






Research Article

Study on the effects of *Salvia officinalis* (common sage) leaf tea and chamomile tea for the management of insomnia disorder: A single-blind randomized controlled trial

Azukaego Thomas Hughs Mokogwu^{1*}, Emeke Edward Okocha², Kingsley Chukwuka Amaihunwa¹, Enekaokom Nwoke Ekene³, Ezenwa John Chidi⁴, Benson Okero Eyenubo⁵ and Godwin Ovie Avwioro¹

1. Department of Medical Laboratory Science, Faculty of Science, Delta State University, Abraka, Nigeria.
2. Prince Abdul Mohsen Hospital, Alula- Saudi Arabia.
3. Department of Pharmacology, Faculty of Basic Clinical Sciences, College of Medical Sciences, Rivers State University, Nkpolu-Orowukwo, Port-Harcourt, Nigeria.
4. Alfa Medical Hospital, Apata-Jos. Plateau State, Nigeria.
5. Department of Science Laboratory Technology, Faculty of Science, Delta State University, Abraka, Nigeria.

Abstract

Salvia officinalis (common sage) is a plant with growing attention as a medicinal herb. However, little or no attention has been paid to its use in the management of insomnia. This study aimed to assess the efficacy of *Salvia officinalis* leaf tea compared to that of chamomile tea in managing insomnia. A randomized single-blind controlled pilot trial that involved 30 subjects with primary insomnia: aged 20-60 years was used for the study. It was a hospital based study, where the participants were randomly assigned into two groups of 15 each- chamomile tea (commonly used herbal medication) for the treatment of Insomnia and *Salvia officinalis* leaf tea. Each group received 2 g. of tea, (chamomile tea or *Salvia officinalis* leaf tea) once a day for 14 days. The primary outcomes were the severity of insomnia {Insomnia Severity Index (ISI)} and the quality of sleep {Pittsburgh Sleep Quality Index (PSQI)} while the secondary outcomes were stress levels (ST-5), satisfaction and safety. Outcomes were assessed on the 7th and 14th day of treatment and on the 21st day post intervention. There were decreases in the Insomnia Severity Index (ISI), enhanced Pittsburgh Sleep Quality Index (PSQI) and decreased stress levels (ST-5) at $p < 0.05$. No significant differences were observed between the groups ($p > 0.05$). The study showed that *Salvia officinalis* could be used for insomnia symptoms' management.

Article Information

Received: 10 March 2026
Revised: 30 March 2026
Accepted: 30 March 2026
Published: 18 April 2026

Academic Editor

Prof. Dr. Christian Celia

Corresponding Author

Prof. Dr. Ghader Ghasemi
E-mail:
gader.g1390@yahoo.com
Tell: +989149037704

Keywords

Salvia officinalis leaf tea, chamomile tea, effectiveness, insomnia, primary outcomes, secondary outcomes, pilot study

1. Introduction

Insomnia, a common sleep disorder is a critical worldwide concern and is often associated with an ever-increasing health burden [1-4]. Grandner et al., [4] observed that sleep is indispensable for proper growth, learning and memory, regulatory processes, cardiovascular and metabolic functions of the body. The same authors noted that sound sleep is associated

with optimal health and a good quality of life. They equally observed that modifications in immunological functions and a heightened risk of cardiovascular and metabolic diseases often occur as a result of sleep deprivation and circadian rhythm disturbance. Insomnia management comprises of pharmacological medicines or psychological

therapies. Non-benzodiazepine sedative-hypnotic drugs have been used. Cognitive behavioral therapy for insomnia is the gold standard for the management of insomnia in man, with pharmacologic options such as low-dose doxepin, melatonin, ramelteon and dual orexin receptor antagonists [5]. However, these are commonly associated with adverse effects, such as forgetfulness, impairment of psychomotor function, daytime weariness, tolerance and dependency. It is also hampered by variables such as time, exposure and effort. This has led to the exploration and investigation into proper and effective traditional formulations particularly in Thailand region in Asia of which the chamomile herbal tea is used for insomnia remedy [6]. Chang and Chem [7], documented that chamomile tea contains apigenin, which is a flavonoid, known for its calming properties and high affinity for benzodiazepine receptors. Insomnia is associated with significant illness, thus increasing the risk of depression, cardiovascular diseases and mortality [8]. Nowadays, there is ever-growing interest in the use of herbs for the treatment/management of metabolic and cardiovascular disorders that are associated with insomnia. *Salvia officinalis* (Common sage) from the family Lamiaceae with characteristic attractive flavor is used as herbal medicine in the management of various diseases [9–13]. It is cultivated worldwide and grows well in Nigeria, particularly in Vom-Jos, Plateau State [9]. It has also been successfully cultivated in our garden at Asaba-Delta State (Fig. 1).



Figure 1. Cultivated *Salvia officinalis* (common sage) leaf plant at Asaba garden.

Salvia officinalis has been used in the management of cerebral ischemia, memory disorders, depression and

Alzheimer's disease [14-17]. Presently, there is no clinical evidence showing that *Salvia officinalis* leaves can be used to manage insomnia in patients. Therefore, this study aimed to investigate the efficacy of *Salvia officinalis* leaf tea in individuals with insomnia and to compare its effectiveness with that of chamomile tea used in Thailand for the management of insomnia.

2. Materials and methods

2.1. Herbal teas for insomnia

Chamomile flower tea packet weighing 10 g. weight was sourced and purchased from Thailand. *Salvia officinalis* plant leaves was obtained from Vom-Jos, Plateau State and identified/authenticated by a Botanist (Dr Michael, Ozioma Emmanuel) with a voucher number DELSU #134 for future reference at Delta State University, Abraka-Nigeria. The green and fresh sage leaves were cleaned, and dried in the shade. They were then exposed to hot air at 60 °C for three hours. Both the Chamomile flower tea and the dried leaves of *Salvia officinalis* were coarsely ground and 2 g. of each were taken.

2.2. Study design and patients

A randomized single-blind pilot study was carried out at Alfa Medical Centre and Zawan Catholic Hospital in Jos, Plateau State, from December to July, 2024. A total of thirty participants were recruited for this research with the following inclusion criteria: a) Males and Females of age 20-60years. b) Subjects showing an insomnia severity score between 18 and 21 i.e. mild and moderate insomnia, with one or more of these symptoms: difficult initiating sleep i.e. taking more than 30 min to fall asleep; difficulty maintaining sleep; inability to resume sleep after waking up; waking earlier than wanted without being able to return to asleep; un-refreshing sleep and daytime dysfunction happening at least 3 times weekly for a period of less than six months. The subjects/participants voluntarily completed the informed consent form. The following exclusion criteria were observed: a) pregnant women in the lactation period; b) subjects with a history of allergic reactions to herbal products, food or medications, c) subjects with diabetes, coronary vascular disease, renal, hepatic or pulmonary disorders, d) subjects on sleep medication, psychiatric medications, antidepressants, anti-anxiety medications as well as

those who are habitually addicted to tobacco, alcohol, coffee and tea.

2.3. Ethical approval

Ethical approval for the study was obtained from the Ethical Committee of the Alfa Hospital with Ref: EC 20 TCR2401.12.

2.4. Treatments

There was proper interaction with the Clinical Officers of the Alfa Hospital to identify the volunteers with an overview of the study and its aims. The subjects were randomly distributed to the intervention groups for *Salvia officinalis* leaf and the chamomile teas both on the part of the assessors and subjects. The subjects/participants in each of the group were later evaluated using the Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI) and Stress Level (ST-5). They were given standard glass tumblers each containing 2 g. of dried *Salvia officinalis* leaf tea or a chamomile tea bag which was steeped for 5 min in 120 mL of clean boiled hot water. The participants/subjects in each group drank the decoction at night i.e. 30 min before sleep, for two weeks.

2.5. Measurements of outcomes

Outcomes were assessed at baseline, after 7th and 14th day treatments and at 21-day post-intervention follow-up, making a total study period of 3 weeks. The primary outcome was severity of insomnia and sleep quality, measured using the Insomnia Severity Index (ISI) [17] and the Pittsburgh Sleep Quality Index (PSQI) [18]. The ISI score spans from 0-28, with higher values indicating more severity of insomnia. The score was evaluated as follows: Score of 0-7 allow the absence of insomnia, 8-14 signify mild insomnia, 15-21 suggest moderate insomnia, 22-28 indicate severe insomnia. The Pittsburgh Sleep Quality Index (PSQI) score which is the sum of all component values is known as the PSQI global score (i.e. ranging from 0-21), a score beyond five (5) depicts poor sleep quality. The secondary outcome was the stress level, assessed by the Srithanya Stress Test (ST-5) [19]. The assessment comprises five elements. The evaluation criteria are as follows: scores of 0-4 show the absence of stress; 5-7 signify light stress; 8-9 reflect moderate stress; while 10-15 imply severe stress. All outcome markers were assessed at baseline and weekly

throughout the treatment period.

2.6. Statistical analysis

Data analysis was performed using SPSS version 22.0 at a significance level of 0.05. The subjects' characteristics and comparative data are shown as frequency and percentage for categorical variables and as the mean and standard deviation for continuous variables. Chi-square was used to compare the herbal tea's satisfaction experience of the two groups. Significant changes in primary and secondary outcomes after 7th and 14th day treatments as well as during the 21-day post-intervention follow-up were evaluated using repeated measures analysis within and between groups.

3. Results

3.1. Characteristics of the investigated subjects

Thirty subjects/participants passed the inclusion criteria and were randomly grouped into either chamomile tea (n=15) or *Salvia officinalis* leaves tea (n=15). The baseline characteristics of the subjects are shown in Table 1. No significant differences ($p > 0.05$) were observed in the baseline characteristics between the two groups.

3.2. Efficacy of herbal teas on the primary outcomes in subjects with insomnia

The assessment of the Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI) in both groups utilizing repeated measurement statistics showed substantial decreases in ISI and PSQI Scores after 7th and 14th day treatments as well as at the 21-day post-intervention follow up ($p < 0.05$) relative to the baseline measurements prior to tea intake. *Salvia officinalis* leaf tea and chamomile tea decreased ISI Scores on day 7, showing scores of 7.16 ± 3.12 and 7.48 ± 1.76 , respectively with no significant ($p > 0.05$) clinical insomnia. The results showed that *Salvia officinalis* leaf tea and chamomile tea might enhance sleep quality within 7-day consumption. Nonetheless, a PSQI score of over 5 units indicates inadequate or poor sleep. Also, a comparative evaluation of the groups showed no significant ($p > 0.05$) variables in the average ISI and PSQI scores before and after tea intake on days 7, 14 and 21 (Table 2).

3.3. Efficacy of herbal teas on the secondary outcomes in subjects with insomnia

Table 1. The characteristics of the study subjects/participants.

Characteristics	Chamomile tea (n = 15)	Common sage (n = 15)	P – value
Gender	No. (%)	No. (%)	
Male	4 (26.67)	4 (26.67)	1.00
Female	11 (73.33)	11 (73.33)	
Age (years)			
< 30	10 (66.67)	9 (60.00)	0.63
31-40	3 (20.00)	4 (26.67)	
- 50	2 (13.33)	2 (13.33)	
> 50	0 (0)	0 (0)	
Known disease			1.00
None	12 (80.00)	12 (80.00)	
Existence	3 (20.00)	3 (20.00)	
Period of Insomnia			0.28
< 1 Month	2 (13.33)	2 (13.33)	
1- 3 “	10 (66.67)	7 (46.67)	
3- 6 “	3 (20.00)	6 (40.00)	

Table 2. Chamomile and *Salvia officinalis* (common sage) leaf teas’ ISI, PSQI & ST-5 Comparison Scores, within and between groups.

Scores	Day	Chamomile tea (Mean ± SD)	Results	Common sage leaves tea (Mean ± SD)	Results	P -Value
ISI	0	16.14 ± 3.48	Moderate	13.36 ± 2.82	Mild	0.16
	7	7.48 ± 1.76*	No insomnia	07.16 ± 3.12*	No insomnia	0.61
	14	06.36 ± 3.12*	No insomnia	06.04 ± 3.16*	No insomnia	0.78
	21	06.12 ± 2.18*	No insomnia	06.36 ± 3.76*	No insomnia	0.83
PSQI	0	11.48 ± 2.36	Poor sleep	11.13 ± 2.12*	Poor sleep	0.57
	7	07.01 ± 1.96*	Poor sleep	07.26 ± 3.10 *	Poor sleep	0.88
	14	04.58 ± 2.26*	Good sleep	04.86 ± 3.16*	Good sleep	0.46
	21	04.42 ± 3.34*	Good sleep	05.98 ± 3.71*	Poor sleep	0.41
ST-5	0	08.28 ± 2.52	Moderate stress	07.48 ± 1.92	Mild stress	0.42
	7	04.62 ± 3.29*	No stress	04.60 ± 1.38*	No stress	0.38
	14	03.48 ± 3.12*	No stress	03.12 ± 2.12*	No stress	0.51
	21	03.32 ± 2.86*	No stress	02.91 ± 2.36*	No stress	0.68

*Statistically significant (p < 0.05) compared to Day 0

In this study, the *Salvia officinalis* leaf tea group had a stress rating of 7.48 ± 1.92 , while that of the chamomile tea group was 8.28 ± 2.52 . This study revealed that after tea consumption the stress rating (ST-5) in each group decreased significantly ($p < 0.05$) after 7th and 14th day treatments and at the 21-day post-intervention follow-up. Equally, both groups of tea effectively decreased stress levels to zero after 7 days of teas intake. Likewise, the comparison of stress scores (ST-5) within the two groups of tea showed no significant ($p > 0.05$) changes in ST-5 scores before and

after tea intake at 7th and 14th day treatments and at 21-day post intervention follow-up (Table 2).

3.4. Satisfaction and negative side effects with herbal teas

The investigation of satisfaction after the intake of both teas revealed that the average satisfaction ratings for color, preparation techniques and relief of insomnia symptoms were very sound. The comparison between the two groups was insignificant ($p > 0.05$), however, satisfaction with the fragrance and flavor of both *Salvia officinalis* leaf tea and chamomile tea was modest. A total satisfaction score for *Salvia*

Table 3. Satisfaction assessment experienced with the teas.

Parameters	Chamomile tea (N=15)		Common sage leaves tea (n = 15)		P – value
	Mean ± SD	Interpretation	Mean ± SD	Interpretation	
Fragrance	3.71 ± 0.86	Moderate	3.85 ± 0.38	Moderate	0.66
Color	4.0 ± 0.48	Very satisfactory	4.36 ± 0.60	Very satisfactory	0.59
Flavor	3.58 ± 0.81	Moderate	4.18 ± 0.36	Moderate	0.98
How to use	4.43 ± 0.61	Very satisfactory	4.30 ± 0.57	Very satisfactory	0.16
Relief of symptoms	4.00 ± 0.68	Very satisfactory	4.12 ± 1.36	Very satisfactory	0.82
Total	4.10 ± 0.62	Very satisfactory	4.01 ± 0.64	Moderate	0.69

officinalis leaf tea was moderate (4.01 ± 0.64), while that for chamomile tea was very satisfactory (4.10 ± 0.62). However, no significant differences ($p > 0.05$) were observed across the groups (Table 3).

4. Discussion

The findings of the primary outcomes that *Salvia officinalis* leaf tea might enhance sleep quality within 7-day consumption, with a PSQI score of over 5 units that indicated inadequate or poor sleep, are in agreement with earlier works [20-23] and Siriyong et al., [2] who made the same observations although with different herbal teas. Therefore, it is advisable to consume tea for up to 14 days to achieve a global PSQI score below 5, indicative of satisfactory sleep quality. This suggests that both *Salvia officinalis* leaf and chamomile teas are efficacious in alleviating insomnia symptoms and enhancing sleep quality. The findings of the secondary outcomes in subjects with insomnia disorder revealed that after tea consumption the stress rating (ST-5) in each of the groups decreased significantly ($p < 0.05$) after 7th and 14th day treatments and also at 21-day post-intervention follow-up are equally in consonance with the works of Amihaesei and Mungui [20], Jarukitsakul et al., [23], who both stated that patients with persistent insomnia and heightened tendency to mental disorder can be effectively managed at decreased stress levels of zero. The authors also noted that subjects with a predisposition to sleep disruption possessed an over-reactive sympathetic nervous system and often exhibited heightened reactions to stressors. This study revealed that both chamomile and *Salvia officinalis* leaf teas have similar efficacy in reducing stress. No negative side effects were observed in the subjects who consumed *Salvia officinalis* leaf tea. This is in

disagreement with the observation of Jarukitsakul et al., [23] who noted a mild negative effect on patients, although with a different herbal medication. However, for the effective alleviation of insomnia, enhancement of the formulation of *Salvia officinalis* leaf tea, may be necessary to increase its scent and flavor to mask the bitter taste of *Salvia officinalis* leaves. The sedative properties of chamomile tea have been elucidated by several researchers. EL Joumaa and Borjae [21] noted that chamomile tea decreased sleep inefficiency scores, which are often associated with medical issues and distress. They also observed that chamomile exhibited several properties, as shown in preclinical and clinical studies, such as antibacterial, antioxidant, anti-inflammatory, anticancer, hypoglycemic, hypolipidemic, cardioprotective, hepatoprotective, neuroprotective, nephroprotective, antiplasmodic, wound healing, antiulcer effects as well as effects on anxiety, sleep deprivation and depression. In addition to its properties, the principal components of chamomile essential oils are apigenin, chamazulene, bisabolol and farnesene, which engage with benzodiazepine receptors and facilitate central nervous system sleepiness. Viola et al., [22], noted that dried chamomile flowers serve as the principal sources of apigenin, which is the flavonoid that modifies GABA receptors to induce sleepiness. Jarukitsakul et al., [23], noted that some pepper fruits have been used in the traditional Thailand medicinal formula to enhance sleep quality. Our findings show that *Salvia officinalis* leaf tea is effective in alleviating insomnia. Hence, the intake of it for 7days led to a significant reduction in insomnia severity, with an improvement in the quantity of sleep as well as a positive drop in stress levels. Ghowsi et al., [24] stated that the most important phytochemicals found in

plants include phenolic acids such as caffeic, vanillic, ferulic and rosmarinic acids as well as flavonoids such as luteolin, apigenin and quercetin, and similarly α - and β -thujone, 1, 8-cineole, camphor, carnostic acid, carnosol, rosmadial, manool and volatile substances. Studies also abound that phenolic and flavonoid compounds, terpenoids and coumarins are responsible for the hypoglycemic, hypolipidemic, antimalarial, antioxidant and free radical scavenging effects of *Salvia officinalis* leaf extract [9, 10, 12, 25]. Jarukitsakul et al., [23], stated that sesquiterpene α -bisabolol is found in the essential oils of several plants. *Salvia officinalis* and chamomile flower essential oils contain α -bisabolol in various fractions. This chemical is known to have depressive effects on the central nervous system by interacting with the GABA receptor [26]. Xie et al., [27], also noted that the administration of melatonin improves sleep efficacy as well as reduction of sleep start latency to stage 2 in patients with insomnia. Therefore, since the above observations are characteristics of chamomile tea which is invariable in comparison with *Salvia officinalis* leaf tea, our findings indicate that both are efficacious in alleviating the symptoms of insomnia. *Salvia officinalis* is also known to contain apigenin, a flavonoid with potential health benefit. Since apigenin is known to have an inhibitory action against cancer cell growth in vitro [26, 28–30], *Salvia officinalis* leaf tea may have an efficacious action on symptoms of insomnia via its complex modulatory actions on GABA receptors. Similarly, melatonin, a hormone primarily known for regulating sleep-wake cycles, is known to interact in several ways, particularly in plant biology and can also be used to enhance growth and phytochemical production. *Salvia officinalis* has been traditionally used to potentially influence melatonin secretion and may have anxiolytic effect. The action of *Salvia officinalis* leaf tea may be attributed to the pharmacological actions of its principal constituent, which is associated with flavonoids.

5. Conclusions

Our findings indicate that the efficacy of *Salvia officinalis* leaf tea in alleviating insomnia symptoms was comparable to that of chamomile tea. Therefore, the intake or ingestion of *Salvia officinalis* leaf tea could be a suitable remedy for the management of insomnia

symptoms. However, further studies with larger sample sizes are necessary to properly elucidate the mechanism of action and focus on the active chemicals associated with sleep.

Ethical consent

Ethical clearance approval was obtained from the Ethical Committee of Alfa Hospital in Jos, Plateau State (Reference Number: EC 20 TCR/ALFAH/2401.12.). Each participant (on agreement) submitted a written informed consent form at the hospital and was enrolled for a period of five weeks.

Disclaimer (artificial intelligence)

The authors hereby state that no generative AI tools such as Large Language Models (Chat GPT, COPILOT, etc.) and text-to-image generators were utilized in the preparation or editing of this manuscript.

Authors' contributions

Conceptualization, A.T.H.M., E.E.O., E.N.E., E.J.C.; methodology, E.E.O., E.J.C., E.N.E., K.C.A., A.T.H.M.; software, A.T.H.M., E.E.O., E.N.E., K.C.A., G.O.A.; validation, A.T.H.M., E.E.O., K.C.A., B.O.A.; formal analysis, B.O.E., E.E.O., K.C.A., G.O.A., A.T.H.M.; investigation, A.T.H.M., E.E.O., E.J.C., E.N.E., K.C.A., B.O.E.; resources, A.T.H.M., E.E.O., E.J.C., E.N.E., K.C.A., B.O.A.; data curation, A.T.H.M., B.O.A., K.C.A., G.O.A.; writing-original draft and preparation, A.T.H.M., E.E.O., E.N.E., E.J.C., K.C.A.; writing review and editing, A.T.H.M., B.O.A., K.C.A., G.O.A.; visualization, A.T.H.M., E.E.O., K.C.A., G.O.A.; supervision, E.J.C., A.T.H.M., E.N.E., E.E.O., K.C.A., G.O.A.; administration, E.K.C., E.E.O., E.N.E., A.T.H.M.; funding acquisition, E.J.C., E.E.O., K.C.A., E.N.E., E.J.C., B.O.A., G.O.A.

Acknowledgements

We acknowledge all medical and non-medical staff of ALFA Medical Hospital, Jos.

Funding

The research received no specific grant from any funding agency.

Availability of data and materials

All relevant data are within the manuscript and its supporting information files. Additional data will be available on request according to the journal policy.

Conflicts of interest

The authors declare no conflict of interest

References

- Annemieke van, S.; Karl, J.W.; Bernát, F.; Joyce, R.; Sarah, G.; Annemarie, I.L.; Mathias, H.; Jaap, L. The prevalence of insomnia disorder in the general population: A meta-analysis. *J. Sleep Res.* 2025, 1-13. <https://doi.org/10.1111/jsr.70089>
- Siriyong, T.; Chanphool, H.; Jitjum, S.; Laohaprapanon, S.; Voravuthikunchai, S.P. Therapeutic efficacy and safety of traditional Thai herbal medicines for insomnia: A double-blind randomized controlled trial. *Adv. Integr. Med.* 2025, 12(3), 100459. <https://doi.org/10.1016/j.aimed.2025.01.006>
- Calet, M. Navigating the nexus: Insomnia and psychotropic medications. *J. Sleep Disord. Ther.* 2024, 13, 528. <https://doi.org/10.35248/2167-0277.24.13.528>
- Grandner, M.; Olivieri, A.; Ahuja, A.; Büsler, A.; Freidank, M.; McCall, W.V. The burden of untreated insomnia disorder in a sample of 1 million adults: a cohort study. *BMC Public Health.* 2023, 23(1), 1481. <https://doi.org/10.1186/s12889-023-16329-9>
- León-Barriera, R.; Chaplin, M.M.; Kaur, J.; Modesto-Lowe, V. Insomnia in older adults: A review of treatment options. *Cleveland Clin. J. Med.* 2025, 92(1), 43-50. <https://doi.org/10.3949/ccjm.92a.24073>
- Yeom, J.W.; Cho, C.H. Herbal and natural supplements for improving sleep: a literature review. *Psychiatry Invest.* 2024, 21(8), 810-821. <https://doi.org/10.30773/pi.2024.0121>
- Chang, S.M.; Chen, C.H. Effects of an intervention with drinking chamomile tea on sleep quality and depression in sleep disturbed postnatal women: A randomized controlled trial. *J. Adv. Nurs.* 2016, 72(2), 306-315. <https://doi.org/10.1111/jan.12836>
- Ng, L.; Cunnington, D. Management of insomnia in primary care. *Aust. Prescr.* 2021, 44(4), 124-128. <https://doi.org/10.18773/austprescr.2021.027>
- Mokogwu, A.T.H.; Amaihunwa, K.C.; Adjekuko, C.O.; Ekene, E.N.; Okoro, E.O.; Adeosun, O.G.; Avwioro, G.O. In vivo antimalarial and liver function profiles of methanol extract of *Salvia officinalis* (common sage) leaf in Plasmodium-berghei infected mice. *Ethiop. J. Health Sci.* 2024, 34(4), 290-300. <https://doi.org/10.4314/ejhs.v34i4.5>
- Mokogwu, A.T.H.; Adjekuko, C.O.; Oshilonyah, U.H.; Ikpefan, J.O.; Avwioro, G.O. Antihypertensive and Cardioprotective effects of *Salvia officinalis* (Sage) leaf in NG-Nitro-L arginine methyl ester (L-NAME) induced hypertensive Wistar rats. *Trop. J. Nat. Prod. Res.* 2022a, 6(12), 2047-2050. <https://doi.org/10.26538/tjnpr/v6i12.25>
- Devin, S.R.; Devin, K.R.; Tamizgran, M. Sage and treatment of diseases: A mini review. *Am. J. Biomed. Sci. Res.* 2021, 15(1), 108109. <https://doi.org/10.34297/AJBSR.2021.15.002078>
- Mokogwu, A.T.H.; Adjekuko, C.O.; Oshilonyah, U.H.; Ikpefan, J.O.; Eyenubo, O.B.; Avwioro, O.G. Hypoglycaemic and hypolipidemic effects of alcoholic extract of common sage (*Salvia officinalis*) in streptozotocin-induced diabetic rabbits. *Afr. J. Biomed. Res.* 2020b, 25(6), 243-247. <https://doi.org/10.4314/ajbr.v25i2.19>
- Ayatollahi, A.; Shojaii, A.; Kobarfard, F.; Mohammad, Z.M.; Choudhary, M. Two flavones from *Salvia leviaefolia*. *Iran J. Pharm. Res.* 2009, 8, 179-84. <https://doi.org/10.22037/ijpr.2010.808>
- Yoon, J.H.; Kim, E.H.; Park, S.B.; Lee, T.Y.; Yoon, S.W. Traditional herbal medicine for insomnia in patients with cancer: A systematic review and meta-analysis. *Front. Pharm.* 2021, 12, 753140. <https://doi.org/10.3389/fphar.2021.753140>
- Hamidpour, M.; Hamidpour, R.; Hamidpour, S.; Shahlari, M. Chemistry, pharmacology, and medicinal property of sage (salvia) to prevent and cure illnesses such as obesity, diabetes, depression, dementia, lupus, autism, heart disease, and cancer. *J. Trad. Complement. Med.* 2014, 4, 82-88. <https://doi.org/10.4103/2225-4110.130373>
- Park, K.M.; Kim, T.H.; Kim, W.J.; An, S.K.; Namkoong, K.; Lee, E. Cognitive behavioral therapy for insomnia reduces hypnotic prescriptions. *Psychiatry Invest.* 2018, 15 (5), 499-504. <https://doi.org/10.30773/pi.2017.11.20>
- Morin, C.M.; Belleville, G.; Bélanger, L.; Ivers, H. The insomnia severity index: Psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep.* 2011, 34(5), 601-608. <https://doi.org/10.1093/sleep/34.5.601>
- Zitser, J.; Allen, I.E.; Falgàs, N.; Le, M.M.; Neylan, T.C.; Kramer, J.H.; Walsh, C.M. Pittsburgh sleep quality index (PSQI) responses are modulated by total sleep time and wake after sleep onset in healthy older adults. *Plos One.* 2022, 17(6), e0270095. <https://doi.org/10.1371/journal.pone.0270095>
- Silpakit, O.; Silpakit, C. A Thai version of mindfulness questionnaire: Srithanya Sati scale. *East Asian Arch. Psychiatry.* 2014, 24(1), 23-29.
- Amihäesei, I.C.; Mungiu, O.C. Main neuroendocrine

- features and therapy in primary sleep troubles. Rev. Med. Chir. Soc. Med. Nat. Iasi. 2012, 116(3), 862-866.
21. El Joumaa, M.M.; Borjac, J.M. *Matricaria chamomilla*: A valuable insight into recent advances in medicinal uses and pharmacological activities. Phytochem. Rev. 2022, 21(6), 1913-1940. <https://doi.org/10.1007/s11101-022-09817-0>
22. Viola, H.; Wasowski, C.; De Stein, M.L.; Wolfman, C.; Silveira, R.; Dajas, F.; Medina, J.H.; Paladini, A.C. Apigenin, a component of *Matricaria recutita* flowers, is a central benzodiazepine receptors-ligand with anxiolytic effects. Planta Med. 1995, 61(03), 213-216. <https://doi.org/10.1055/s-2006-958058>
23. Jarukitsakul, S.; Keawjeen, T.; Keawjeen, T.; Inthanuchit, K.; Chatawatee, B.; Masapan, C.; Chaisri, S.; Pakbara, K.; Siriyong, T. A Comparative study on the effectiveness of pepper leaves tea and chamomile tea for insomnia disorder: A single-blind randomized clinical trial. Trop. J. Nat. Prod. Res. 2025, 9(3), 1977-1980. <https://doi.org/10.26538/tjnpr/v9i5.1>
24. Ghowsi, M.; Yousofvand, N.; Moradi, S. Effects of *Salvia officinalis* L. (common sage) leaves tea on insulin resistance, lipid profile, and oxidative stress in rats with polycystic ovary: An experimental study. Avicenna J. Phytomed. 2020, 10(3), 263-272. <https://doi.org/10.22038/AJP.2019.14005>
25. Mokogwu, A.T.H.; Adjekuko, C.O.; Oshilonyah, H.U.; Avwioro, O.G. Studies of *Salvia officinalis* leaf extract on some biochemical parameters in rats induced with overdosed-tramadol. Afr. J. Biotech. 2022, 21(8), 353-360. <https://doi.org/10.5897/AJB2022.17490>
26. Tabari, M.A.; Tehrani, M.A. Evidence for the involvement of the GABAergic, but not serotonergic transmission in the anxiolytic-like effect of bisabolol in the mouse elevated plus maze. Naunyn Schmiedebergs Arch Pharmacol. 2017, 390, 1041-1046. <https://doi.org/10.1007/s00210-017-1405-0>
27. Xie, Z.; Chen, F.; Li, W.A.; Geng, X.; Li, C.; Meng, X.; Feng, Y.; Liu, W.; Yu, F. A review of sleep disorders and melatonin. Neurol. Res. 2017, 39(6), 559-565. <https://doi.org/10.1080/01616412.2017.1315864>
28. Damjuti, W.; Thitikornpong, W.; Saengow, S.; Thanusuwannasak, T.; Fuangfoo, T.; Boonruab, J. The interaction of Suk-Saiyasna remedy with GABAA and CB1 receptor-targeting drugs: enhancing hypnotic and sedative effects in in vivo models. J. Adv. Pharm. Technol. Res. 2024, 15(1), 13-1. https://doi.org/10.4103/JAPTR.JAPTR_355_23
29. Shaha, D.P. Insomnia management: A review and update. J. Fam. Pr. 2023, 72 (6), S31-S36. <https://doi.org/10.12788/jfp.0620>
30. Riemann, D.; Benz, F.; Dressle, R.J.; Espie, C.A.; Johann, A.F.; Blanken, T.F. et al. Insomnia disorder: State of the science and challenges for the future. J. Sleep. Res. 2022, 31 (4), Article e13604. <https://doi.org/10.1111/jsr.13604>