

Plant Bioactives for Improving Occasional Stress and Sleeplessness

Research Highlights

- ✓ Stress and disrupted circadian rhythms may affect melatonin production and the balance between excitatory and inhibitory neurotransmitters, leading to occasional sleeplessness.
- ✓ Plant-derived ingredients such as passionflower, jujube, California poppy, lavender, and kava have been used to address sleep concerns, with scientific studies supporting their efficacy in promoting relaxation and restful sleep.
- ✓ Melatonin supplementation, backed by systematic reviews of clinical trials, has been shown to support a healthy circadian rhythm and relieve occasional sleeplessness.

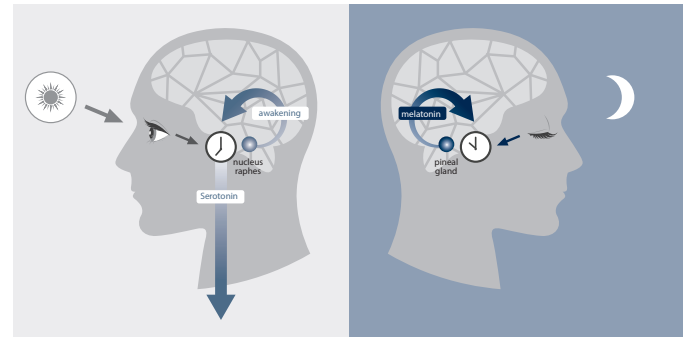
Introduction

A healthy sleep is one with adequate duration, good quality, proper timing, regularity, and the absence of disturbances or disorders.¹ However, nearly everyone experiences occasional sleeplessness for various reasons. Sleeplessness presents in multiple forms, including difficulty falling asleep, disrupted sleep, and early awakenings. It can contribute to daytime fatigue, irritability, and difficulties with attention and memory. Emotional well-being can also be affected, leading to feelings of depression or anxiety. These sleep-related issues can impact daily activities, increasing the risk of accidents. Moreover, persistent worry about sleep further compounds the challenges of achieving restful nights.²

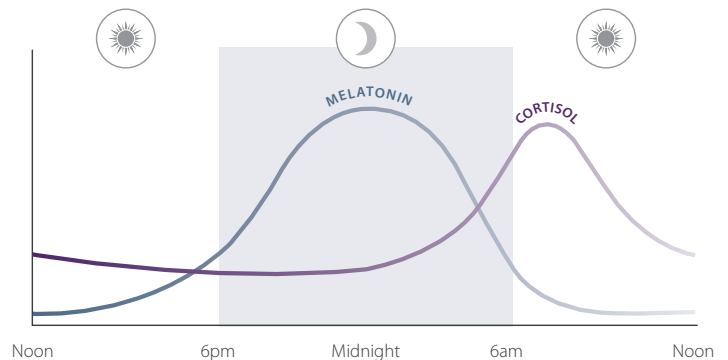
Circadian Rhythms and Melatonin

Circadian rhythms, the cyclical 24-hour period of human biological activity coordinated by bodies' internal clocks, help our body adjust to and anticipate daily changes in the environment and are essential in the regulation of the sleep-wake cycle.³ This process involves the suprachiasmatic nucleus (SCN), the central pacemaker or "master clock" in the brain. As bright light strikes the light-sensitive retina, the SCN interprets the signal and instructs the pineal gland to adjust its production of melatonin. Also known as the "darkness hormone" or "sleep hormone," melatonin levels start to increase after sunset, preparing the body for sleep.⁴

Body Clock (Circadian Rhythm)



Circadian Rhythm



During the 24-hour cycle, the levels of melatonin and cortisol in our bodies vary in response to the quantity of light, guided by our circadian rhythm.

Occasional Sleep Loss

When there's a misalignment of the internal body clock with our lifestyle or the external environment—caffeine, nicotine, alcohol, traveling across multiple time zones, excessive noise, use of self-luminous devices at nighttime, argument, work stress, anxiety, and worry—it can cause misaligned circadian rhythm leading to sleep disturbances.^{2,5}

- Exposure to light, especially in the evening, inhibits melatonin production. Disruptions in melatonin release can lead to difficulty falling asleep and maintaining a consistent sleep pattern.
- Misalignment of the circadian rhythm may affect the optimal balance between the neurotransmitters gamma-aminobutyric acid (GABA; associated with relaxation and sleep) and glutamate (associated with wakefulness and alertness) in the brain, potentially contributing to difficulties in falling asleep or maintaining sleep.

Plant Ingredients and Melatonin Supporting Occasional Stress and Sleeplessness

The use of plant-derived ingredients for promoting mental calm or better sleep is a common thread across numerous countries and cultures throughout history. Traditional medicine systems, such as Ayurveda in India, Traditional Chinese Medicine, European herbal medicines, and Native American herbal traditions, have long incorporated various herbs and plants to address sleep-related concerns. Scientific pre-clinical models have provided valuable insights on how plant-derived ingredients help relieve occasional sleeplessness and soothe away occasional nervous tension:

Passionflower (*Passiflora incarnata*) extract⁶⁻⁸

- Contains flavonoids and flavonoid glycosides (e.g., GABA, vitexin, isovitexin, orientin, iso-orientin), phenolics, and alkaloids.
- Modulates GABA system via affinity to GABAA receptors in the brain membrane and hippocampal neurons.

Jujube (*Ziziphus jujuba*) extract⁹⁻¹¹

- Contains triterpenoids (e.g., jujuboside A and B), flavonoids, vitamin C, and organic acids.
- Modulates gene expression of GABAA and serotonin (5-HT) receptors in hippocampal neurons and inhibits the glutamate-mediated excitatory signal pathway in the hippocampus.

California poppy (*Eschscholzia californica*) extract¹²⁻¹⁴

- Contains alkaloids such as N-methylaurotetanine (NMT), protopine, and allocryptopine.
- Modulates GABA system via affinity to GABAA receptors in the brain tissue, producing soothing and calming properties.

Lavender (*Lavandula angustifolia*) oil^{15,16}

- Contains linalyl acetate, linalool, geranyl acetate, and β -caryophyllene.
- Exerts nerve-calming effects via modulating N-methyl-D-aspartate (NMDA) receptor and modulates serotonin reuptake by binding the serotonin transporter.

Kava (*Piper methysticum*) extract¹⁷⁻¹⁹

- Contains kavalactones such as kavain, methysticin, and yangonin.
- Enhances ligand binding to GABAA receptors, reduces excitatory neurotransmitter release via the blockade of calcium ion channels, and reduces neuronal reuptake of norepinephrine and dopamine.

Many human randomized clinical studies have supported the use of plant ingredients to promote relaxation or sleep. For example:

- Participants receiving passionflower extract prior to medical procedures found it helpful in occasional nervousness relief compared with a placebo.²⁰
- In a 10-week study, a specific lavender flower oil (80 mg) was shown to significantly provide calming effects, help with occasional restlessness, and support restful sleep compared with a placebo.²¹
- Kava extract has been shown in several studies ranging from 1 to 24 weeks to promote a restful state and support occasional sleeplessness and sleep when quality compared with a placebo.²²

Melatonin

Several systematic reviews have summarized evidence from multiple randomized clinical trials that investigated the effects of melatonin. These reviews have found that melatonin supplementation supports a healthy circadian rhythm and a good night's rest, and may relieve occasional sleeplessness.²³⁻²⁵ Further analyses also found that melatonin at 3 mg is sufficient to provide the beneficial effects.²³

Summary

Sleep is a basic human need and is vital for our overall well-being. It is crucial for proper brain function, brain waste clearance, metabolism, appetite regulation, immune responses, physical functioning, and development.²⁶ Hence the phrase: sleep is good medicine. Lifestyle practices, better sleep hygiene, and plant-based ingredients are helpful tools to support a healthy circadian rhythm and promote restful sleep during periods of occasional sleeplessness.

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