AYUSHDHARA
ISSN: 2393-9583 (P)/ 2393-9591 (O)
An International Journal of Research in AYUSH and Allied Systems

Review Article

CIRCADIAN RHYTHM DISRUPTION AND *DINACHARYA*: A *KRIYA SHARIR* PERSPECTIVE ON SLEEP DISORDERS IN THE DIGITAL ERA

Tamanna Lochab[1]*, Ashutosh Gaur[1], Alok Kumar Asthana[2], Monika Asthana[3]
*[1]PG Scholar, [2]Associate Professor, Department of Kriya Sharir, CBPACS, New Delhi.
[3]Associate Professor & HOD, Department of Panchkarma, SRM Govt. Ayurvedic College, Bareilly, UP, India.

Article info
Article History:
Received: 24-02-2026
Accepted: 19-03-2026
Published: 06-05-2026
KEYWORDS:
Circadian rhythm, *Dinacharya, Kriya Sharir*, Sleep disorders, Blue light, *Anidra.*

ABSTRACT

In today's world, constant exposure to blue light from screens, erratic sleep schedules, and mismatched daily routines have sharply increased circadian rhythm disturbances and sleep disorders such as insomnia. Modern chronobiology points to melatonin suppression through the suprachiasmatic nucleus (SCN) pathway as a central mechanism behind these issues. Ayurveda, through the lens of *Kriya Sharir*, views these biological rhythms as natural cycles governed by the rhythmic predominance of the three *Doshas* - *Vata, Pitta,* and *Kapha* - in alignment with solar and diurnal time. The classical daily regimen known as *Dinacharya* offers practical tools to realign these energies and support *Ratri Swabhavaprabha,* the body's innate tendency toward restorative sleep. This review brings together current evidence from chronobiology with insights from Ayurvedic texts to show how specific *Dinacharya* practices- waking during *Brahma Muhurta*, eating meals at appropriate times, retiring early, and moderating sensory overstimulation- can effectively counteract the disruptive effects of digital-age light exposure. When applied thoughtfully, these routines provide a simple yet holistic strategy for preventing and managing sleep problems in contemporary life. Further well-designed clinical studies are needed to evaluate the impact of integrated Ayurvedic-modern approaches.

INTRODUCTION

In our increasingly screen-dominated world, the way people encounter light throughout the day and night has shifted dramatically. Smartphones, tablets, and laptops, which most of us rely on until late in the evening, pour out bright short-wavelength blue light that reaches its peak intensity near 450nm. This artificial glow clashes with the natural light-dark cycle that human biology has followed for millennia, throwing off our internal circadian rhythms and contributing to a noticeable rise in sleep disturbances and related health challenges across populations. To understand the scale of this problem, researchers have turned to large real-world studies. One particularly robust cross-sectional analysis drew on data from 122,058 adults participating in the American Cancer Society's Cancer Prevention Study-3. It found that individuals who used electronic screens during the hour before bedtime slept about 7.64 minutes less on workdays (95% confidence interval: 6.65–8.63 minutes) compared with those who did not. Their bedtimes were also delayed by roughly 18.82 minutes, and they faced a 33% greater likelihood of reporting poor sleep quality (prevalence ratio 1.33; 95% CI: 1.27–1.39). The effects appeared even stronger among people with evening chronotypes- those who naturally prefer later sleep and wake times- who lost an additional 8.36 minutes of sleep on workdays. These patterns highlight how evening screen habits quietly chip away at rest, especially for those already wired for night-owl tendencies[1].

Access this article online
Quick Response Code
https://doi.org/10.47070/ayushdhara.v13i2.2657

MATERIALS AND METHODS

This is a narrative review article. No primary data collection, experimental procedures, or statistical analyses were performed. Sources: Modern chronobiology literature was retrieved from PubMed, Google Scholar, and journal databases using keywords:

"blue light sleep", "circadian disruption screen use", "melatonin suppression evening light", "chronobiology digital era".

Ayurvedic sources included classical texts (*Charaka Samhita, Ashtanga Hridaya, Ashtanga Sangraha*) and recent peer-reviewed publications on *Kriya Sharir, Dinacharya*, and circadian correlations.

Further insight comes from network analyses that map out the complex web of connections between digital habits and sleep difficulties. In a study involving 9,443 Chinese adults, blue light exposure stood out as the factor with the strongest direct relationship to sleep problems (partial correlation r=0.31, p<0.001). This link operated partly through disruptions in circadian rhythms, with blue light showing a moderate association with circadian disturbance (r=0.18) and circadian issues in turn connecting to sleep complaints (r=0.26). What makes this finding particularly striking is that blue light emerged as a central hub in the overall network, suggesting it plays a pivotal bridging role rather than acting as just one minor influence among many[2].

Taken together, these findings point to broader consequences that reach far beyond simply feeling tired the next day. Disrupted sleep architecture, longer times to fall asleep, daytime fatigue, foggy thinking, emotional ups and downs, and elevated risks for metabolic issues, heart health problems, and immune system imbalances have all been linked to this pattern of evening light exposure[3]. Young people and adolescents, who tend to spend the most time with digital devices, often show especially clear signs of melatonin suppression and a shift toward delayed sleep phases, making the issue particularly pressing for younger generations Consequences extend to fragmented sleep architecture, prolonged latency, daytime fatigue, cognitive deficits, mood instability, metabolic syndrome, cardiovascular risks, and immune dysregulation. Adolescents and young adults, heavy digital users, exhibit pronounced melatonin suppression and delayed sleep phase. Systematic reviews confirm blue light's disruptive effects on sleep, performance, and wellbeing in young adults[4].

Core Mechanisms: How Evening Blue Light Disrupts the Body's Internal Clock

At the centre of our daily biological rhythms sits a small but powerful region in the brain called the suprachiasmatic nucleus, or SCN, located in the hypothalamus. This tiny cluster of neurons functions as the master pacemaker for the entire circadian system, coordinating everything from sleep-wake cycles to hormone release across the body. The process begins in the eyes. A special group of retinal cells known as intrinsically photosensitive retinal ganglion cells (ipRGCs) contain the photopigment melanopsin, which is particularly sensitive to short-wavelength light in the blue part of the spectrum. When these cells detect bright blue-enriched light in the evening- the kind commonly emitted by LED screens- they send strong signals directly to the SCN. In response, the SCN suppresses the pineal gland's production of melatonin, the hormone that signals darkness and prepares the body for rest[5].

Evidence from controlled studies shows just how potent this effect can be. For instance, even a two-hour exposure to monochromatic blue light at around 460 nm in the evening can significantly reduce circulating melatonin levels. Interestingly, the strongest suppression often occurs with slightly shorter wavelengths closer to violet (around 424nm). Yet the good news is that this inhibition tends to be short-lived: once the blue light is switched off, melatonin concentrations typically begin to recover within about 15 minutes. This rapid rebound suggests the effect is largely acute and direct rather than causing long-lasting changes to the system[6].

Beyond melatonin, evening light exposure influences several other interconnected pathways that keep the circadian system running smoothly. Cortisol rhythms, which normally peak in the early morning to promote alertness, can become flattened or shifted. At the molecular level, the expression of key clock genes-such as PER, CRY, and CLOCK gets disrupted, throwing off the internal timing machinery in cells throughout the body. These changes ripple outward, affecting glucose regulation, the functioning of the gastrointestinal tract, and even inflammatory responses. Over time, the repeated mismatch creates a cascade of problems: the natural evening phase delay becomes harder to correct, sleep becomes more fragmented and less efficient, and periods of unwanted wakefulness stretch longer into the night. What once might have been a minor inconvenience has grown into a recognised public health concern, especially in societies where digital devices keep us bathed in artificial light well after sunset[7].

Ayurvedic *Kriya Sharir*: A Holistic Framework for Understanding the Body's Natural Timing

Ayurveda offers a rich physiological lens through *Kriya Sharir*, the branch that explores how the body functions in dynamic ways. Central to this view is the concept of the three *Tridosha- Vata* (governing movement and nervous system regulation), *Pitta* (driving transformation, metabolism, and digestion), and *Kapha* (providing structure, stability, and cohesion). These fundamental energies do not remain static; they rise and fall throughout the day and night in harmony with the sun's natural cycle[8]. In practical

terms, each dosha tends to predominate during specific four-hour windows, creating a gentle rhythm that influences energy levels, bodily processes, and optimal times for activity or rest. *Kapha* energy, with its qualities of heaviness and stability, is strongest from 6 to 10 in both morning and evening - making these periods ideal for grounding activities like sleep onset in the evening or building strength in the morning. *Pitta*, associated with heat and transformative fire, peaks between 10 am and 2 pm (when digestion is at its strongest) and again from 10 pm to 2 am (supporting deep cellular repair during sleep). *Vata*, linked to lightness, movement, and alertness, dominates from 2 to 6 am and pm - times when mental clarity or creative flow may come more easily[9].

Classical Ayurvedic texts, such as the *Charaka Samhita* and *Ashtanga Hridaya*, have long connected these *Doshic* shifts to broader environmental factors called *Kala* (time), along with sensory experiences and daily behaviours. When routines fall out of sync- whether through irregular sleep schedules, excessive screen time and overstimulation, or exposure to artificial light late at night (what Ayurveda might describe as improper or excessive use of the senses, or *Atiyoga*)- it can aggravate *Vata* and *Pitta* energies. This imbalance tends to override *Kapha's* naturally restorative role, often resulting in difficulty falling or staying asleep, known classically as *Anidra* (insomnia). Modern observations echo this idea: the sharp rise in morning cortisol aligns with the transition from late-night *Kapha* into morning activity, while the gradual increase in melatonin at night supports the calm, cohesive qualities of evening *Kapha*[10].

Dinacharya: Time-Tested Daily Practices for Restoring Balance

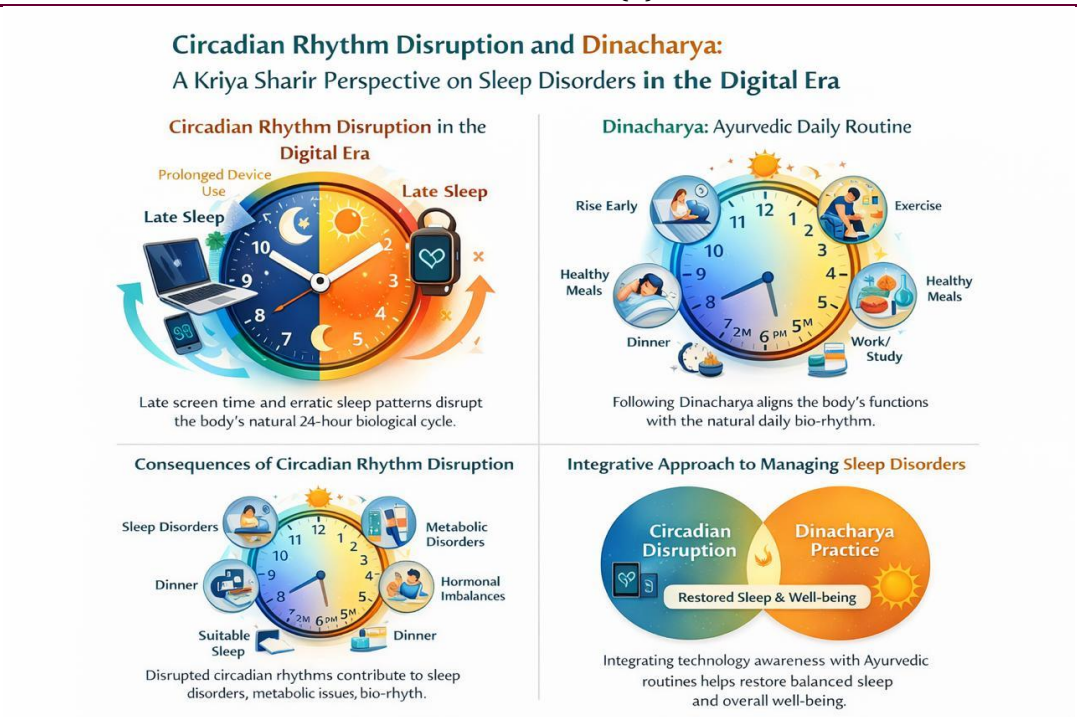
Ayurveda does not stop at observation- it provides a practical daily regimen called *Dinacharya* that gently reinforces alignment with these natural rhythms. These routines serve as a form of chronotherapy, helping the body stay tuned to environmental cues rather than fighting against them. Key elements include waking during Brahma Muhurta, roughly 96 minutes before sunrise, a window associated with *Vata's* light and clear qualities that supports mental sharpness and a calm start to the day[11]. Morning practices often feature *Abhyanga* (a gentle self-massage with warm oil) to promote circulation and calm the nervous system, followed by *Vyayama* (moderate exercise) during the early *Kapha* phase, when the body can build strength without excessive strain. The main meal is traditionally recommended around midday, when *Pitta* energy- and with it, digestive fire or *Agni*- reaches its peak, allowing for better nutrient absorption and metabolic efficiency. In the evening, the emphasis shifts toward winding down with a lighter dinner and aiming for bedtime before 10 pm. This supports the natural rise of melatonin and allows *Kapha's* stabilizing influence to promote deep, restorative sleep[12].

Clear parallels emerge when viewed alongside today's science. Rising early during *Brahma Muhurta* coincides with the natural cortisol awakening response that prepares us for the day. Eating the largest meal at midday takes advantage of peak digestive enzyme activity and helps regulate insulin sensitivity. Moderating evening stimulation and screen exposure protects the evening melatonin surge. Emerging research in chrononutrition and sleep hygiene increasingly supports how such timed routines can improve sleep quality, metabolic balance, and resilience against the disruptions caused by constant digital light exposure.

Rationale for Bringing Modern Chronobiology and Ayurveda Together

The master clock in the brain- the suprachiasmatic nucleus (SCN) and its regulation of melatonin- shows striking conceptual overlap with Ayurveda's *Tridosha* and *Kala* framework[13]. Ancient scholars appear to have intuited many of the same timing principles that modern research is now confirming at the molecular level. In a world where artificial light has become a near-constant environmental stressor, *Dinacharya* stands out as a simple, preventive, and holistic approach that can help counter insomnia and its ripple effects on mood, metabolism, and overall wellbeing[14].

While individual studies continue to build the case - from large epidemiological findings on screen use to mechanistic reviews of light's impact on circadian rhythms- truly integrated syntheses that respect both scientific rigor and Ayurvedic depth are still relatively uncommon. This review therefore brings together recent data from fields like chronobiology with classical insights from *Kriya Sharir*[15]. By drawing on sources such as JAMA Network Open, CNS Neuroscience & Therapeutics, Chronobiology International, and Ayurvedic literature, it aims to offer clinicians and researchers a solid foundation for developing practical, culturally resonant strategies to support healthier sleep in our digital era[16].



Time Period	Predominant *Dosha*	Key Qualities & Physiological Influence	Recommended *Dinacharya* Practices	Modern View
2–6 AM / 2–6 PM	*Vata*	Lightness, movement, alertness, mental clarity	Wake during *Brahma Muhurta* (pre-sunrise); creative or light mental work in afternoon	Cortisol awakening response; increased alertness
6–10 AM / 6–10 PM	*Kapha*	Stability, heaviness, cohesion, rest/sleep onset	Morning exercise (*Vyayama*), *Abhyanga* (oil massage); evening wind-down and sleep preparation.	Morning metabolism boost; evening melatonin rise
10 AM–2 PM/ 10 PM–2 AM	*Pitta*	Transformation, heat, metabolism, repair	Main meal at midday (peak *Agni*/digestion); deep repair during night sleep.	Peak digestive enzyme activity; cellular repair during sleep.

DISCUSSION

The integration of modern chronobiology with Ayurvedic *Kriya Sharir* reveals striking mechanistic parallels that validate *Dinacharya* as a scientifically grounded chronotherapeutic strategy for mitigating digital-era circadian disruption and associated sleep disorders. Blue light from electronic screens (peak wavelength ~450nm) potently suppresses melatonin via melanopsin-containing ipRGCs projecting to the suprachiasmatic nucleus (SCN), resulting in phase delays, reduced sleep duration (approximately 7–8 minutes less on workdays), later bedtimes, and a 33% higher prevalence of poor sleep quality. These findings are amplified in evening chronotypes and align precisely with Ayurvedic descriptions of *Vata-Pitta prakopa* overriding *Kapha*-dominant restorative phases, culminating in *Anidra* (insomnia) and systemic debility. A core strength of this integrative perspective lies in the temporal alignment of *Tridosha* cycles with SCN-regulated neuroendocrine rhythms. *Kapha* predominance (6–10 PM) mirrors melatonin-facilitated sleep onset and deep NREM restoration, while Pitta (10 PM–2 AM) corresponds to nocturnal tissue repair and metabolic recalibration; *Vata* (2–6 AM) parallels pre-dawn alertness and REM consolidation. Practices embedded in *Dinacharya-Brahma Muhurta* awakening, *Abhyanga*, timed midday meals during peak *Agni*, and early bedtime- reinforce these natural zeitgebers, optimizing cortisol awakening response, insulin sensitivity, and melatonin

rise in a manner corroborated by chrononutrition and sleep hygiene research.

Recent Ayurvedic physiological reviews explicitly correlate *Dinacharya* with circadian principles, demonstrating that adherence enhances metabolic homeostasis, immunity, and mental clarity while counteracting artificial light-induced *Doshic* imbalance. This preventive framework offers distinct advantages over isolated pharmacological or technological interventions (e.g., blue-light filters alone), as it addresses root causes through holistic lifestyle synchronization rather than symptom palliation. Nevertheless, several limitations temper current conclusions. Most evidence derives from observational cohorts, cross-sectional surveys, and conceptual correlations; few randomized controlled trials have directly tested *Dinacharya* protocols in screen-exposed populations using objective measures such as polysomnography, actigraphy, or serial melatonin assays. Individual variability in *Prakriti* (constitution), seasonal *Ritu* influences, and cultural adaptation in digital-heavy urban settings remain underexplored. Additionally, while blue-light blocking strategies show promise, long-term efficacy of app-based filters remains inconsistent, underscoring the need for combined interventions.

From a public health standpoint, *Dinacharya* represents a low-cost, culturally resonant, scalable strategy to combat the global epidemic of circadian misalignment. Implementation at societal levels- through workplace policies encouraging early wind-down routines, educational campaigns on *Brahma Muhurta*, and integration into digital wellness apps- could significantly reduce insomnia prevalence, metabolic comorbidities, and healthcare burden in technologically advanced societies. Clinicians trained in integrative medicine may personalize regimens using *Prakriti* assessment alongside wearable chronotype monitoring, creating hybrid protocols superior to either system alone.

Future research directions should prioritize high-quality, multicentre trials evaluating Dinacharya-enhanced interventions (e.g., screen curfews plus *Ratricharya* and herbal support such as *Ashwagandha* for *Vata* calming) in diverse digital cohorts. Longitudinal studies incorporating *Dosha* profiling, clock-gene expression analysis, and inflammatory biomarkers would further elucidate mechanistic synergies. Comparative effectiveness research against standard chronotherapy (melatonin supplementation or light boxes) and cost-benefit analyses in low-resource settings are also warranted. Such evidence would strengthen the case for incorporating Ayurvedic chronobiology into mainstream sleep medicine guidelines.

CONCLUSION

Circadian rhythm disruption induced by pervasive blue-light exposure in the digital era constitutes a major public health challenge, manifesting as delayed sleep phase, insomnia (*Anidra*), and multisystem comorbidities through SCN-mediated melatonin suppression. The Ayurvedic framework of *Kriya Sharir* elegantly conceptualizes this pathology as *Tridosha* imbalance, while *Dinacharya*- with its precisely timed practices- provides a time-tested, physiologically aligned intervention that restores *Ratri Swabhavaprabha* (natural circadian sleep) and prevents disease at its root.

This review demonstrates compelling conceptual and empirical convergence between modern chronobiology and classical Ayurvedic principles, positioning *Dinacharya* as an accessible, preventive, and holistic chronotherapeutic tool superior in sustainability to fragmented modern approaches. By realigning human activities with natural solar-lunar cycles, *Dinacharya* not only counters artificial zeitgeber disruption but also promotes enduring physical, mental, and metabolic resilience. Widespread adoption of these integrative strategies, supported by rigorous future clinical research, holds transformative potential for mitigating sleep disorders and fostering population-level well-being in the digital age. Ultimately, the fusion of ancient wisdom and contemporary science offers a beacon for sustainable health in an increasingly technology-driven world.

REFERENCES

1. Zhong C, Masters M, Donzella SM, Diver WR, Patel AV. Electronic screen use and sleep duration and timing in adults. JAMA Netw Open. 2025; 8(3): e252493.
2. Gan H, Xu L, Tong C. Digital sleep disruption: unraveling the network structure of technology use and sleep problems through network analysis. CNS Neurosci Ther. 2026; 32(2): e70778.
3. Zisapel N. Sleep and sleep disturbances: Biological basis and clinical implications. Cellular and Molecular Life Sciences, 2007.
4. Silvani MI, et al. The influence of blue light on sleep. PMC. 2022; PMC9424753.
5. Wright KP Jr, McHill AW, Birks BR, et al. Entrainment of the human circadian clock to the natural light-dark cycle. Current Biology, 2013.
6. Tähkämö L, Partonen T, Pesonen AK. Systematic review of light exposure impact on human circadian rhythm. Chronobiol Int. 2019;3 6(2): 151-170.

7. Zisapel N. Sleep and sleep disturbances: Biological basis and clinical implications. Cellular and Molecular Life Sciences, 2007.
8. Acharya JT, editor. Charaka Samhita of Agnivesha, Sutra Sthana. Varanasi: Chaukhambha Sanskrit Sansthan; 2015.
9. Pardeshi SG. Chronobiology and Ayurvedic dinacharya: a physiological perspective. World J Pharm Res. 2025; 14(2): 381-384.
10. Vagbhata. Ashtanga Hrdayam. Vol. 1. Sutrasthana 2 (Dinacharya Adhyaya). Translated by Srikantha Murthy KR. Varanasi: Chaukhambha Krishnadas Academy; 2012. p. 44-54.
11. Tiwari PV. Ayurvediya Dinacharya. Varanasi: Chaukhambha Orientalia, 2006.
12. Sharma RK, Dash B. Charaka Samhita. Varanasi: Chaukhambha Sanskrit Series Office, 2001.
13. Tiwari PV. Ayurvediya Dinacharya. Varanasi: Chaukhambha Orientalia, 2006.
14. Lad V. Textbook of Ayurveda, Fundamental Principles of Ayurveda. Albuquerque: The Ayurvedic Press, 2002.
15. Czeisler CA, Buxton OM. The human circadian timing system and sleep-wake regulation. In: Kryger MH, Roth T, Dement WC. Principles and Practice of Sleep Medicine. Elsevier, 2011.
16. Lockley SW, Arendt J, Skene DJ. Visual impairment and circadian rhythm disorders. Dialogues in Clinical Neuroscience, 2007.

Cite this article as:
Tamanna Lochab, Ashutosh Gaur, Alok Kumar Asthana, Monika Asthana. Circadian Rhythm Disruption and Dinacharya: A Kriya Sharir Perspective on Sleep Disorders in the Digital Era. AYUSHDHARA, 2026;13(2):455-460.
https://doi.org/10.47070/ayushdhara.v13i2.2657
Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Tamanna Lochab
PG Scholar,
Department of Kriya Sharir,
CBPACS, New Delhi.
Email: lochabtamanna48@gmail.com