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Nurse-Led Yoga and Brain Gym for Reducing Anxiety and Improving Sleep Quality in Menopausal Women

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ABSTRACT

Background: Menopause often brings significant psychological and physiological challenges for women, notably increased anxiety and disrupted sleep patterns. Nurse-led, non-pharmacological interventions such as yoga and brain gym offer promising strategies for managing these symptoms effectively. **Objectives:** This study aimed to evaluate the effectiveness of nurse-led yoga and brain gym interventions in reducing anxiety and improving sleep quality among menopausal women. **Methods:** A quasi-experimental study was conducted from January to April 2024 at Puskesmas (Community Health Center) Sukarami, Palembang, Indonesia. A total of 100 menopausal women were randomly assigned to two groups: 50 participants received a structured yoga intervention, and 50 engaged in brain gym, both facilitated by trained nurses. Pre-and post-intervention assessments of anxiety and sleep quality were conducted using validated instruments. Data was analyzed using paired and independent *t*-tests. **Results:** Both groups showed statistically significant improvements in anxiety and sleep quality ($p < 0.05$). However, the yoga group exhibited a more substantial reduction in anxiety levels and greater improvements in sleep quality than the brain gym group. **Conclusion:** Nurse-led yoga and brain gym are effective in reducing anxiety and enhancing sleep quality among menopausal women. Yoga demonstrated superior outcomes and can be recommended as a primary non-pharmacological approach. Future studies should explore long-term effects and scalability of these interventions in broader healthcare settings.

Keywords: Anxiety; Brain Gym; Menopausal Women; Nurse-Led Interventions; Sleep Quality; Yoga

INTRODUCTION

Menopause marks a significant biological milestone in a woman's life, typically occurring between the ages of 45 and 55, characterized by the permanent cessation of menstruation and reproductive function. Despite its natural occurrence, menopause often brings complex physiological and psychological consequences that interfere with daily functioning and overall well-being. Among the most frequently reported symptoms are increased anxiety and impaired sleep quality, which frequently coexist and aggravate one another (Ministry of Health Republic of Indonesia, 2023). WHO (2022) estimates that approximately 47 million women worldwide enter menopause each year, many of whom experience persistent psychological distress and sleep disturbances that significantly reduce quality of life.

In the Asian context, between 25% and 45% of menopausal women experience anxiety, while more than half report sleep problems, including insomnia and non-restorative sleep (Baral & Kaphle, 2023). This pattern is also evident in Indonesia, where Zolfaghari *et al*.(2020) and Hanafi and Utamayasa (2021) reported that 38% of menopausal women had moderate to severe anxiety and 61% experienced poor sleep quality. In Palembang, South Sumatera, community health centers such as Puskesmas Sukarami have also reported an increase in visits from menopausal women with emotional instability, persistent anxiety, and chronic sleep complaints (Central Statistics Agency of South Sumatera Province, 2023). These data emphasize an urgent

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need for accessible, safe, and sustainable interventions for this vulnerable group.

Physiologically, anxiety and sleep disturbances in menopause are closely linked to declining estrogen levels that disrupt neurotransmitters such as serotonin and Gamma-Aminobutyric Acid (GABA). These alterations may trigger emotional reactivity, irritability, dysregulation of circadian rhythms, and impaired sleep continuity (Hazar *et al*., 2025; Rees *et al*., 2024). Many women report difficulty falling asleep, frequent awakenings, and early morning arousal leading to poor restorative sleep and reduced vitality. Interestingly, Wang *et al*. (2025) showed that although subjective sleep complaints were frequent, objective sleep measures sometimes remained within a functional range, suggesting complex interactions between hormonal changes, psychological stressors, and perception of sleep. In response to growing concern about adverse effects, limited accessibility, and the cost of pharmacological therapies, attention has shifted toward non-pharmacological approaches. Agustina (2025) highlighted yoga as a complementary therapy capable of enhancing neuroendocrine stability, autonomic balance, and psychological resilience. Yue *et al*. (2025) further confirmed through meta-analysis that low- to moderate-intensity physical activity, including yoga, reduces anxiety and depressive symptoms by improving endorphin release, lowering inflammatory responses, and regulating sleep. Within this context, yoga and Brain Gym emerge as promising strategies for community-based management of menopausal symptoms. Yoga integrates postures, breathing, and meditation to reduce cortisol, activate parasympathetic responses, and improve emotional regulation (Tripathi *et al.*, 2025; Mehta *et al*., 2021; Dennison & Dennison, 2018). Meanwhile, Brain Gym, rooted in educational kinesiology, utilizes cross-lateral movements to promote hemispheric integration and emotional stability (Ströhle, 2019). Nurse-led delivery enhances feasibility, adherence, education, and empowerment (Suraya *et al*., 2024; Wisuda, 2020). However, comparative evidence in Indonesia remains limited. Therefore, this study aims to evaluate and compare the effectiveness of nurse-led yoga and Brain Gym in reducing anxiety and improving sleep quality among menopausal women at Puskesmas Sukarami, Palembang, Indonesia.

METHODOLOGY

Study Design

This study employed a quasi-experimental design with a pretest-posttest two-group approach to assess the effectiveness of yoga and brain gym in reducing anxiety and improving sleep quality among menopausal women. This design allowed for the evaluation of intervention effects both within each group over time and between the two groups after the intervention. By using this structured comparison, the study aimed to provide robust evidence on the relative impact of both non-pharmacological interventions (Vanitha *et al*., 2025).

To enhance clarity, the experimental framework is outlined in Table 1, which presents the study structure. The table illustrates the sample size for each group, the sequence of pre-test and post-test assessments, the type of nursing-led intervention administered, and the study timeline. Specifically, Group A received yoga sessions, while Group B received brain gym, both conducted three times per week for eight weeks. Pre-test measurements (O_1 and O_3) were taken before the interventions, followed by post-test measurements (O_2 and O_4) at designated time points ($T_1 \rightarrow T_2 \rightarrow T_3$). This structured comparison highlights how the interventions were systematically applied and measured (Polit & Beck, 2020; Creswell & Creswell, 2018).

Table 1: Experimental Design Structure of the Study

Group	Sample Size (n)	Pre-Test	Intervention	Post-Test	Timeline
Intervention Group A (Yoga)	50	O_1	X_1 = Nurse-led Yoga (3x/week, 8 weeks)	O_2	$T_1 \rightarrow T_2 \rightarrow T_3$
Intervention Group B (Brain Gym)	50	O_3	X_2 = Nurse-led Brain gym (3x/week, 8 weeks)	O_4	$T_1 \rightarrow T_2 \rightarrow T_3$

Study Setting and Duration

The research was conducted at Puskesmas Sukarami, a community health center located in Palembang City, South Sumatera, Indonesia. This site was selected based on its active involvement in community health

initiatives and the accessibility of the menopausal female population. The study was carried out over a four-month period, from January to April 2024, encompassing participant recruitment, intervention administration, and follow-up assessments.

Population and Sample

The study population comprised menopausal women aged between 45 and 60 years who resided in the service area of Puskesmas (Community Health Center) Sukarami, Palembang, Indonesia. Participants were recruited based on the following inclusion criteria: experiencing natural menopause (defined as the absence of menstruation for at least 12 consecutive months), reporting symptoms of anxiety and/or sleep disturbances, being physically able to participate in light to moderate physical activity, and providing written informed consent. Women were excluded if they were currently using hormone replacement therapy or psychotropic medications, had a diagnosed psychiatric or neurological disorder, suffered from severe musculoskeletal limitations, or had participated in similar mind-body interventions in the past six months.

Sampling Technique

A total of 100 eligible participants were selected using purposive sampling. After enrollment, participants were randomly assigned into two equal groups (n = 50 per group) using a simple randomization method supported by a computer-generated random number list. The first group participated in the yoga intervention, while the second group engaged in brain gym exercises. This quasi-experimental design ensured balance between the groups at baseline and enabled comparative analysis of intervention outcomes.

Intervention Procedures

Both intervention groups underwent a structured, nurse-led program over an 8-week period, with sessions held three times per week. Each session lasted approximately 45 to 60 minutes and was conducted by certified instructors to ensure uniformity, safety, and appropriateness for menopausal participants.

The yoga intervention consisted of a progressive sequence that included pranayama (breathing techniques), gentle stretching, and yoga postures specifically selected for menopausal women, such as Balasana (Child's Pose), Sukhasana (Easy Pose), and Setu Bandhasana (Bridge Pose), followed by guided relaxation or mindfulness-based meditation. The intervention was carefully adapted to participants' physical capabilities, minimizing the risk of injury while enhancing emotional regulation, musculoskeletal comfort, and autonomic balance.

The brain gym intervention involved a series of neurokinesthetic exercises rooted in the theoretical framework of educational kinesiology, which posits that specific movement patterns can enhance interhemispheric brain communication and support emotional and cognitive function. Exercises such as cross-crawl, lazy eights, hook-ups, and energy yawns were employed to promote integration of the brain's left and right hemispheres, reduce psychological tension, and improve attention and sleep quality. These movements have been widely applied in educational and therapeutic contexts for their capacity to foster neurological efficiency, emotional stability, and behavioral self-regulation (Dennison & Dennison, 2018; Ströhle, 2019).

To minimize potential confounding factors, all participants were instructed to maintain their usual daily routines and refrain from engaging in other structured physical, psychological, or spiritual wellness programs during the intervention period.

Outcome Measures

The study measured two primary outcomes: anxiety and sleep quality. Anxiety was assessed using the State-Trait Anxiety Inventory (STAI), a widely validated psychological tool that differentiates between temporary anxiety (state anxiety) and general anxiety tendencies (trait anxiety). Each subscale contains 20 items rated on a 4-point Likert scale, yielding separate scores for state and trait anxiety (ranging from 20 to 80 per subscale). Higher scores indicate greater anxiety levels. STAI is particularly suitable for menopausal populations due to its sensitivity in detecting psychological distress in response to situational and internal factors (Utami & Mamesah, 2021; Zsido *et al.*, 2020).

Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI), which assesses seven components, including subjective sleep quality, latency, duration, efficiency, disturbances, use of sleeping medication, and daytime dysfunction. The global PSQI score ranges from 0 to 21, with higher scores indicating poorer sleep quality.

Both instruments were administered at baseline (pre-test) and after the completion of the 8-week intervention period (post-test) to determine the efficacy of each treatment (Sukmawati & Putra, 2019).

Data Analysis

All collected data were coded and analyzed using IBM SPSS Statistics version 25. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to summarize demographic variables and baseline scores. The paired sample t-test was used to evaluate changes within each group between pre- and post-intervention measurements. The independent sample *t*-test was applied to compare mean differences between the two groups at post-test. Statistical significance was determined at a *p*-value threshold of < 0.05.

Ethical Consideration

This study received ethical approval from the Medical and Health Research Ethics Commission of the Faculty of Medicine, Sriwijaya University, Indonesia, with reference number 044-2024, on 9th January 2024.

RESULTS

Sociodemographic Characteristics

A total of 100 menopausal women participated in this study, evenly divided into the yoga group (n = 50) and the brain gym group (n = 50). The demographic profiles of the two groups were comparable at baseline components.

Table 2: Sociodemographic Characteristics of Participants (n = 100)

Variables	Yoga Group (n = 50)	Brain Gym Group (n = 50)
Age (mean ± SD)	52.3 ± 4.1	52.1 ± 4.3
Education Level		
- Primary	8 (16.0%)	10 (20.0%)
- Secondary	25 (50.0%)	24 (48.0%)
- Higher Education	17 (34.0%)	16 (32.0%)
Marital Status		
- Married	40 (80.0%)	38 (76.0%)
- Widowed/Divorced	10 (20.0%)	12 (24.0%)
Employment Status		
- Employed	18 (36.0%)	20 (40.0%)
- Unemployed/Housewife	32 (64.0%)	30 (60.0%)

Table 2 presents the sociodemographic characteristics of the 100 menopausal women enrolled in the study, evenly divided between the yoga group (n = 50) and the brain gym group (n = 50). The participants in both groups had comparable mean ages of 52.3 ± 4.1 years in the yoga group and 52.1 ± 4.3 years in the brain gym group, indicating a homogenous age distribution suitable for comparative analysis. In terms of education, secondary schooling was most prevalent in both groups (50.0% in the yoga group and 48.0% in the Brain Gym group), followed by higher education (34.0% and 32.0%, respectively) and primary education (16.0% and 20.0%). Most participants were married (80.0% in the yoga group and 76.0% in the Brain Gym group), while the remainder were widowed or divorced. Regarding employment status, a majority in both groups were unemployed or housewives (64.0% in the yoga group and 60.0% in the Brain Gym group), with the rest being employed. These balanced demographic distributions indicate a well-matched baseline between groups and support the internal validity of the study by reducing the likelihood of demographic confounding in the outcome measures.

Table 3: Within-Group Comparison of Anxiety and Sleep Quality Scores Using Paired Sample t-test (n = 50)

Outcome	Group	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	*t*-value	*p*-value	Cohen's d (dz)	95% CI of Cohen's d
STAI (Anxiety)	Yoga	58.62 ± 7.45	41.18 ± 6.23	−17.44	−13.57	<0.001	1.92	1.45 to 2.39
	Brain gym	58.40 ± 7.12	46.72 ± 6.95	−11.68	−10.31	<0.001	1.46	1.06 to 1.86
PSQI (Sleep Quality)	Yoga	11.84 ± 2.67	6.02 ± 2.35	−5.82	−14.10	<0.001	1.99	1.51 to 2.47
	Brain gym	11.56 ± 2.55	7.80 ± 2.61	−3.76	−9.88	<0.001	1.40	1.01 to 1.79

Table 3 shows that both the yoga and brain gym groups experienced statistically significant improvements in anxiety and sleep quality after the 8-week intervention (all $p < 0.001$). The yoga group demonstrated larger reductions in anxiety (STAI mean difference = −17.44; Cohen's d = 1.92, 95% CI: 1.45–2.39) and greater improvements in sleep quality (PSQI mean difference = −5.82; Cohen's d = 1.99, 95% CI: 1.51–2.47) compared with the brain gym group, which showed smaller though still large effect sizes for both outcomes. Overall, these findings indicate that yoga produced more substantial and clinically meaningful improvements than brain gym.

Table 4: Between-Group Comparison of Post-Test Anxiety and Sleep Quality Scores Using Independent Sample t-test (n= 50)

Outcome	Yoga (Mean ± SD)	Brain Gym (Mean ± SD)	Mean Difference	*t*-value	*p*-value	Cohen's d	95% CI of Cohen's d
STAI (Anxiety)	41.18 ± 6.23	46.72 ± 6.95	−5.54	−4.18	<0.001	0.84	0.44 to 1.24
PSQI (Sleep Quality)	6.02 ± 2.35	7.80 ± 2.61	−1.78	−3.52	0.001	0.71	0.32 to 1.10

Table 4 indicates that, at post-test, participants in the yoga group exhibited significantly lower anxiety (STAI) scores and better sleep quality (PSQI) compared with those in the brain gym group. The between-group differences were statistically significant for both outcomes and were accompanied by moderate-to-large effect sizes (STAI: Cohen's d = 0.84, 95% CI: 0.44–1.24; PSQI: Cohen's d = 0.71, 95% CI: 0.32–1.10), indicating that yoga produced more substantial and clinically meaningful improvements in anxiety reduction and sleep quality among menopausal women.

DISCUSSION

This study evaluated the comparative effectiveness of nurse-led yoga and Brain Gym in reducing anxiety and improving sleep quality among menopausal women. Both interventions significantly improved outcomes; however, yoga produced greater reductions in anxiety (STAI) and more substantial improvements in sleep quality (PSQI). These findings suggest the superior therapeutic potential of yoga, likely attributable to its combination of movement, controlled breathing, and meditative focus that modulates the HPA axis, lowers cortisol, and enhances parasympathetic activation (Badve *et al*., 2025; Jing *et al*., 2024).

Neurochemical mechanisms further support yoga's benefits. Regular practice has been associated with increased GABA, serotonin, and melatonin, neurotransmitters essential for emotional stability and sleep regulation (Zhu *et al*., 2023; Fara *et al*., 2019). Xu *et al.* (2024) and Cramer *et al.* (2018) similarly confirmed yoga's effectiveness in managing anxiety and sleep disturbances during menopause. While Brain Gym also improved outcomes, its effects may be more limited because it lacks the meditative and vagal-stimulating depth present in yoga, although it effectively stimulates bilateral brain integration and emotional balance (Ganesh *et al*., 2021; Wang *et al.*, 2020; Khose & Bhore, 2023).

The current findings are consistent with previous evidence showing yoga's role in improving sleep latency, duration, and efficiency (Alghosi *et al*., 2025) and enhancing broader menopausal health parameters such as mood, BMI, and blood pressure (Wang *et al.*, 2025). Meta-analyses by Gangadharan *et al.* (2024) and Liu *et al.* (2020) further confirm yoga as a safe, effective, and well-tolerated intervention for menopausal well-

being. These outcomes reinforce the importance of integrating holistic, body–mind approaches within menopausal care rather than relying solely on pharmacological treatment.

From a nursing perspective, these findings strengthen the conceptual and practical contribution of nursing in menopausal health management. Nurse-led delivery situates these interventions within a biopsychosocial care framework, addressing biological instability, psychological anxiety, and social support simultaneously (Tsai & Chiang, 2024; Okechukwu *et al*., 2022). Nurses play a key role in ensuring safety, cultural appropriateness, motivation, and adherence, thereby enhancing the therapeutic benefits of both yoga and Brain Gym. This positions nurses not only as implementers but as clinical decision-makers and health educators who shape non-pharmacological care policy and practice (Özlü *et al*., 2021).

Although yoga demonstrated superior outcomes, Brain Gym remains relevant, particularly in contexts where yoga is culturally unfamiliar, physically demanding, or resource restricted. Its simplicity, low cost, minimal physical strain, and adaptability to community and rural health settings make it a practical complementary strategy (Qin *et al*., 2022; Arbianingsih *et al*., 2021). Collectively, the findings support integrating yoga and Brain Gym into nursing practice and primary care programs to enhance mental health and sleep quality in menopausal women. Future research should explore long-term sustainability, cultural acceptance, and patient experience to support broader policy adoption and scalable implementation.

Implications for Nursing Practice

The findings of this study highlight the critical role of nurses in delivering holistic, non-pharmacological interventions to reduce anxiety and improve sleep quality among menopausal women. The demonstrated effectiveness of nurse-led yoga supports its integration as an evidence-based nursing intervention within routine menopausal care, particularly in primary care and community health settings. Conceptually, this approach aligns with the biopsychosocial and mind–body frameworks of nursing, positioning nurses as therapeutic agents who facilitate patient-centered self-care and symptom management. Although yoga showed superior effectiveness, brain gym remains a valuable complementary option due to its simplicity, low physical demand, and adaptability for individuals with mobility limitations or in resource-limited settings. Integrating these nurse-led interventions into practice may enhance the quality, accessibility, and sustainability of nursing care for menopausal women by providing safe, cost-effective, and culturally responsive strategies to support mental well-being and sleep quality.

Limitations

This study offers notable strengths, including a well-structured quasi-experimental design with balanced baseline characteristics between groups, standardized intervention protocols, and the use of validated instruments, the State-Trait Anxiety Inventory (STAI) and the Pittsburgh Sleep Quality Index (PSQI), to ensure accurate assessment of anxiety and sleep quality. The nurse-led implementation of yoga and brain gym enhances the study's real-world relevance and underscores the feasibility of integrating such interventions into community healthcare settings for menopausal women. By directly comparing two culturally adaptable, low-cost, non-pharmacological therapies, the research provides actionable insights for scalable mental health strategies. However, the study also has limitations. The relatively small sample size, short intervention duration, and reliance on self-reported outcomes introduce potential bias and limit the generalizability and long-term interpretation of the results. Moreover, the absence of a no-treatment control group and lack of physiological or objective sleep measures constrain the ability to rule out placebo effects and evaluate sustained benefits. Future studies should involve larger, more diverse populations, incorporate objective biomarkers, and include long-term follow-up to validate and extend these findings.

CONCLUSION

In conclusion, this study demonstrates that nurse-led yoga and brain gym interventions are effective non-pharmacological approaches for reducing anxiety and improving sleep quality among menopausal women, with yoga showing significantly superior outcomes. Nevertheless, brain gym remains a viable alternative, particularly in resource-limited or culturally sensitive settings, due to its simplicity, flexibility, and accessibility. These findings underscore the importance of integrating holistic, nurse-led practices into

community-based mental health programs as a cost-effective and sustainable strategy to enhance the well-being of menopausal women. Further research is needed to evaluate long-term effects, cross-cultural acceptability, and the effectiveness of implementing these programs in diverse healthcare contexts.

Conflict of Interest

The authors declare that they have no competing interest.

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