



Review Article

SLEEP DISTURBANCES IN PERIMENOPAUSE: EXPLORING PHYSIOLOGICAL AND AYURVEDIC CONCEPTS

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ABSTRACT

At perimenopause, sleep disturbances occur due to hormone, neuro-endocrine and psychological changes, which leads to poor quality of life for women. **Objective:** The transition through menopause is often accompanied by various sleep disturbances, with the objective being to review how these sleep disturbances manifest physiologically and the potential for drug *Guduchi* (*Tinospora cordifolia*) to address them from biomedical and Ayurvedic perspectives. **Methods:** The literature search was made by applying the method of searching literature from PubMed, Scopus, Google Scholar and ScienceDirect based on the guideline of PRISMA 2020. The studies included in English-language human and animal studies, reviews, and clinical studies from 2015 to 2025. **Results:** Evidence indicates that symptoms of estrogen deficiency, vasomotor symptoms, oxidative stress, inflammation, and disruption of the circadian rhythm are factors that negatively impact sleep. *Guduchi* has been found to have *Rasayana*, antioxidant, anti-inflammatory, adaptogenic and immunomodulatory properties, all of which can help in reducing these. Evidence, however, is limited to direct clinical data concerning the effects of sleep in perimenopausal women. **Conclusion:** *Guduchi* has been found as a potential complementary management in women having sleep disturbances related to menopause. Additional well designed randomised clinical trials are required to validate its efficacy and safety.

INTRODUCTION

The perimenopause is a transitional period-physical, psychological and sleep changes that occur gradually. Perimenopausal women suffer from sleep disorders like insomnia, fragmented sleeping, problems falling asleep or waking up during the night and these affect a significant number of women and greatly impact their life (Parveen et al., 2025). This association of reduced levels of estrogen and progesterone along with vasomotor changes, mood changes, and changes in circadian control can lead to sleep disturbances. It is clear that chronic sleep disruption is linked to fatigue, diminished cognitive function, anxiety and depression, metabolic conditions

and greater cardiovascular risk; this goes to show why healthy sleep is significant during this segment of life (Kumar, 2020).

Some of the available methods of treatment are hormone replacement therapy (HRT), cognitive behavioral therapy for insomnia (CBT-I), melatonin, and sedative-hypnotic drugs. These ways can help sleep quality, however they can have adverse effects, contraindications, inconsistent and variable effectiveness, and are poorly tolerated by patients over the long-term (Bryson, 2025). This is why there is increasing interest in safer and holistic intervention that impacts on several mechanisms that cause menopausal symptoms.

Menopause (*Rajonivritti*) is believed to be a common phenomenon of ageing that affects the physiology of older females with increased *Vata* dominance and is recommended to be managed through *Rasayana* therapy to boost overall well-being, nourish all aspects of physiology and assist the process of healthy ageing (Reena et al., 2025). However, the

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antioxidant, immunomodulatory, anti-inflammatory, adaptogenic and neuroprotective properties of *Guduchi* (*Tinospora cordifolia*) one of the *Rasayana* herbs might reduce the sleep associated with menopause.

A brief account of present scientific facts in relation to physiology of sleep and sleep disturbances of menopause and its biomedical and Ayurvedic potential for menopause therapy and management was highlighted.

MATERIALS AND METHODS

Literature Search

A literature search was carried out according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. The electronic databases such as PubMed, Science Direct, Scopus, and Google Scholar were searched for relevant studies published between 2015 and June 2025.

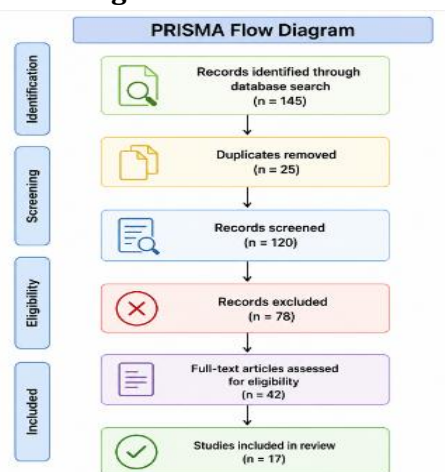
Search Strategy

Combinations of Medical Subject Headings (MeSH) and free-text medical terms were used. Boolean operators (AND/OR) were used in combination with each other in order to narrow down the search and obtain records of relevant literature.

Eligibility Criteria

Only studies published in the English language containing human or animal research, clinical studies, observational studies, systematic reviews, narrative reviews or experimental investigations were included that are relevant to menopause, sleep disorders or *Guduchi* or Ayurvedic management. Editorials, conference abstracts, duplicate publications, non-English publications and studies without outcome data were excluded. Titles and abstracts were screened and full-length articles were then assessed for eligibility. Study identification and screening, eligibility assessments, and study inclusion were done following PRISMA 2020 guidelines.

PRISMA Flow Diagram



RESULTS AND DISCUSSION

Pathophysiology of Menopause-Associated Sleep Disorders

One of the most often reported menopausal transition symptoms is sleep disruption, which is a complicated issue involving neuroendocrine and hormonal changes. Lowering of oestrogen contributes to loss of thermoregulation, loss of serotonergic neurotransmission and destabilisation of circadian rhythm, which leads to poorer sleep quality and retracing from sleep (Baker et al., 2018; Haufe & Leeners, 2023). Furthermore, there is decreased progesterone that plays a role in poor sleep through its anxiolytic/anti-anxiety and sedative effects on γ -aminobutyric acid (GABA) receptors (Coborn et al., 2022). During perimenopause, heavy lower energies (Troia et al., 2025) and hot flashes, a kind of vasomotor imbalance, are responsible for different problems and general sleep fragmentation, leading to a greater impact on sleep efficiency. Moreover, peri-menopausal thyroid symptoms are often accompanied by mood disorders like anxiety, irritability, and depression, which negatively affect sleep quality as well (Zeng et al., 2025).

There are also changes in the nervous system and parts of the brain, as well as changes in the nervous system cells, which are very important. Melatonin reduction in older individuals affects circadian rhythms, thereby causing sleep to be delayed (Haufe & Leeners, 2023), whereas serotonin's reduction in metabolism affects mood and sleep architecture (Haufe & Leeners, 2023). Overactivity of the hypothalamic-pituitary-adrenal (HPA) axis leads to an over-secretion of cortisol and chronic insomnia and hyperarousal. Moreover, oxidative stress and low-grade systemic inflammation as a result of estrogen deficiency have been linked to aggravations in sleep disturbance during the menopausal transition (Baker et al., 2018; Zeng et al., 2025).

Ayurvedic Perspective

In Ayurvedic medicine, Menopause is mentioned as a natural transition that takes place during *Jaravastha* (ageing), '*Rajonivritti*'. In this stage, there is predominance of *Vata dosha* which leads to symptoms like sleeplessness, anxiety, tiredness, dryness, emotional imbalance (Meher et al., 2022). Sleep disturbance is correlated with *Nidranasha*, it occurs at the time of aggravated *Vata* and there is aging of *Dhatu*s. Over the era of Ayurveda, *Rasayana Chikitsa* is recommended for the restoration of physiological balance, promotion of the health of old age, vigor, mental equilibrium and good health. These properties of *Rasayana* drugs make them appropriate for managing menopausal complaints, which include

enhanced immunity, delayed degenerative changes, nourishment of tissues and supporting cognition and psychology (Rathod, 2023; Kalia, 2022).

Mechanistic Basis for *Guduchi* in Menopause-Associated Sleep Disorders

Figure 1. Proposed mechanism of *Guduchi* in menopause-associated sleep disorders

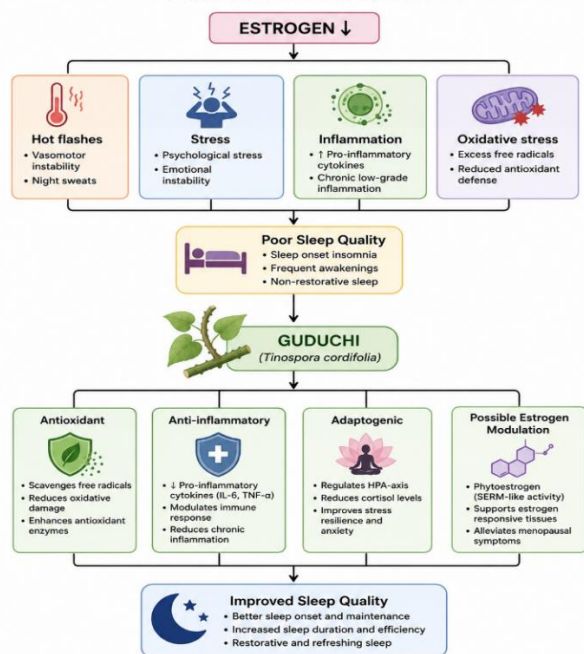


Figure 1: Proposed mechanism of *Guduchi* in menopause-associated sleep disorders

Why *Guduchi*?

Rasayana Properties

Among the *Rasayana* herbs of Ayurveda *Guduchi* (*Tinospora cordifolia*) is one of the most important herbs. It has 5 properties: it is *Vayasthapana* (anti-ageing), *Balya* (strength promoting), *Medhya* (cognitive enhancing), *Tridoshaghna* (balancing all the three *Doshas*) and it is also *Dahaghna* (relieving burning sensation). The following steps can contribute to reducing fatigue, cognitive impairment, emotional changes and vasomotor symptoms that may occur during perimenopause (Meher et al., 2022).

Antioxidant Activity

After women enter menopause, the loss of estrogen can lead to greater oxidative stress, which can

cause problems in neuronal function and sleep quality. The *Guduchi* contains active ingredients such as alkaloids, diterpenoid lactones, glycosides, polyphenols and flavonoids, which have significant antioxidant properties. These phytochemicals protect the neuronal function by scavenging free radicals and by improving the endogenous antioxidant mechanisms while lowering lipid peroxidation, which will play an important role in healthy sleep regulation.

Anti-inflammatory Activity

There's chronic low-grade inflammation at the time of menopause in which certain pro-inflammatory cytokines like tumor necrosis factor α and interleukin 6 are produced and can affect the normal sleep physiology. *Guduchi* shows prominent immunomodulatory and anti-inflammatory properties as it regulates inflammatory mediators and prevents oxidative tissue damage. They can help to promote better sleep quality and general health and wellbeing.

Adaptogenic and Anti-stress Effects

Psychological stress can be a significant factor causing sleep disturbances during perimenopause. Based on experimental research, *Guduchi* has been found to have adaptogenic qualities that improve resistance to stress, decrease anxiety-like behaviour and modulate cortisol reactions via the HPA axis. These actions can help to make the person sleep better, as they may be able to reduce physiological and psychological stress.

Suggested but not established SERM-like Activity (P Lewis)

There have been some emerging experimental evidence regarding the possible mild phytoestrogenic or selective estrogen receptor modulator (SERM) activity of *Guduchi*. There have been animal studies that have shown its ability to affect the estrogen-sensitive tissues and provide anti-estrogen effects. While this is positive, there is limited clinical evidence of estrogen modulation and further research in perimenopausal women is needed.

Evidence from Animal and Human Studies

Author	Year	Study Type	Intervention	Main Findings
Baker et al.	2018	Review	Menopause	Sleep disruption common
Coborn et al.	2022	Cohort	Hormones	Hormonal fluctuations affect sleep
Troia et al.	2025	Narrative Review	Perimenopause	Vasomotor symptoms impair sleep
Balkrishna et al.	2025	Clinical	Ashwagandha	Improved menopausal symptoms
Sultana et al.	2025	Systematic Review	Botanicals	Herbal therapies improve psychological symptoms
Sukumar et al.	2025	Review	Ayurveda	Supports phytotherapy in menopause

Current Modern Management

Hormone Replacement Therapy (HRT) is a current treatment for management of sleep disorders associated with menopause that effectively treats vasomotor symptoms but carries a risk of thromboembolic events and hormone dependent malignancies and is not suitable for all women (Delamater & Santoro, 2018). Insomnia Cognitive Behavioral Therapy (CBT-I) is the first-line nonmedical treatment and it has been proven to have beneficial effects on sleep without side effects from using medication. While melatonin supplementation is a possible way to help regulate circadian rhythm other drugs used as sedative-hypnotics may provide only short-term symptomatic relief, but can lead to tolerance, dependence, and cognitive impairment. Regular physical activity, sleep hygiene, stress reduction and dietary changes are recommended as supportive measures (Troia et al., 2025). However, today's treatment modalities are not without drawbacks, there are concerns about the safety of these treatments in the long-term and the efficacy of these treatments may depend on patient compliance.

Research Gap

Disturbance of sleep is a common part of perimenopausal transition and plays a substantial role on physical and psychological health. The biological activities of *Guduchi* relevant to the possible mechanism of menopause induced sleep disorders include antioxidant, anti-inflammatory, adaptogenic, immunomodulatory and estrogen modulating properties. Most evidence available, though, comes from experimental studies or investigations assessing general menopausal symptoms, or sleep-specific outcomes. Efficacy of *Guduchi* in improving sleep in Perimenopausal women has not been well studied clinically. Thus, randomized controlled trials conducted by clinical researchers with sleep assessment devices of proven validity are needed to determine its clinical effectiveness and safety.

CONCLUSION

Sleep disturbances during menopause result from a complex and intricate relationship among these hormones, neuroendocrine and inflammatory pathways, oxidative processes and their impact on women's health and quality of life. The changes are interpreted through Ayurveda as *Rajonivritti*, dominance of *Vata* and *Nidranasha* and recommend *Rasayana Chikitsa* for healthy ageing and balancing physiology. *Guduchi* (*Tinospora cordifolia*) has antioxidant, anti-inflammatory, adaptogenic, immunomodulatory and neuroprotective activities which can be applicable to multiple mechanisms associated with menopausal sleep disorders. While

there is some experimental and clinical support for suggestive therapeutic use, there is limited clinical evidence for the use to enhance sleep quality in perimenopausal women. Further RCTs with a well-designed approach are recommended for assessing *Guduchi* for its safety and efficacy as a supportive treatment for menopausal sleep disturbances.

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