS	Combined intervention most effective (p < 0.05)
Calderone et al. (2025) ⁸	Systematic review	Relaxation	Various	Improved QoL and stress
Jeon (2024) ¹¹	Narrative review	Non-pharmacological	Various	Supports relaxation approaches

To further evaluate the methodological quality of the included studies and to support the interpretation of findings, a structured risk of bias assessment was conducted. This assessment aimed to identify potential sources of bias that could influence the validity and reliability of the reported outcomes across different study designs.

Randomized controlled trials were evaluated using the Cochrane Risk of Bias 2 (RoB 2) tool, while observational studies were assessed using the Newcastle–Ottawa Scale (NOS). These tools provide a standardized framework for assessing internal validity, including aspects related to study design, outcome measurement, and control of confounding factors.

The results of the risk of bias assessment are summarized in Table 2, which presents the overall risk classification for each included study based on predefined criteria. This evaluation is essential for contextualizing the strength of evidence and identifying limitations that may affect the interpretation of the findings.

Table 2. Risk of Bias Assessment of Included Studies

Study	Design	Tool Used	Risk of Bias
Bais et al. (2021)	Comparative	NOS	Moderate
Anthoni et al. (2022)	Quasi-experimental	NOS	Moderate
Zhou et al. (2021)	Observational	NOS	Moderate
Andriani et al. (2023)	Interventional	NOS	Moderate
Liu et al. (2020)	RCT	RoB 2	Moderate
Harorani et al. (2020)	RCT	RoB 2	Low
Birmingham et al. (2022)	Cohort	NOS	Moderate
Pelit Aksu et al. (2022)	RCT	RoB 2	Low
Calderone et al. (2025)	Systematic review	—	Not assessed
Jeon (2024)	Narrative review	—	Not assessed

Due to heterogeneity in study design, intervention protocols, and outcome measures, a meta-analysis was not feasible. Therefore, findings are synthesized narratively following SWIM principles, with additional semi-quantitative interpretation where possible.

The majority of intervention studies reported statistically significant improvements in sleep quality following relaxation-based interventions. Progressive muscle relaxation (PMR) emerged as the most consistently studied and effective intervention across included studies.^{4,22}

Across interventional studies, improvements in sleep outcomes were indicated by reductions in insomnia symptoms and significant decreases in PSQI scores (p < 0.05). Some studies reported statistically significant improvements in sleep quality, including findings with p < 0.001. However, statistical significance alone does not indicate the magnitude of the intervention effect.

Although standardized effect sizes and confidence intervals were not consistently reported across studies, the consistency of statistically significant findings suggests a potentially beneficial direction of effect. However, the magnitude of the overall effect cannot be classified as small, moderate, or large based on statistical significance alone.

Relaxation techniques also demonstrated positive effects on quality of life, particularly in physical and psychological domains.⁴ Studies using validated instruments such as SF-36 and MENQOL consistently reported improvements in mental health, emotional well-being, and functional status.

Comparative studies indicated that both PMR and structured physical interventions such as Pilates improved quality of life outcomes.⁴ However, combined or multimodal interventions showed relatively greater improvements, suggesting a potential additive or synergistic effect.²²

A semi-quantitative subgroup analysis based on intervention type indicates that progressive muscle relaxation (PMR) consistently demonstrated effectiveness across diverse populations and study designs. In contrast, combined interventions, particularly those integrating health education with PMR, yielded the most substantial improvements in outcomes. Mind–body approaches, such as mindfulness and yoga, were also associated with positive effects; however, these findings were reported less consistently across studies. Overall, these results suggest that multimodal and behaviorally integrated interventions may offer greater clinical benefits compared to single-technique approaches.

Observational evidence indicated that psychological factors, particularly anxiety and depression, play a mediating role in the relationship between menopausal symptoms and sleep quality.¹⁹ Quantitatively, anxiety contributed approximately 17.86% and depression 5.36% to sleep disturbance variance, suggesting that relaxation techniques may exert indirect effects through psychological regulation mechanisms.¹⁹

Substantial heterogeneity was observed across studies in terms of intervention duration, frequency, outcome measures, and study populations. No included studies reported standardized effect sizes (e.g., Cohen's *d*) or confidence intervals, limiting the ability to perform quantitative synthesis or directly compare intervention effects. Formal assessment of heterogeneity (e.g., I^2 statistics) was not conducted due to the absence of meta-analysis. Similarly, publication bias was not assessed.

The presence of predominantly low to moderate risk of bias across included studies suggests that the findings should be interpreted with caution, particularly given the variability in study design and reporting quality.

Discussion

This systematic review aimed to evaluate the effectiveness of relaxation techniques on sleep quality and quality of life in menopausal women. Overall, the findings suggest that relaxation-based interventions, particularly progressive muscle relaxation (PMR), mindfulness, and combined educational approaches, are associated with improvements in sleep quality and multidimensional aspects of quality of life. However, the strength of this evidence must be interpreted cautiously due to methodological limitations and heterogeneity across studies.

A key finding of this review is the consistent improvement in sleep quality following relaxation interventions. This aligns with previous systematic reviews and meta-analyses demonstrating that non-pharmacological interventions, including mind-body therapies, significantly reduce insomnia severity and improve sleep outcomes in menopausal populations.⁹ The observed effects are biologically plausible, as relaxation techniques are known to modulate autonomic nervous system activity by reducing sympathetic arousal and enhancing parasympathetic tone, which facilitates sleep initiation and maintenance.¹² Furthermore, reductions in cortisol levels and psychological stress may contribute to improved sleep regulation, particularly in women experiencing vasomotor symptoms and emotional distress during menopause.¹¹

In addition to sleep improvements, this review identified consistent positive effects on quality of life, particularly in physical and psychological domains. These findings are supported by large-scale observational and interventional studies indicating that sleep quality is a central determinant of overall well-being in menopausal women.⁹ Poor sleep has been associated with reduced functional capacity, impaired emotional health, and decreased social engagement, suggesting that interventions targeting sleep may produce broader benefits beyond symptom relief.⁸ The improvements observed in quality of life outcomes may therefore be mediated not only by physiological relaxation but also by psychological factors such as reduced anxiety, improved mood, and enhanced coping mechanisms.

Importantly, this review highlights the potential added value of combined interventions, particularly those integrating relaxation techniques with health education. Studies included in this review demonstrated that combined approaches yielded greater improvements compared to single interventions, suggesting a synergistic effect.²² This finding is consistent with behavioral health models emphasizing the importance of multimodal interventions that address both physiological and cognitive components of symptom management. Such approaches may enhance adherence, improve self-efficacy, and promote sustainable behavioral change in menopausal women.

The interpretation of these findings should be considered in light of the methodological quality of the included studies. The risk of bias assessment indicated that most studies were classified as having low to moderate risk of bias. Common limitations included inadequate reporting of randomization procedures, lack of blinding, and insufficient control of confounding variables in observational designs. These methodological weaknesses may introduce systematic bias and potentially overestimate the observed intervention effects.

Furthermore, the absence of standardized effect size reporting and confidence intervals across studies limits the ability to quantify the magnitude of intervention effects and compare outcomes across different study designs. As a result, although the direction of the findings is consistent, the strength and clinical significance of the effects remain uncertain.

Despite these promising findings, there remains substantial uncertainty regarding the magnitude and consistency of the observed effects. The included studies varied widely in terms of intervention type, duration, intensity, and outcome measurement tools, which limits comparability and precludes quantitative synthesis. Moreover, the absence of standardized effect size reporting and confidence intervals reduces the ability to estimate the true clinical impact of these interventions. This heterogeneity represents a significant limitation and underscores the need for more standardized research protocols in future studies.

In addition, no formal assessment of publication bias was conducted due to the limited number and heterogeneity of included studies. Therefore, the possibility that studies with negative or non-significant results were underreported cannot be excluded, which may further affect the validity of the conclusions.

Another critical issue identified in this review is the lack of high-level evidence with consistently low risk of bias across all domains. While several randomized controlled trials were included, variations in methodological quality and reporting standards limit the overall confidence in the evidence. From an evidence hierarchy perspective, the overall certainty of evidence in this review can be considered low to moderate, primarily due to study limitations and inconsistency.

The role of psychological mediators, particularly anxiety and depression, emerged as an important consideration in interpreting the findings. Observational evidence suggests that these factors significantly influence the relationship between menopausal symptoms and sleep quality. The ability of relaxation techniques to reduce psychological distress may therefore represent a key mechanism underlying their effectiveness. This is consistent with biopsychosocial models of menopause, which emphasize the interaction between hormonal, psychological, and environmental factors in shaping symptom experiences.

From a clinical perspective, relaxation techniques represent a low-risk, accessible, and cost-effective intervention that can be integrated into primary healthcare and community-based programs. Current clinical guidelines increasingly recommend non-pharmacological approaches as first-line or adjunctive treatments for menopausal symptoms, particularly in women who are unable or unwilling to use hormone therapy.²² However, the translation of these findings into clinical guidelines should be approached cautiously due to the limited certainty of evidence and variability in intervention protocols.

Several limitations of this review should be acknowledged. First, the absence of a registered protocol and initial lack of risk of bias assessment may reduce methodological transparency. Second, the reliance on narrative synthesis without quantitative pooling limits the precision of the findings. Third, potential publication bias was not formally assessed. Fourth, heterogeneity in study populations, interventions, and outcome measures may limit generalizability.

Future research should focus on well-designed randomized controlled trials with larger sample sizes, standardized intervention protocols, and consistent outcome measures. The inclusion of robust methodological components such as risk of bias assessment, GRADE evaluation, and effect size reporting is essential to improve the strength and applicability of future evidence. Additionally, comparative studies evaluating different types of relaxation techniques and their long-term effectiveness are needed to inform clinical decision-making.

Conclusion

This systematic review indicates that relaxation techniques, particularly progressive muscle relaxation, mindfulness, and combined educational approaches, are associated with improvements in sleep quality and quality of life among menopausal women. These interventions demonstrated consistent benefits in reducing insomnia symptoms and enhancing physical and psychological well-being.

However, the overall certainty of evidence is considered low to moderate due to methodological heterogeneity, variability in intervention protocols, and the presence of moderate risk of bias across most included studies. In addition, the lack of standardized effect size reporting and absence of quantitative synthesis limit the ability to determine the magnitude of the observed effects.

From a practical perspective, relaxation techniques represent accessible, low-risk, and cost-effective non-pharmacological interventions that can be implemented in clinical and community-based settings to support menopausal health.

Nevertheless, the integration of these interventions into clinical practice should be approached cautiously, and their application should be tailored to individual patient needs and clinical contexts.

Future research should focus on well-designed randomized controlled trials with standardized intervention protocols, comprehensive risk of bias assessment, and consistent reporting of effect sizes and confidence intervals. The incorporation of evidence grading frameworks, such as GRADE, is also recommended to strengthen the certainty and clinical applicability of future findings.

Author Contribution

Heiqmadinar Azzahra Nugraha: Conceptualization, methodology, literature search, study selection, data extraction, data synthesis, writing of the original draft, and manuscript revision.

Riza Pahlawi: Supervision, methodology review, critical review of the manuscript, interpretation of findings, and final approval of the manuscript.

Both authors: Final approval of the version to be published and accountability for the integrity of the work.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest related to this study or its publication.

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Ethics Statement

Ethics approval was not required for this study because it was a systematic literature review based exclusively on previously published studies and did not involve direct participation of human subjects or the collection of identifiable personal data.

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