

Effect of Bay Leaf on Quality of Sleep in Patients With Primary Insomnia: A Randomized Control Study

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“EFFECT OF BAY LEAF ON QUALITY OF SLEEP IN PATIENTS WITH PRIMARY INSOMNIA: A RANDOMIZED CONTROL STUDY”

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ABSTRACT

Background: Insomnia are quite common in the general population and have substantial medical, psychological, and social effects. Consumption of medication always carries a risk of various adverse effects, which has led for the search of safe, effective ways to counter the complications. As alternative therapies can be utilised in managing symptoms of this disease, the present study was conducted to investigate the effect of bay leaf in patients with primary insomnia.

Method: This is a randomized controlled trial and was carried out in Cuddalore district, Tamil Nadu. Participants were randomly allocated to either the intervention group (SG), who

consumed 100ml of bay leaf decoction after dinner as a bedtime tea for 90 days, or the control group (CG), who received an equivalent volume of warm water. Insomnia Severity Index (ISI) score were collected and blood samples were collected to measure serum cortisol levels (SCL) at baseline and post-intervention.

Results: After 90 days of intervention, the group that consumed bay leaf decoction demonstrated a significant reduction in both Insomnia Severity Index (ISI) and serum cortisol levels (SCL) ($p < 0.001$) compared to the control group. The between-group comparison also revealed statistically significant differences in ISI and SCL scores ($p < 0.05$).

Conclusion: The findings suggest that bay leaf decoction effectively improves the quality of sleep in individuals with primary insomnia.

Keywords: Bay leaf decoction, primary insomnia, serum cortisol levels, insomnia severity index, randomized controlled trial.

INTRODUCTION:

Sleep is a complex neurological state, with its primary function of providing rest and restoring the body's energy levels. The importance of sleep could be seen from the fact that people spend about one-third of their lifespan in sleep(1). Sleep disorders are quite common in the general population and have substantial medical, psychological, and social effects(2). Difficulty falling asleep, staying asleep, or having non-restorative sleep are the hallmarks of insomnia, which is frequently linked to negative consequences during the day. Insomnia can manifest as a separate ailment, while it frequently happens as a result of medical, psychological, circadian rhythm, or other sleep disorders. Primary insomnia is regarded as a separate clinical entity and is thought to make up around 25% of all cases of chronic insomnia(3).

Although sleep medicine can be a useful short-term treatment for insomnia, some individuals report side effects such as amnesia, cognitive impairment, and morning hangover. Furthermore,

some patients continue to experience sleep disturbances while using these medications, which leads to increasing doses and ultimately drug dependence and tolerance(4). As a result, there is a growing demand for alternative and complementary therapies that are safer, more accessible, and culturally acceptable.

These days, one of the most popular supplementary or alternative therapies for insomnia is herbal medicine(5). Bay leaf, also known as bay laurel, is a culinary herb that comes from the small evergreen tree *Laurus nobilis* L. (family Lauraceae). This plant is native to the Mediterranean and enjoys extensive cultivation in the warm climates of the southern United States, Central America, Europe, the Middle East, and Asia(6). A significant industrial plant, *Laurus nobilis* is utilized in food, medications, and cosmetics. In the food business, dried leaves and essential oils are widely used to season seafood, meat items, and soups(7). Bay leaf has antibacterial, antidiarrheal, anti-inflammatory, and antidiabetic qualities. Flavonoids, phenols, and essential oils (such as cineole and eugenol) are among the substances that give it its analgesic, and antioxidant and sedative effects(8).

Despite its traditional use and fascinating pharmacological qualities, scientific evidence of bay leaf's influence on sleep quality, particularly in patients with primary insomnia, is lacking. As a result, the purpose of this randomized controlled trial is to look at the efficacy of bay leaf in improving sleep quality in those who have primary insomnia. The study's findings could support a natural, cost-effective, and safe alternative intervention for insomnia management.

MATERIALS AND METHODS:

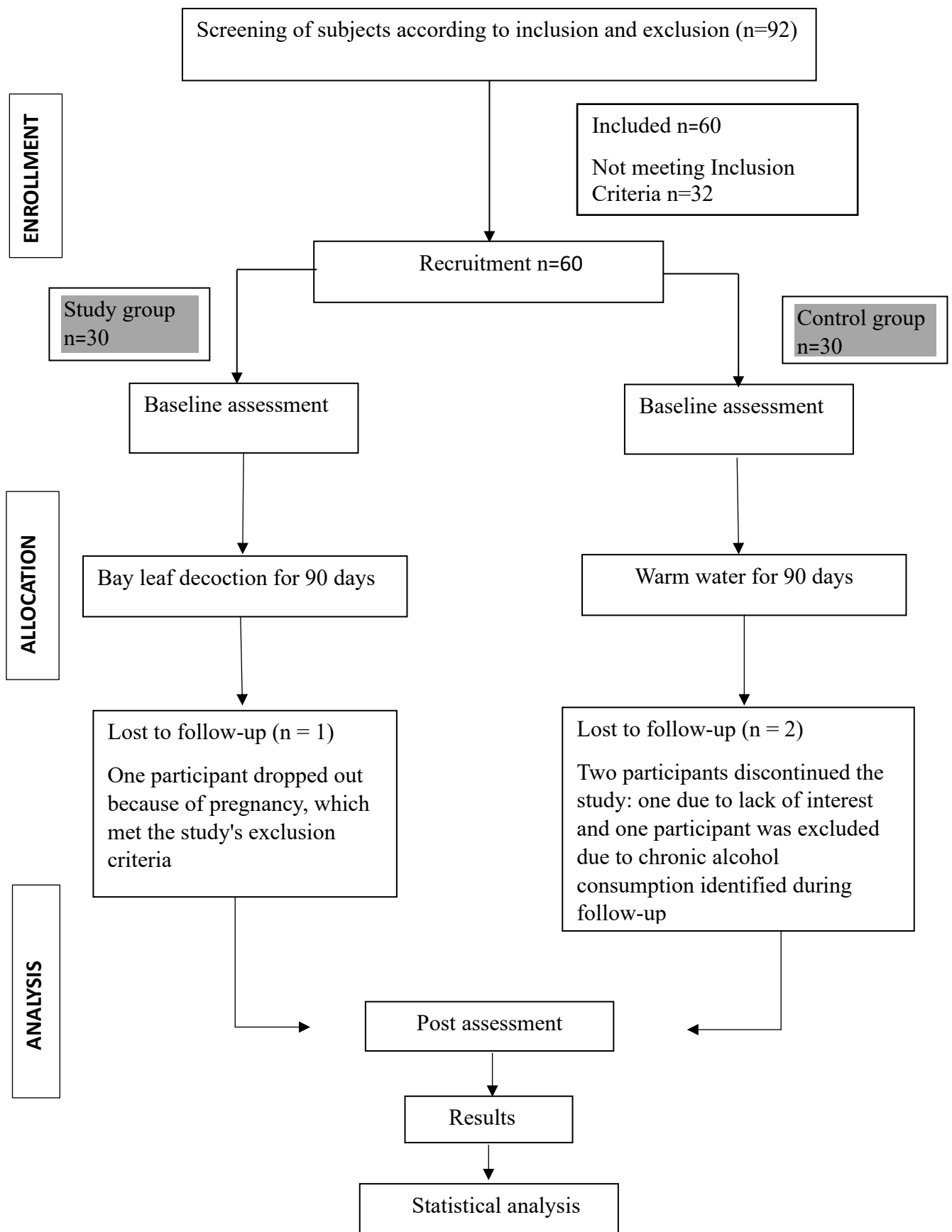
The subjects were recruited from Cuddalore District, Tamil Nadu, after obtaining prior ethical approval from Sri Dharmasthala Manjunatheshwara College of Naturopathy and Yogic Sciences, Ujire-574240, Dakshina Kannada, Karnataka. Individuals aged 18–69 years, both male and female, diagnosed with primary insomnia according to DSM-5 criteria and fulfilling

the predefined inclusion and exclusion criteria were screened for participation. A total of 92 subjects were screened, of whom 32 were excluded, and 60 eligible subjects were selected and randomly divided into two groups of 30 each: the study group and control group. The study group received bay leaf decoction, while the control group received warm water after dinner at bedtime for 90 days. NeutraVed Tej Patta (bay leaf) powder was used for the intervention, with 3 g of bay leaf powder added to 100 mL of water, brought to a boil, and consumed warm by the participants after food at bedtime. The control group received warm water at the same time and for the same duration. Participants were instructed to maintain their normal daily routine, including their usual food and exercise activities, throughout the study period and were selected individually without being part of a group or having direct contact with each other. Compliance was monitored through dosage monitoring and regular contact with the participants, and all participants who consumed the bay leaf decoction reported no significant side effects.

The Insomnia Severity Index (ISI) questionnaire was administered before and after the intervention. The ISI consists of seven self-reported items, with each item scored on a 5-point Likert scale from 0 to 4, giving a total score ranging from 0 to 28. Scores of 0–7 indicate no clinically significant insomnia, 8–14 indicate subthreshold insomnia, 15–21 indicate moderate insomnia, and 22–28 indicate severe insomnia. Serum cortisol levels were measured on days 0 and 90. Participants were instructed to maintain overnight fasting and avoid physical activity, caffeine, and alcohol before sample collection. Approximately 2–5 mL of venous blood was collected under aseptic precautions in the morning before 8:00 AM using a sterile syringe and transferred into plain tubes, where it was allowed to clot at room temperature for 20–30 minutes. The cortisol values obtained before and after the intervention were compared to assess changes among the participants.

During the 90-day intervention, two participants in the control group were lost to follow-up: one discontinued due to lack of interest and one was excluded after chronic alcohol consumption was identified during follow-up. In the study group, one participant discontinued due to pregnancy, which met the predefined exclusion criteria. Therefore, 57 participants completed the study and underwent post-intervention assessment, and the collected data were subsequently subjected to statistical analysis. The recruitment, allocation, follow-up, and analysis of participants are presented in Figure 1 (CONSORT flow chart)

FIGURE 1: CONSORT FLOW CHART



SAMPLE SIZE OF ESTIMATION:

The sample size was estimated using G*Power software (version 3.1.9.4) for a two-tailed hypothesis with a significance level of $\alpha = 0.05$ and statistical power of 80% ($1-\beta = 0.80$). A moderate effect size (Cohen's $d = 0.5$) was assumed based on findings from previous randomized controlled trials evaluating insomnia interventions(9,10). The minimum required sample size was calculated as 54 participants (27 per group). Considering an anticipated dropout rate of approximately 10%, the final sample size was increased to 60 participants (30 per group).

STATISITICAL ALYSIS:

Two-way ANOVA and randomized control design were used for statistical analysis. All data processing and Statistical analyses were performed using Jamovi 2.7.26 software. Descriptive statistics were expressed as mean $\pm$ standard deviation. The normality of the data was assessed using the Shapiro–Wilk test. As the data were not normally distributed, non-parametric tests were used for analysis. The Wilcoxon signed-rank test was applied to compare both Insomnia Severity Index (ISI) scores and serum cortisol levels before and after 90 days within the same participants. A p-value of < 0.05 was considered statistically significant.

RESULTS:

The present study aims to assess the effect of effect of bay leaf decoction on patients with primary insomnia. In study group, one participant has withdrawn due to a newly diagnosed medical condition identified during the study period. In the control group, two participants discontinued the study: one due to lack of interest and one participant was excluded due to chronic alcohol consumption identified during follow-up. The study trial was conducted between September 2025 to February 2026 and involved subject recruitment, randomization, evaluation, and intervention. The trial ended after completion of expected study samples. With age of

49.6±13.1 years with 31.0% male and 69.0% female in SG. 51.3±11.7 years 35.71% male and 64.3% female in CG.

Variables	SG		Within the group	CG		Within the group	Between the group
	PRE	POST		PRE	POST		
	mean ± SD	mean ± SD		mean±SD	mean± SD		
ISI	17.9 ± 2.83	15.2 ± 3.8	<0.001**	18.2±3.66	17.9 ± 3.73	0.400	0.005#
SCL	11.32±5.18	9.01 ± 2.28	< 0.001**	14.8±9.95	15.1±8.16	0.650	0.004#

Table 1: Within the group and Between the group Comparison of Insomnia Severity Index (ISI) and Serum Cortisol Levels (SCL) in Study Group (SG) and Control Group (CG)

*p < 0.05 significant, **p < 0.001 highly significant and #p < 0.05 significant between groups.

Data were expressed in mean ± SD, ISI: Insomnia Severity Index, SCL: Serum cortisol levels.

After 90 days of intervention, the group that consumed bay leaf decoction demonstrated a significant reduction in both Insomnia Severity Index (ISI) and serum cortisol levels (SCL) ($p < 0.001$) compared to the control group. The between-group comparison also revealed statistically significant differences in ISI and SCL scores ($p < 0.05$). The within-group and between-group comparisons of ISI and serum cortisol levels are presented in Table 1. The changes in serum cortisol levels between the study and control groups are illustrated in Fig. 2. The comparison of Insomnia Severity Index scores between the study and control groups is presented in Fig. 3.

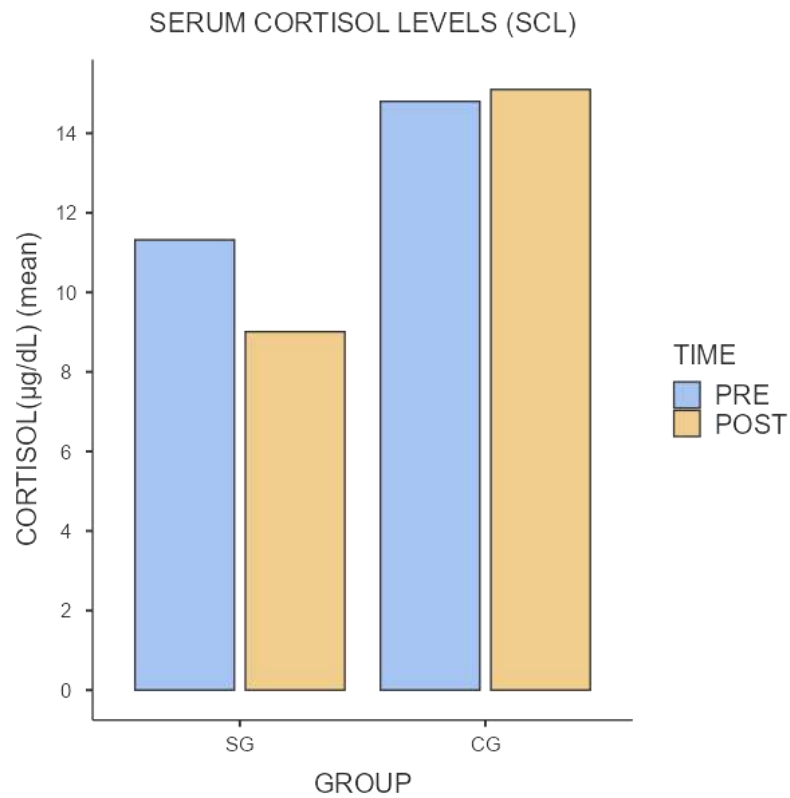


Figure 2: comparison of SERUM CORTISOL LEVELS (SCL) in Study (SG) and control group (CG)

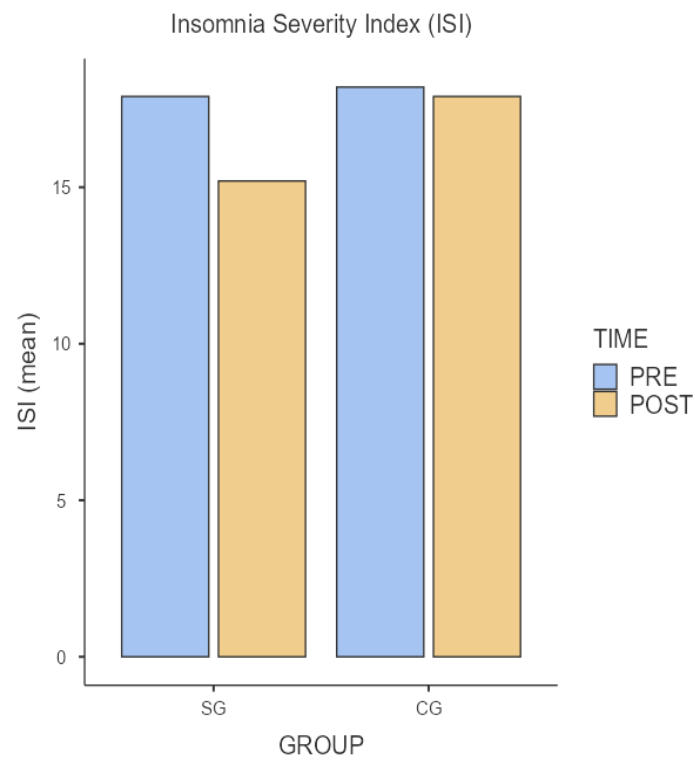


Figure 3: Comparison of Insomnia Severity Index (ISI) in Study (SG) and control group (CG)

DISCUSSION:

Primary insomnia is defined as difficulty in falling asleep, maintaining sleep or non-restorative sleep which is not due to other medical, psychiatric or sleep disorders(11). For optimal health and a high standard of living, getting enough healthy sleep is essential. In spite of this, the prevalence and burden of insomnia condition, which can be either acute (short-term) or chronic, are rising worldwide(12).

Insomnia is linked to disruption of neurotransmitters or endogenous chemicals that regulate sleep. Gamma amino butyric acid (GABA), serotonin, melatonin, histamine, prostaglandins, and hypocretin or orexin are neurotransmitters linked to circadian cycles and sleep control. Furthermore, it also is believed that dysfunction of the hypothalamus-pituitary-adrenal gland (HPA) axis increases the disruption of the sleep-wake cycle, which results in insomnia. Endogenous substances such corticotrophin-releasing hormone (CRH), corticosterone (CORT), and adrenocorticotrophic hormone (ACTH) are involved in the HPA axis(13).

The present study showed that bay leaf decoction could improve sleep quality among individual with primary insomnia. To our best knowledge, the current study is the first to investigate the effect of bay leaf decoction among primary insomnia individual.

According to the results, there was a high statistical significant difference seen in both INSOMNIA SEVERITY INDEX SCORE AND SERUM CORTISOL LEVELS ($p < .001$) after 90 days of bay leaf decoction as compared to baseline and after intervention data within the study group. The between-group comparison also revealed statistically significant differences in ISI and SCL scores ($p < 0.05$).

Cinnamomum tamala, or bay leaf, is a member of the Lauraceae family(14). It is a fragrant leaf used in Ayurveda that was categorized as "Tej patta" and has strong

therapeutic qualities to treat a variety of illnesses. It is typically used as fresh or dried leaves in cooking(15). In traditional medicine, they have been used to prevent blood/glucose-related disorders like diabetes and heart disease, improve nervous system functions, and control body metabolism(16,17). Additionally, they defend the body by preventing cancer, strengthening bones, lowering stress, enhancing digestion, warding off illnesses, treating colds, maintaining dental health, and regulating hormones. Additionally, bay leaves demonstrated anti-inflammatory, anti-oxidative, anti-microbial, anti-atherosclerotic, anti-cancer, and central nervous system-enhancing qualities. Furthermore, potassium, iron, vitamins A and C, carbohydrates, calcium, dietary fibers, salt, lipids, proteins, chlorogenic acid, catechins, procyanidins, and quercetin glycosides are the key nutrients found in bay leaves(18).

Sharma et al. (2012) investigated the central nervous system effects of eugenol in mice and rats and demonstrated significant sedative, analgesic, and anticonvulsant activities. However, eugenol did not produce significant anxiolytic effects or impair motor coordination in the experimental models studied(19).

Bay Leaves (*Syzygium Polyanthum*) include a variety of macrominerals, such as calcium (751.25 mg per gram), magnesium (48.75 mg per gram), phosphorus (25.15 mg per gram), sulphur (62.5 mg per gram), chlorine (5.4 mg per gram), and potassium (287.5 mg per gram)(20). According to a study by Behnood Abbasi et al., supplementing with magnesium appears to improve both objective measures of insomnia in older adults, such as serum renin, melatonin, and cortisol concentration, and subjective measures of insomnia, such as ISI score, sleep efficiency, sleep time and sleep onset latency, and early morning awakening(21).

Numerous studies have been conducted on the chemical makeup of bay laurel leaves. The primary compound found is 1,8-cineole (30.8%), followed by α -terpinyl acetate (14.9%), α -terpineol (8.0%), sabinene (7.9%), terpinen-4-ol (6.0%), α -pinene (5.3%), β -pinene (3.6%), methyleugenol (3.6%), and γ -terpinene (3.3%)(22).

Abou-Khalil et al. highlighted the presence of linalool in *Laurus nobilis* and its reported sedative and anxiolytic effects. Such actions may reduce arousal and anxiety, thereby contributing to the improvement in insomnia symptoms observed in the present study(23).

As per studies 1,8-cineole enhances sleep by altering the concentrations of crucial neurotransmitters in serum and brain tissue, specifically serotonin (5-HT) and gamma-aminobutyric acid (GABA)(24).

According to Porres-Martínez M et al. α -pinene and 1,8-cineole have been shown to protect U373-MG cells from H₂O₂-induced oxidative damage by reducing the loss of cell viability and morphology, preventing the production of reactive oxygen species (ROS) and lipid peroxidation, and boosting the endogenous antioxidant status(25).

After inhalation, 1,8-cineole is rapidly absorbed and reaches peak plasma concentrations within approximately 18 minutes. Owing to its lipophilic nature, it readily crosses the blood–brain barrier and has an elimination half-life of approximately 1.5–2 hours, allowing transient modulation of central neurotransmitter pathways.(26).

In a previous study by Davinelli et al., showed that the sleep disorders are directly related with elevated oxidative stress and reduced NRF2 activation, a important regulator of antioxidant defence. Neuronal dysfunction and sleep dysregulation may be caused by reduced NRF2 activity, hinting that target oxidative stress pathways may enhance the sleep quality(27).

A study conducted by M.Elmas tas et al. bay leaf extract has considerable antioxidant and radical scavenging activity, as evidenced by its capacity to neutralize free radicals, show significant reducing power, and chelate metal ions in a number of in-vitro tests. The outcome shows that the presence of phenolic and flavonoid compounds, which function as effective donors of hydrogen or electrons and prevent oxidative chain reactions like lipid peroxidation(28). This may contribute to improve sleep quality by reducing oxidative stress and supporting neuroendocrine balance.

As per the experiment done by Dwi Puspitasari et. (2023) in male Wistar rats concluded that bay leaf extract which has significant amount of bioactive compounds such as flavonoids, tannins, and steroids, which neutralizes free radicals and restore oxidative balance can effectively reduce malodialdehyde (MDA) levels which is a key biomarker of oxidative stress(29).

Upadhyay, et al., performed an experimental rat model, which showed that 400mg/kg of bay leaf extract exhibits a significant anxiolytic, antidepressant, and antistress effects by mitigating stress-induced biochemical alterations, including corticosterone and metabolic parameters(30).

These reports suggest that bay leaf decoction intake may have contribution to improve quality of sleep in patients with primary insomnia.

CONCLUSION:

A significant reduction in Insomnia Severity Index (ISI) and Serum Cortisol (SCL) Levels supports the efficacy of Bay Leaf Decoction among individuals with Primary insomnia. Further studies are required to determine the exact mechanism of action, bioactivity guided fractionation, and enzymatic study of constituents of the plant extract with other pharmacological drugs for betterment of primary insomnia.

SUMMARY

The present study summarizes that the bay leaf decoction effective in improving sleep quality among individuals with Primary insomnia. As a result, this study shows that the bay leaf decoction effective and safe supplemental treatments for primary insomnia. So before using bay leaf in future studies or clinically, the results of the present study should be considered.

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DECLARATIONS:

Ethics Approval

The study was approved by the Institutional Ethics Committee of Sri Dharmasthala

Manjunatheshwara College of Naturopathy and Yogic Sciences, Ujire, Karnataka. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Consent to Participate

Written informed consent was obtained from all participants before their participation in the study.

Clinical Trial Registration

Clinical Trials Registry–India (CTRI), [CTRI/2025/09/094786], registered on [September 15, 2025].

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