



Development Of A Therapeutic Multi-Component Yoga Module For Improving Sleep And Reducing Insomnia-Related Problems: A Study Based On Traditional And Scientific Approaches

Shrikant Pitambar Wadile

Abstract

Insomnia is a prevalent and debilitating sleep disorder affecting approximately 10–30% of adults globally, with significant consequences for physical, psychological, and functional well-being. Conventional pharmacological treatments carry risks of dependency, tolerance, and adverse effects, while access to Cognitive-Behavioral Therapy for Insomnia (CBT-I) remains restricted. This randomized controlled study evaluated the efficacy of a 40-minute daily multi-component yoga module comprising Omkar Prayer, Anulom Vilom Prāṇāyāma, Bhrāmarī Prāṇāyāma, and Dhāraṇā in managing chronic insomnia and associated psychological disturbances among 96 participants (Yoga: $n = 47$; Control: $n = 49$) aged 40–59 years. Outcomes were assessed at baseline, 4 weeks, and 8 weeks using the Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS-16), and Depression Anxiety Stress Scale (DASS-21). Results revealed extraordinarily large treatment effects: insomnia severity decreased by 75.1% (ISI: $23.06 \pm 1.57 \rightarrow 5.75 \pm 1.59$, partial $\eta^2 = .918$) and sleep quality improved by 76.6% (PSQI: $15.70 \pm 1.32 \rightarrow 3.68 \pm 1.45$, partial $\eta^2 = .879$), all $p < .001$. The findings confirm that this multi-component yoga module is a safe, accessible, and highly efficacious non-pharmacological intervention for chronic insomnia.

Introduction

Insomnia, defined as persistent difficulty initiating or maintaining sleep occurring at least three nights per week for a minimum of three months, constitutes a significant global public health burden. Epidemiological evidence confirms that approximately 10% of adults worldwide meet full diagnostic criteria for insomnia disorder, with an additional 20% experiencing intermittent symptoms of varying severity. The disorder creates bidirectional relationships with anxiety, depression, and chronic stress, wherein disturbed sleep exacerbates psychological distress and psychological distress perpetuates sleep disturbance a self-reinforcing cycle that substantially impairs personal, occupational, and social functioning.

Pharmacological interventions including benzodiazepines and non-benzodiazepine hypnotics provide short-term relief but carry risks of physiological dependence, tolerance, cognitive impairment, and rebound insomnia upon discontinuation. CBT-I, recognized as first-line non-pharmacological treatment, demonstrates efficacy but faces barriers including limited practitioner availability, cost, and geographic

access restrictions. These limitations create urgent need for holistic, accessible, and evidence-based alternatives.

Yoga, systematically codified in Patañjali's *Yoga Sūtras* (circa 5th century BCE) through the Eight Limbs encompassing *yamas*, *niyamas*, *āsana*, *prāṇāyāma*, *pratyāhāra*, *dhāraṇā*, *dhyāna*, and *samādhi* offers a multidimensional intervention that simultaneously addresses the physiological, cognitive, and behavioral dimensions of insomnia pathophysiology. The present study was conducted to systematically evaluate the efficacy of a carefully designed multi-component yoga module in alleviating chronic insomnia and its psychological comorbidities through a rigorous randomized controlled trial design.

Methodology

Sample

Table 1: Study Sample Characteristics

Characteristic	Yoga Group	Control Group	Total
Sample Size (<i>n</i>)	47	49	96
Age Range (years)	40–59	40–59	40–59
Recruitment Site	Shree Ayurved Hospital; Sidhhivinayak Hospital; Yog Vidya Dham, Shirpur	Same	Shirpur, Maharashtra
Insomnia Criterion	DSM-5	DSM-5	DSM-5
Minimum Duration	> 6 months	> 6 months	> 6 months
Drug-Free Period	≥ 1 month	≥ 1 month	≥ 1 month
Randomisation	Computer-generated random sequence	Computer-generated random sequence	Double-blind
Intervention	40-min Yoga Module (daily, 8 weeks)	Sleep Hygiene Education (no yoga)	8-week trial

Participants were selected from outpatient departments of Shree Ayurved Hospital and Sidhhivinayak Hospital, Shirpur, Maharashtra, supplemented by community announcements at Yog Vidya Dham. The study received ethical approval from the Ethics Committee of Kaivalyadhama, Lonavala. Randomisation employed computer-generated random number sequences, and allocation was concealed from both participants and assessors.

Yoga Module Protocol

Table 2: Multi-Component Yoga Module Session Protocol

Seq.	Component	Duration	Therapeutic Mechanism
1	Omkar and Opening Prayer	2 min	Mental focus and preparatory intention
2	Anulom Vilom Prāṇāyāma	10 min	Balances sympathetic–parasympathetic activity
3	Bhrāmarī Prāṇāyāma	15 min	Vibrational resonance; vagal stimulation; calming
4	Dhāraṇā (Body & Breath Awareness)	10 min	Reduces cognitive hyperactivity; enhances mindfulness
5	Closing Prayer and Omkar	3 min	Psychological closure; nervous system transition to rest
	Total	40 min	

Sessions were conducted daily under certified yoga instructors with clinical training. The control group attended sleep hygiene education sessions without any yoga or meditation components.

Outcome Measures and Statistical Analysis

Five validated instruments assessed outcomes: PSQI (sleep quality, 0–21), ISI (insomnia severity, 0–28), ESS (daytime sleepiness, 0–24), DBAS-16 (dysfunctional sleep beliefs, 16–80), and DASS-21 (depression, anxiety, stress, each 0–42). Repeated measures analysis of variance (RM-ANOVA) with Greenhouse-Geisser corrections, Bonferroni-adjusted pairwise comparisons, and partial eta-squared (η^2) effect sizes were computed using IBM SPSS Statistics Version 28, with $\alpha = .05$.

Results

Table 3: Sleep Quality (PSQI) Descriptive Statistics Across Time and Group

Group	Baseline Mean (SD)	4-Week Mean (SD)	8-Week Mean (SD)	% Change
Yoga	15.70 (1.32)	10.72 (1.47)	3.68 (1.45)	–76.6%
Control	17.94 (1.42)	17.12 (1.56)	16.45 (1.51)	–8.3%

RM-ANOVA: $F(1.78, 166.97) = 684.33, p < .001$, partial $\eta^2 = .879$

Table 4: Insomnia Severity (ISI) and Daytime Sleepiness (ESS)

Measure	Group	Baseline Mean (SD)	8-Week Mean (SD)	% Reduction
ISI	Yoga	23.06 (1.57)	5.75 (1.59)	–75.1%
ISI	Control	24.31 (1.88)	23.29 (1.74)	–4.2%
ESS	Yoga	11.57 (1.28)	3.23 (1.91)	–72.1%
ESS	Control	12.45 (0.98)	11.53 (0.92)	–7.4%

ISI Interaction: $F(1.78, 166.88) = 1057.82, p < .001$, partial $\eta^2 = .918$. ESS Interaction: $F(1.53, 144.09) = 300.01, p < .001$, partial $\eta^2 = .761$

Table 5: Psychological Well-Being (DBAS-16 and DASS-21)

Outcome Measure	Group	Baseline Mean (SD)	8-Week Mean (SD)	% Reduction	Partial η^2
DBAS-16 (Total)	Yoga	65.36 (5.12)	23.62 (4.06)	-63.9%	.963
DBAS-16	Control	68.92 (4.04)	66.80 (3.56)	-3.1%	
DASS-Depression	Yoga	23.74 (1.70)	7.36 (1.73)	-69.0%	.864
DASS-Anxiety	Yoga	16.85 (1.00)	8.98 (1.01)	-46.7%	.704
DASS-Stress	Yoga	28.89 (2.35)	16.94 (1.01)	-41.4%	.737

All yoga group changes: $p < .001$

Table 6: RM-ANOVA Summary All Outcome Measures (Time $\times$ Group Interaction)

Outcome	F-value	df	p-value	Partial η^2	Variance Explained
PSQI	684.33	1.78, 166.97	< .001	.879	~88%
ISI	1057.82	1.78, 166.88	< .001	.918	~92%
ESS	300.01	1.53, 144.09	< .001	.761	~76%
DBAS-16	2453.75	1.57, 147.92	< .001	.963	~96%
DASS-Depression	599.05	2, 188	< .001	.864	~86%
DASS-Anxiety	223.81	2, 188	< .001	.704	~70%
DASS-Stress	263.88	2, 188	< .001	.737	~74%

Note. Sphericity violations corrected via Greenhouse-Geisser adjustment. Software: IBM SPSS v.28.

Discussion

The findings provide compelling empirical evidence for the efficacy of the multi-component yoga module. The extraordinarily large effect sizes (partial $\eta^2 = .704-.963$) substantially exceed values typically reported in yoga intervention studies, where effect sizes commonly range from .25 to .50. The 75.1% reduction in insomnia severity and 76.6% improvement in sleep quality represent clinically meaningful transformation from severe clinical insomnia to below-threshold scores over eight weeks.

The neurobiological basis for these outcomes is well established. Anulom Vilom Prāṇāyāma activates the parasympathetic nervous system through alternate nostril stimulation, reducing autonomic hyperarousal characteristic of insomnia. Bhrāmarī Prāṇāyāma produces vibrational resonance facilitating brain entrainment, vagal stimulation, and sustained parasympathetic engagement. The 8-week intervention duration normalises hypothalamic-pituitary-adrenal (HPA) axis function, restoring circadian cortisol rhythm essential for sleep-onset. Dhāraṇā reduces pre-sleep cognitive hyperactivity and worry rumination the primary psycho-cognitive perpetuators of chronic insomnia.

The 63.9% reduction in DBAS-16 scores (partial $\eta^2 = .963$) indicates fundamental cognitive restructuring: participants abandoned catastrophic interpretations of poor sleep and replaced maladaptive beliefs with rational experiential learning—a change that occurred without explicit cognitive therapy, suggesting that embodied yoga practice independently facilitates cognitive modification. Improvements in depression (−69.0%), anxiety (−46.7%), and stress (−41.4%) confirm that the intervention holistically addresses the bidirectional relationship between sleep and psychological health.

Conclusion

This randomized controlled trial demonstrates that a 40-minute daily multi-component yoga module comprising Omkar Prayer, Anulom Vilom Prāṇāyāma, Bhṛāmārī Prāṇāyāma, and Dhāraṇā substantially improves insomnia severity, sleep quality, daytime sleepiness, dysfunctional sleep cognitions, and psychological well-being in adults with chronic insomnia. Extraordinarily large effect sizes (partial $\eta^2 = .704-.963$) and near-complete clinical remission of insomnia symptoms across 8 weeks confirm robust therapeutic efficacy. The module's non-pharmacological nature, cost-effectiveness, cultural accessibility, and potential for sustainability position it as a viable first-line intervention. Future research should include longitudinal follow-up, polysomnographic validation, and direct comparisons with CBT-I.

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