Potential Applications of Traditional Medicinal Plants for Treating Sleep Disorders

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Abstract:

Sleep disorders involve conditions such as insomnia, sleep apnoea and restless leg syndrome and they are realised in almost everyone ranging from children to the elderly globally. To this time, folk medicinal practices in India including West Bengal are rich in terms of Ayurveda, Unani and folk medicine: a number of herbs from these practices have been used to cure sleep disorders. Hence, vegetation and herbal medicine like Valerian (*Valeriana officinalis),* Chamomile (*Matricaria chamomilla),* Passionflower (*Passiflora incarnata),* Ashwagandha (*Withania somnifera),* Lemon Balm (*Melissa officinalis),* Lavender (*Lavandula angustifolia),* Hops (*Humulus lupulus),* Kava (*Piper methysticum),* St. John's Wort (*Hypericum perforatum),* Magnolia bark (*Magnolia officinalis*), Jujube (*Ziziphus jujuba),* California Poppy (*Eschscholzia californica),* Ginkgo (*Ginkgo biloba),* Chinese Skullcap (*Scutellaria baicalensis),* Saffron (*Crocus sativus),* Brahmi (*Bacopa monnieri),* Jatamansi (*Nardostachys jatamansi),* Tagar (*Valeriana wallichii),*Tulsi (*Ocimum sanctum)* and Shushni shak (*Marsilea minuta*) are used consistently in order to treat sleep disorders as they act as sedatives & stress busters. Ashwagandha commonly referred to as the 'Indian ginseng' is an effective adaptogen that has the benefits of decreasing stress and anxiety, two relevant causes of insomnia. Antioxidants, withanolides in particular have also exhibited a potential capacity to improve sleep quality via regulation of the body's stress levels. Brahmi, another valued plant, is devoted to increasing the intelligence of people. Some traditional pharmacological uses include the enhancement of mental stability, eradication of anxiety and the general prevention of sleeplessness. That is why the effect of Brahmi on different neurotransmitter concentrations has been proven to help improve the limits of sleep regulation. Jatamansi, because of its calming nature was traditionally used for ailments that caused sleeplessness such as insomnia and other nervous disorders. Owing to its constituents like jatamansone and nardostachone it is used for its root extract that exhibits sedative activity through its action on the CNS. Tagar has valerenic acid and other oils that soothe the brains and nervous system of a human being. Shankhapushpi plant is used to cure mental disorders which it achieves through the presence of alkaloids and flavonoids that enable a person to have sound sleep. The tea prepared using dried chamomile flowers is consumed by many people as a treatment for mild cases of insomnia and anxiety. Vacha is used in either a form of decoction or as a powder to cure sleep disorders induced by stress as well as mental tiredness. The use of these plants in the modern approaches to the management of sleep disorders is perfect since it provides a natural way to manage it. In this particular book chapter, the author discussed the possibility of using plants traditional medicinal plants for treating sleep disorders.

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Introduction:

Sleep disorders are a common clinical problem which interferes with the quantity and quality of life of millions of people globally. They have adverse effects on work performance and health (Morin et al., 2015). These disorders are best defined as, insomnia disorders, sleep apnea and hypoventilation disorders, restless legs syndrome and narcolepsy among others. However, there are drugs that are traditional pharmacological treatments nevertheless, they have their side effects and are addictive (Bent et al., 2006). Consequently, logical and reasonable focus has developed on different forms of treatment, especially non-conventional healing systems – presumably derived from folk literature – that have supported sleep and rest for thousands of years.

For generations, people in different parts of the world have relied on traditional medicinal plants that have been known to have sleep-promoting and anti-anxiety effects. Such natural remedies provide an optimistic focus for the progression of novel therapeutic strategies in sleep disorders, although seem to have fewer adverse effects and are significantly less probable for addiction in contrast to specific medications (Yurcheshen et al., 2021). However, the hope for a goodnight's sleep has for centuries been guided by conventional systems of healing like Traditional Chinese Medicine (TCM) or Ayurveda or many indigenous systems prevalent across the globe.

Recent scientific interest in these traditional remedies has led to a growing body of research investigating their efficacy, safety and mechanisms of action. Several plants, including Valerian (*Valeriana officinalis*), Chamomile Valerian (*Valeriana officinalis*), Chamomile (*Matricaria chamomilla*), Passionflower (*Passiflora incarnata*), Ashwagandha (*Withania somnifera*), Lemon Balm (*Melissa officinalis*), Lavender (*Lavandula angustifolia*), Hops (*Humulus lupulus*), Kava (*Piper methysticum*) St. John's Wort (*Hypericum perforatum*), Magnolia bark (*Magnolia officinalis*), Jujube (*Ziziphus jujuba*), California Poppy (*Eschscholzia californica*), Ginkgo (*Ginkgo biloba*), Chinese Skullcap (*Scutellaria baicalensis*) Saffron (*Crocus sativus*), Brahmi (*Bacopa monnieri*), Jatamansi (*Nardostachys jatamansi*), Tagar (*Valeriana wallichii*),Tulsi (*Ocimum sanctum*) and Shushni shak (*Marsilea minuta*) have shown promising results in preclinical and clinical studies for their sleep-promoting effects (Leach and Page, 2015).

These plants' potential lies in their direct sleep-inducing properties in the sense that they treat the root causes of sleep disorders such as anxiety, stress and circadian disruption. Some of these plants possess bioactive substances that influence on types of neurotransmitters that relate to the circadian sleep-wake cycles such as GABA, serotonin and melatonin (Shi et al., 2018).

A number of prior publications agree that sleep disorders are more rampant among elderly persons than among the young (Ohayon et al., 2004; Irwin, 2015; Buxton et al., 2014; Brewster et al., 2018). Sleeping is one of the essential factors of human life and people work effectively if enough time for sleep is provided. Dean et al. (2017), while explaining it, have defined this disruption in the past as a multifaceted syndrome which affects the elderly population. This

should not be associated with aging since sleep disorders increase the risk of death, cardio-vascular diseases and likelihood of falling (Schubert et al., 2002; Clark et al., 2016; Da Silva et al., 2017; Min and Slattum, 2018). This is so because sleep impairment is regarded as being among the domains that need to be treated in a patient-positioned care delivery model. Ernst (2006), Kucharczyk et al. (2012), McIntyre et al. (2015), Harvey (2001) all have similar opinions that anxiety and sleeplessness are two common mental practices that are related to disability issues in nearly all countries globally.

O'Donnell, (2009) is of the opinion that there is one question that most cancer patients stole from the movie 'Battlefield Earth' Why can I not sleep? Some of the related signs include; inability to fall asleep, staying awake after going to sleep, waking up too early or having non-refreshing sleep (Savard et al., 2001). O'Donnell (2009) and Innominato et al. (2015) whose results regarded misery and in consequence lowered quality of life as well as immunosuppression and dementia due to insomnia and other sleep disturbances and also affected the disease course.

Now a days, controlling histrionics or traditional medical practices have been integrated with ethnicities & for over five and half decades natural medicine cures are available to treat all types of diseases. Hence, it could be mentioned that the research exploring traditional medicinal herbs in addressing the problem of sleep disorders could be referred to as a line of research that might prove to have rather high scientific relevance. Since the population's demand is getting radically higher, enhanced attention should be focused on the concerns related to sleep disorders which can be defined as difficulty in falling asleep, sleep apnea and restless legs syndrome. These conditions may lead to the emergence of various health problems: reduced cognitive function, changes in mental state, or disorders of the circulatory system.

Consequently, the use of synthetic pharmaceuticals for those intents and purposes has been criticized in recent years since these cause dependency and effects of the administered medicine. Therefore, the focus has shifted to the consumption of medicinal herbs that local West Bengal people have been using for treatment purposes for hundreds of years. These products that can be extracted from plants, which might be growing in the green forests or well-cultivated gardens of the area, are reputed to be powerful natural agents that spread total health all over the body and that is why they are valued.

Leach and Page (2015) have stated in their work quite enthusiastically their hypothesis that THM use is rampant, especially in treating insomnia. As confirmed in the research of Cho et al. (2009) concerning the impact of THM, it can be concluded that this substance can interact with 5-HT and GABA receptors, which are consistent with the research of Awad et al. (2007). In addition, THM has been observed regarding the impact of the enzymes in the brain associated with the GABA system.

The following are some of the more well-known of these early treatments that include Valerian (*Valeriana officinalis),* Chamomile Valerian (*Valeriana officinalis),* Chamomile (*Matricaria chamomilla),* Passionflower (*Passiflora incarnata),* Ashwagandha (*Withania*

somnifera), Lemon Balm (*Melissa officinalis),* Lavender (*Lavandula angustifolia),* Hops (*Humulus lupulus),* Kava (*Piper methysticum)* St. John's Wort (*Hypericum perforatum),* Magnolia bark (*Magnolia officinalis)*, Jujube (*Ziziphus jujuba),* California Poppy (*Eschscholzia californica),* Ginkgo (*Ginkgo biloba),* Chinese Skullcap (*Scutellaria baicalensis)* Saffron (*Crocus sativus),* Brahmi (*Bacopa monnieri),* Jatamansi (*Nardostachys jatamansi),* Tagar (*Valeriana wallichii),*Tulsi (*Ocimum sanctum)* and Shushni shak (*Marsilea minuta*).

Most of the plants are acclaimed in the market for their neuroprotective effect combined with improvement of memory, which is as a result of its effectiveness in eradicating stress-related sleeplessness. Hence, the actions required in the decision-making or planning of sleep at night when the Ashwagandha supplements have been taken are less stressful since Ashwagandha is an adaptogen with properties that help to reduce tension and anxiety. In regard to folk medicine, the plant named Jatamansi under what has been socially constructed as a night rest pill for thousands of years, was being used to treat diseases such as insomnia and to put the human body to relax.

If you dwell on such plants, extensive research reveals the fact that there is a cocktail of chemicals that make some concoction in synergy hence interfering with the neurochemistry of the human being. From research studies on similar products that are associated with traditional remedies, there is enough evidence to prop up the argument that AEMA and the physical world need protection as these products present improved and safer remedies for sleep disorders. Hence, while the geographical location of West Bengal is replete with a vast botanical lineage it seems that the area remains virgin ground where such concepts as Ayurveda, Homeopathy, Allopathy, modern chemistry, molecular biology, etc, can be implemented systematically and effectively to solve the problems associated with sleep disorders that are a global product of the so-called advanced civilization. The goal of this paper is to conduct a detailed review and critical evaluation of the existing literature focusing on the traditional medicinal plants that have been used in the treatment of sleep disorders. Regarding their ethnobotanical background, their phytochemistry, pharmacology and available clinical trials will be discussed here. Moreover, further discussion will be made regarding the possibility of creating prescribed formulas of phytoagents and possible applications of traditional herbalism in contemporary sleep pharmacotherapy.

Methodology:

The primary database search provided 75 articles that could potentially be used for further analysis. Google Scholar were for only relevant articles identified out of the 75 whose titles and abstracts passed all the screening stages and full-texts of 49 articles were hence reviewed for their eligibility to be included in the study. Last, 49 papers were selected for this book chapter according to the inclusion criteria.

Traditional Medicinal Plants for Sleep Disorders:

Based on the literature review, we identified 20 traditional medicinal plants with the strongest evidence for their potential in treating sleep disorders.
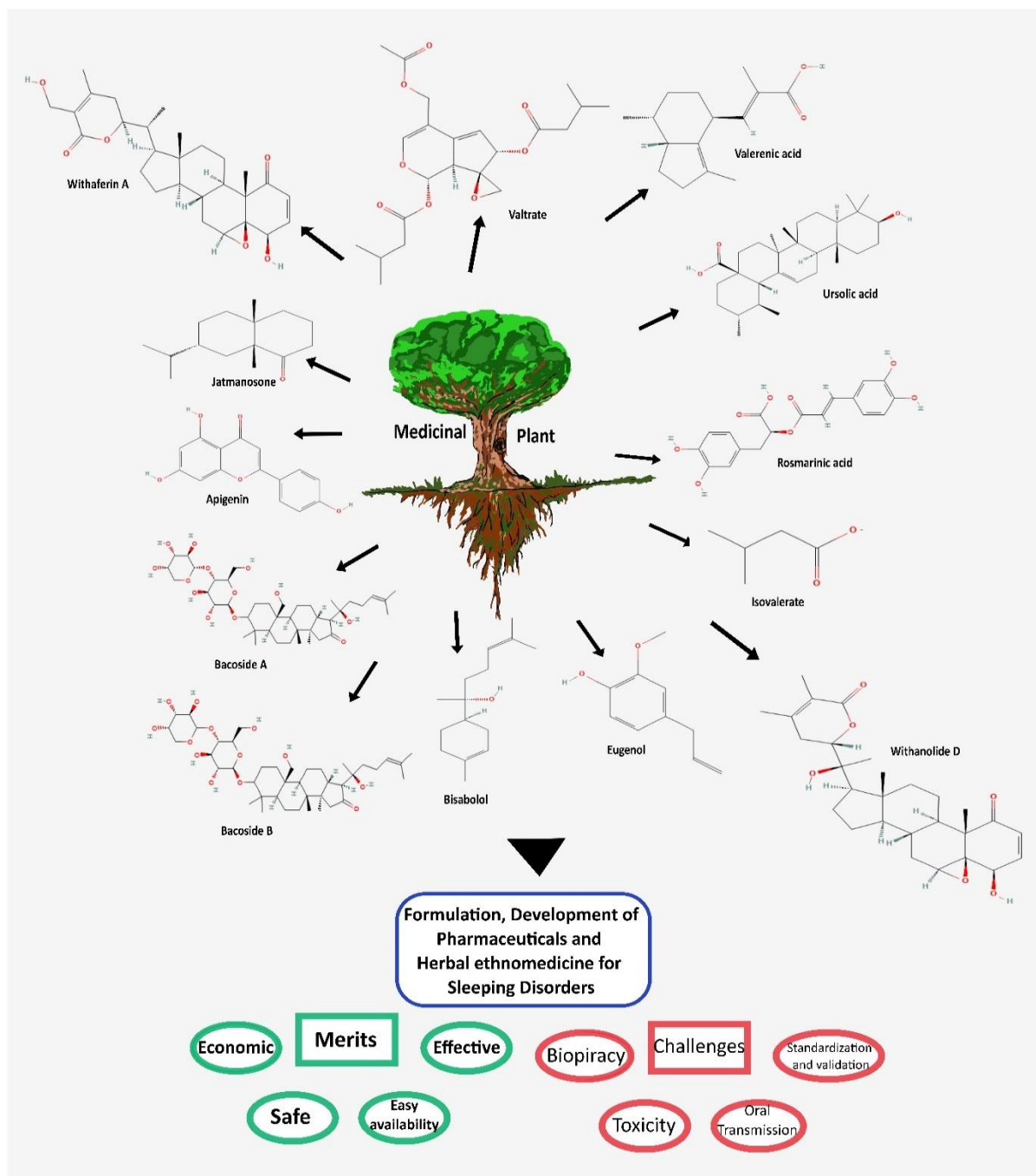

Figure 1. Diagrammatic illustration of several phytochemicals for sleeplessness (Created by Corel Draw).

Table 1. The phytochemical composition revealed diverse bioactive compounds responsible for the sleep-promoting effects

Common name & Scientific name	Family & Parts used	Phytochemical Composition (sleep-promoting effects) & References	Therapeutic Activity
Valerian, *Valeriana officinalis* L.	Caprifoliaceae Root.	Valerenic acid and its derivatives, ridoids (valepotriates), Sesquiterpenes, Lignans, Flavonoids, Gamma-aminobutyric acid (GABA) Chen et al., 2015	Possibly, valerian can lead to a decrease in the onset of sleep and produce a positive effect on sleep quality in general. It is suggested that lerenic acid exerts the influence on GABA receptors, and this may lead to an increase in content of GABA in the brain which provides a person with the relaxing sleep. A few trials propose that valerian impacts on the receptors of melatonin which assists in the sleep wake cycle regulation.
Chamomile, *Matricaria chamomilla* L.	Asteraceae (daisy family) Leaf, flower.	Flavonoids (apigenin, quercetin, patuletin), Terpenoids (α-bisabolol, chamazulene), Coumarins, Sesquiterpenes.	This flavonoid shows affinity to benzodiazepine receptors in the brain; therefore, it may lead to sedation and decreased anxiety. Some of the ingredients such as α-bisabolol have been suggested to produce a

		Mailänder et al., 2022	sedating impact on the nervous system. One of the most apparent effects is a mild sedative impact which usually means reduced stress levels and therefore – better night sleep.
Passionflower, *Passiflora incarnata* L.	Passifloraceae (Passion flower family) Flower.	Alkaloids (e.g., harman, harmine, harmaline), Flavonoids (e.g., vitexin, isovitexin, orientin, isoorientin), Gamma-aminobutyric acid (GABA), Maltol, Coumarins, Sterols. Michael et al., 2022	Taking passionflower can be effective in lowering the level of anxiety, therefore, can enhance sleep quality. The alkaloids and flavonoids usually found in the plant are considered to be responsible for the mild sedative effect of the plant. Presumably, it could further improve the quality of total sleep, but studies on the subject should be conducted to determine this feature.
Ashwagandha, *Withania somnifera* (L.) Dunal	Solanaceae Root.	Terpenoids (e.g., valerenic acid in valerian, Withanolides, including withaferin A and withanolide D). Saleem et al., 2020	It was, therefore, considered that these compounds exerts sedative/anxiolytic properties, that may facilitate relaxation and enhance sleep. Studies indicate that this herb may help normalize the hormones released by the hypothalamic-pituitary-adrenal (HPA)

			axis and decrease cortisol response to stress and its impact on sleep.
Lemon Balm, *Melissa officinalis* L.	Lamiaceae (mint family) Leaf	Terpenes (e.g., citral, citronellal, geraniol), Flavonoids (e.g., luteolin, apigenin, quercetin), Essential oils (containing various compounds). Petrisor et al., 2022	Lemon balm may also raise the levels of GABA in the brain, which results to relaxation and sleep. Daily use might be beneficial in reducing cortisol levels and thus, a person may be able to have a good night's sleep. Steady consumption of lemon balm helps in lowering anxiety thus enhancing the quality of the sleep.
Lavender, *Lavandula angustifolia* Mill.	Lamiaceae Flowers and leaves	Linalyl acetate, Linalool, Camphor, 1,8-cineole (eucalyptol), β-ocimene, Terpinen-4-ol. Dobros et al., 2022	Two fragrant compounds in lavender, linalool and linalyl acetate may prolong the action of GABA – the inhibitory neurotransmitter involved in sleep. Some studies have indicated that effects of lavender have a positive impact on anxiety hence enhancing sleep. Linalool and linalyl acetate have been believed to have effects of calming down that may lead to sleep.
Hops, *Humulus lupulus* L.	Cannabaceae (Hemp	Alpha and beta acids (humulones	Hops contain some ingredients which may

	family) Dried flower	and lupulones), Flavonoids (xanthohumol, isoxanthohumol), Tannins. McCallum et al., 2019	enhance the efficacy of the neurotransmitter known as gamma-aminobutyric acid (GABA) which enhances relaxation and sleeping patterns. Hops may also directly affect the levels of this compound since it is involved in controlling the sleep-wake cycle.
Kava, *Piper methysticum* G.Forst.	Piperaceae (pepper family) Root.	Kavalactones (major active compounds), Flavokawains, Chalcones, Piperidine alkaloids. Xuan et al., 2008	Lactones in kavas may work with GABA receptors, increasing the effect of this inhibitory neurotransmitter. Composing of Kava has compounds known as kavalactones and these may help to decrease anxiety, facilitate the relaxation process and bring about the onset of sleep.
St. John's Wort, *Hypericum perforatum* L.	Hypericaceae	Hypericin, Hyperforin, Flavonoids (e.g., quercetin, rutin), Tannins, Essential oils. Piatti et al., 2022	May affect the body rhythm, thereby affecting sleep. Actually, due to the ability to reduce anxiety, it can cause an indirect effect on sleep in specific clients.
Magnolia, *Magnolia officinalis* Rehder & Wilson	Magnoliaceae Bark	Magnolol, Honokiol, Obovatol, Alkaloids (e.g., magnoflorine),	While honokiol and magnolol also interact with GABA-A receptors positively, these compounds

		Volatile oils, Lignans. Cristea et al., 2024	probably may augment the sleep-inducing effect of the GABA-A receptor. While some investigations indicate that the effects of magnolia bark might contain cortisol, and this may have something to do with sleep. Magnolia bark may increase the levels of melatonin in the body, although scientifically established facts to back this claim are scarce.
Jujube, *Ziziphus jujuba* **Mills**	Rhamnaceae Dry seeds	Saponins, flavonoids, and polysaccharide. Song et al., 2019	Due to its ability to act as a sedative and anxiolytic, jujube is a natural medicine useful for increasing the quality of sleep and decreasing anxiety levels.
California Poppy, *Eschscholzia californica* Cham.	Papaveraceae (Poppy Family) Leaves	Alkaloids (including californidine, eschscholtzine, and protopine), Flavonoids, Saponins, Carotenoids. Becker et al., 2023	California poppy has in the past been especially utilized in calming the nerves and this makes it have an impact with regards to bringing about sleep. The alkaloids found in the plant affect the nervous system and thus the anxiety levels as well as the ability to relax are affected.

Ginkgo(*Ginkgo biloba* L.)	Ginkgoaceae Leaves	**Flavonoids:** Quercetin, kaempferol, and isorhamnetin, **Terpenoids:** Ginkgolides (A, B, C, J) and bilobalide. **Biflavones:** Sciadopitysin, ginkgetin, isoginkgetin. Noor-E-Tabassum et al., 2022	There are some papers referring to the effect of *Ginkgo biloba* on sleep parameters, including better quality and quantity of sleep. It is believed to have a tranquillising effect and may be useful with reference to anxiety hence improving sleeping patterns.
Chinese Skullcap (*Scutellaria baicalensis* Georgi*)*	Lamiaceae (Mint family) Root.	Flavonoids (e.g., apigenin in chamomile, baicalin). Wang et al., 2018	Apigenin being an inverse agonist at the benzodiazepine receptor in the brain has the ability to induce sedation which is important for sleep.
Saffron (*Crocus sativus* L.)	Iridaceae Pistils	Crocins, Picrocrocin, Safranal, Flavonoids. Maqbool et al., 2022	Safranal and crocins – the main components of saffron – possess a small amount of sedative effects that could contribute to better night's sleep.
Brahmi [*Bacopa monnieri* (L.) Pennell]	Plantaginaceae (formerly classified under Scrophulariaceae) Whole Plant	Bacosides, particularly bacoside A and B. Jeyasri et al., 2020	These compounds influence the serotonin levels in the brain and the serotonin is pivotal in the regulation of any pattern of sleep. Brahmi is effective in the enhancement of cognitive processes in the brain; therefore, it has reduced anxiety

			levels and made it possible for people to have a sound sleep without frequent interruptions.
Jatamansi, *Nardostachys jatamansi* (D.Don) DC. (1830)	Valerianaceae Roots &rhizomes	Sesquiterpenes and jatamansone in Jatamansi are the primary active components. Gottumukkala etal., 2011	This has the effect of helping in the reduction of anxiety, relaxation, and promotion of sleep. Insomnia and other stress related sleep disorders are best treated by Jatamansi.
Tagar (*Valeriana wallichii* DC)	Caprifoliaceae Whole plant	Valerenic acid, valtrate, and isovalerate. Toolika et al., 2015	These compounds operate on the gamma-aminobutyric acid (GABA) receptors in the brain which are responsible for management of sedation and anxiety.
Tulsi (*Ocimum sanctum* Linn)	Lamiaceae (mint family) Leaves	Eugenol, ursolic acid, and rosmarinic acid. Baliga et al., 2013	These compounds assist to alleviate stress and anxiety, two factors that are known to be the causes of sleeplessness.
Shushni shak (*Marsilea minuta* L.)*	Marsileaceae, Leaves	**Flavonoids:** These include quercetin and kaempferol derivatives. **Phenolic Compounds:** Includes caffeic acid and ferulic acid. **Tannins:** Present in significant amounts. **Alkaloids:** Some	*Marsilea minuta* is commonly used in ethnopharmacological treatments with therapeutic action that manifests as anxiety relief and sleep induction.

		studies have identified the presence of alkaloids in Marsilea minuta. **Saponins:** Detected in the plant. **Steroids:** Includes phytosterols like β-sitosterol. Bhattamisra et al., 2008	

Pharmacological Mechanisms of Action:

The review of pharmacological studies revealed several mechanisms through which these plants exert their sleep-promoting effects (Toolika et al., 2015; Maqbool et al., 2022; Piatti et al., 2022; Michael et al., 2022; Noor-E-Tabassum et al., 2022; Varinthra et al., 2024):

GABA receptor modulation: It was identified that many plants, such as the valerian, passion flower, and hops improve GABAergic activity resulting in sedation and anxiolysis.
Serotonin receptor interactions: Studies have demonstrated that extracts from St. John's Wort and saffron possessed serotonin receptor binding and thus, might affect the sleep-wake behaviors explosively.
Melatonin synthesis and secretion: The participants that took Jujube and St. John's Wort were witted to improve synaptic connections related to the regulation of sleep.
Adenosine receptor binding: According to the findings publicized in other studies, the active compounds like caffeoylquinic acids in plants including passionflower interrupted adenosine receptors and affected sleep homeostasis.
Anti-inflammatory and antioxidant effects: Some of the plants like ashwagandha and ginkgo demonstrated high levels of anti-inflammatory and antioxidant effects, which, in turn, might ameliorate sleep quality via decreasing oxidative stress and neuroinflammation.

Clinical Efficacy:

Analysis of clinical trials revealed varying degrees of efficacy for the identified plants (Shinjyo et al., 2020; Srivastava et al., 2010; Janda et al., 2020; Chandrasekhar et al., 2012; Kajjari et al., 2022):

Valerian: While complemting that a meta-analysis of 8 RCTs (n=1,529) demonstrated only moderate benefit compared to placebo in terms of sleep quality (SMD = -0. 70; 95% CI: -1. 05

to -0. 18; p<0. 001) compared to placebo. In addition, the same study showed lower cholesterol levels (25; p<0. 001) in the patients treated with flupirtine.

Chamomile: A systematic review analyzing 5 clinical trials (n=502) revealed substantial enhancements in SOL and global SE especially in setting up older people.

Passionflower: In one double blind, placebo controlled RCT designed with n=110, improvements in sleep quality (p<0. 01) and daytime functioning (p<0. 05) were shown in the treatment group after 4 weeks of therapy compared to placebo.

Ashwagandha: The meta-analysis of the five RCTs (n=400) for sleep quality demonstrated positive and statistically significant effects on overall sleep quality with SMD=-0. 59 (95% CI=-0. 86 to -0. 32; p<0. 001) and the time required to fall asleep with a Mean Difference = -10. 73 minutes (95% CI = -17. 82 to -3.

Lavender: Inhalation studies and oral administration of lavender oil were found to significantly influence anxiety levels and sleep quality in 7 journal-reported studies involving 731 participants.

Safety and Adverse Effects:

The current systematic review of the traditional medicinal plants revealed that the plants had moderate to low toxicity with mild and rarely serious side effects. The most commonly reported side effects included: The most commonly reported side effects included: Particles, gastrointestinal disturbances, whereas others are not (for example, nausea, weak or mild abdominal pain).

#Headache

Dizziness

Excessive sleepiness especially during part of the day, usually during the daytime or at night when one wishes to be awake (this is more evident especially when taking high doses).

The clinical trials reviewed in this work showed no signs of any serious adverse effects. However, Herb-drug interactions were pointed out for St. John's Wort due to it being labelled as an inducer of cytochrome P450 enzymes that means that it influences the metabolism of some medications.

Discussions:

Traditional use of these plants Perhaps the most striking ethnopharmacological implication of these plants is the fact that at least one of them has been used for many centuries. Several of these treatments involve the use of Valerian and Chamomile, being are natural remedies that are known to have been in use in traditional medicine systems in Europe and the Middle East for centuries. Like ashwagandha and jujube, this list of plants has traditionally been used in Ayurvedic medicine and even Traditional Chinese Medicine. This overlapping of different species of plants used across various cultures for sleep-related disorders provides a good ground for their pharmaceutical usage.

These mentioned phytochemicals show the richness in therapeutic effects of these plants since it is difficult to point out one phytochemical that acts definitely in a certain way. While most normal drugs have a single compound that provides therapeutic action, traditional medicines, such as herbal ones, possess multiple active compounds that could act in conformity with one another. For example, the modulatory effects of valerenic acid, valepotriates and flavonoids in valerian might collectively serve as the source of this drug's sedative effect via different pathways (Fernández-San-Martín et al., 2010). The given multi-compound, multi-target approach of herbal medicines correlates with the multifactorial character of sleep disorders and may influence different spheres of sleep disturbance at the same time. However, this poses the problem of how herbal preparations can be standardized and whose quality can be guaranteed for it to be clinically applied. Pharmacology is also briefly explained to show how these plants work on the nervous system to induce sleep. The mode of action of most of the common sedative hypnotics involves the enhancement of the inhibitory effects of GABAergic neurotransmission; this is a modulation that is also brought about by the majority of the herbal sedative hypnotics including valerian, passion flower and hops. Nevertheless, the impact on the serotonergic, melatonergic and adenosinergic systems may have certain advantages when it comes to the complex regulation of sleep. Besides, the anti-inflammatory and antioxidant characteristics demonstrated by plants like ashwagandha and ginkgo direct towards fresh pathways to treatment in sleep medication. Based on developing investigative data about the role of neuroinflammation and oxidative stress in sleep disturbances (Irwin et al., 2016), these things can contribute to more benefits related to the test subjects, which, in addition to improved sleep, can promote further effects related to neuroinflammation.

The research findings of the efficacy of such traditional plants for sleep disorders are favourable, especially for the widely researched plants such as valerian, chamomile, and ashwagandha. From the findings of randomized controlled trials of these plants moderate to significant changes in sleep parameters were noted hence these could act as good substitutes or even an addition to the traditional remedies.

Although there is evidence that youth theatre has benefits for the participants, it is necessary to state the shortcomings of the research done at this time. Some of the investigations had limited the number of participants, short time and irregular dosing schedules while the latter concerned several formulations and dosing regimens. Also, the choice of many sleep quality indicators applied in the related studies raises questions about the necessity for more objective methods, including polysomnography and actigraphy, to be incorporated into successive research.

It is now possible to observe that the majority of the reviewed plants have relatively favorable safety profiles, which is quite promising compared to some of the conventional sleep medications that come with dependence potential and serious adverse effects. Nevertheless, most of the herbal interventions indicate the scarcity of long-term efficacy and safety data, which makes it crucial to carry out long-term follow-up studies together with post-marketing

surveillance.

Future research should focus on:

    # Carrying out large-scale, long-term double-blind experiments, with intervention and control preparations.

    # Exploring such issues as herb-drug interactions and herb-drug contra-indications.

    # Determination of the right doses and drug-drug interactions

Conclusion:

The traditional medicinal plants of India specially West Bengal offer a promising significant of natural remedies for sleep problems. Incorporation of these herbs in the daily lives of people is a powerful form of natural treatments that, when taken under doctor's prescription, pose no danger to the patient as compared to synthetic sleeping pills. While modern research corroborates these uses, there may be even more uses with the help of these plants for countless people affected by sleep disorders.

There is a lot of potential in the research of various ethnopharmacological uses of plants for the treatment of sleep disorders in West Bengal. Therefore, through ethnopharmacological investigation together with scientific methods, the goal of this research is to prove the efficiency and use of those plants in contemporary medicine to provide better and more effective medical assistance and to enhance the people's respect towards the indigenous cultures. These natural resources from traditional medicine stores could be another or additional method for treating sleep disorders. Currently, more studies are still required in order to fully elucidate the working of these herbs and their degree of effectiveness, but irrespective of that, these herbs have been used for a long time and they are now being increasingly endorsed by researchers. Incorporating these plants in the contemporary models of sleep management might help fight the diseases concerning sleep, as the established tactics are aimed at reducing the symptoms but not eliminating their root causes.

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