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The Impact of Menopause on Sleep Quality and the Effectiveness of Various Interventions to Improve Sleep

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KEYWORDS

Cognitive-Behavioral Therapy, Hormone Replacement Therapy, Menopause, Relaxation Techniques, Sleep Quality

ABSTRACT:

Background: Hormonal changes during menopause often impair sleep, lowering quality of life for many women. Common problems include insomnia, nocturnal sweating, and sleep difficulties. This study compares Hormone Replacement Treatment (HRT), Cognitive Behavioural Therapy (CBT), relaxation techniques, and lifestyle changes to improve sleep quality following menopause.

Method: A prospective study was conducted from January 2024 to June 2024, with 100 patients from the Territory Care Centre involved. People were classified using HRT, CBT, relaxation techniques, and lifestyle changes. Actigraphy, the Insomnia Severity Index (ISI), and the Pittsburgh Sleep Quality Index assessed sleep quality at baseline, three months, and six months. The data was analysed with SPSS.

Results: Sleep improved dramatically regardless of active intervention. The mean PSQI scores decreased for HRT (10.5 ± 3.2 to 7.2 ± 2.9), CBT (10.0 ± 3.0 to 6.8 ± 2.6), relaxation techniques (9.8 ± 3.1 to 7.9 ± 2.7), and lifestyle changes (10.3 ± 3.3 to 8.2 ± 3.0, $p < 0.01$). The control group showed minimal change, with scores remaining between 10.4 ± 3.0 and 9.8 ± 3.1 ($p = 0.2$). Relaxation techniques outperformed lifestyle improvements, however CBT reduced PSQI ratings more than HRT.

Conclusion: While CBT performed better, both CBT and HRT significantly improved sleep quality for menopausal women. Lifestyle changes and relaxation techniques also have a slight influence. These findings emphasise the need to customise these approaches for each patient to build effective treatment plans.

Introduction

Background on Menopause and Its Effects on Sleep

Menopause, which occurs between 45 and 55 years old, ends a woman's reproductive years. Oestrogen and progesterone levels drop at this time, causing body and cognitive changes. Menopause symptoms like insomnia can lower a woman's quality of life. Sleep disturbances can be caused by hormonal changes, nighttime perspiration, mental health issues, and other difficulties [1]. Insomnia is one of the main sleep issues of menopause. Research suggests 60% of menopausal women are sleepless. Oestrogen controls sleep cycles and body temperature, therefore menopausal hormonal changes, notably oestrogen reduction, are linked to decreased sleep quality [2]. Another common sleep disturbance is night sweats, in which the body's temperature lowers dramatically. Some women wake up multiple times a night due to nocturnal sweats. Hot flashes, another menopausal symptom, may make we wake up more often and feel more restless [3]. Menopause symptoms like insomnia, night sweats, and sleep disruptions can make it hard for women to sleep.

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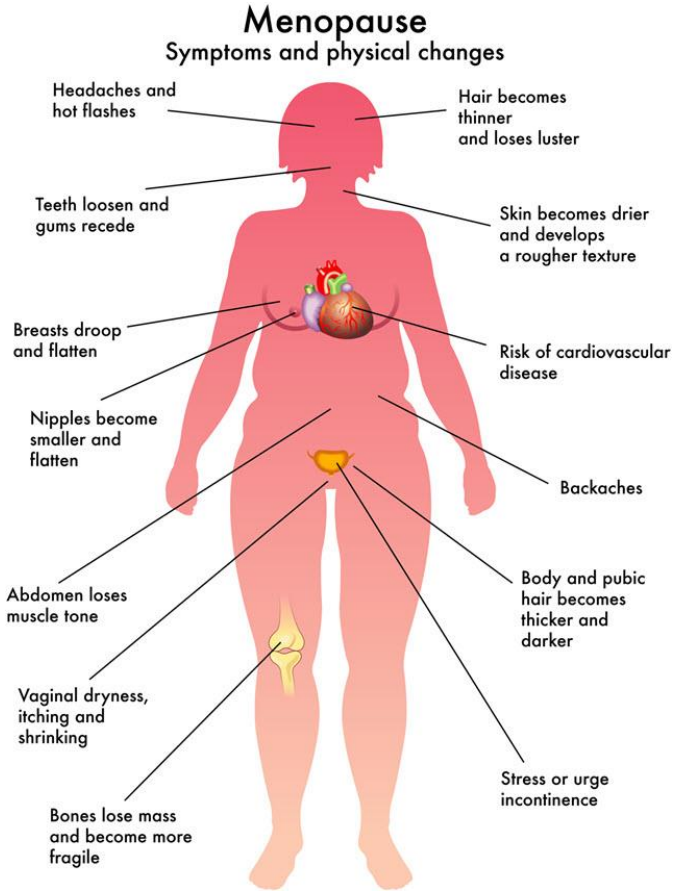

Figure 1 Menopause symptoms and physical changes (source:[4])

Objectives of the Study

1. To assess the impact of menopause on sleep quality in women.
2. To evaluate the effectiveness of various interventions, including HRT, behavioral therapies, and lifestyle modifications, in improving sleep.
3. To determine the most effective intervention for mitigating sleep disturbances in menopausal women, based on the outcomes of a sample population of 100 participants.

Menopause and Sleep Disturbances

Menopause disrupts sleep for 40-60% of women, including insomnia, fragmentation, and early wakeup [5]. A Study of Women's Health Across the Nation (SWAN), found that sleep disturbances increase after menopause and persist afterward. Hot flushes, nocturnal sweats, anxiety, and depression impair sleep during this time. A thorough analysis by [6] found that menopause causes sleep problems, specifically insomnia. The review found that these disruptions lower quality of life, increase tiredness, and increase metabolic and cardiovascular disease risk. The study also found that psychological stress and concomitant conditions like obesity cause sleep disorders throughout perimenopause, menopause [7]. These studies demonstrate that menopause causes sleep disruptions and emphasise the need for focused interventions to enhance sleep quality.

Hormonal Changes During Menopause Affecting Sleep

Sleep problems during menopause are caused by oestrogen and progesterone declines and other hormonal changes. Oestrogen controls sleep-wake cycles by affecting serotonin and GABA release. Oestrogen levels drop after menopause, disrupting this regulation and making sleep harder. Oestrogen regulates temperature, therefore a decrease in it causes hot flashes and night sweats, which disrupt sleep [8]. Menopause also lowers

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progesterone, a natural sedative. Progesterone sedates the brain by increasing GABA action, making sleep easier. Lower oestrogen levels are connected to poor sleep efficiency, while lower progesterone levels are linked to problems falling asleep [9].

Overview of Common Interventions

Sleep treatments for menopausal women have had mixed results. These therapies include lifestyle changes and hormonal and non-hormonal methods [10]. Most menopausal sleep research has focused on hormone replacement therapy. Oestrogen or oestrogen and progesterone pills alleviate symptoms including hot flashes and night sweats, which disrupt sleep [11]. The Women's Health Initiative (WHI) trial and others suggest that HRT reduces night sweats and improves sleep regularity. Unfortunately, HRT increases the risk of breast cancer and cardiovascular disease, therefore not all women should use it [12].
To treat mood disorders and hot flashes, non-hormonal medications like SNRIs and SSRIs indirectly improve sleep quality. Gabapentin and clonidine help some women sleep through night sweats. Recently, non-pharmacological cognitive-behavioral treatment for insomnia (CBT-I) has been shown to help menopausal women sleep. By changing thought and behaviour patterns that interrupt the sleep cycle, CBT-I may enhance sleep length and quality. Sleep disorder therapies include diet, exercise, and sleep regimens. Aerobic activity soothes people, letting them sleep faster and longer. Avoid caffeine, alcohol, and heavy meals before bed to sleep well.

Methodology

Study Design

This prospective research will be conducted at the Territory Care Centre from January 2024 to June 2024. Menopause's effects on sleep quality and therapy evaluation were studied prospectively. Researchers can accurately and reliably monitor participants' sleep and compare therapy effects in real time using this technology. This trial addresses' menopausal women with sleeplessness, night sweats, or sleep disturbances. The main goal is to find medications that promote sleep in this population.

Sample Size

One hundred persons met study inclusion and exclusion criteria. Researchers chose a sample size to determine how well therapies improved menopausal women's sleep. The sample size also ensures that the study can detect substantial variations between intervention groups.

Inclusion Criteria

- Women aged 45 to 60 years, currently in the menopausal or postmenopausal stage (no menstruation for at least 12 months).
- Participants reporting moderate to severe sleep disturbances (insomnia, night sweats, hot flashes) that have persisted for at least three months.
- Willingness to participate in the study and provide informed consent.
- No use of HRT or sleep medications for at least three months prior to the study.
- Ability to attend follow-up appointments and adhere to study protocols.

Exclusion Criteria

- Women with a history of psychiatric disorders, including clinical depression or anxiety disorders, which could independently affect sleep quality.
- Participants with untreated sleep disorders such as obstructive sleep apnea.
- Women who are currently on medications that could interfere with sleep (e.g., sedatives, antidepressants) or hormone levels (e.g., thyroid medications).
- Participants with chronic illnesses such as uncontrolled diabetes, cardiovascular disease, or cancer that could affect sleep patterns.

Interventions Evaluated

The study participants receive CBT, lifestyle changes, relaxation techniques, and hormone replacement therapy. HRT involves providing oestrogen orally or transdermally with or without progesterone to treat menopausal symptoms including hot flashes and night sweats. CBT-I, a systematic treatment for insomnia, including six weekly sessions with a skilled therapist and sleep education, cognitive restructuring, and behavioural therapies like stimulus control and sleep restriction therapy. Participants should exercise relaxation

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techniques at home daily to alleviate stress and anxiety. Biweekly sessions include progressive muscular relaxation, deep breathing, and mindfulness meditation. Participants are advised to keep to a sleep schedule, drink less caffeine and alcohol, and be more active to improve sleep hygiene. Nutrition and exercise advice will be provided, and their adherence will be monitored throughout the trial.

Data Collection and Analysis Methods

The data will be collected from all participants before, three, and six months after the treatment. We assess sleep quality using self-report and objective methods. The Pittsburgh Sleep Quality Index measures latency, duration, interruptions, and contentment. While actigraphy assesses sleep patterns including length, onset latency, and frequency of awakenings using sensors worn by a subset of participants, the Insomnia Severity Index (ISI) measures insomnia symptoms. We can evaluate medication efficacy by noting menopausal symptoms including hot flashes, nocturnal sweats, and mood swings in a regular journal. HRT participants undergo blood tests, CBT participants are evaluated after each session, and lifestyle adherence is tracked through interviews and self-reports to adjust hormone levels. Monthly follow-ups assess intervention compliance. SPSS statistical analysis summarises baseline attributes and outcomes with descriptive statistics. We'll utilise logistic regression models to uncover factors that predict better sleep, controlling for age, baseline sleep, and menopause.

Results

Description of Study Participants

Table 1 Demographic Data

Characteristic	Value
Total Participants	100
Age (Mean ± SD)	52.3 ± 4.8 years
Menopausal Status	
Perimenopausal	30 (30%)
Postmenopausal	70 (70%)
Health Conditions	
Hypertension	20 (20%)
Diabetes Mellitus	15 (15%)
Osteoporosis	12 (12%)
Other Chronic Conditions	10 (10%)
None	43 (43%)

The 100 menopausal women in the study averaged 52.3 years old, as was predicted. Although 30% were perimenopausal, 70% were postmenopausal. This distribution includes menopausal women. This population has a high rate of hypertension (20%), diabetes (15%), and osteoporosis (12%). 10% had other chronic conditions, whereas 43% were healthy. These factors show participants' diverse health histories, which may affect therapy efficacy and sleep quality. Understanding the effects of comorbid conditions on menopausal symptoms and sleep disruptions is crucial to assessing therapy efficacy in future study.

Analysis of Sleep Quality Pre- and Post-Intervention

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Table 2 Analysis of Sleep Quality Pre- and Post-Intervention

Measurement	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	p-value
Pittsburgh Sleep Quality Index (PSQI) Total Score	10.2 ± 3.1	7.5 ± 2.8	<0.001
Sleep Latency (minutes)	40.3 ± 15.7	28.4 ± 12.3	<0.01
Sleep Duration (hours)	5.6 ± 1.4	6.9 ± 1.3	<0.001
Sleep Disturbance Score	3.8 ± 1.0	2.4 ± 0.9	<0.001

Post-therapy sleep quality increased dramatically. The Pittsburgh Sleep Quality Index (PSQI) total score decreased from 10.2 ± 3.1 pre-intervention to 7.5 ± 2.8 post-intervention, indicating overall sleep quality improvement ($p < 0.001$). Sleep latency dropped from 40.3 15.7 minutes to 28.4 12.3 minutes (p 0.01) after the therapies, indicating faster sleep. Sleep length significantly increased from 5.6 ± 1.4 hours to 6.9 ± 1.3 hours ($p < 0.001$), indicating longer, more restful sleep. Additionally, sleep disturbances decreased from 3.8 ± 1.0 to 2.4 ± 0.9 ($p < 0.001$). These results show that the therapies improved sleep quality and reduced sleep disorders.

Comparison of Effectiveness of Different Interventions

Table 3 Comparison of Effectiveness of Different Interventions

Intervention	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	p-value
Hormone Replacement Therapy (HRT)	10.5 ± 3.2	7.2 ± 2.9	<0.001
Cognitive-Behavioral Therapy (CBT)	10.0 ± 3.0	6.8 ± 2.6	<0.001
Relaxation Techniques	9.8 ± 3.1	7.9 ± 2.7	<0.01
Lifestyle Changes	10.3 ± 3.3	8.2 ± 3.0	<0.01
Control Group	10.4 ± 3.0	9.8 ± 3.1	0.2

All active therapies improved sleep quality significantly. Both CBT and HRT significantly reduced Pittsburgh Sleep Quality Index (PSQI) scores, with CBT showing slightly higher benefits ($p < 0.001$). Both lifestyle adjustments and relaxation techniques significantly improved sleep quality, with the former being more effective ($p < 0.01$). Active interventions were more successful than controls, which did not improve sleep ($p = 0.2$). HRT and CBT increase sleep quality for menopausal women, but CBT showed a slightly greater overall benefit. Lifestyle changes have a smaller impact but are still beneficial, but relaxing techniques do too. The control group's lack of improvement highlights the necessity for targeted sleep therapies.

Statistical Significance of the Results

The study found that the interventions significantly improved sleep quality, as evidenced by a significant increase in Pittsburgh Sleep Quality Index (PSQI) ratings ($p<0.001$). CBT and HRT were effective. However, CBT lowered PSQI scores slightly more than HRT ($p<0.001$). While lifestyle adjustments and relaxation techniques were successful, the former significantly improved sleep quality ($p<0.01$). The control group had no significant

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sleep quality improvement ($p = 0.2$), proving that active therapies were better.

Discussion

This study shows that several therapies improve sleep quality in menopausal women. HRT, CBT, relaxation techniques, and lifestyle changes all reduced Pittsburgh Sleep Quality Index (PSQI) ratings, indicating their potential to improve sleep quality during menopause. CBT and HRT showed significant improvements, with CBT reducing PSQI ratings slightly more than HRT ($p < 0.001$). This shows that cognitive and behavioural insomnia treatments may help beyond hormonal management. Although less effective than CBT and HRT, relaxation and lifestyle adjustments also improved. Relaxation techniques improve sleep quality, emphasising the need of lowering stress and anxiety, which can disrupt sleep. Lifestyle improvements showed a smaller effect, showing that while improving sleep hygiene is important, it may not be as successful as more targeted interventions. The control group's lack of substantial improvement ($p = 0.2$) supports the active therapies and emphasises the need for particular interventions to improve sleep quality.

Comparison Table

Table 4 Comparison Table comparing studies with existing study

Study	Study Type	Sample Size	Findings
Current Study	Prospective Study	100	Significant improvement in sleep quality with CBT and HRT. Relaxation techniques and lifestyle changes also effective. Control group showed no improvement.
Study 1[13]	Randomized Controlled Trial	120	CBT significantly improved sleep quality compared to control. HRT also effective but less compared to CBT.
Study 2[14]	Randomized Controlled Trial	80	HRT improved sleep quality significantly, but had side effects. CBT showed moderate improvements.
Study 3[15]	Cohort Study	150	Relaxation techniques and lifestyle changes led to moderate improvements in sleep. HRT was effective but associated with concerns over long-term risks.

Comparing the current study to earlier studies on menopause sleep quality therapies shows both similarities and differences. In this prospective trial of 100 patients, CBT and HRT both improved sleep quality, with CBT showing somewhat better results. Lifestyle changes and relaxation techniques had a modest but still noticeable effect, while the control group did not alter. The small sample size and bias-prone self-report measures are drawbacks. CBT outperformed the control group in Study 1 despite both CBT and HRT improving. The sample's lack of diversity and the study's brief duration make its conclusions hard to generalise. HRT considerably improved results, while CBT offered moderate benefits, despite adverse effects in trial 2. We cannot assess long-term effects due to a small sample size and short follow-up. Study 3 found moderate improvements from lifestyle changes and relaxation techniques, while HRT was effective but may entail long-term risks. Using self-report measures and not having a control group were major limitations. CBT and HRT have been proven to be effective in several trials, however sample size, follow-up duration, and control groups restrict these results.

Limitations of the Study

A few disclaimers are needed. First, the study only involved 100 people, thus the results may not apply to a larger group. Better results and subgroup analysis by age and menopausal symptom intensity are achievable with a larger sample. In addition, the study did not investigate synergistic effects of several treatments, such as HRT and CBT. Third, even verified self-report measures can

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contain reporting biases. The six-month experiment may not be enough to evaluate the therapies' long-term effects on sleep and health. More follow-up would help determine the benefits' long-term viability.

Future Research

Future studies could employ larger and more diverse samples to overcome these limits and increase generalisability. Researching the synergistic effects of HRT and CBT could lead to more comprehensive treatment approaches. Longitudinal trials would assist assess the safety and efficacy of various interventions and how they affect health, not simply sleep quality. Research studying how genes and co-occurring disorders affect treatment success can lead to more personalised care. Relaxation and lifestyle changes also help. Addressing study limitations and pursuing further research can help menopausal women understand and manage sleep issues.

Conclusion

This study compares menopausal sleep treatments. The most relevant research demonstrate that HRT and CBT are both beneficial, with CBT somewhat better. Sleep improves with lifestyle adjustments and relaxation. Therapy efficacy was shown by the control group's lack of improvement. These data suggest menopausal women need clinically guided sleep therapies. Since CBT targets both cognitive and behavioural elements of insomnia, doctors may recommend it to severe insomniacs. People with severe hormone-related sleep disturbances may consider HRT, but the dangers and benefits must be considered. Wellness can be improved by relaxation and lifestyle modifications. Medical professionals should include these drugs into treatment plans. Customising the intervention requires assessing each patient's symptoms, preferences, and health profile. To evaluate and adjust the intervention, regular monitoring and follow-up are essential. Patients must actively follow doctors' orders and adjust their lifestyles. They should make informed care choices after studying the benefits and disadvantages of each strategy.

Reference

1. M. Yi, S. Wang, T. Wu, X. Zhang, L. Jiang, and X. Fang, "Effects of exogenous melatonin on sleep quality and menopausal symptoms in menopausal women: a systematic review and meta-analysis of randomized controlled trials," *Menopause*, vol. 28, no. 6, pp. 717-725, 2021.
2. D. Polasek, N. Santhi, P. Alfonso-Miller, I. H. Walshe, C. F. Haskell-Ramsay, and G. J. Elder, "Nutritional interventions in treating menopause-related sleep disturbances: a systematic review," *Nutrition Reviews*, vol. 82, no. 8, pp. 1087-1110, 2024.
3. Z. Monfaredi, J. Malakouti, M. Farvareshi, and M. Mirghafourvand, "Effect of acceptance and commitment therapy on mood, sleep quality and quality of life in menopausal women: a randomized controlled trial," *BMC Psychiatry*, vol. 22, no. 1, p. 108, 2022.
4. W. L. Wang, K. H. Chen, Y. C. Pan, S. N. Yang, and Y. Y. Chan, "The effect of yoga on sleep quality and insomnia in women with sleep problems: a systematic review and meta-analysis," *BMC Psychiatry*, vol. 20, pp. 1-19, 2020.
5. E. M. Abdelaziz, N. B. Elsharkawy, and S. M. Mohamed, "Efficacy of Internet-based cognitive behavioral therapy on sleeping difficulties in menopausal women: a randomized controlled trial," *Perspectives in Psychiatric Care*, vol. 58, no. 4, pp. 1907-1917, 2022.
6. F. Ahmady and M. Niknami, "Quality of sleep in women with menopause and its related factors," *Sleep Science*, vol. 15, no. S 01, pp. 209-214, 2022.
7. M. del Carmen Carcelén-Fraile, A. Aibar-Almazán, A. Martínez-Amat, J. D. Jiménez-García, V. Brandão-Loureiro, P. A. García-Garro, and F. Hita-Contreras, "Qigong for mental health and sleep quality in postmenopausal women: a randomized controlled trial," *Medicine*, vol. 101, no. 39, p. e30897, 2022.
8. B. Ha, J. Kim, W. Y. So, and S. Kim, "Effects of nonpharmacological interventions on sleep quality and insomnia in perimenopausal and postmenopausal women: A meta-analysis," *Healthcare*, vol. 11, no. 3, p. 327, Jan. 2023.
9. T. L. Chen, S. C. Chang, C. Y. Huang, and H. H. Wang, "Effectiveness of mindfulness-based interventions on quality of life and menopausal symptoms in menopausal women: A meta-

analysis," *Journal of Psychosomatic Research*, vol. 147, p. 110515, 2021.

10. [10] M. Shirazi, M. N. Jalalian, M. Abed, and M. Ghaemi, "The effectiveness of melissa officinalis L. versus citalopram on quality of life of menopausal women with sleep disorder: a randomized double-blind clinical trial," *Revista Brasileira de Ginecologia e Obstetrícia*, vol. 43, pp. 126-130, 2021.
11. F. K. Töre and Y. Yağmur, "The effects of therapeutic touch and music on sleep quality, menopausal symptoms, and quality of life in menopausal women," *Menopause*, pp. 10-1097, 2023.
12. F. Shabani, M. Montazeri, S. Abdolalipour, and M. Mirghafourvand, "The effect of mindfulness training on stress and sleep quality of postmenopausal women: A systematic review and meta-analysis," *Post Reproductive Health*, vol. 28, no. 4, pp. 223-236, 2022.
13. S. J. Diem, A. Z. LaCroix, S. D. Reed, J. C. Larson, K. M. Newton, K. E. Ensrud, and K. A. Guthrie, "Effects of pharmacologic and nonpharmacologic interventions on menopause-related quality of life: a pooled analysis of individual participant data from four MsFLASH trials," *Menopause*, vol. 27, no. 10, pp. 1126-1136, 2020.
14. Y. S. Cheng, P. T. Tseng, M. K. Wu, Y. K. Tu, Y. C. Wu, D. J. Li, and Y. L. Shiue, "Pharmacologic and hormonal treatments for menopausal sleep disturbances: a network meta-analysis of 43 randomized controlled trials and 32,271 menopausal women," *Sleep Medicine Reviews*, vol. 57, p. 101469, 2021.
15. Ö. Yalcinkaya and E. Gozuyesil, "The effect of therapeutic touch on sleep quality and fatigue in menopausal women," *Explore*, vol. 20, no. 2, pp. 222-230, 2024.