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Review Article

Exploring the Efficacy and Safety of Herbal Remedies for the Management of Sleep Deprivation in Insomnia

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ABSTRACT

Insomnia is most common sleep disorder effecting many lives. Various factors contribute in our sleep cycle like stress, daily activity, workload, use of gadgets/ screen time and many more. If your circadian rhythm got disturbed it will affect your sleep cycle. It might lead to many health issues, fatigue, decline in cognitive function. Now a day's adults along with youth are having insomnia issues due to multiple reasons. If it remains untreated it will affect your quality of life. Since long pharmacological therapies are used that will have negative effect on longer run so herbs like valarine, chamomile and lavenders are now being used because of their sedative properties it acts on nervous system and help to get rid of insomnia. Herbs have gained popularity as its natural and help sleep better.

INTRODUCTION

Almost one third portion of our lives consist of sleep, that is necessary for physical, mental and psychological health. Also sleeping promotes immune functionality, physiological behavior and also necessary for memory recall and helps in learning things [1]. Insomnia is defined as poor quality and quantity of sleep, with complain of awakenings at night often, and difficulty of sleeping again once you awake at night, or getting up early even you do not want to wake up or before your scheduled time [2]. A large population is affected by insomnia on different basis for instance, recurrent, chronic or situational. It is also one of the common disorders in health care field. Patients complain about sleep difficulty, not satisfied with sleep quality and quantity, which effects their daytime performance [3]. However, depression, anxiety, substance abuse, suicidal thoughts, hypertension and diabetes are risk factors of insomnia [4]. People who have schizophrenia or psychotic problems, the treatment of insomnia is necessary for them to reduce the sleep problem, daytime poor performance and other mental issues [5]. Insomnia is a prevailing disorder, 40 to 50% of general population is affected by it. Also, the

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consequences of insomnia are severe on patient, it could be direct for example lethargy, mental distress, and cognitive impairment or indirect such as poor quality of life [6]. Some studies suggested the prevalence of insomnia about 30% of population, while some showed high prevalence of 50 to 60%, Insomnia is most prevalent in females, adults and in those people, who have any kind of mental problem [7]. Classification of insomnia is given in Table 1:

Table 1: Classification of Insomnia [8]

Types of insomnia	Definition
Transient	Difficulty in sleeping, anxiety for short time, acute situational stress like, interview, relationship issues. It last for few days or one week.
Acute	Episodes of sleeping difficulty, that last for 3 months, insomnia caused by life events like, changes in job that is stressful or travelling. It goes away without taking medication.
Onset	Difficulty in sleeping when light is emerging.
Maintenance	Difficulty in beginning or continuing sleep, that leads to daytime dysfunction last for 3 months or 3 nights every week
Comorbid	It occurs with multiple sleep issues, medical issues and psychological issues.

Causes of Insomnia

Sleep is turning into an increasingly valuable thing as a greater number of individuals is facing these issues with sleep in the society. Issues related to sleep are known as insomnia. They are further divided into two types which are as follow:

Short term Insomnia

The reasons of short-term insomnia are not surely known and are not attributable to a single etiology. The etiology of a sleeping disorder includes numerous variables such as behavioral, hereditary, environmental and psychological which leads to a condition of hyper arousal [9]. Hyper arousal is a condition of increased cortical, somatic and cognitive activation. Estimated in physiologic terms, this would mean that patients with short term insomnia would exhibit expansions in cortisol levels, 24-hour metabolic rate, and pulse and body temperature [10]. Untreated and unnoticed short-term insomnia can lead to serious complications. Accordingly, in treating patients, it would be prudent for a supplier to know about these complications. The list of complications [11] is as follow:

1. Hypertension
2. Cardiovascular disease (CVD)
3. Dependence of taking sleep medication
4. Type 2 diabetes mellitus
5. Psychiatric issues such as anxiety and depression

Chronic Insomnia

Chronic insomnia disorder is considered as a risk factor for hypertension, asthma, gastro esophageal reflux (GERD), type 2 diabetes and cardiovascular disease. Chronic insomnia disorder is considered as a risk factor for hypertension, asthma, gastro esophageal reflux (GERD), type 2 diabetes and cardiovascular disease [11] (Figure 1).

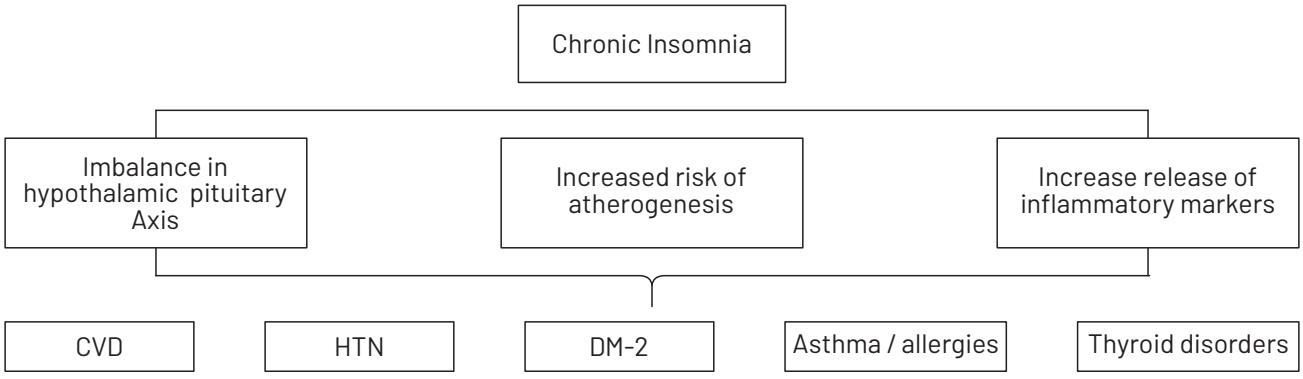

Figure 1: Chronic Insomnia

People who experience issues to cope with a stressful situation or the individuals who report being habitual light sleepers have a raised propensity to create chronic sleep insomnia. There is a high rate of relationship among sleep deprivation and mental issues like anxiety, depression, and post-traumatic stress disorder. Comorbid clinical issues like chronic pain, gastro esophageal reflux disease (GERD), restless legs syndrome, respiratory issues, and stability are related with risk of chronic insomnia. Developmental issues during adolescence, for instance, separation anxiety, may incline a kid to develop sleep problem. Individuals with certain characteristics like perfectionism, desire, neuroticism, low extraversion, and susceptibility

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to depression and stress are likely to create insomnia over time. Sleep deprivation is also more commonly found in people with psychosocial stress like disturbed family life, the demise of a spouse, divorce and substance abuse [12]. Parkinson's diseases, Cold/allergies, hypothyroidism, sleep apnea, low back pain, depression, arthritis, cancer restless leg syndrome are all associated. Antipsychotic medication, nicotine, caffeine and biological factors such as reduced Estrogen, heightened cortisol and progesterone may also effect [13].

Specific causes of insomnia

Primary insomnia causes include:

1. Various ecological stressors like light, noise or temperature
2. Changes in sleep plan because of circumstances like jet lag, a new shift at work, or certain bad habits that negatively impact the state of sleep
3. Stressful life events like extreme changes in death of a loved one.

Secondary insomnia causes include [14]:

1. Already existing psychological well-being issues like anxiety and depression
2. Certain drugs can likewise disturb sleep cycle particularly medicines for depression, allergies, hypertension, and asthma
3. Already existing psychological well-being issues like anxiety and depression
4. Excessive utilization of caffeine, alcohol and tobacco
5. Presence of distress during night in the form of chronic pain

Sign and symptoms

Insomnia is interlinked with other symptoms and disorders like mental issues [15]. Not only this, disturbed circadian rhythm also plays an important role in insomnia progression. For example, those who work at night shift or those who have to cope with their work even at night by disturbing their sleep again and again find it difficult to maintain sleep quality [16]. It might link with altered sleep pattern along with depression, sleep disturbance, fatigue and sleepiness whole day so quality of work got disturbed [17]. Now question arise is how to evaluate insomnia. Following chart [18] will help you (Figure 2).

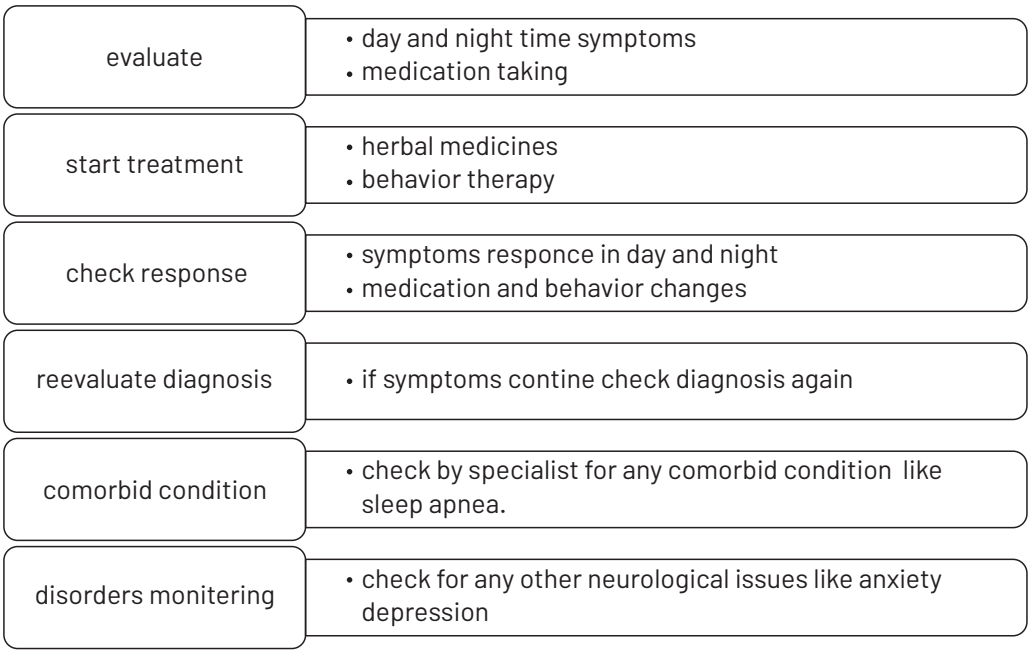

Figure 2: Evaluation of Insomnia

Risk factors:

a. Hormonal changes in menopausal women
b. In aged people due to no physical activity disturb pattern of sleep and medication
c. Mental/ psychological issues
d. Physical stress or stress [19]

Table 2 shows previous studies and their findings on different treatments in insomnia.

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Table 2: Previous studies and their findings

Study	Previous Findings	Author	Publishing year
RCT to check effect of valerine on quality of sleep-in postmenopausal women	100 Post menopausal women age between 50-60 who experience insomnia were selected. Pittsburgh Sleep Quality Index was used as standard. Two groups were created 50 each one was given placebo treatment and other with 530mg of valerine extract twice a day for period of 4 week.	Taavoni et al.,	2011 [20]
Double blind RCT effect of valerine on sleep quality, depression and anxiety in patients of Hemodialysis	39 hemodialysis patients were divided in two groups, one is valerine other is placebo. For time duration of 1 month both groups get their treatment 1 hour before sleep. It not only induces sleep but also relieve anxiety and depression. Significant effect was shown in valerine group as compared to placebo.	Tammadon, et al,	2021 [21]
The effects of chamomile extract on sleep quality among elderly people.	60 elder people were allocated for convenience sampling in two groups. Sleep was assessed before and after two weeks by using the Pittsburgh Sleep Quality Index. It was seen that group given chamomile has significant improvement in quality of sleep as compared to other.	Adib-Hajbaghery et al.,	2017 [22]
Effect of extract of chamomile on melatonin level in sufferers of insomnia and anxiety.	15% w/v chamomile extract was given to 50 randomly selected subjects for time of 8 weeks. Increase in levels of melatonin was seen in treatment group. Moreover, it is natural without any side effects that help with sleep quality, symptoms of anxiety and improve lipid profile as well.	Hasan	2022 [23]
Double blind randomized trial: use of lavender oil in postmenopausal women facing insomnia	35 females having insomnia due to post menopause were divided in two groups. Evaluation was done for 29 days in both groups. Aroma therapy patients experience improvement in sleep and its quality.	dos Reis Lucena et al.,	2021 [24]
Efficacy of Lavender oil on sleep quality and metabolic control in insomnia and type 2 diabetes patients.	52 patients with type 2 diabetes and insomnia were allocated by Pittsburgh Insomnia Rating Scale-20(PIRS-20)>5. These were treated for 4 weeks. 1st week was washing period in this. It shows lavender improves sleep and enhance its quality where as it has no effect on metabolism.	Lari et al.,	2020 [25]

Valerian

Valeriana officinalis (valerian) is everlasting flowering plant that is found in Asia and Europe. From old times, it has been used for medical purpose. It also has sedative and antispasmodic activities, due to which it is well-known throughout the world. Valerian tea is eminent due to its sleep-inducing results [26]. According to EMA (European Medicine Agency), the well-known use of Valerian root is reliving from nervous distress and also sleeping issues. For nervous distress the recommended dosage is 400-600mg orally hydroalcoholic extract and herbal (root) dosage 0.3-3g three times per day [27]. While seeing mechanism of action, valepotriates, valerenic acid and some other compounds present in valerian that interacts with GABAergic system as shown in the Figure 1. GABA is important neurotransmitter for inducing sleep [28]. Some evidence suggests that, valerian is most favorable agent for inducing sleep. It also induces melatonin release because it is agonist of 5-hydroxytryptamine 2A receptor [29] (Figure 3).

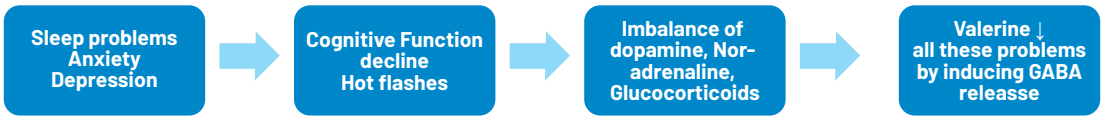

Figure 3: Active ingredients and health related benefits of Valerian [30]

Chamomile

Chamomile is ancient used herb in treatment of insomnia [15]. It is yellow white flower with two common species i.e., German and roman chamomile [31]. Many herbalists and Ayurveda medication used chamomile because of sedative properties that are still under study but considered important in calming nervous system so ultimately treats insomnia [32].

Dosage

It is commonly used as tea but tablet, oils and inhalation sprays are also available. Common method of tea in which dried leaves are infused in boiling water having 90-400mg of its active ingredient or flavonoid apigenin [33].

Bioactive components

Mainly flavonoids like apigenin, quercetin and their metabolites that have sedative effect. They have pharmacological effects

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while compounds like Chamazulene are anti-inflammatory. It will affect quality of life if you are not treating your insomnia [34].

Lavender

Lavender is a plant which belongs to Lamiaceae family and its numerous species along with various substance attributes exist, which include L. stoechas, L. latifolia, Lavandula Angustifolia and Lavandula x intermedia. Although unique in relation to an herbal perspective, the previously referenced lavender species shares some similar synthetic constituents and properties [35]. The concentrates and Lavandula angustifolia fundamental oil have different pharmacological impacts, like anxiolytic, anticonvulsant, anticholinesterase, antioxidant, antifungal and antimicrobial activities [36]. Lavender is an herb that covers around 28 local species as well as 300 hybrids in Lamiaceae group. This natural herbal cure strengthens the nervous system. The time required for digesting this fundamental oil is around two hours. Oil of Lavender is the fundamental oil refined from lavender bloom, with anti-inflammatory, antifungal, antibacterial, antimicrobial, antiseptic, antidepressant properties. This herb stimulates urine production, reduces emotional stress and anxiety and improves digestion as described in the Table 3. This spice heals burns and wounds, improves sleep, improves dermatitis and psoriasis, diminishes skin inflammation and store skin complexion. Lavender is also utilized in aromatic healing [37].

Table 3: Different herbs and their mechanism of action

Herbs Name	Mechanism of action
Valerian	Studies suggested a mechanism of action of valerian that possess sedative properties which leads to increase in GABA quantity (inhibitory neurotransmitter) that is present in synaptic cleft. It causes brain nerve ends to release GABA and then block the reuptake of GABA into nerve cells. Also, valerian also protect GABA form those enzymes that cause inhibition of GABA [38].
Chamomile	Sedative property of chamomile is due to flavonoid named apigenin that act on GABA receptors [39].
Lavender	Linalyl acetic acid has narcotic activities whereas, linalool is a sedative. Linalool has an impact that resembles Phenobarbital. The reports on non-pharmacological interventions demonstrate that the lavender oil may have more acceptability and can be used for treating severe to moderate disturbance of sleeping. Most researches on lavender focus on the aroma-therapeutic effect on encouraging sleep [40].

Pro Sleep Foods

Functional foods play a role in the prevention of sleep disorder (insomnia). Various researches have shown that the people who consume less functional food sources in the diet are at great risk of having sleeping disorder. The functional foods contain higher functional components which promote sleep, including pyridoxine, tryptophan, melatonin, GABA, calcium, L-ornithine, potassium and hexadecanoic acid. The components which promote sleep are functional foods such as milk, whole grains, lettuce, walnut, barley grass powder, cherry, asparagus powder and kiwifruits. Barley grass powder which is high in calcium, GABA and potassium is the best useful functional food that helps to prevent insomnia [41]. Different nutritional interventions help to improve the sleep which includes high CHO, melatonin, high glycemic index, tryptophan rich protein, kiwifruit, tart cherry juice & micronutrients. Functional food-based mediations are expected to improve sleep quality and promote general/sleep wellbeing [42].

CONCLUSIONS

Herbs have shown effect in promoting sleep by reducing anxiety. Chamomile, known for its calming properties, is often brewed into a soothing tea. Chamomile have apigenin that helps in sleep. Lavender, with its pleasant scent, can be inhaled or used in aromatherapy to induce relaxation. Valerian root, a well-known herbal remedy, is believed to improve sleep quality by calming the nervous system. Valerian promotes GABA neurotransmitter that promotes sleep.

Authors Contribution

Conceptualization: NN
Writing-review and editing: NN, MB, AA, FR

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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