Sleep and Yoga Nidra: The Complementarity that May Prove Valuable in Chronic Ailments

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ABSTRACT

Background

Sleep is a fundamental biological process essential for neurological restoration, immune regulation, metabolic stability, emotional balance, and cardiovascular health. Chronic sleep disturbances have increasingly been associated with hypertension, diabetes mellitus, obesity, chronic pain syndromes, neurodegenerative disorders, anxiety, depression, and impaired immune function. In parallel, Yoga Nidra, commonly referred to as "yogic sleep," has emerged as a structured meditative and relaxation-based intervention with measurable physiological and psychological effects.

Objective

This narrative review synthesizes current neurophysiological evidence, clinical studies, and integrative medicine perspectives evaluating the complementarity between physiological sleep and Yoga Nidra in the management of chronic ailments. The review aims to examine mechanistic pathways linking sleep restoration, autonomic regulation, stress modulation, and psychosomatic health, while assessing the therapeutic relevance of Yoga Nidra as a non-pharmacological adjunct to sleep-focused interventions.

Methods and Discussion

The article reviews emerging evidence on the neurophysiological mechanisms underlying sleep and Yoga Nidra, with particular emphasis on autonomic nervous system modulation, hypothalamic–pituitary–adrenal (HPA) axis regulation, parasympathetic activation, emotional regulation, and reduction of stress-related biomarkers including cortisol, high-sensitivity C-reactive protein (hs-CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α). Evidence from clinical and neurophysiological studies also suggests improvements in heart rate variability, sleep efficiency, slow-wave sleep, and psychological well-being following Yoga Nidra practice. The review further discusses the therapeutic relevance of these mechanisms in chronic conditions including hypertension, diabetes mellitus, chronic insomnia, chronic pain syndromes, cancer-related fatigue, anxiety disorders, and depression

Conclusion

Yoga Nidra does not replace physiological sleep; rather, it appears to augment restorative neurophysiological mechanisms associated with sleep and recovery. Integrative incorporation of Yoga Nidra into sleep-focused therapeutic protocols may represent a cost-effective, safe, and non-pharmacological adjunct within allied health and integrative healthcare systems for improving chronic disease outcomes and overall well-being.

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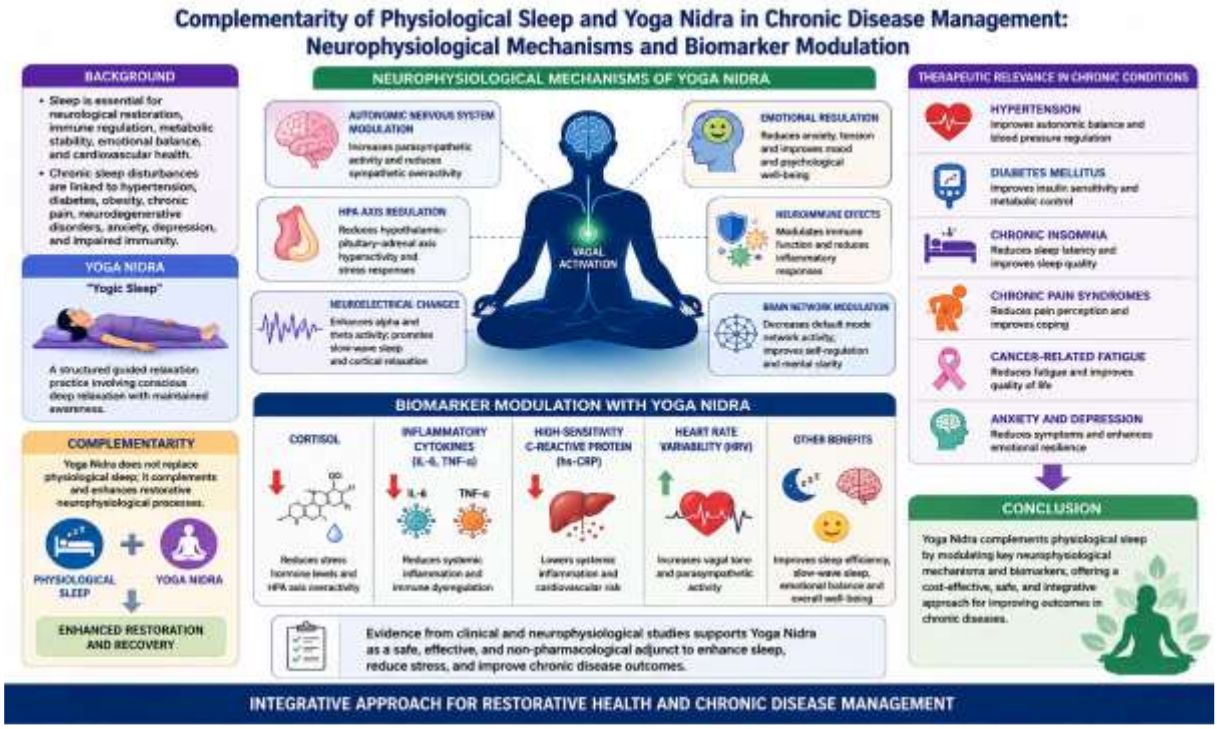

Figure 1: Graphical abstract: Complementarity of Physiological Sleep and Yoga Nidra in Chronic Disease Management: Neurophysiological and Therapeutic Perspectives. Yoga Nidra complements physiological sleep through biomarker modulation, autonomic regulation, stress reduction, improved sleep quality, and chronic disease resilience.

Keywords: Sleep, Yoga Nidra, chronic disease, integrative medicine, insomnia, autonomic regulation, psychosomatic medicine

INTRODUCTION

Sleep is a dynamic physiological process essential for tissue repair, cognitive integration, endocrine regulation, immune surveillance, and emotional homeostasis. Disturbances in sleep architecture are now recognized as major contributors to chronic disease progression and reduced quality of life (Irwin, 2015). Modern lifestyles characterized by excessive screen exposure, occupational stress, sedentary behavior, circadian disruption, and psychological overload have contributed to an unprecedented rise in sleep disorders globally. Chronic insomnia alone affects millions of individuals and is frequently associated with anxiety, depression, cardiovascular disease, diabetes, obesity, and chronic inflammatory states (Riemann et al., 2017).

Parallel to growing concerns regarding sleep deprivation, complementary therapies aimed at enhancing relaxation and restoring neurophysiological balance have gained increasing scientific attention. Yoga Nidra, a guided meditative practice traditionally derived from yogic traditions, has emerged as one such intervention. The term “Yoga Nidra” literally translates to “yogic sleep,” though the practice is more accurately described as a state between wakefulness and sleep involving conscious deep relaxation (Pandi-Perumal et al., 2022).

Yoga Nidra combines systematic body awareness, breath regulation, guided imagery, sensory withdrawal, and focused attention. Unlike ordinary sleep, Yoga Nidra involves maintenance of awareness during profound relaxation. This state appears capable of inducing parasympathetic dominance, reducing cortical hyperarousal, and modulating stress pathways (Moszeik et al., 2020). The complementarity between physiological sleep and Yoga Nidra may therefore hold significant therapeutic implications for chronic ailments in which stress dysregulation and sleep disruption coexist.

The present article examines the interaction between sleep physiology and Yoga Nidra and evaluates how their integration may contribute to the management of chronic diseases within the field of integrative and alternative medicine.

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Physiology of Sleep and Its Importance in Chronic Disease

Sleep is composed of non-rapid eye movement (NREM) and rapid eye movement (REM) stages. NREM sleep includes stages N1, N2, and N3, with N3 representing slow-wave sleep (SWS), a highly restorative phase characterized by synchronized delta-wave activity (Carskadon & Dement, 2017). During deep sleep, growth hormone secretion increases, tissue repair accelerates, synaptic restoration occurs, and metabolic waste products are cleared through glymphatic activity.

Sleep deprivation disrupts multiple biological systems. Chronic reduction in sleep duration has been associated with elevated cortisol levels, sympathetic overactivity, insulin resistance, systemic inflammation, and impaired immune function (Walker, 2017). Individuals with chronic insomnia frequently exhibit heightened autonomic arousal and elevated inflammatory cytokines such as interleukin-6 and tumor necrosis factor-alpha (Irwin, 2015).

Furthermore, inadequate sleep contributes to cardiovascular morbidity by increasing blood pressure variability, endothelial dysfunction, and arrhythmogenic risk. Metabolic consequences include altered leptin–ghrelin balance, increased appetite, obesity, and type 2 diabetes mellitus (Medic et al., 2017). Neuropsychological outcomes include impaired cognition, reduced emotional regulation, anxiety, depression, and decreased resilience (Figure2).

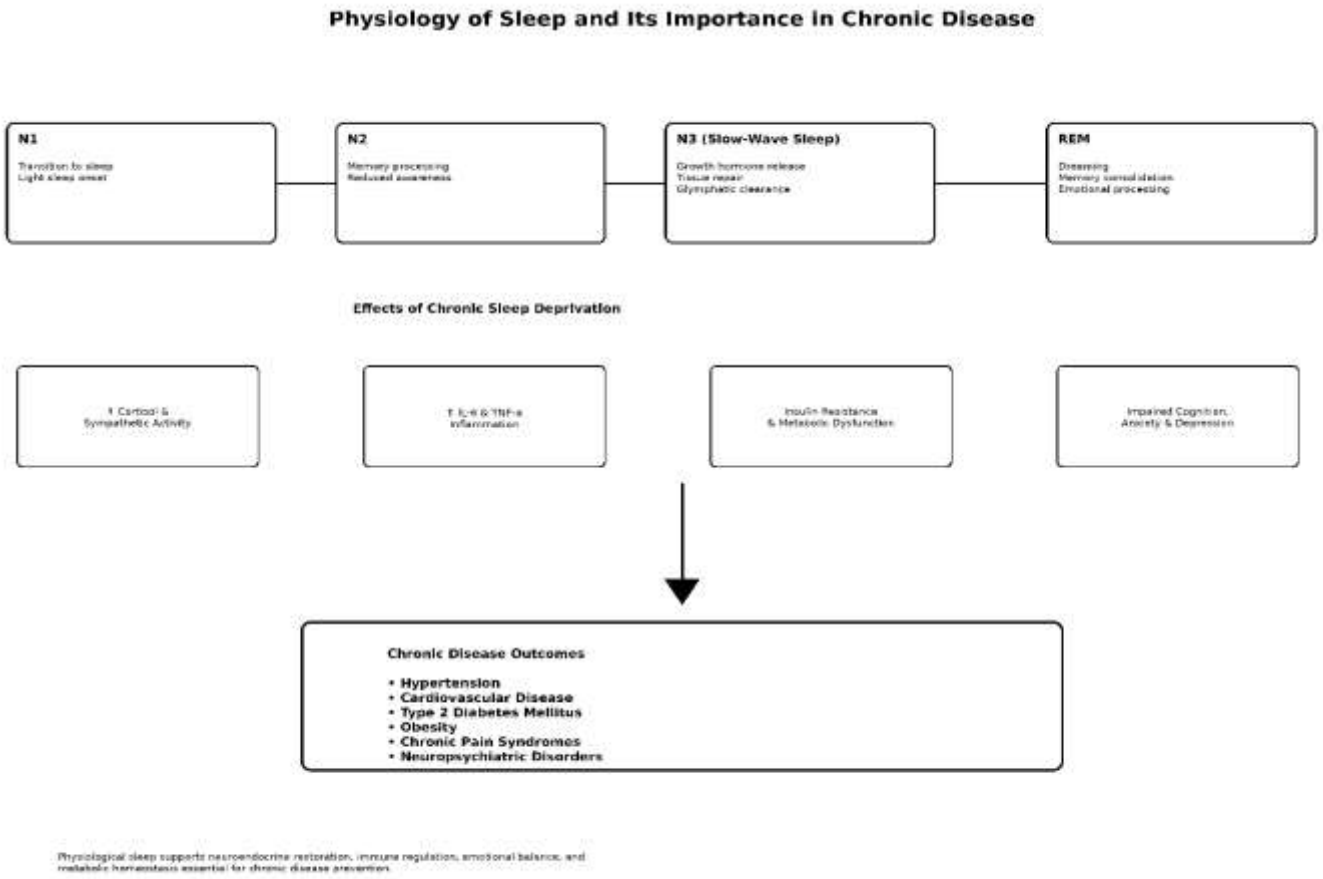

Figure 2: Physiology of Sleep and Its Role in Chronic Disease Pathogenesis .Sleep stages regulate restoration, immunity, metabolism, and cognition, while sleep deprivation promotes inflammation, autonomic imbalance, and chronic disease progression.

The close relationship between sleep and chronic illness has led to increased interest in non-pharmacological approaches capable of improving sleep quality while reducing physiological stress. Yoga Nidra appears particularly relevant in this context because it targets autonomic imbalance and psychological hyperarousal, both central components of chronic disease pathology.

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Understanding Yoga Nidra

Yoga Nidra has roots in ancient yogic and tantric traditions but has evolved into a structured therapeutic practice within modern integrative medicine. Contemporary forms of Yoga Nidra were popularized by Swami Satyananda Saraswati and later adapted therapeutically by researchers and clinicians including Richard Miller (Pandi-Perumal et al., 2022).

The practice is generally performed in a supine posture and includes sequential stages involving intention setting (sankalpa), body scanning, breath awareness, emotional observation, visualization, and reintegration into wakeful awareness. Electroencephalographic studies indicate that Yoga Nidra may induce alpha and theta dominance with transitions toward delta-wave activity while awareness is retained (Parker et al., 2013).

Unlike conventional meditation techniques requiring sustained attentional effort, Yoga Nidra employs guided awareness that progressively reduces sensory engagement and cognitive activity. This process resembles pratyahara, or sensory withdrawal, described in classical yoga philosophy.

Several neurophysiological mechanisms may explain the effects of Yoga Nidra:

1. Reduction of sympathetic nervous system activity.
2. Increased parasympathetic tone and vagal activation.
3. Modulation of the HPA axis and cortisol secretion.
4. Improved emotional processing and limbic regulation.
5. Enhancement of interoceptive awareness and mindfulness.
6. Reduction of hypervigilance and cognitive rumination.

Heart rate variability studies suggest that Yoga Nidra increases vagal tone, indicating improved autonomic flexibility (Markil et al., 2012). Simultaneously, reductions in salivary cortisol have been observed in insomnia patients practicing Yoga Nidra regularly (Datta et al., 2021).

Complementarity Between Sleep and Yoga Nidra

Sleep and Yoga Nidra are not identical phenomena; however, they appear to share overlapping restorative mechanisms. Physiological sleep provides biological recovery through hormonal regulation, memory consolidation, immune restoration, and metabolic repair. Yoga Nidra, by contrast, facilitates conscious relaxation and psychophysiological regulation that may optimize sleep-related restorative functions.

The complementarity between the two may be conceptualized in several ways.

Reduction of Hyperarousal

Chronic insomnia is increasingly understood as a disorder of hyperarousal involving excessive cortical activation and sympathetic dominance (Riemann et al., 2017). Yoga Nidra directly addresses hyperarousal through guided relaxation and breath awareness. By reducing physiological vigilance, Yoga Nidra may facilitate transition into restorative sleep states.

Enhancement of Slow-Wave Sleep

Clinical investigations suggest that Yoga Nidra may improve sleep architecture, particularly slow-wave sleep. Datta et al. (2021) demonstrated improvements in total sleep time, sleep efficiency, and slow-wave sleep in chronic insomnia patients practicing Yoga Nidra. Enhancement of deep sleep may contribute to improved tissue repair, emotional regulation, and immune functioning.

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Regulation of Stress Hormones

Excessive activation of the HPA axis contributes to insomnia, hypertension, depression, and metabolic dysfunction. Yoga Nidra appears capable of reducing cortisol levels and sympathetic activation, thereby complementing the endocrine restorative functions of sleep (Moszeik et al., 2020).

Emotional Integration and Mental Recovery

Sleep plays a critical role in emotional processing and memory consolidation. Yoga Nidra similarly facilitates emotional observation without reactive engagement. This process may improve resilience and reduce emotional overload commonly observed in chronic diseases.

Neuroplastic Restoration

Both sleep and meditative states influence neuroplasticity. Emerging evidence suggests that Yoga Nidra may positively influence neural connectivity and attentional networks (Fialoke et al., 2024). The combination of restorative sleep and Yoga Nidra may therefore support cognitive recovery in chronic stress-related disorders.

Yoga Nidra in Chronic Insomnia

Among chronic ailments, insomnia represents one of the most extensively studied conditions in relation to Yoga Nidra. Chronic insomnia is associated with impaired quality of life, cardiovascular risk, depression, impaired cognition, and occupational dysfunction.

Datta et al. (2021) conducted a randomized controlled trial comparing Yoga Nidra with cognitive behavioral therapy for insomnia (CBT-I). Both interventions improved subjective and objective sleep parameters; however, Yoga Nidra demonstrated marked improvements in sleep onset latency, sleep efficiency, and slow-wave sleep.

Patients practicing Yoga Nidra also showed reductions in salivary cortisol levels, suggesting physiological stress reduction. These findings support the hypothesis that Yoga Nidra may function as an effective adjunctive intervention for chronic insomnia.

Importantly, Yoga Nidra offers advantages in resource-limited settings because guided sessions can be practiced independently after training. This may prove valuable in rural or underserved populations where access to sleep specialists remains limited.

Cardiovascular Disorders and Hypertension

Sleep disturbances are strongly associated with cardiovascular morbidity. Short sleep duration and poor sleep quality contribute to hypertension, endothelial dysfunction, inflammation, and increased cardiovascular mortality.

Yoga Nidra may improve cardiovascular health through autonomic regulation. Studies have reported reductions in blood pressure, improved heart rate variability, and decreased sympathetic activity following Yoga Nidra interventions (Ahuja et al., 2025). Enhanced parasympathetic dominance may reduce vascular resistance and improve cardiovascular adaptability.

Additionally, chronic stress is a recognized contributor to hypertension. Since Yoga Nidra reduces psychological stress and promotes relaxation, it may indirectly contribute to improved blood pressure control. Integration of Yoga Nidra into cardiac rehabilitation and lifestyle medicine programs therefore warrants further exploration.

Diabetes Mellitus and Metabolic Disorders

Sleep deprivation contributes significantly to insulin resistance and metabolic dysregulation. Poor sleep quality

alters glucose metabolism, appetite-regulating hormones, and inflammatory pathways.

Yoga Nidra may complement metabolic management through several mechanisms:

- Reduction of stress-induced hyperglycemia.
- Improvement of autonomic balance.
- Enhancement of sleep quality.
- Reduction of cortisol-mediated insulin resistance.
- Promotion of behavioral self-regulation.

Mind–body interventions including Yoga Nidra may improve adherence to lifestyle modification by reducing emotional distress and enhancing self-awareness. Although larger controlled trials are required, preliminary findings indicate potential benefits for glycemic control and metabolic stability.

Chronic Pain and Fibromyalgia

Sleep disturbance is both a consequence and amplifier of chronic pain. Individuals with fibromyalgia, arthritis, neuropathic pain, and musculoskeletal disorders frequently experience fragmented sleep and heightened pain sensitivity.

Yoga Nidra may reduce pain perception through modulation of autonomic pathways, relaxation responses, and emotional processing. By decreasing sympathetic activation and improving sleep quality, Yoga Nidra may interrupt the vicious cycle linking pain, anxiety, and insomnia.

Furthermore, meditative relaxation techniques may influence central pain processing networks. Patients often report reduced pain catastrophizing, enhanced coping ability, and improved emotional resilience following regular Yoga Nidra practice.

In fibromyalgia, where central sensitization plays a major role, interventions targeting stress physiology and sleep quality are particularly valuable.

Mental Health Disorders

The relationship between sleep and mental health is bidirectional. Anxiety and depression impair sleep, while chronic sleep disturbances worsen psychiatric symptoms.

Yoga Nidra has demonstrated beneficial effects on stress, anxiety, depression, and emotional well-being (Moszeik et al., 2020). Mechanistically, these effects may arise through:

- Reduced amygdala hyperactivity.
- Improved parasympathetic activation.
- Enhanced mindfulness and emotional awareness.
- Reduced rumination and cognitive reactivity.
- Improved sleep continuity.

In trauma-related disorders, Yoga Nidra has also been investigated as a supportive intervention. Richard Miller’s iRest protocol has been utilized among military veterans experiencing post-traumatic stress disorder (PTSD), with reports of improved emotional regulation and reduced hypervigilance.

Given the substantial overlap between sleep dysregulation and psychiatric pathology, integrating Yoga Nidra into mental healthcare may provide multidimensional therapeutic benefits.

Cancer, Fatigue, and Palliative Care

Cancer-related fatigue remains one of the most distressing symptoms experienced by oncology patients. Sleep disruption, anxiety, pain, and emotional distress frequently coexist.

Yoga Nidra may offer supportive benefits through deep relaxation, emotional comfort, and autonomic stabilization. Patients undergoing chemotherapy or palliative care often experience high psychological burden and reduced sleep quality. Guided relaxation practices may reduce distress and improve subjective well-being.

Although evidence remains preliminary, Yoga Nidra appears particularly suitable for debilitated patients because it requires minimal physical exertion. Unlike physically demanding yoga practices, Yoga Nidra can be practiced even by severely fatigued individuals.

Neurophysiological Basis of Therapeutic Effects

The therapeutic potential of Yoga Nidra may be understood through its influence on several interconnected neurophysiological systems.

Autonomic Nervous System Modulation

Chronic disease states are frequently characterized by sympathetic dominance and reduced vagal tone. Yoga Nidra enhances parasympathetic activity, thereby promoting cardiovascular stability, emotional calmness, and physiological restoration.

HPA Axis Regulation

Persistent stress elevates cortisol and contributes to inflammation, metabolic dysfunction, anxiety, and sleep disturbance. Yoga Nidra appears capable of attenuating HPA axis overactivity and reducing cortisol secretion.

Brainwave Changes

Electroencephalographic investigations suggest transitions toward alpha, theta, and delta activity during Yoga Nidra practice. These patterns resemble restorative sleep states while preserving conscious awareness.

Neuroimmune Effects

Stress reduction and improved sleep quality may positively influence immune function and inflammatory regulation. This is particularly relevant in chronic inflammatory and autoimmune disorders.

Default Mode Network Regulation

Recent neuroimaging studies indicate altered functional connectivity during Yoga Nidra practice, particularly within attention and self-referential processing networks (Fialoke et al., 2024). These changes may contribute to improved emotional regulation and reduced psychological distress.

Biomarker Modulation and Neurophysiological Mechanisms of Yoga Nidra in Chronic Disease Management

Emerging evidence suggests that the therapeutic effects of Yoga Nidra are closely associated with modulation of several physiological and biochemical biomarkers implicated in chronic disease pathogenesis (Figure3). One of the most consistently reported findings is the reduction in cortisol, the principal stress hormone regulated by the hypothalamic–pituitary–adrenal (HPA) axis. Chronic elevation of cortisol has been associated with insomnia, hypertension, insulin resistance, immune dysregulation, anxiety, depression, and systemic

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inflammation (Irwin, 2015; Walker, 2017). Studies evaluating Yoga Nidra interventions have demonstrated reductions in salivary and serum cortisol levels, indicating attenuation of chronic stress responses and improved autonomic regulation (Datta et al., 2021; Moszeik et al., 2020).

In addition to cortisol modulation, Yoga Nidra appears to influence inflammatory pathways by reducing circulating inflammatory biomarkers such as interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF-α), and high-sensitivity C-reactive protein (hs-CRP). Elevated IL-6 and TNF-α levels are strongly associated with chronic inflammatory states, cardiovascular disease, metabolic dysfunction, chronic pain syndromes, and depressive disorders (Irwin, 2015). Similarly, elevated hs-CRP is recognized as an important marker of systemic inflammation and cardiovascular risk. Preliminary studies involving Yoga-based relaxation interventions, including Yoga Nidra, have demonstrated reductions in hs-CRP and inflammatory activity, suggesting potential anti-inflammatory and immunomodulatory effects mediated through stress reduction and autonomic stabilization (Devraj et al., 2021; Yadav et al., 2012).

Improvements in heart rate variability (HRV), a sensitive marker of autonomic nervous system balance and vagal tone, have also been observed following Yoga Nidra practice. Increased HRV reflects enhanced parasympathetic activity and improved cardiovascular adaptability, both of which are associated with reduced morbidity, emotional resilience, and improved stress tolerance (Markil et al., 2012). Enhanced vagal activity may further contribute to reductions in sympathetic overactivity, thereby supporting cardiovascular and metabolic homeostasis. Collectively, these biomarker alterations provide objective physiological support for the role of Yoga Nidra as a complementary intervention capable of enhancing restorative sleep mechanisms, reducing stress-related physiological burden, and improving overall biopsychosocial health in chronic disease populations (Pandi-Perumal et al., 2022).

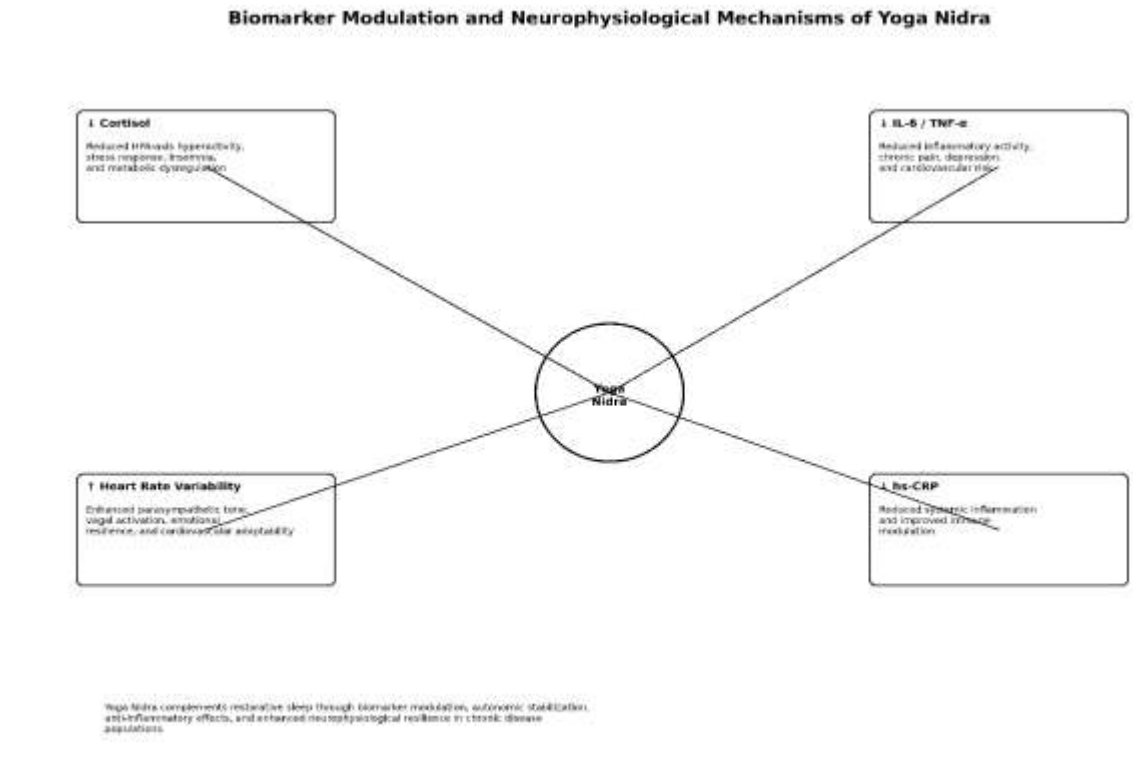

Figure3: Biomarker Modulation and Neurophysiological Effects of Yoga Nidra in Chronic Disease Management: Yoga Nidra modulates cortisol, inflammatory cytokines, hs-CRP, and HRV, promoting autonomic balance, stress reduction, and restorative health benefits.

Limitations of Current Evidence

Despite promising findings, current research on Yoga Nidra remains limited by several methodological challenges.

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1. Small sample sizes.
2. Heterogeneity of Yoga Nidra protocols.
3. Variability in intervention duration.
4. Limited long-term follow-up data.
5. Insufficient blinding and control conditions.
6. Underrepresentation of diverse populations.

Furthermore, many studies combine Yoga Nidra with broader yoga interventions, making it difficult to isolate specific effects. Future research should emphasize standardized protocols, objective sleep measurements, biomarker analysis, and multicenter randomized trials.

Implications for Integrative and Allied Healthcare

The integration of Yoga Nidra into allied healthcare systems may offer several advantages:

- Low cost and minimal infrastructure requirements.
- Non-pharmacological stress management.
- Accessibility across age groups.
- Suitability for chronic illness populations.
- Potential reduction in medication dependence.
- Enhancement of patient-centered care.

Nurses, physiotherapists, psychologists, sleep therapists, rehabilitation specialists, and integrative medicine practitioners may incorporate Yoga Nidra into multidisciplinary treatment frameworks.

Digital health platforms and telemedicine applications may further expand accessibility through guided audio-based interventions. Such approaches may prove especially useful in chronic disease management programs, rural healthcare settings, and preventive medicine.

CONCLUSION

Sleep and Yoga Nidra represent two interconnected yet distinct restorative processes with significant implications for chronic disease management. While physiological sleep remains biologically indispensable, Yoga Nidra appears capable of complementing sleep through autonomic regulation, stress reduction, emotional integration, and enhancement of restorative neurophysiological mechanisms. Current evidence suggests that Yoga Nidra may improve sleep quality, reduce insomnia severity, enhance parasympathetic activity, decrease cortisol levels, and improve psychological well-being in individuals with chronic ailments. Its potential applications extend across cardiovascular disease, diabetes mellitus, chronic pain syndromes, psychiatric disorders, cancer-related fatigue, and psychosomatic conditions.Although further high-quality research is required, Yoga Nidra represents a promising adjunctive intervention within integrative medicine. The complementarity between sleep and Yoga Nidra may ultimately contribute to more holistic, accessible, and patient-centered approaches to chronic disease management.

Disclosures

Contribution of authors: AMS- Concept development and literature review, manuscript Writing,

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