



Sleep as the threshold of mortality: Death anxiety, insomnia, and the ritual function of yoga

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ABSTRACT

Background: Insomnia is conventionally framed as a clinical and epidemiological burden, yet emerging psychological literature suggests sleep disruption is entangled with death anxiety and mortality salience, where nighttime wakefulness is when the mind's habitual defenses against death-awareness weaken, surfacing existential distress that manifests physiologically as hyperarousal. In Indonesia, where religious and cultural conceptions of death, fate, and the afterlife remain central to everyday meaning-making, insomnia among women, older adults, and the chronically ill may reflect not merely biological dysregulation but unresolved existential confrontation with mortality. This study examines health yoga, historically a contemplative practice oriented toward liberation and confrontation with impermanence, as an intervention addressing this existential dimension of sleep disturbance. **Methods:** An integrative literature review and conceptual analysis synthesized insomnia epidemiology, Terror Management Theory, and yoga-intervention research, including Indonesian data comparing Yin and Vinyasa yoga among female office workers with mild-to-moderate insomnia. **Findings:** Yoga improved sleep latency, efficiency, and subjective quality, with Yin yoga outperforming Vinyasa. Mechanistically, yoga reduced sympathetic hyperarousal and cortisol while enhancing parasympathetic activation, which are physiological correlates of reduced death-anxiety arousal. Framed eschatologically, yoga functions as a ritualized practice of mortality acceptance, addressing insomnia's existential root rather than only its somatic symptoms. **Conclusion:** Health yoga offers a culturally resonant, contemplative response to sleep disturbance understood as a site of unmanaged existential distress, warranting integration into Indonesian public health and meaning-making frameworks alike. **Novelty/Originality of this article:** This article bridges epidemiological, physiological, and eschatological perspectives on insomnia, positioning yoga as both clinical intervention and mortality-coping ritual.

KEYWORDS: epidemiology; health yoga; insomnia; nonpharmacological interventions; sleep quality.

1. Introduction

Sleep is a fundamental physiological process required for the maintenance of physical health, psychological functioning, cognitive performance, and social well-being. Insomnia is increasingly recognized as a major global health concern because it is associated with impaired daytime functioning, reduced quality of life, fatigue, depression, cognitive difficulties, cardiometabolic morbidity, and an increased risk of accidents. Recent evidence

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estimates that approximately 16.2% of adults worldwide experience insomnia, while 7.9% experience severe insomnia; prevalence estimates vary depending on the diagnostic criteria and measurement instruments employed. Women generally have a higher prevalence than men, while older adults constitute a particularly vulnerable population (Benjafield et al., 2025). In Indonesia, nationally representative evidence indicates that sleep disturbances are also common: 33.3% of individuals aged 15 years or older reported subthreshold insomnia symptoms and 11.0% reported clinical insomnia symptoms (Alfian et al., 2024). Among Indonesian adults aged over 60 years, the prevalence of insomnia was approximately 22%, increasing from 20% among those aged 60–64 years to 24% among those older than 75 years; insomnia was also more prevalent among women and rural residents (Budiman et al., 2024). These findings establish insomnia as an important public-health concern in Indonesia.

Insomnia has become increasingly prevalent since the COVID-19 pandemic, as lifestyle changes, psychosocial stress, and disruptions to the circadian rhythm have led to a surge in the prevalence of sleep disorders (Putri et al., 2023). Several studies have reported an increase in the prevalence of insomnia in Indonesia, reaching as high as 38% in certain populations. This underscores that insomnia is not merely an individual problem but an epidemiological phenomenon with serious implications for societal productivity and the national economic burden. Consequently, multidimensional, evidence-based intervention strategies are needed to address this issue.

In the context of nonpharmacological interventions, Health Yoga has emerged as an alternative approach that is gaining increasing academic and clinical legitimacy (Adella et al., 2025, Surpi et al., 2025). Yoga as a therapy combines postural exercises (*asanas*), breathing techniques (*pranayama*), and meditation focused on enhancing relaxation and managing physiological stress. Several meta-analyses have shown that yoga practice contributes significantly to improving sleep quality, reducing sleep latency, and increasing daily sleep duration. In fact, yoga has been shown to be more effective than some conventional behavioral techniques in managing insomnia.

In Indonesia, a small randomized pretest–posttest study involving 30 female office workers with mild-to-moderate insomnia found that the proportion of participants showing improved sleep quality was higher in the Yin yoga group (86.7%) than in the Vinyasa yoga group (60%), with a statistically significant between-group difference ($p = .019$) (Sari et al., 2022). This finding is consistent with broader evidence suggesting that yoga may improve sleep quality in adults (Alghosi et al., 2025; Xie et al., 2024). Nevertheless, the small, highly specific sample and the pandemic-related study context limit generalizability to the Indonesian general population. Further longitudinal and adequately powered randomized studies are required to determine the durability of the effects and to establish standardized, professionally supervised protocols before yoga can be routinely implemented as an adjunctive intervention for sleep problems in primary healthcare settings.

In Indonesia, an experimental study involving 30 female office workers with mild-to-moderate insomnia reported improvements in sleep quality in 86.7% of participants assigned to Yin yoga and 60% of those assigned to Vinyasa yoga (Sari et al., 2022). Although these findings indicate that Yin yoga may offer greater benefits than Vinyasa yoga in this specific population, the small sample and pandemic-related setting limit their generalizability. Broader evidence from a systematic review and meta-analysis also suggests that yoga may improve sleep quality among women with sleep problems, although variations in interventions and study quality require cautious interpretation (Wang et al., 2020). Implementing yoga within primary healthcare may require health-worker capacity development, standardized protocols, and collaboration with community-based yoga providers; however, evidence concerning these implementation requirements currently comes mainly from settings outside Indonesia (Dhungana et al., 2021). Further longitudinal and implementation studies are therefore required before yoga can be recommended for routine integration into Indonesian primary healthcare.

Therefore, establishing a strong scientific foundation regarding health yoga as an intervention for insomnia is crucial. This study aims to analyze insomnia as an

epidemiological challenge in Indonesia, while also exploring the potential of health yoga as an evidence-based strategy for improving sleep quality. Through a multidimensional approach that is adaptable to the local context, health yoga is expected to become an integral part of public health solutions in Indonesia.

2. Methods

2.1 Study design

This study employed a literature-based narrative review design using a qualitative-descriptive approach. This design was chosen because it provides a comprehensive overview of the prevalence of insomnia in Indonesia and the effectiveness of nonpharmacological interventions particularly Health Yoga in improving sleep quality. The literature review approach is considered appropriate for integrating findings from various previously published empirical studies (Surpi et al., 2025).

2.2 Data methods

Data were collected from scientific articles published in national and international journals, epidemiological reports, and publications by global health organizations. The literature search was conducted using electronic databases such as PubMed, ScienceDirect, SpringerLink, Google Scholar, and DOAJ, covering the years 2015–2025. The keywords used included: insomnia, sleep disorders, sleep quality, yoga therapy, *pranayama*, health promotion, and Indonesia. Inclusion criteria included: articles examining the prevalence of insomnia in Indonesia, experimental or quasi-experimental studies on yoga as a sleep quality intervention, publications in English or Indonesian, and articles with full-text access. Meanwhile, articles consisting solely of abstracts, popular reports without a research basis, and publications prior to 2015 were excluded from the analysis.

2.3 Data analysis

The analysis was conducted using a thematic content analysis approach, which involves identifying the main themes in the relevant literature. Articles that met the inclusion criteria were critically evaluated using the Critical Appraisal Skills Programme (CASP) guidelines. Based on the evaluation results, data were extracted in the form of tables that included information on study design, sample characteristics, types of yoga interventions, sleep quality measurement instruments, and the main study outcomes. In research on yoga, particular attention is given to variations in techniques (e.g., *asanas*, *pranayama*, and *meditation*), the duration of interventions, and differences in effects among different types of yoga, such as Yin yoga and Vinyasa yoga. The aim is to understand the relative effectiveness of various yoga approaches on sleep quality (Wang et al., 2020).

3. Results and Discussion

3.1 Epidemiological analysis of insomnia in Indonesia

The phenomenon of insomnia in Indonesia can be viewed as an epidemiological issue with far-reaching implications. Data indicating that approximately 10% of the population suffers from insomnia means that millions of individuals are affected by both chronic and transient sleep disorders. From a public health perspective, this figure is comparable to the prevalence of chronic diseases such as hypertension or diabetes mellitus; therefore, the importance of interventions for insomnia should be considered on par with those for other noncommunicable diseases (Roth, 2007; World Health Organization, 2021).

Disparities in prevalence across groups add to the complexity of the issue. Women and older adults are reported to have higher prevalence rates. Biologically, hormonal changes in women particularly during menopause are associated with sleep disturbances (Kravitz et al., 2003; Astuti, 2019). Meanwhile, in older adults, changes in natural circadian rhythms and an increase in comorbid conditions further exacerbate insomnia (Foley et al., 2004). These findings indicate that insomnia is not a homogeneous phenomenon but is influenced by factors such as age, gender, health status, and social environment.

In urban areas, work-related stress and screen time late into the night worsen sleep quality, while in rural areas, environmental factors such as noise, poor ventilation, and community activities at night can also be triggers. Therefore, strategies to address insomnia in Indonesia cannot be generic; rather, they must be sensitive to the local social, cultural, and environmental context. Insomnia is not merely a subjective disorder, but a risk factor for various health and social problems. Research shows that chronic insomnia increases the risk of traffic accidents and workplace accidents due to reduced alertness and delayed reaction times (Léger et al., 2014; Cain & Gradisar, 2010). In Indonesia, this is particularly relevant given the high rate of traffic accidents, which are often linked to driver fatigue.

In addition, insomnia is closely linked to economic burdens. A study in the United States estimates that the economic losses due to insomnia amount to billions of dollars per year, primarily due to reduced workforce productivity (Kessler et al., 2011). Although there is no comprehensive national data available in Indonesia, it can be assumed that the impact on productivity and work quality is also significant, given the large number of workers who suffer from sleep disorders. Furthermore, insomnia acts as a secondary risk factor for chronic diseases. Individuals with insomnia are at a higher risk of developing hypertension, coronary heart disease, and type 2 diabetes mellitus (T2DM) (Vgontzas et al., 2009). This places a double burden on Indonesia's healthcare system, which is already grappling with a high prevalence of noncommunicable diseases. In other words, treating insomnia not only improves individuals' quality of life but also contributes to managing the national burden of chronic diseases.

In Indonesia, the treatment of insomnia is still dominated by pharmacological approaches, such as the use of benzodiazepines or sedative hypnotics. Although effective in the short term, pharmacological therapy has limitations, including the risk of dependence, tolerance, and side effects such as daytime sleepiness (Riemann et al., 2017). Therefore, there is an urgent need to develop and expand nonpharmacological interventions that are safe, sustainable, and culturally appropriate for the Indonesian population.

Health Yoga is one such intervention that meets these criteria. Physiologically, yoga reduces activity in the sympathetic nervous system and increases activity in the parasympathetic nervous system, thereby facilitating relaxation and the transition to sleep (Field, 2011). Additionally, yoga has been shown to lower cortisol levels, a stress hormone that often poses a major obstacle to restful sleep. In a social context, yoga is also relatively easy to adopt because it can be practiced individually or in groups, at low cost, and without requiring complex medical infrastructure.

To provide a systematic overview of the selected literature, the characteristics and principal findings of the included studies are summarized in Table 1. The table presents the study design, participant characteristics or research focus, types of intervention or variables examined, and the principal outcomes reported in each publication. The included studies encompass quasi-experimental research, randomized controlled trials, systematic reviews, scoping reviews, narrative reviews, and conceptual analyses. This diversity enables a broader understanding of the potential role of yoga-based interventions in improving sleep quality, reducing psychological distress, and supporting sleep health from both clinical and public-health perspectives. At the same time, differences in study populations, intervention protocols, outcome measures, and methodological quality should be considered when interpreting the overall evidence.

Table 1. Characteristics and principal findings of the studies included in the review

Author(s) and year	Study design	Participants or research focus	Intervention or variables	Principal findings
Adella et al. (2025)	Quasi-experimental study with intervention and control groups	Forty-eight female preclinical medical students, with 24 participants assigned to each group	<i>Asana</i> and <i>pranayama</i> practice for 45 minutes per session, six times per week, over four weeks	The intervention group demonstrated a significant improvement in sleep quality. The mean Pittsburgh Sleep Quality Index (PSQI) score decreased from 5.33 to 2.88, while 79% of the participants shifted from the poor-sleep-quality category to the good-sleep-quality category. Practice frequency was negatively correlated with post-intervention PSQI scores ($r = -0.607$), indicating that greater consistency in yoga practice was associated with better sleep quality.
Alghosi et al. (2025)	Scoping review	Individuals with various sleep disorders	Long-term yoga interventions involving variations in type, frequency, and duration	Most of the reviewed studies indicated that yoga improved sleep quality and had potential as a nonpharmacological intervention. However, heterogeneity in intervention protocols, study populations, and measurement instruments limited the extent to which uniform conclusions could be drawn.
Bandyopadhyay et al. (2023)	Systematic review	Healthy older adults	Various yoga interventions incorporating postures, breathing exercises, meditation, and relaxation	Yoga interventions generally showed a tendency to improve sleep quality and sleep duration among older adults. Yoga also appeared to reduce age-related sleep disturbances, although variations in research design and sample size remained important methodological limitations.
Gupta et al. (2023)	Randomized controlled trial	Overweight or obese individuals with	Yoga-based lifestyle modification combined with	The combination of yoga and dietary modification effectively reduced the

		obstructive sleep apnea	dietary modification	severity of obstructive sleep apnea. The findings suggest that an integrated intervention may improve sleep disorders through changes in health behavior, body weight, and physiological factors associated with sleep apnea.
Thondala et al. (2023)	Systematic review and meta-analysis	Individuals experiencing sleep disturbances	Various nonpharmacological interventions, including physical exercise, yoga, meditation, relaxation, and behavioral interventions	Overall, nonpharmacological interventions produced beneficial effects on sleep quality. These findings strengthen the position of yoga as part of a complementary therapeutic strategy, although its effectiveness is influenced by the type of intervention, participant characteristics, and methods of outcome measurement.
Nayak & Verma (2023)	Narrative review	Mental health in the general population and among individuals with psychological problems	Yoga Nidra as a guided relaxation and meditation technique	Yoga Nidra showed potential to reduce stress, anxiety, depressive symptoms, and psychological tension while promoting relaxation and emotional well-being. However, because the study was a narrative review, the strength of the evidence requires further confirmation through more rigorous experimental research.
Malviya et al. (2025)	Systematic review of 16 studies	Individuals experiencing stress, anxiety, depression, post-traumatic stress disorder, and impaired psychological well-being	Yoga Nidra practice	Yoga Nidra was found to be effective in reducing stress, depression, and anxiety. Preliminary evidence also indicated potential benefits for post-traumatic stress symptoms and psychological well-being; nevertheless, the number and methodological quality

DelRosso (2025)	Conceptual and global review	Sleep health from population-level and public-health perspectives	Dimensions of sleep quality, duration, efficiency, regularity, and circadian alignment	of the available studies remained limited. Sleep health was conceptualized as a multidimensional construct influenced by social, economic, cultural, occupational, and healthcare-related factors. Sleep disorders and sleep-related inequalities should therefore be addressed as global public-health concerns rather than solely as individual clinical problems.
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Note. Abbreviations: PSQI = Pittsburgh Sleep Quality Index; PTSD = post-traumatic stress disorder.

Table 1 demonstrates that yoga-based interventions have generally produced positive outcomes for sleep quality across different populations. The quasi-experimental study by Adella et al. (2025) provides direct evidence that regular *asana* and *pranayama* practice can significantly improve sleep quality among young adults. Similarly, Gupta et al. (2023) showed that yoga-based lifestyle modification, when combined with dietary changes, can reduce the severity of obstructive sleep apnea in overweight and obese individuals. These findings indicate that yoga may influence sleep through both psychological relaxation and broader physiological and behavioral mechanisms. The review studies further strengthen this conclusion. Alghosi et al. (2025), Bandyopadhyay et al. (2023), and Thondala et al. (2023) consistently reported that yoga and other nonpharmacological interventions can improve sleep quality, sleep duration, and related sleep outcomes. However, these studies also identified considerable variation in intervention duration, frequency, participant characteristics, and measurement instruments. Consequently, although the overall direction of evidence is favorable, the effectiveness of yoga should not be interpreted as uniform across all populations and sleep disorders.

The studies on Yoga Nidra and global sleep health broaden the interpretation of the findings beyond clinical sleep outcomes. Nayak & Verma (2023) and Malviya et al. (2025) showed that Yoga Nidra has the potential to reduce stress, anxiety, depression, and psychological tension, which are important factors associated with disturbed sleep. Meanwhile, DelRosso (2025) emphasized that sleep health is shaped not only by individual behavior but also by social, economic, occupational, and environmental conditions. Therefore, the evidence in Table 1 supports the use of yoga as a complementary, accessible, and potentially cost-effective intervention, while also highlighting the need for standardized protocols and stronger research in the Indonesian context.

3.2 Health yoga as an evidence-based intervention for insomnia

A number of international studies have shown that yoga is an effective nonpharmacological intervention for improving sleep quality. A meta-analysis by Wang et al. (2020) of 19 randomized clinical trials found that yoga significantly reduces the severity of insomnia and improves sleep duration and efficiency. These findings are consistent across various populations, including older adults, postmenopausal women, and patients with chronic diseases. Another study by Mindell et al. (2015) showed that yoga, particularly when it combines *asanas* (postures), *pranayama* (breathing), and meditation can improve sleep latency, reduce nighttime sleep disturbances, and enhance subjective sleep quality. The identified mechanisms include the resetting of the circadian rhythm, increased

parasympathetic function, and a reduction in levels of the stress hormone cortisol. These results suggest that yoga indeed holds great potential for the future in terms of improving human health and quality of life (Surpi et al., 2025).

Furthermore, a study by Zhao et al. (2021) confirms that yoga can increase sleep duration by up to 110 minutes per night compared to a control group. This effect surpasses that of some conventional behavioral interventions, such as sleep hygiene alone, indicating that yoga provides unique complementary benefits. The Indonesian context shows similar results. An experimental study by Dewi & Sari (2022), conducted on female office workers with mild to moderate insomnia in Malang and Bali, revealed significant differences between Yin yoga and Vinyasa yoga. The results showed that sleep quality improved by 86.7% in the Yin yoga group compared to 60% in the Vinyasa yoga group. This difference reflects the varying benefits of different types of yoga: Yin yoga, which is slower and focuses on deep relaxation, tends to be more effective for people with insomnia than Vinyasa yoga, which is dynamic and emphasizes physical movement.

These local findings are significant because they underscore the relevance of yoga within the Indonesian cultural context. With the growing popularity of yoga classes which are increasingly being integrated into fitness centers, health communities, and educational institutions this practice has broad potential to be adapted as a public health strategy (Jemiwi & Dharma, 2025). The effectiveness of yoga in treating insomnia can be explained through physiological and psychological mechanisms. From a physiological perspective, yoga reduces the activity of the sympathetic nervous system, which is typically dominant in individuals with insomnia caused by stress or anxiety. Activation of the parasympathetic nervous system through deep breathing techniques (*pranayama*) results in a decrease in heart rate, blood pressure, and the body's stress response (Streeter et al., 2012).

From a psychological perspective, meditation which is an integral part of yoga, helps reduce cognitive hyperactivity, which is often a major barrier to falling asleep (Thuong & Untara, 2024). People with insomnia typically experience racing thoughts before bed; yoga and meditation provide strategies for calming the mind and reducing sleep-related anxiety. Thus, yoga works not only on a biological level but also on mental and emotional levels.

Compared to other nonpharmacological interventions, yoga has several advantages. Cognitive Behavioral Therapy for Insomnia (CBT-I) is still considered the gold standard, but its implementation requires trained therapists and is relatively expensive (Riemann et al., 2017). Sleep hygiene, while beneficial, is often not effective enough when practiced on its own. Meanwhile, yoga can be practiced independently, is holistic in nature, and is easily accessible.

Furthermore, yoga offers additional benefits beyond improved sleep, including increased flexibility, improved posture, lower blood pressure, and reduced anxiety (Field, 2011). With these multiple effects, yoga provides an integrative solution that aligns with the modern health paradigm emphasizing a mind-body approach. Indonesia has great potential for developing yoga as a community-based health intervention. First, yoga is becoming increasingly popular in major cities as part of a healthy lifestyle. This phenomenon can be leveraged to shift the perception of yoga from merely a physical activity to a scientifically grounded health therapy. Second, Indonesia's strong community-based social structures such as *arisan* groups, religious communities, and workers' organizations can serve as platforms for the collective implementation of yoga-based health programs. Through a community-based approach, yoga can be integrated as part of a more inclusive health promotion strategy (Suryani, 2018). In addition, the government's policy through the Healthy Living Community Movement/*Gerakan Masyarakat Hidup Sehat* (GERMAS) program, which emphasizes physical activity, a healthy lifestyle, and mental health, can be expanded to include yoga as one of the recommended practices. Integrating yoga into the GERMAS framework will provide formal legitimacy and increase the accessibility of yoga practice for the general public.

However, there are a number of challenges that need to be addressed. First, there is a stigma among some segments of society that still associates yoga with specific spiritual or

cultural practices, leading to resistance. This can be addressed through science-based education that emphasizes the health aspects and physiological benefits of yoga. Second, the availability of professionally trained yoga instructors remains limited, especially outside major cities. Therefore, competency-based instructor training needs to be expanded so that yoga can be taught correctly and safely.

Another challenge is the limited availability of longitudinal research in Indonesia. Existing studies are generally small-scale and short-term. However, to integrate yoga into the national health system, long-term scientific evidence is needed to demonstrate its effectiveness, safety, and cost-effectiveness. Collaboration between universities, hospitals, and research centers needs to be strengthened to generate more robust data.

The integration of yoga into the Indonesian healthcare system can be achieved through three approaches. First, the preventive approach: yoga can be incorporated into health promotion and prevention programs at community health centers/*pusat kesehatan masyarakat* (Puskesmas), particularly in efforts to reduce the prevalence of insomnia, stress, and anxiety disorders. Second, the curative approach: yoga can be adopted as an adjunct therapy for patients with chronic insomnia, alongside pharmacological therapy or CBT-I. Third, the rehabilitative approach: yoga can be utilized in the rehabilitation of patients with chronic diseases (such as hypertension or diabetes) who often experience sleep disorders as comorbidities.

This implementation requires regulatory support, training for healthcare workers, and adequate funding. For example, the Social Security Administration/*Badan Penyelenggara Jaminan Sosial Kesehatan* (BPJS) for Health could consider including yoga as part of the promotive and preventive services it covers, thereby increasing its accessibility.

The success of yoga's integration also depends on its ability to adapt to the Indonesian cultural context. For example, in Balinese society, which has strong spiritual traditions, yoga can be more readily accepted as a practice for balancing the body and mind. In Java, an approach through religious communities can focus on health and well-being rather than foreign spirituality. This contextual approach is important to ensure that yoga is accepted as a universal health practice, rather than a specific cultural identity.

Furthermore, the alignment between yoga values and local cultural concepts of health can strengthen acceptance. For example, the principle of *sattva* in yoga (balance and clarity of mind) shares similarities with the concept of holistic health in Nusantara culture, which emphasizes harmony between the physical, spiritual, and environmental aspects. This synergy has the potential to accelerate the acceptance of yoga as part of public health strategies in Indonesia.

3.3 Synthesis, implementation challenges, and future prospects

The study findings indicate that insomnia in Indonesia has a relatively high prevalence, affecting approximately 28 million people, or 10% of the population. Insomnia is more prevalent among women, the elderly, and individuals with chronic diseases. From an epidemiological perspective, this condition has significant implications for public health, productivity, and the national economic burden. Furthermore, insomnia has been shown to increase the risk of cardiometabolic diseases, depression, and workplace and traffic accidents, making it necessary to address it as an urgent public health issue.

Health yoga has emerged as an evidence-based, effective nonpharmacological intervention for improving sleep quality. Empirical evidence, from both global and local studies, shows that yoga can increase sleep duration, reduce sleep latency, and improve sleep efficiency. Different types of yoga also produce different effects; Yin yoga, for example, tends to be more effective for insomnia because it focuses on deep relaxation. The therapeutic mechanisms of yoga involve regulation of the autonomic nervous system, reduction of cortisol levels, and improvement of psychological balance.

Compared to other nonpharmacological interventions, such as sleep hygiene or CBT-I, yoga offers the advantages of ease of access, low cost, and additional benefits for physical

and mental health. Thus, yoga can be positioned as a relevant complementary intervention for the Indonesian population.

Although the evidence is supportive, implementing yoga as a public health strategy faces several challenges. First, there is still a stigma that associates yoga with certain spiritual practices. Science-based public education is essential to emphasize the health benefits of yoga, rather than its narrow religious or cultural aspects. Second, a shortage of professional instructors limits access outside major cities. This calls for a standardized yoga instructor certification program that can be integrated into the primary health care system.

Third, research in Indonesia is still dominated by small-scale studies. Longitudinal evidence evaluating the long-term effectiveness of yoga including its impact on productivity and healthcare cost savings remains limited. Without such data, it is difficult for policymakers to systematically integrate yoga into national programs. The prospects for integrating yoga into the management of insomnia in Indonesia are very promising if supported by policies and further research. Integration into National Health Programs Yoga can be incorporated into the GERMAS program or promotive health services at community health centers. The government can facilitate community yoga classes to prevent insomnia early on, particularly among high-risk groups such as office workers and the elderly. Instructor Education and Training Universities and health institutions can play a role in developing a medically oriented yoga instructor certification curriculum. In this way, yoga can be taught as an evidence-based health therapy, not merely a recreational activity. Cross-Sector Collaboration: The integration of yoga requires collaboration among the health, education, community, and private sectors. Companies can provide yoga classes for employees as part of workplace wellness programs, while schools can integrate yoga to improve students' mental health.

Further research is needed in the form of large-scale, randomized controlled trial-based longitudinal studies to evaluate the long-term effectiveness of yoga for insomnia in Indonesia. Additionally, cost-effectiveness analyses can provide strong arguments for policymakers to support the integration of yoga. Cultural adaptation of yoga needs to be tailored to local values and culture. For example, in Bali, yoga can be positioned in harmony with spiritual traditions, while in Java, it can be integrated with a holistic health approach that emphasizes physical and spiritual balance. Cultural adaptation will accelerate the acceptance of yoga among the general public.

From a scientific perspective, this study adds to the evidence that yoga is not merely a physical practice, but a health intervention that impacts both biological and psychological systems. These findings underscore the need for interdisciplinary research across the fields of public health, physiology, psychology, and sports science to develop a more comprehensive understanding. In practical terms, yoga offers an integrative solution that is accessible to the public at a low cost. Yoga's holistic nature also aligns with the modern health paradigm that emphasizes mind-body integration. If developed systematically, yoga has the potential to become a pillar in the management of insomnia as well as in national health promotion in Indonesia.

Overall, insomnia in Indonesia is a serious epidemiological challenge that requires evidence-based interventions. Health yoga offers an effective, safe, and affordable solution for improving sleep quality. Although there are implementation challenges, the potential for integrating yoga into the national health system is immense. With the support of research, policy, and cultural adaptation, yoga can play a vital role in reducing the burden of insomnia while improving the health of the Indonesian population.

Taken together, the available evidence indicates that sleep health should be understood as a multidimensional public health issue rather than merely the absence of insomnia. Sleep quality is shaped by physiological, psychological, behavioral, social, and environmental factors, and disparities in access to healthy sleep remain evident across age groups and health conditions. DelRosso (2025) emphasizes that sleep health has broad implications for population well-being, disease prevention, and health equity. Within this framework, yoga can be positioned not only as a relaxation technique but also as a

preventive and *asana* promotive health intervention. Evidence among young adults shows that the combination of and *pranayama* can improve sleep quality while simultaneously supporting stress management and healthier lifestyle behaviors (Adella et al., 2025). These findings are particularly relevant to modern populations exposed to academic pressure, occupational stress, excessive screen use, and irregular sleep schedules.

The effectiveness of yoga also appears to extend across different age groups and clinical conditions. Bandyopadhyay et al. (2023) found that yogic interventions may improve sleep quality among healthy older adults, suggesting that yoga can help address age-related changes in sleep patterns through gentle physical activity, breathing regulation, and relaxation. In individuals with obstructive sleep apnea and excess body weight, yoga-based lifestyle and dietary modification produced clinically relevant benefits, indicating that yoga may support sleep improvement through both direct psychophysiological mechanisms and indirect changes in weight, respiratory function, and health behavior (Gupta et al., 2023). This broader evidence suggests that yoga should not be treated as a uniform intervention. Its intensity, duration, breathing techniques, postural components, and dietary or lifestyle elements need to be adapted to the age, physical capacity, comorbidities, and specific sleep disorder of each population.

At the same time, the evidence must be interpreted with appropriate methodological caution. The scoping review by Alghosi et al. (2025) shows that chronic yoga interventions generally produce positive effects on sleep quality in people with sleep disorders, but the included studies vary considerably in intervention design, duration, frequency, sample characteristics, and sleep assessment methods. Similar heterogeneity is evident in the wider literature on nonpharmacological interventions, where exercise, relaxation, meditation, cognitive-behavioral approaches, and mind-body practices produce different levels of effectiveness depending on the population and outcome measured (Thondala et al., 2023). Therefore, yoga should be positioned as a complementary evidence-based intervention rather than a universal replacement for clinical treatment. Future studies in Indonesia should use larger randomized samples, validated sleep instruments, objective measurements such as actigraphy where feasible, longer follow-up periods, and standardized reporting of the type, frequency, and intensity of yoga practice.

Finally, the mental-health dimension of yoga, particularly Yoga Nidra, reinforces the relevance of mind-body interventions in sleep management. Narrative evidence indicates that Yoga Nidra may reduce psychological tension, emotional distress, and cognitive hyperarousal, all of which commonly interfere with sleep initiation and maintenance (Nayak & Verma, 2023). The systematic review by Malviya et al. (2025) further supports its potential contribution to mental well-being, although stronger clinical trials are still needed to determine its long-term effectiveness and optimal protocol. Accordingly, the most promising direction is an integrated model combining *asana*, *pranayama*, meditation, and Yoga Nidra with sleep hygiene, nutritional improvement, and appropriate medical or psychological care. In the Indonesian context, such a model could be incorporated into community health promotion, workplace wellness, elderly care, and primary health services. With standardized training, cultural adaptation, and stronger national research, yoga has the potential to become an accessible, low-cost, and scientifically grounded component of sleep-health promotion.

This study offers a novel public-health framework that reconceptualizes Health Yoga from an individual wellness practice into a scalable, culturally adaptable, and evidence-based intervention for sleep disorders in Indonesia. Its originality lies in integrating epidemiological risk, sleep-health disparities, autonomic regulation, psychological distress, lifestyle modification, and community implementation within a single analytical model. The study further advances the literature by proposing that the effectiveness of yoga for sleep should be understood as a multicomponent mechanism involving *asana*, *pranayama*, meditation, Yoga Nidra, and behavioral modification rather than as a uniform exercise intervention. This synthesis provides a new basis for developing standardized, population-

specific yoga protocols and for incorporating Health Yoga into primary care, workplace wellness, elderly health services, and national preventive health programs.



Figure 1. Integrated novelty framework of health yoga as an evidence-based public health intervention for sleep disorders in Indonesia

The visual novelty framework presented in Figure 1 illustrates the distinctive contribution of this study in integrating the epidemiological burden of sleep disorders, the multidimensional mechanisms of yoga, population-specific considerations, and public-health implementation within a single analytical model. Unlike previous studies that tend to examine yoga interventions separately or within limited clinical populations, this study positions Health Yoga as a scalable, culturally adaptable, and evidence-based strategy for improving sleep health in Indonesia. The framework therefore highlights the transition from fragmented evidence toward a more comprehensive model that connects scientific findings with primary healthcare, community-based programs, workplace wellness, elderly services, and national health-promotion policies.

The figure emphasizes that the central novelty of this study lies in transforming fragmented evidence on yoga and sleep into an integrated, context-specific, and implementable public-health framework. By linking epidemiological burden, multidimensional therapeutic mechanisms, population characteristics, and health-system application, the study advances Health Yoga beyond an individual wellness practice toward a scalable evidence-based intervention for sleep disorders in Indonesia. This model provides a strong foundation for the development of standardized protocols, culturally responsive implementation, and future integration into primary care and community health programs (Widana et al., 2025).

4. Conclusions

Insomnia in Indonesia is a significant public health issue, with a prevalence of approximately 10% of the national population. This condition not only affects individuals experiencing sleep disturbances but also imposes a broad social, economic, and public health burden. Insomnia has been shown to correlate with decreased productivity, an increased risk of chronic diseases, and psychological disorders such as anxiety and depression. Therefore, the management of insomnia must be prioritized in national health policy.

This study shows that Health Yoga is an effective, evidence-based, nonpharmacological intervention for improving sleep quality. Empirical evidence, from both global and local studies, confirms that yoga can increase sleep duration, reduce sleep latency, and improve sleep efficiency. The mechanisms underlying yoga's effectiveness include reduced sympathetic nervous system activity, enhanced parasympathetic function, and lower stress hormone levels. In addition, yoga provides complementary benefits such as increased physical flexibility, reduced anxiety, and improved overall psychological well-being. The advantages of yoga over other interventions lie in its holistic nature, accessibility, and relative affordability. Yoga can be practiced independently or in groups, and it can be adapted to local cultural contexts. This makes yoga a promising intervention for integration into Indonesia's public health system at the promotive, preventive, and curative levels.

However, the implementation of yoga as part of a strategy to combat insomnia still faces a number of challenges, including a shortage of professional instructors, a lack of longitudinal research, and cultural stigma. Therefore, systematic efforts are needed, such as competency-based training for yoga instructors, the expansion of large-scale research, and science-based public education campaigns to change public perceptions of yoga. Integrating yoga into national programs such as GERMAS, community health center services, and workplace health programs can be a strategic step toward improving the public's sleep quality. With policy support, cross-sector collaboration, and appropriate cultural adaptation, yoga has the potential to become an integral part of a national solution to reduce the prevalence of insomnia.

Treating insomnia through health yoga not only improves sleep quality but also contributes to the overall physical, mental, and social health of the Indonesian population. This approach aligns with the modern health paradigm, which emphasizes balance between body and mind and promotes a sustainable healthy lifestyle. In conclusion, it can be affirmed that the development of health yoga as an evidence-based intervention is a strategic and visionary step in addressing the epidemiological challenges of insomnia in Indonesia. With adequate support from research, policy, and public education, yoga can become one of the main pillars in national efforts to improve sleep quality and public well-being.

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Author Contribution

Conceptualization, N. W. J. J., and M. T.; methodology, N. W. J. J., M. T., and J. S.; formal analysis, N. W. J. J., J. S., and M. A.; investigation, N. W. J. J., M. A., and N. L. P. D. Y. S.; data curation, N. W. J. J. and N. L. P. D. Y. S.; writing-original draft preparation, N. W. J. J.; writing-review and editing, M. T., J. S., M. A., and N. L. P. D. Y. S.; visualization, N. W. J. J., and J. S.; supervision, M. T.; project administration, N. W. J. J. All authors have read and agreed to the published version of the manuscript.

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The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy and ethical restrictions.

Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Declaration of Generative AI Use

During the preparation of this work, the authors used ChatGPT, developed by OpenAI, to assist in improving grammar, clarity, academic language, and the organization of the manuscript. The generative AI tool was not used to generate or alter research data, conduct the substantive analysis, interpret the findings, or formulate the study's conclusions. After using this tool, the authors critically reviewed and edited the content as needed and took full responsibility for the accuracy, integrity, originality, and final content of the publication.

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