Lavender: A Magical Herb with medicinal properties

ABSTRACT:

Every year about 3/4th of the world's population is suffering from insomnia and is the major reason for many health illness leading to mortality. Insomnia is also an economic burden to the people in both the direct and indirect ways. The general treatment of insomnia includes the powerful drugs and sleeping pills, which cause some side implications in human health and these treatments are also very costly. This review aims to highlight the effects of insomnia and treatment of insomnia by alternate ways i.e) non-medical ways, with additional effects to the human health and economically acceptable by all the classes of people.

Keywords *: insomnia, lavender, aromatherapy, sleep, essential oil, disorder*

INTRODUCTION:

. Lavender (*Lavandula angustifolia*) belongs to the family, Lamiaceae. It is originated from the Mediterranean region, and it is also grown in many other nations across the world, including Poland (Prusinowska and Smigielski, 2014). The Mediterranean region is home to 30 species and hybrids, of which more than half (22) are major to specific regions of the western Mediterranean. In India, the climate of Jammu and Kashmir is ideal for growing lavender because this plant can withstand chilly winters and temperate summers. This cash crop has a two-year gestation period before becoming economically productive. Lavender develops to a height of 40 to 60 cm. The stem's upper portion is green, while the lower portion is woody. The root system of lavender is

fibrous and branching, and its leaves are linear or lanceolate with curled edges. The top of the stem is covered with spikes of lavender flowers that are grouped in circles, each with three to five blossoms (Gora, 2005). It is an ornamental aromatic herb which also consists of numerous medicinal properties. Economically it is useful in essential oil extraction, perfume, pigment industry, medicinal industry and food industry. This medicinal and aromatic plants have served a variety of purposes, and recently they have found success as profitable crops grown all over the world for the production of essential oils (Pokajewicz *et al.*,2023). The growth of essential oil got increased drastically after the COVID pandemic (Hawkins *et al*., 2022). These plant essential oils are now commercially used as a result of their perception as a "well-being" lifestyle. Lavender flowers contains, anthocyanins, phytosterols, sugars, minerals, tannins and essential oil (Batiha *et al*., 2023). The Linalool, linalyl acetate, terpinen-4-ol, acetate lavandulol, ocimene, and cineole are the main constituents of lavender essential oil. Linalool stimulates the aminobutyric acid receptors in the central nervous system which triggers falling asleep (Rai *et al*., 2020). The digestive and nervous systems are greatly benefited by lavender essential oil's strong antioxidant and antibacterial properties (Kajjari *et al*., 2022). While lavender hydrolate is advised for the treatment of skin issues, lavender extract protects dementia and may stop the growth of cancer cells (Batiha *et al*., 2023). About 1500 tons of essential oils are produced each year from the species and hybrids of the genus *Lavandula* (Wells *et al*., 2018). Several Lavandula species produce essential oils with flavouring and therapeutic qualities that are useful in the culinary, beauty, and nutraceutical sectors (Torras-Claveria *et al.*, 2007). Although there are many species of lavender, the three of these species are significant due to their high commercial value: Lavender *(Lavandula angustifolia)* also known as true lavender, fine lavender, or English lavender), Lavandin (*Lavandula intermedia)* and *spike lavender* (Lesage-Meessen *et*

al., 2015). The amount of volatile oil in fresh lavender flowers ranges from 0.7 to 1.4%. On average, a ton of fresh inflorescence yields 10 kg of volatile oil (Muntean *et al* ., 2016). The key plant portion of the lavender plant that collects volatile

oil is the calyx. The yield for the entire flowering top was 0.7%, with the calyx alone showing a yield of 1.3%, followed by the corolla (0.1%) and leaf (0.05%) (Wilson *et al*., 2021). Long-standing research has shown that lavender flowers produce 4-5 times more essential oil than lavender leaves (Aprotosoaie *et al*., 2017). More over 200 tons of lavender oil are produced annually throughout the world. France, UK, and Bulgaria produce the majority of the world's lavender essential oil (Saeed *et al.,* 2023). The use of lavender essential oil is issued safe designation by the Food and Drug Administration Regulatory Administration (21CFR182.20 2015). Dong *et al.,* 2020 conducted a research work and studied about the different chemical components in the lavender essential oil by using GC-MS and 40 components were identified with their major components highlighted in table 1 below .

Table 1: The chemical composition of lavender essential oil (Dong *et al* ., 2020)

S.no	Chemical compound	Relative content %
1.	Oxygenated monoterpenes	31.53
2.	Esters	43.23
3.	Linalyl acetate	26.61
4.	Linalool	19.71

5.	Lavandulol acetate	12.68
6.	Monoterpene hydrocarbons	8.03
7.	Oxygenated sesquiterpenes	4.54
8.	Sesquiterpene hydrocarbons	3.61
9.	Lavandulol	0.48
10.	Cuminol	0.33

For aromatherapy, the essential oil is used sparingly either directly to the body or through vaporisation (Radu *et al*., 2020). Treatment of insomnia with lavender via aromatherapy is simple because essential oil molecules are volatile and they are recognized by the brain and respond with the sensory organs immediately (Lestari, 2016). In 1910, René-Maurice Gattefossé, a chemical engineer from Lyon who suffered severe burns in a laboratory explosion, discovered the healing powers of lavender and he coined the term aromatherapy (Cаnera, 2017). Essential oils are traditionally used in indian medicine ayurveda since more than three thousand years (Mukund *et al*., 2022). Lavender essential oil is traditionally used for curing

insomnia. Insomnia is the sleeping disorder in which the people have trouble in falling sleep. It is a widespread disorder that can affect individuals, including infants, adolescents, and the old aged people (Chigome *et al.*, 2018). It is anticipated that 14% of the general adult population will experience symptoms of insomnia, while 8% of adults will be predicted to experience either clinical or chronic insomnia (Hafner *et al.*, 2023). Insomnia is a typical symptom in daily living, but persistent insomnia is a sign of a sleep problem (Mai *et al.*, 2008). Long-term insomnia raises the risk of early mortality (Janson *et al.*, 2001) and can cause other physical and mental illnesses. Cancer patients may experience significant sleep disorders that require medical intervention. According to evidence, one-third of cancer patients have sleep disturbance and have poor sleep quality (Savard and Morin, 2001;Ma *et al.*, 2021). According to studies, 44-48 percent of cancer patient's prescriptions contain sleeping pills, and 28-37 percent of patients take these prescribed medicine (Liu *et al.*, 2013, Weisman and Brunton 2020). Sleep issues are reported around 39-47 percent in premenopausal women, in addition to the 35-60 percent in postmenopausal women, these data were given by the National Institute of Health on Menopause-Related Symptoms Management National Institutes of Health in 2005. A number of studies reveals the benefit of lavender essential oil for improving the quality of sleep and other health issues like reducing labour pain, dysmenorrhea, epistomy healing, depression, insomnia, sugar level regulation, aromatherapy. The benefit of using lavender product for different health issues is presented in the table 2.

Table 2 : The benefits of using lavender products for different health issues.

S.no	**Benefits**	**Reference**
1.	Reduces labour pain	Kazeminia *et al.*, 2020; Mirzaiinajmabadi *et*

		al., 2018; Makvandi *et al*., 2016.
2.	Dysmenorrhea	Mousavi Kani *et al*.,2019
3.	Episiotomy healing	Abedian *et al*.,2020
4.	Depression recovery	Firoozeei *et al*.,2021
5.	Therapy for sleeplessness	Mameneh *et al*., 2021; Fismer and Pilkington 2012; Lin *et al*.,2019
6.	Reducing stress	Bikmoradi *et al*., 2017
7.	Aromatherapy and massage	Koulivand *et al*., 2013
8.	Blood sugar level regulation	Sebai *et al*., 2013

Causes of insomnia:

Sleep is essential for all living beings from children to adults in order to maintain good mind and body health (Matricciani *et al*., 2019). Healthy sleep is referred to as, the sleep-in terms of both quality and quantity. Quality which means the absence of sleep disorder and quantity which means the timing of sleep (Ramar *et al*., 2021). The term "sleep quality" is used to describe a variety of sleep parameters, such as total sleep time (TST), sleep onset latency (SOL), sleep maintenance, total wake time (TWT), sleep efficiency (SE), and occasionally sleep disruptiveness (Krystal and Edinger, 2008). The health issues related with the sleep disorder are,anxiety and depression (Coulombe *et al*., 2010; Pallesen *et al*.,2011), Hypertension and Obesity (Schlafer *et al*., 2014), heart attacks and heart disease (Janszky and Ljung, 2008). The

amount of sleep that a newborn baby gets is “16 to 18” hours and drops to 6-7 hours in older people. According to the guidelines of the National Sleep Foundation, a healthy young adult (18-25 years) and adult (26 -64 years) needs an average sleep of 7-9 hours per day (Hirshkowitz *et al*.,2015). The adults require approximately 7-8 hours of sleep per day (Putra & Widiastuti, 2020). The amount of sleep between birth and 36 months of age received was examined through an online survey in 17 nations and that were majorly in Asian and Caucasian areas. According to this survey, the overall amount of sleep ranged from 11.6 hours in Japan to 13.3 hours (New Zealand) (Mindell *et al*., 2010). Now a days because of modernization, economic issues and the nuclear family system the aged people were sent to the old age homes. Jesudoss and co - scientists in 2023 conducted an experiment with the aged people in the area of Andhra pradesh, South India in order to evaluate the extent of insomnia and to find the quality of sleep in them. The participants were 100 in number and among them mostly sixty seven participants were resulted with the sleeplessness condition. They found that the sleeplessness condition is due to the different ailments like disease, medication intake for the disease recovery. There are many factors that contribute to loss of sleep, they can be grouped into two main, categories such as lifestyle/occupational factors and sleep disorders. The causes of insomnia are mentioned in the figure 1.

Lifestyle or the occupational factors includes:

Stress: Stress has a significant role in many cases of insomnia. The mind may remain active at night due to worries about your family, job, health, finances, or other factors, making it difficult to fall asleep.

Travel or work commitments: The sleep patterns serve as regulator for body's temperature, metabolism, and sleep-wake cycle. Insomnia can result from a disruption of body's sleep

patterns. Tiredness and sleeplessness because of changing time zones, working late or early, or often switching shifts.

Poor sleeping habits: Poor sleep habits include irregular bedtimes, naps, uncomfortable sleeping quarters, and using your bed for work, eating, or watching TV. Using computers, TVs, video games, smartphones, or other electronics shortly before bed may interfere with the sleep cycle.

Health conditions: Chronic pain, cancer, diabetes, heart illness, asthma, gastroesophageal reflux disease (GERD), an overactive thyroid, Parkinson's disease, and Alzheimer's disease are a few disorders that have been linked to sleeplessness. Include references

Figure 1 : Causes of insomnia

The previous research history determines that insomnia is directly and indirectly linked with many diseases and disorders which can cause the great effect in the human health. The serious health effects in some severe conditions will lead to death. The health implications associated with insomnia are mentioned in the figure 2:

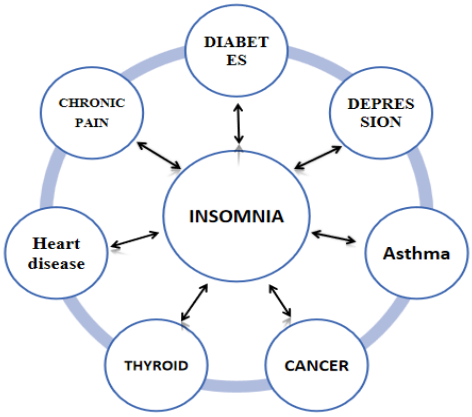

Figure 2 : Diseases and disorders linked to sleeplessness / insomnia

Economic burden: Hafner *et al*., 2023, states that the chronic insomnia is linked to an average productivity loss of 45–54 days at work, which is projected to result in annual losses in the national gross domestic product of between 0.64% and 1.31%, or between $1.8 to $207.5 billion. The direct costs which include the doctor consultation, prescription of medicines and hospitalization in severe sleeplessness cases and the indirect costs which includes alcoholic consumption for inducing sleep, accidents, vehicle damage and massage therapy if needed. Prolonged absences due to illness have a temporary negative impact on the workforce and, in serious circumstances, can have a lasting negative impact on labour output.

Different ways of using lavender products for improving quality of sleep:

Aromatherapy: Aromatherapy is the practice of using essential oils for therapeutic benefit. Essential oils are the concentrated volatile aromatic compound collected from various aromatic plant components, such as the flower, stem, leaf, root, and bark which are used in aromatherapy with the goal of calming, balancing, and revitalising the mind, body, and soul (Corio, 1993).

Wafer in 1994, introduced aromatherapy in a hospital unit that provides aromatherapeutic baths, foot baths, inhalation, compresses, and massages. Various scientific studies revealed the benefit of using lavender essential oil in aromatherapy for improving quality of sleep.

Lavender wipes: Wet wipes are portable and ease to handle. These wipes calm the mind effectively and helpful in handling the stressful situations that we encounter on a regular basis. When travelling a long distance or performing any hectic work, they are utilised to reduce stress and tiredness. Wet wipes have an oily aroma, when inhaled, that reduces stress and gives the good feel (Yasotha and sobithaa, 2020).

Lavender tea: Drinking lavender tea before bed can promote deeper sleep (Negi, *et al*., 2017). By inducing chemical changes in the nervous system, lavender tea will relax brain function in numerous scientific investigations. By drinking lavender tea, synthesis of dopamine gets increased while cortisol stress hormone decreased (Masuo *et al*., 2021). According to one of these studies, lavender boosts the proportion of deep slow-wave sleep, which is regarded as the restorative sleep period. The tiny purple buds, which have a beautiful scent, were used to make lavender tea.

Lavender sleeping pillow: The lavender sleeping pillow which is used in the form of small eye pillows in which the lavender extract or the essential oil sachet is added. Thus, the extracts or the compounds present in the eye pillow helps in relaxation and stimulates the sleep.

Lavender spray: Pillow mists and sprays have been shown to be effective because they emit fragrances that help us fall asleep by causing our bodies to produce melatonin, a hormone that encourages restful sleep.

Lavender diffuser ornaments: Using essential oil via ornaments are the modern way of infusing aroma. The ornaments are portable, easy to carry and wear. The diffuser in the ornaments, wear produce the aroma of the essential oil and while inhaling that makes us feel relaxed and calm. The ornaments may be diffusing pendants, necklaces, finger rings and bracelets. The different ways of using lavender for inducing sleep are mentioned in figure3.

Figure 3: Lavender products for inducing sleep Include references

Scientific evidence of lavender for insomnia treatment

Mahyuvi *et al.*,(2021), conducted a study to look the effect of lavender on insomnia in the elder people. The participants of this research trial were from the old Posyandu in the village of Tambakrejo district. The participants were 21 persons. In this trial, breathing relaxation in combination with aromatherapy using Lavender is followed. It is a relaxation technique in which elder peoples were made to inhale lavender aroma in a relaxed state that results in the reduction of stress on the elderly and so that the sleep quality is improved. This relaxation technique was followed for 1 week (6 consecutive days) by researchers for 20 minutes prior to bed time. The

combination of breathing relaxation and lavender aromatherapy (*Lavandula angustifolia*) is more effective in reducing insomnia levels in the elderly and is highly recommended. It is suitable and safe for the elderly people. It has been determined that insomnia in diabetic individuals lowers quality of life and raises the risk of depression. Lari *et al*., 2020 conducted a study with the purpose to assess the effectiveness of *Lavandula angustifolia* breathed as a supplemental treatment for diabetes patients' sleeplessness. In this clinical research, 52 patients with type II diabetes mellitus (DM) and insomnia were treated with inhaled lavender oil or a placebo for two cycles of four weeks each, with a one-week washout period in between. At the beginning and end of each study period, Questionnaire, and scale were used to evaluate sleep quality, quality of life, and mood status. Before and after the interventions, fasting blood sugar (FBS), caloric consumption, and physical activity were tracked. The quality and amount of sleep after the inhalation of lavender were increased compared to the control group. The results were in the positive side after the inhalation of the lavender oil.

Hamzeh *et al*., (2020), carried out a study to compare the effect of aromatherapy inhalation with lavender and peppermint essential oils on the quality of sleep-in cancer patients. The study's population included all cancer patients hospitalised to the oncology ward of Taleghani Hospital located in Kermanshah, Iran. 120 patients were randomly assigned to three groups: lavender, peppermint, or control. For seven days, the participants were given with the three drops of essential oil. Aromatic distilled water had been used for the control group. The Pittsburgh Sleep Quality Index (PSQI) was used to measure the sleep index. Prior to the intervention, no significant difference in mean PSQI values was detected. After the intervention, the difference between the three groups were statistically significant. PSQI mean scores were lower in

Lavender and peppermint groups performed better than the control group. Aromatherapy help cancer patients to sleep better.

Negi *et al*., (2017), a study was conducted with the Sixty indian postpartum women-participants in the experimental group were instructed to drink one cup of lavender tea after inhaling its aroma one hour before bedtime for a two-week period. A single teabag was used to make each cup of tea, and it was steeped for 10 to 15 minutes in 300 ml of boiling water. The intensity of their exhaustion, the level of their sleep, and the bonding between the babies all improved.

Chen *et al*., (2015) conducted research with the total of 80 Taiwanese postpartum mothers who had inadequate sleep. In this trial the interventions were given in the form of lavender tea, which should be consumed every night for the period of two weeks. It is concluded that intake of lavender tea shows the positive impact in the sleep of the postpartum mothers and to the addition the bonding between the infant and the mother got increased.

Najafi *et al.,* in 2014, studied about the haemodialysis patients from the dialysis centers of Akhavan hospital in Kashan and Shohadaye Lenjan hospital in Zarrinshahr. The patients in the trial were about 60 in number. The interventions for the experimental group were inhalation of the lavender aroma during the study. The results shows that the usage of lavender essential oil via aromatherapy, helps the hemodialysis patients to have better sleep.

Chien *et al*., (2012) conducted research, in this trial volunteers were recruited from Taipei communities participating in a sleep hygiene healthcare programme. The participants were examined after the usual work shift between 5 pm and 11 pm hours. The Participants were required to avoid the consumption of stimulant or alcoholic beverages for at least 3 hours before participating in the study. For the evaluation, all experiments were carried out in a well-lit

environment. The room was maintained silent, and the temperature was controlled between 22 and 25℃. Participants were seated, After reclining in a comfy chair with arm rests for a while After 10 minutes, aromatherapy was performed through inhalation. In the aromatherapy group, participants had 12-week treatment, that involved two sessions, each week for a total of 24 times. In the experimental group, control experiments without aromatherapy were carried out in the same context as mentioned above. As a result, midlife women with insomnia improved their sleep quality after 12 weeks of lavender aromatherapy.

Chang *et al.,* 2008 conducted a study in which the nurses who work at neurosurgery critical care unit during night shift at the hospital in seoul were the participants and the interventions given to them were inhalation of the lavender aroma before going to the bed after their night shift work. The results observed were inhaling aromas had good effects on night shift nurses in both the quantity and quality of their sleep and they also had positive impacts on their capacity to work on the next following day.

Lewith *et al*., 2005, carried out the trial with ten volunteers of both female and male were participated for the period of four week. The trial consisted of lavender aroma as treatment and the control is almond oil. The steam was given in the way by aroma device. The results favour lavender, but lewith and co workers also suggested that a larger trial is required to draw definitive conclusions.

Lee., 2004, hosted the research with the postpartum mothers group as the participants . The participants were 51 in number. They were given with the lavender aroma inhalation for the continuous six days. Everyday from 2:00 PM to 8:00 PM, participants in the trial were asked to wear a necklace containing lavender and eucalyptus oil. The obtained results of this trial was in

such a positive way that the postpartum mother's sleep loss appears to be lessened by this strategy and to the addition the bonding between the babies and the mothers got increased.

Conclusion:

Insomnia is the frequent problem from small infants to the elderly people and mostly occur in the adults. Many pharmacological treatments were followed for the treatment of insomnia, in order to reduce the side effects of using drugs and medicines and to reduce the expense of medications. A wide range of alternative therapies are taken into account for the treatment of sleep disorders. This review highlights the non medical treatments, such as utilizing of lavender flowers in different ways for treatment of insomnia. Treating insomnia using non medication methods have many advantages from the health to economic aspects.

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