


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

Fatemeh Hamzeh<sup>1</sup> , Damoun Razmjoue<sup>2,3</sup>  

<sup>1</sup>Department of Neurology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran

<sup>2</sup> Medicinal Plants Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

<sup>3</sup>Department of Pharmacognosy, Faculty of Pharmacy, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

Article Info	ABSTRACT
<p><b>Article type:</b> Review Article</p> <p><b>Article History:</b> Received: Sep. 12, 2024 Received: Nov. 25, 2024 Accepted: March. 31, 24 Published Online: May. 17, 2025</p> <p> <b>Correspondence to:</b> Damoun Razmjoue</p> <p><b>Email:</b> d.razmjoue@gmail.com</p>	<p><b>Objective:</b> 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.</p> <p><b>Methodology:</b> 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.</p> <p><b>Results:</b> 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.</p> <p><b>Conclusion:</b> 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.</p> <p><b>Keywords:</b> Medicinal plants, Insomnia, Traditional medicine, Sleep treatment, Anxiety, Melatonin, Central nervous system</p>
<p><b>How to cite this paper</b> Hamzeh F, Razmjoue D. Herbal Therapy for Sleep Improvement: A Review of the Mechanisms of Medicinal Plants in Insomnia. <i>Plant Biotechnology Persa</i> 2025; 7(2): 70-75.</p>	

### 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

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

## 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,

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.

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].

**Table 1.** Medicinal Plants for Improving Sleep and Treating Insomnia

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

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

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.

### References

- Roth T. Insomnia: definition, prevalence, etiology, and consequences. *J Clin Sleep Med*. 2007;3(5 Suppl): 7-S10.
- Morin CM, Drake CL, Harvey AG, Krystal AD, Manber R, Riemann D, Spiegelhalter K. Insomnia disorder. *Nat Rev Dis Primers*. 2015;1(1):1-18. doi: 10.1038/nrdp.2015.26.
- Levenson JC, Kay DB, Buysse DJ. The pathophysiology of insomnia. *Chest*. 2015;147(4):1179-1192. doi: 10.1378/chest.14-1617.
- Winkelman JW. Insomnia disorder. *N Engl J Med*. 2015;373(15):1437-1444. doi: 10.1056/NEJMcp1412740.
- Patel, D., Steinberg, J., & Patel, P. (2018). Insomnia in the elderly: a review. *Journal of Clinical Sleep Medicine*, 14(6): 1017-1024. doi: 10.5664/jcsm.7172.
- Patel D, Steinberg J, Patel P. Insomnia in the elderly: a review. *J Clin Sleep Med*. 2018;14(6):1017-1024. doi: 10.5664/jcsm.7172.
- Morin CM, Buysse DJ. Management of insomnia. *N Engl J Med*. 2024;391(3):247-258. doi: 10.1056/NEJMcp2305655.
- Wheatley D. Medicinal plants for insomnia: a review of their pharmacology, efficacy and tolerability. *J Psychopharmacol*. 2005;19(4):414-421. doi: 10.1177/0269881105053309.
- Borrás S, Martínez-Solís I, Ríos JL. Medicinal plants for insomnia related to anxiety: an updated review. *Planta Med*. 2021;87(10):738-753. doi: 10.1055/a-1510-9826.
- Akram M, Daniyal M, Munir N, Mohiuddin E, Sultana S. Medicinal plants combating against insomnia: a green anti-insomnia approach. *J Nerv Ment Dis*. 2019;207(11):927-935. doi: 10.1097/NMD.0000000000001052.
- Feizi F, Namazi N, Rahimi R, Ayati MH. Medicinal plants for management of insomnia: A systematic review of animal and human studies. *Galen Med J*. 2019;8: 1085. doi: 10.31661/gmj.v8i0.1085.
- Caro DC, Rivera DE, Ocampo Y, Franco LA, Salas RD. Pharmacological evaluation of *Mentha spicata* L. and *Plantago major* L., medicinal plants used to treat anxiety and insomnia in Colombian Caribbean coast. *Evid Based Complement Alternat Med*. 2018; 5921514. doi: 10.1155/2018/5921514
- Avicenna. *The Canon of Medicine*. 2nd ed. Beirut: Dar Ihya al-Turath al-Arabi; 1999.
- Aghili Khorasani MH. *Makhzan al-Adwiyah*. Tehran: Tehran University of Medical Sciences; 2009.
- Zargari A. *Medicinal Plants*. Vol 1-5. Tehran: Tehran University Press; 1990.
- Ghahraman A. *Ethnobotany and Flora of Iran*. Tehran: Research Institute of Forests and Rangelands; 2003.
- Ebn-e-Bitar DZ. *Al-Jame' li-Mufradat al-Adwiyah wa al-Aghdhiyah*. Beirut: Dar al-Kutub al-Ilmiyya; 2002.
- Rhazes (Al-Razi). *Al-Hawi fi al-Tibb*. Hyderabad: Osmania Oriental Publications Bureau; 1961.
- Chopra RN, Nayar SL, Chopra IC. *Glossary of Indian Medicinal Plants*. New Delhi: Council of Scientific & Industrial Research; 1956.
- Mozaffarian V. *A Dictionary of Iranian Plant Names*. Tehran: Farhang Moaser; 1996.
- Najmabadi M. *History of Medicine in Iran after Islam*. Tehran: Tehran University Press; 2008.
- Amin G. *Popular Medicinal Plants of Iran*. Tehran: Tehran University of Medical Sciences; 2005
- Idoiaga-Mondragon, N., Gaztañaga, M., Yarritu, I., & Pascual-Sagastizabal, E. Academic Anxiety in Spanish Higher Education: A Systematic Review. *Behavioral Sci*. 2025; 15(2): 192. <https://doi.org/10.3390/bs15020192>
- Mao JJ, Xie SX, Keefe JR, Soellerm I, Li QS, Amsterdam J. D. Long-term chamomile (*Matricaria chamomilla* L.) treatment for generalized anxiety disorder: A randomized clinical trial. *Phytomedicine*. 2016; 23(14), 1735-1742. doi: 10.1016/j.phymed.2016.10.012.
- Ghazizadeh J, Sadigh-Eteghad S, Marx W, Fakhari A, Hamedeyazdan S, Torbati M, Mirghafourvand M. The effects of lemon balm (*Melissa officinalis* L.) on depression and anxiety in clinical trials: A systematic review and meta-analysis. *Phytotherapy Res*. 2021; 35(12): 6690-6705. doi: 10.1002/ptr.7252.
- Pitsikas N, Boultsadakis A, Georgiadou G, Tarantilis PA, Sakellaridis N. Effects of the active constituents of *Crocus sativus* L., crocins, in an animal model of anxiety. *Phytomed*. 2008; 15(12), 1135-1139. doi: 10.1016/j.phymed.2008.06.005.
- Bakhriansyah M, Sulaiman SN, Fauzia R. The effect of *Camellia sinensis* tea on a decreased risk of anxiety for medical students at Universitas Lambung Mangkurat Indonesia. *Clinical Epidemiology and Global Health*. 2022; 17: 101114.
- Komaki A, Rasouli B, Shahidi S. Anxiolytic effect of *Borago officinalis* (Boraginaceae) extract in male rats. *Avicenna J Neuro Psycho Physiol*. 2015; 2(1), 34-38.
- Mannucci, C., Calapai, F., Cardia, L., Inferrera, G., D'Arena, G., Di Pietro, M., ... & Calapai, G. (2018). *Clinical Pharmacology of Citrus aurantium and Citrus sinensis for the Treatment of Anxiety. Evidence-Based Complementary and Alternative Medicine*, 2018(1), 3624094.
- Kyrou I, Christou A, Panagiotakos D, Stefanaki C, Skenderi K, Katsana K, Tsigos C. Effects of a hops

- (*Humulus lupulus* L.) dry extract supplement on self-reported depression, anxiety and stress levels in apparently healthy young adults: a randomized, placebo-controlled, double-blind, crossover pilot study. *Hormones*. 2017; 16(2), 171-180. doi: 10.14310/horm.2002.1738.
31. Komaki A, Hoseini F, Shahidi S, Baharlouei N. Study of the effect of extract of *Thymus vulgaris* on anxiety in male rats. *J Traditional Complementary Med*. 2016; 6(3): 257-261. doi: 10.1016/j.jtcme.2015.01.001
  32. Kennedy DO, Pace S, Haskell C, Okello EJ, Milne A, Scholey A. B. Effects of cholinesterase inhibiting sage (*Salvia officinalis*) on mood, anxiety and performance on a psychological stressor battery. *Neuropsychopharmacol*. 2006;31(4): 845-852. doi: 10.1038/sj.npp.1300907.
  33. Yadav M, Jindal DK, Parle M, Kumar A, Dhingra S. Targeting oxidative stress, acetylcholinesterase, proinflammatory cytokine, dopamine and GABA by eucalyptus oil (*Eucalyptus globulus*) to alleviate ketamine-induced psychosis in rats. *Inflammopharmacol*. 2019; 27: 301-311. doi: 10.1007/s10787-018-0455-3.
  34. Yusha'u Y, Hanafi AA, Adam UM. Antidepressant-Like Effects of *Cinnamomum verum* on Open-Space Forced Swim-Induced Depression in Mice. *Nigerian J Physiological Sci*. 2023; 38(2): 223-227. doi: 10.54548/njps.v38i2.11.
  35. Peng WH, Hsieh MT, Lee YS, Lin YC, Liao J. Anxiolytic effect of seed of *Ziziphus jujuba* in mouse models of anxiety. *J Ethnopharmacol*. 2000; 72(3): 435-441. doi: 10.1016/s0378-8741(00)00255-5.
  36. Mannucci C, Navarra M, Calapai F, Squeri R, Gangemi S, Calapai G. Clinical pharmacology of *Citrus bergamia*: A systematic review. *Phytotherapy Res*. 2017; 31(1), 27-39. doi: 10.1002/ptr.5734.