

Sleep disorders and a review of the uses of valerian, chamomile, lavender and passionflower: Pharmacy students' knowledge and views

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Abstract

Insomnia is a common sleep disorder that affects the quality and length of sleep. Individuals who suffer from insomnia may encounter daytime fatigue, mood problems, impaired concentration, and increased risk of chronic diseases. This disorder can be acute or chronic. Acute insomnia is short-term and usually triggered by stress or life events, while chronic insomnia is long-term and often associated with other medical or psychological conditions. Insomnia can be treated with medications, lifestyle changes or herbal remedies. Four different herbs are thought of as potential treatment for insomnia: Valerian, Chamomile, Lavender, and Passionflower. This paper analyzes the potential effects of these remedies and their effectiveness in treating insomnia. It also collected data on what pharmacy students know about sleep disorders and their opinions about aspects that affect sleep. A total of 40 students completed the demographic survey questions with a 100% response rate. Of these, 36 answered the five knowledge-based questions (89.5% response rate) and about 35 (88%) completed the opinion questions. The five opinion statements had an average agreement rate of 81.2% among the survey respondents.

Keywords: Insomnia; Pharmacy; Students; Opinion; Knowledge; Herbs; Valerian; Chamomile; Lavender and Passionflower

1 Introduction

1.1 Disease Mechanism

Insomnia is a condition that involves a combination of psychological and cognitive arousal and altered circadian and homeostatic mechanisms. It can be transient, acute, or chronic, with each type having different causes. For example, transient insomnia can be caused by stress, or changes in sleep environment. If chronic, it is believed to result from predisposing factors. The exact cause by which these factors occur is not fully understood.

1.2 Prevalence and Impact

Insomnia is a sleep disorder which causes a failure in initiating or maintaining sleep and is associated with daytime consequences. Chronic insomnia persists for at least three months at a rate of three times per week. Short-term insomnia lasts less than three months. It affects 30% to 50% of the population. Chronic insomnia, however, affects 5% to 10% of the population in industrialized countries. The prevalence is significantly higher in medical and psychiatric patients. Chronic insomnia affects the functional status, health and quality of life of individuals. In addition, increased rates of work absenteeism, and occupational and motor vehicle accidents have also been associated with chronic insomnia. Persistent insomnia is a significant risk factor for psychiatric disorders, such as mood disorder. It is also associated with increased risk of relapse for depression and alcoholism. Chronic insomnia is also a risk factor for

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cardiovascular diseases. Insomnia with objectively short sleep time is a significant risk factor for hypertension. It has been reported that chronic insomnia imposes substantial economic burdens on society in direct and indirect costs [1].

2 Review of Selected Herbs

2.1 Valerian

Valerian (*Valeriana officinalis*) is a herb native to Asia and Europe, but it can also be found in North America. Valerian root's medical usage dates to ancient Greece and Rome, where it was used to treat conditions like migraine, tiredness, stomach cramps, and insomnia. Currently, people primarily take valerian to help address insomnia, anxiety, premenstrual syndrome (PMS), menopause, depression, and headaches. When used as a dietary supplement, valerian root is generally dried, then made into a tea, tincture, capsule, or tablet. [2]. These forms of valerian root are available without a prescription in pharmacies, grocery stores, and online.

A randomized, triple-blind study was conducted by Taavoni, *et al.* The study enrolled 100 postmenopausal women aged 50 to 60 years who experienced insomnia. The subjects were randomly divided into two groups. Each group received either 530 mg of concentrated valerian extract or a placebo twice a day for 4 weeks. A statistically significant change ($p < 0.001$) was noted in the quality of sleep of the intervention group in comparison with the placebo group, with 30% of the participants in the intervention group and 4% in the placebo group showing an improvement in the quality of sleep ($p < 0.001$). The investigators concluded Valerian improves the quality of sleep for women with menopause who are experiencing insomnia. According to the authors, their findings support the effectiveness of valerian in the clinical management of insomnia [3].

2.2 Chamomile

Chamomile (*Matricaria chamomilla*) is a type of herbal tea that has been used for centuries as a gentle sleep agent. It has some components, such as apigenin and glycine, that can calm the nerves and muscles and promote mild sedation. Chamomile tea is claimed to improve sleep quality and stress levels, especially for people with anxiety or insomnia. However, its sedative mechanisms of action are not fully understood and may involve the neurotransmitter GABA and may not be very effective. In a randomized, double-blind, placebo-controlled pilot trial, 34 patients aged 18-65 years with DSM-IV primary insomnia for ≥ 6 -months were randomized to 270 mg of chamomile twice daily or placebo group for 28-days. The recorded primary outcomes included sleep diary measures, while the secondary outcomes measured were daytime symptoms, safety assessments, and effect size of these measures. There were no significant differences between the groups in changes in various parameters: sleep diary measures, including total sleep time (TST), sleep efficiency, sleep latency, wake after sleep onset (WASO), sleep quality, and number of awakenings. Although not significant, the chamomile group gained some advantage on daytime functioning. There were no differences in adverse events reported between the groups. The investigators concluded that chamomile could provide modest benefits of daytime functioning and mixed benefits on sleep diary measures relative to placebo in adults with chronic primary insomnia [4].

2.3 Lavender

The genus *Lavandula* is native to the Mediterranean area, southern Europe, northern and eastern Africa, Middle Eastern countries, southwest Asia and southeast India. It includes more than 30 species, dozens of subspecies, and hundreds of hybrids and selected cultivars. *L. angustifolia*, commonly known as English Lavender (sometimes referred to as French lavender) has a very strong odor. The various lavenders have similar ethnobotanical properties and major chemical constituents, ranging from linalool to linalyl acetate, 1,8-cineole *B*-ocimene, terpinen-4-ol, and camphor. Lavender is used in aromatherapy for inhalation, aromatherapy massage, dripping oil, and bathing. Lavender oil is often applied undiluted to the skin. The essential oils and their components are rapidly absorbed through the skin. Since medieval periods, lavender has been a source of drugs, perfumes, soaps, flavorings, and crafts. It is suggested to possess anticonvulsant, antidepressive, anxiolytic, sedative, and calming properties. Some medieval physicians prescribed it for treatment of epilepsy and migraine attacks. Lavender is also considered to be beneficial in pain control and tremor conditions [5].

A study by Mahdavian, *et al.* compared the effects of aromatherapy with peppermint and lavender essential oils on the sleep quality of cardiac patients. A total of 105 patients were randomly allocated to three groups of peppermint essential oil, lavender essential oil, and control. In each experimental group, the patients inhaled three drops of lavender and peppermint essential oils, whereas the control group received aromatic distilled water. Data was collected using the Pittsburgh Sleep Quality Index (PSQI). The participants completed PSQI before and after the intervention. The study

found that aromatherapy with lavender and peppermint essential oils can improve the sleep quality of cardiac patients [6].

2.4 Passionflower

Passionflower (*Passiflora incarnata*) is a climbing vine that is native to the southeastern United States and Central and South America. Native peoples of the Americas used it as a sedative. Sixteenth-century Spanish explorers in South America are said to have learned of passionflower. The plant was then brought to Europe, where it became widely cultivated and was also introduced to Europe. Nowadays, passionflower is sold as a dietary supplement for anxiety, sleep problems, pain, heart rhythm problems, menopausal symptoms, and attention-deficit hyperactivity disorder. Topically, it is applied to the skin for burns and to treat hemorrhoids. Although they are not conclusive, some studies suggest that passionflower might help to reduce anxiety when administered prior to surgical or dental procedure. Sufficient evidence is not available to support its use in other health conditions, such as attention-deficit hyperactivity disorder, congestive heart failure, insomnia, and stress [7].

A standardized extract of the aerial parts of *Passiflora incarnata* was studied in the management of stress and sleep problems. The study was conducted among Indian participants in a randomized, double-blind, placebo-controlled, clinical study. A total of 65 participants with stress and insomnia were randomized to *Passiflora incarnata* extract group and 33 in the placebo group. Subjects were asked to take the test substance along with water at bedtime for 30 days. The Perceived Stress Scale, quality of life using the General Health Questionnaire (GHQ-12) scale, and Insomnia Severity Index were assessed on day 1, day 15, and day 30. *Passiflora incarnata* extract showed a statistically significant reduction in the mean score of stress on the Perceived Stress Scale and significantly increased the mean score of total sleep time compared to placebo. The general psychological health was found to be significantly improved *Passiflora incarnata* extract group compared to the placebo group on day 15 and day 30. The *Passiflora incarnata* extract did not show any adverse effects. The results of the study indicated that *Passiflora incarnata* extract is beneficial in the management of stress and helps to improve sleep quality in subjects with stress and insomnia [8].

3 Literature Gap, Study Objective and Impact

Some healthcare professionals believe that certain herbs may help improve sleep quality. The purpose of this study was to provide literature evidence on selected herbs that may help in insomnia. The knowledge of first year pharmacy students about herbal sleep aids is not adequately studied. They may also not be knowledgeable about the causes of insomnia and the various approaches to treat the condition. The objective of this study was to impart information on selected herbs and to carry out a survey on the knowledge and opinions of first year pharmacy students. The literature review and survey results will impact the views of the students as they advance in their pharmacy training.

4 Methods

A total of 40 students who recently joined Howard University's pharmacy program were given a survey to help determine how much they knew about insomnia and their opinions about various aspects of the disorder. In the demographic part of the questionnaire, the students were asked to reveal the state they lived in prior to joining Howard University's pharmacy program, how many years they worked at a paying job, the type of work they held, whether it was pharmacy related or otherwise and their prior levels of education. The surveyed group of students consists of 10 males and 40 females, with only 4 to 5 students declining to take the survey. The age range of the students was between 18 to 40 years. The participating students were given 5 questions and were asked to determine if they were true or false. They were also given 5 statements and asked if they agreed or disagreed. For the knowledge and opinion-based parts of the questionnaire, the mean, standard deviation and variance of the respective responses were recorded. For the opinion responses, a Likert Scale was utilized (1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree). A score above 2.5 on the Likert Scale was considered agreement.

5 Results

5.1 Demographics

The data in Table 1 depicts the demographics of the students regarding gender and age range. There were 40 students in the class; the majority of students in the class were female (40; 75%), while the remaining ten (25%) were male. Among the students, at least 52.5% were in the age range 18 to 24 years, while 37.5% were between 24-30 years. 7.5% of them were between 30-40 and 2.5% of the students were above 40 years old. The table also shows the states where

the students lived prior to joining the pharmacy program. Most of the students (56.4%) lived in Washington, D.C., Maryland and Virginia, and the rest (43.6%) in other states.

Table 1 Demographic data of the participants ($n=40$)

Demographic characteristics		<i>n</i> (%)
Gender	Male	10 (25)
	Female	30 (75)
Age (years)	18 -24	21 (52.5)
	24 – 30	15 (37.5)
	30 – 40	3 (7.5)
	Above 40	1 (2.5)
States you have lived in before coming to Howard Pharmacy Program*	Washington, D.C.	6 (15.4)
	Maryland	15 (38.5)
	Virginia	1 (2.5)
	Other States	17 (43.6)

*One participant did not answer the state she lived in.

5.2 Work and Educational Background

Table 2 depicts the educational background and work experience of the participants before they joined the pharmacy program. Two students (5%) never worked, while 20 (52.6%) were employed in pharmacy-related areas. Nine (23.7%) students worked in nonpharmacy but other health-related fields, and nine (23.7%) had non-health-related jobs. Regarding their highest educational level, the majority (65%) held a Bachelor of Science (BSc) or Bachelor of Arts (BA) degree. A smaller number (17.5%) had a Master of Science (MSc) degree, while five (12.5%) had completed some pre-pharmacy or college work. Two (5%) had an associate degree. These data summarize the work experience and academic background of the surveyed students.

Table 2 Work and educational background of the participants

Question	Response	<i>n</i> (%)
How many years have you had a paying job before joining the Pharmacy program at Howard?	Never Worked	2 (5)
	1-2	12 (30)
	3-4	10 (25)
	5 or more	16 (40)
What kind of work have had?	Pharmacy Related	20 (52.6)
	Non-Pharmacy Related but other health related	9 (23.7)
	Non-health related	9 (23.7)
What is the highest educational level you have achieved before joining the pharmacy program at Howard?	Pre-Pharmacy or some college work	5 (12.5)
	Associate degree	2 (5)
	BSc or BA degree	26 (65)
	MSc/MA or higher	7 (17.5)

5.3 Knowledge Based Questions

The survey data on insomnia provides insightful revelations about participants' understanding of the condition (Table 3). A majority, 91.7%, accurately recognized insomnia as a sleep disorder characterized by difficulties in falling and/or staying asleep, demonstrating a high awareness of its basic definition, with an average correctness rate of 0.9167. Pertaining to the symptoms associated with insomnia, such as fatigue, low energy, and concentration challenges, 85.7% of participants correctly identified these issues, reflecting a strong understanding of how insomnia impacts daily functioning, with a mean correctness rate of 0.8571.

Moreover, 83.3% of respondents correctly defined chronic insomnia as disrupted sleep occurring at least three nights a week for a duration of at least three months. This shows a substantial grasp of the specifics that distinguish chronic insomnia from more transient sleep disturbances, holding a correctness rate of 0.8333. Additionally, the link between chronic insomnia and an increased risk of psychological disorders like depression and anxiety was correctly acknowledged by 88.9% of the participants. This underscores an appreciation of the broader health implications of prolonged sleep disorders, with a correctness rate of 0.8889.

However, when asked whether insomnia is typically a standalone condition, only 50% of participants recognized that it is often associated with other health issues, indicating a significant gap in understanding the interconnectedness of health conditions related to insomnia, with an even correctness rate of 0.5. This variation in correct responses highlights areas where public knowledge is strong and where further education might be needed to fully grasp the complexities and broader health ramifications of insomnia.

Table 3 Knowledge Based Questions

Question	Correct Answer	True (n)	False (n)	Participants (n, %) with correct answers	Mean correct answer rate out of 1 (\pm SD)	Variance
Insomnia is a sleep disorder that is characterized by difficulty falling and/or staying asleep.	True	33	3	33 (91.7)	0.9167 \pm 0.2764	0.0764
People with insomnia can feel dissatisfied with their sleep and usually experience one or more of the following symptoms: fatigue, low energy, difficulty concentrating, mood disturbances and decreased performance in work or at school.	True	30	5	30 (85.7)	0.8571 \pm 0.3499	0.1224
Chronic insomnia is defined as disrupted sleep that occurs at least three nights per week and lasts at least three months.	True	30	6	30 (83.3)	0.8333 \pm 0.3727	0.1389
Chronic insomnia can lead to an increased risk of developing disorders such as depression and anxiety.	True	32	4	32 (88.9)	0.8889 \pm 0.3143	0.0988
Insomnia is typically a standalone condition and not associated with any other health problems.	False	18	18	0.50 (50)	0.5 \pm 0.5	0.25

5.4 Opinion Based Questions

The survey on opinion-based questions regarding treatments and perceptions of insomnia reveals varied levels of agreement among participants. The belief in Cognitive Behavioral Therapy (CBT) as a recommended treatment for chronic insomnia is notably strong, with 28.6% strongly agreeing and 54.3% agreeing, resulting in a high mean Likert score of 3.0857, indicating a favorable opinion towards this non-pharmaceutical therapy.

Concerning the reliance on prescription medications for treating insomnia, a significant majority (88.6%) either disagreed or strongly disagreed with the notion that insomnia can only be treated with medications, showcasing a broad acknowledgment of alternative treatments with a mean score of 3.0556. This reflects a progressive understanding that insomnia management can extend beyond pharmacological solutions.

The role of physical activity in reducing insomnia symptoms is also well-regarded, with 83.9% expressing agreement or strong agreement, underscored by a mean Likert score of 3.1143. This suggests a consensus on the benefits of regular exercise in alleviating sleep disorders. The impact of electronic devices on sleep health garnered a mixed response, with 80% acknowledging a contribution to insomnia, reflecting a recognition of lifestyle factors affecting sleep, though the mean score of 2.9714 indicates some variability in strongly held beliefs.

Lastly, the idea that not all sleep troubles equate to insomnia was moderately agreed upon, with 74.3% either disagreeing or strongly disagreeing with the oversimplification of sleep issues as insomnia. This mean score of 2.9143 highlights a nuanced understanding that difficulties in sleeping do not always warrant an insomnia diagnosis, indicating a need for more precise education on sleep disorders.

Table 4 Opinion Based Questions

Question	SA (n, %)	A (n, %)	DA (n, %)	SDA (n, %)	Mean LK±SD	Variance
I believe that Cognitive Behavioral therapy for insomnia is a recommended treatment for chronic insomnia	10 (28.6)	19 (54.3)	5 (14.3)	1 (2.9)	3.0857±0.7318	0.5355
Would you dispute the notion that insomnia can only be treated with prescription medications?	8 (22.2)	23 (63.9)	4 (11.1)	1 (2.8)	3.0556±0.6643	0.4414
I believe in the idea that regular physical activity can help reduce the symptoms of insomnia.	10 (29.6)	19 (54.3)	6 (17.1)	0 (0)	3.1143±0.6664	0.4441
I agree that the use of electronic devices like smartphones and laptops before bed can contribute to insomnia.	9 (25.7)	19 (54.3)	4 (11.4)	3 (8.6)	2.9714±0.7135	0.7135
Do you think it's an oversimplification to say that everyone who has trouble sleeping has insomnia?	8 (22.9)	18 (51.4)	7 (20)	2 (5.7)	2.9143±0.8061	0.6498

*SA= Strongly agree; A=agree; DA=Disagree; SD=Strongly disagree; LK=Likert Score; SD=Standard deviation

6 Discussion

The survey indicated that 79.9% of students answered the knowledge-based questions correctly. Insomnia is a sleep disorder that is characterized by difficulty falling and/or staying asleep. This statement was true and based on the survey 91.7% of students answered it correctly. People with insomnia can feel dissatisfied with their sleep and usually experience one or more of the following symptoms: fatigue, low energy, difficulty concentrating, mood disturbances, and decreased performance in work or at school. This statement is true with about 86% of students answering correctly. About 83% of the survey respondents correctly defined chronic insomnia as disrupted sleep that occurs at least three nights per week and lasts at least three months. Nearly 90% of the respondents provided the correct answer that chronic insomnia can lead to an increased risk of developing disorders such as depression and anxiety. Finally, only half of the survey participants wrongly thought insomnia is typically a standalone condition and not associated with any other health problems.

The responses to the opinion statements were revealing. Most participants' views were consistent with literature reviewed in this survey. For example, 82.9% agreed that Cognitive Behavioral Therapy for Insomnia (CBT-I) is a recommended treatment for chronic insomnia. Only 13.9% disagreed with the notion that insomnia can only be treated with prescription medications.

The majority (82.9%) believed that regular physical activity can help reduce the symptoms of insomnia.

7 Conclusion

The literature was reviewed on the potential merits of Valerian, Chamomile, Lavendar and Passionflower for Sleep Disorders. A survey of Howard University first year pharmacy students revealed about 80% of the respondents had correct knowledge about insomnia, although the questionnaire did not specifically include queries on the sleep aid plants. About 81% of the responses of participants to opinion-based statements on insomnia were in line with what is reported in the literature.

This paper has a few limitations. The sample size of 40 participants, with 35 to 40 responding, is relatively small which limits the generalizability of findings. The survey questionnaire did not include specific questions on the herbs reviewed, but only focused on the knowledge and attitudes of the respondents on insomnia in general. The survey did not try to draw correlation between the gender, age and educational background of the respondents with their responses.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

References

- [1] Sateia, M.J.; Buysse, D.J.; Krystal, A.D.; Neubauer, D.N.; Heald, J.L. Clinical Practice Guideline for the Pharmacologic Treatment of Chronic Insomnia in Adults: An American Academy of Sleep Medicine Clinical Practice Guideline. *J Clin Sleep Med*. 2017, 13 (2):307-349. doi: 10.5664/jcsm.6470. PMID: 27998379; PMCID: PMC5263087.
- [2] Valerian Fact Sheet for Health Professionals. Available at: <https://ods.od.nih.gov/factsheets/Valerian-HealthProfessional/> (Last Updated: March 15, 2013). Accessed: September 4, 2024.
- [3] Taavoni, S.; Ekbatani, N.; Kashaniyan, M.; Haghani, H. Effect of valerian on sleep quality in postmenopausal women: a randomized placebo-controlled clinical trial. *Menopause*. 2011, 18(9): 951-955 | DOI: 10.1097/gme.0b013e31820e9acf]
- [4] Zick, S.M.; Wright, B.D.; Sen, A.; Arnedt, J.T. Preliminary examination of the efficacy and safety of a standardized chamomile extract for chronic primary insomnia: a randomized placebo-controlled pilot study. *BMC Complement Altern Med*. 2011, 11:78. doi: 10.1186/1472-6882-11-78. PMID: 21939549; PMCID: PMC3198755.
- [5] Koulivand, P.H.; Khaleghi, G.M.; Gorji A. Lavender and the nervous system. *Evid Based Complement Alternat Med*. 2013; 2013:681304. doi: 10.1155/2013/681304. Epub 2013 Mar 14. PMID: 23573142; PMCID: PMC3612440
- [6] MahdaviKian, S.; Rezaei, M.; Modarresi, M.; Khatony, A. Comparing the effect of aromatherapy with peppermint and lavender on the sleep quality of cardiac patients: a randomized controlled trial. *Sleep Science and Practice*. 2020, 4. 10.101186/s41606-020-00047-x.
- [7] <https://www.nccih.nih.gov/health/passionflower>. Last Updated: August 2020. Accessed: September 3, 2024).
- [8] Harit, M.K.; Mundhe, N.; Tamoli, S Sr.; Pawar, V.; Bhapkar, V.; Kolhe, G.; Mahadik, S.; Kulkarni, A.; Agarwal, A. Randomized, Double-Blind, Placebo-Controlled, Clinical Study of Passiflora incarnata in Participants with Stress and Sleep Problems. *Cureus*. 2024 Mar 20;16(3): e56530. doi: 10.7759/cureus.56530. PMID: 38646244; PMCID: PMC11026993.