Ilam University of Medical Sciences

Plant Biotechnology Persa

Online ISSN: 2676-7414

Homepage: https://pbp.medilam.ac.ir

Herbal Therapy for Sleep Improvement: A Review of the Mechanisms of Medicinal Plants in Insomnia

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Article Info

Article type:
Review Article

Article History:
Received: Sep. 12, 2024
Received: Nov. 25, 2024
Accepted: March. 31, 24
Published Online: May. 17, 2025

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A B S T R A C T

Objective: Insomnia or sleep disorders refer to conditions characterized by insufficient sleep, difficulty falling asleep, or sudden awakenings during the night. These issues can be distressing for some individuals and significantly affect their daily functioning. While various factors contribute to insomnia, scientific research continues to explore the body's need for sleep and its underlying causes. The aim of this study is to investigate the effects of medicinal plants on sleep improvement and the treatment of insomnia. In this research, the mechanisms influencing insomnia and how Iranian medicinal plants impact sleep quality are analyzed and reported.

Methodology: For this review, key terms such as medicinal plants, traditional medicine, native Iranian plants, insomnia, and sleep treatment were used. Relevant articles were searched from reputable scientific databases including PubMed, Google Scholar, Scopus, and Web of Science. Additionally, specialized resources such as reference books, encyclopedias, and online sources were consulted for data collection. All available articles and resources were carefully examined and analyzed to identify medicinal plants used in traditional Iranian medicine to improve sleep.

Results: Traditional Iranian medicine offers a range of herbal remedies for sleep improvement and insomnia. Notable plants include saffron, thyme, lavender, pear, sage, rosemary, eucalyptus leaves, mint, ginger, lemon balm, cinnamon, chamomile, passionflower, jujube, hops, violet flower, borage, bitter orange, milk thistle, wild lettuce, green tea, and bitter orange, all of which are part of Iran's native flora used in traditional treatments.

Conclusion: The findings of this review demonstrate that medicinal plants are recognized as natural and safe treatments for insomnia and sleep enhancement. These plants primarily exert their effects by regulating the central nervous system, reducing anxiety and stress, and enhancing melatonin production.

Keywords: Medicinal plants, Insomnia, Traditional medicine, Sleep treatment, Anxiety, Melatonin, Central nervous system

➢ **How to cite this paper**
Hamzeh F, Razmjouei D. Herbal Therapy for Sleep Improvement: A Review of the Mechanisms of Medicinal Plants in Insomnia. Plant Biotechnology Persa 2025; 7(2): 70-75.

[DOI: 10.61186/pbp.7.2.11]

Introduction

Insomnia is one of the most common sleep disorders that widely affects individuals around the world [1]. This condition can manifest as difficulty falling asleep, frequent awakenings during the night, or waking up earlier than usual [2]. Insomnia can negatively impact both the physical and mental health of individuals, leading to reduced quality of life and decreased daily functioning [2]. The causes of insomnia can range from psychological, physiological, and environmental factors. Consequently, numerous treatments have been proposed to manage this issue, one of which is the use of medicinal plants. This study will examine the effects of medicinal

DOI: 10.61186/pbp.7.2.11
Publisher: Ilam University of Medical

plants on the treatment of insomnia and sleep quality improvement [3].

Insomnia is commonly caused by various physiological and psychological issues such as anxiety, depression, chronic stress, or hormonal imbalances [4]. In many individuals, abnormal neural and hormonal responses, such as increased secretion of stress hormones like cortisol, disrupt the sleep cycle. Additionally, physical conditions such as chronic pain, gastrointestinal issues, and respiratory diseases can interfere with sleep [5]. However, in many cases, the causes of insomnia are complex and involve a combination of different factors, requiring a multi-faceted approach for identification and treatment. In this context, herbal treatments have emerged as a natural and low-risk alternative [6].

In recent decades, medicinal plants have gained considerable attention from researchers and medical professionals due to their calming and anti-stress properties [7]. Certain medicinal plants have been recognized as effective in improving sleep quality and alleviating symptoms of insomnia [8]. These plants, through their sedative and anxiolytic effects, can help reduce stress and facilitate the sleep process. Some of these plants work by affecting the central nervous system and modulating gamma-aminobutyric acid (GABA) function, a neurotransmitter that plays a key role in relaxation and sleep, thus enhancing sleep quality [9].

Various mechanisms underlie the effects of medicinal plants on sleep and insomnia. Generally, certain medicinal plants interact with GABA receptors in the brain, calming the nervous system, reducing anxiety, and improving sleep quality. These plants help individuals reach a state of relaxation and achieve deeper sleep by reducing unnecessary neural activity [10]. Some medicinal plants act as natural anti-stress agents and help regulate stress hormone levels, facilitating the sleep process [11]. Furthermore, these plants, due to their sedative properties, can alleviate mild pain and physical and psychological tension, thereby aiding the sleep onset process. These effects make medicinal plants powerful tools for improving sleep quality and treating insomnia [12].

The aim of this review study is to identify and report on medicinal plants used in traditional Iranian medicine for improving sleep and treating insomnia, with a focus on their biological mechanisms.

Methodology

For this review study, relevant keywords such as "medicinal plants," "traditional medicine," "insomnia," "sleep treatment," and "native Iranian medicine" were selected. Articles and related scientific resources were searched and reviewed from reputable scientific databases such as PubMed, Google Scholar, Scopus, and Web of Science. In addition, specialized sources, including reference books, encyclopedias, and trusted online resources, were utilized to collect more comprehensive data. The study specifically focused on identifying medicinal plants from traditional Iranian medicine that are commonly used to improve sleep and treat insomnia. All retrieved articles and sources were carefully and thoroughly analyzed to extract mechanisms through which these plants impact sleep quality and treat sleep disorders. Therefore, the data and evidence regarding the effects of these plants on sleep improvement, particularly concerning insomnia, were systematically and accurately evaluated.

Results

Traditional Iranian medicine offers several herbal remedies for improving sleep and treating insomnia, including plants such as saffron, thyme, lavender, pear, sage, rosemary, eucalyptus leaves, mint, ginger, lemon balm, cinnamon, chamomile, passionflower, jujube, hops, violet, borage, bitter orange, milk thistle, wild lettuce, green tea, and warang bo. These are among the most important plants in the Iranian flora used in traditional medicine. The medicinal plants that improve sleep and alleviate insomnia are listed in Table 1 [22-13].

[DOI: 10.61186/pbp.7.2.11]

Table 1. Medicinal Plants for Improving Sleep and Treating Insomnia

Persian Name	English Name	Scientific Name	Plant Family	Mechanism
Zafaran	Saffron	Crocus sativus	Iridaceae	Increase serotonin and dopamine levels, reduce anxiety
Avishan	Thyme	Thymus vulgaris	Lamiaceae	Anti-anxiety and calming effects
Ostokhodous	Lavender	Lavandula angustifolia	Lamiaceae	Calming and stress reduction
Golabi	Pear	Pyrus	Rosaceae	Calming and stress reduction
Maryamgoli	Sage	Salvia officinalis	Lamiaceae	Anxiety reduction and calming effects
Rosmary	Rosemary	Rosmarinus officinalis	Lamiaceae	Anti-inflammatory and calming effects
Okaliptus	Eucalyptus	Eucalyptus globulus	Myrtaceae	Anti-inflammatory and relieves nerve tension
Naena	Mint	Mentha	Lamiaceae	Calming and relieves tension
Zangabil	Ginger	Zingiber officinale	Zingiberaceae	Anti-inflammatory and relieves digestive symptoms
Badranjbouyeh	Melissa	Melissa officinalis	Lamiaceae	Calming and anti-anxiety effects
Darchin	Cinnamon	Cinnamomum verum	Lauraceae	Reduces anxiety and regulates blood sugar
Babouneh	Chamomile	Matricaria chamomilla	Asteraceae	Calming and anti-anxiety effects
Gole saatai	Passionflower	Passiflora incarnata	Passifloraceae	Calming and anti-anxiety effects
Annab	Jujube	Ziziphus jujuba	Rhamnaceae	Anti-anxiety and calming effects
Razak	Hops	Humulus lupulus	Cannabaceae	Sedative and calming effects
Gole banafsheh	Violet	Viola odorata	Violaceae	Calming and anti-anxiety effects
Gole gavzaban	Borage	Borago officinalis	Boraginaceae	Reduces anxiety and facilitates sleep

[DOI: 10.61186/pbp.7.2.11]

baharnaranj	Orange blossom	Citrus aurantium	Rutaceae	Calming and anti-anxiety effects
Kharmaryam	Milk thistle	Silybum marianum	Asteraceae	Calming and detoxifying effects
Kahouye vahshi	Wild Lettuce	Lactuca virosa	Asteraceae	Calming and sedative effects
Chaye sabz	Green Tea	Camellia sinensis	Theaceae	Relieves anxiety and improves sleep quality
Varangbou	Bergamot	Citrus bergamia	Rutaceae	Anti-anxiety and calming effects

Discussion

Anxiety is one of the most prevalent psychiatric disorders worldwide, significantly affecting the quality of life of individuals. In recent years, there has been a growing interest in natural and complementary treatments for managing anxiety. Among these, medicinal plants with calming and anti-anxiety effects have gained particular attention from researchers [23].

Insomnia is considered one of the common sleep disorders, adversely affecting both the physical and mental health of individuals. Various factors such as stress, anxiety, hormonal changes, and unhealthy lifestyles can disrupt the quality and quantity of sleep. While conventional pharmacological treatments can be effective, they are often accompanied by side effects such as dependency, daytime drowsiness, and drug tolerance. In this context, the use of herbal compounds as a natural and low-risk approach has attracted attention [23].

Medicinal plants that improve sleep operate through several mechanisms. Some, like chamomile (Matricaria chamomilla) and lemon balm (Melissa officinalis), induce relaxation and drowsiness by enhancing GABA receptor activity in the central nervous system [24, 25]. Plants like saffron (Crocus sativus) and green tea (Camellia sinensis) play a significant role in regulating the circadian rhythm of sleep by modulating neurotransmitter levels such as serotonin and melatonin [25, 26]. Other plants, such as borage (Borago officinalis) and bitter orange (Citrus aurantium), reduce cortisol levels, which directly impacts stress and anxiety—key contributors to insomnia [27, 28].

Lavender (Lavandula angustifolia) extract, with its calming compounds like linalool and linalyl acetate, significantly improves sleep quality and reduces nighttime awakenings [29]. Hops (Humulus lupulus), due to its bitter compounds, has notable sedative effects and has been suggested as a natural alternative to pharmaceutical sleep aids in some studies [30].

Herbal medicines, with their diverse calming and anti-anxiety effects, play a crucial role in improving sleep quality and reducing stress. Many of these plants help regulate mood and reduce anxiety by increasing levels of neurotransmitters such as serotonin and dopamine. Plants like saffron, thyme, and lavender are known for their calming properties and effectively alleviate stress and anxiety. Additionally, anti-inflammatory herbs such as rosemary and ginger, with their anti-inflammatory effects, can ease nerve tension and gastrointestinal symptoms associated with anxiety.

Conclusion

Scientific evidence suggests that certain medicinal plants can serve as natural alternatives for improving sleep. These plants enhance sleep quality and reduce insomnia through mechanisms such as strengthening GABA receptor function, reducing cortisol, and modulating neurotransmitters. However, further large-scale clinical studies are necessary to determine the optimal dosages, long-term effects, and potential interactions with other medications.

Statements and Declarations

Competing interests

The authors have no competing interests to declare that are relevant to the content of this article.

Ethics approval

[DOI: 10.61186/pbp.7.2.11]

This study was performed in line with the principles of the Declaration of Helsinki.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Acknowledgments

The authors would like to express their gratitude to the clinical research development unit of Imam Khomeini Hospital, Urmia University of Medical Sciences, for English editing solid tumor research center.

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[DOI: 10.61186/pbp.7.2.11]