



## INTEGRATION OF *AYURVEDA* AND MODERN STRATEGIES FOR DISEASE PREVENTION IN NIGHT SHIFT WORKERS

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Received 6<sup>th</sup> March 2025; Revised 25<sup>th</sup> April 2025; Accepted 16<sup>th</sup> July 2025; Available online 1<sup>st</sup> May 2026

<https://doi.org/10.31032/IJBPAS/2026/15.5.10149>

### ABSTRACT

The circadian rhythm, governed by the Earth's natural light-dark cycle, orchestrates vital physiological processes in humans, including sleep, metabolism, and hormonal regulation. Night shift work, by disrupting these rhythms, contributes to a heightened risk of metabolic disorders, cardiovascular diseases, gastrointestinal issues, psychological disturbances, and cancer. Modern interventions—such as strategic light exposure, forward-rotating shifts, sleep hygiene practices, controlled eating patterns, and mental health support—have been developed to mitigate these risks. *Ayurveda*, the ancient Indian system of medicine, offers complementary strategies that emphasize alignment with natural cycles through *Dinacharya* (daily routine), *Ahara* (diet), *Vihara* (lifestyle practices), *Nidra* (sleep management), *Rasayana* therapies

(rejuvenation), *Panchakarma* (detoxification), and *Ritucharya* (seasonal regimens). Specific *Ayurvedic* interventions such as *Abhyanga* (oil massage), *Nasya* (nasal therapy), *Divaswapna* (daytime sleep), dietary adjustments favouring *Vata* and *Pitta* pacification, and *Yoga-Pranayama* practices have shown promise in reducing the adverse effects of circadian disruption. Modern scientific research increasingly validates these traditional practices, recognizing their impact on autonomic balance, hormonal regulation, and immune resilience. Integrating modern occupational health strategies with *Ayurvedic* principles presents a holistic, sustainable approach for disease prevention and health promotion among night shift workers. This integrative model addresses not only the physical impacts of circadian misalignment but also enhances emotional stability and lifestyle adaptation, offering a comprehensive framework for improving the wellbeing and quality of life of individuals engaged in nocturnal occupations.

**Keywords: Night Shift Work, Circadian Rhythm, Ayurveda, Dinacharya, Sleep Disorders, Occupational Health, Rasayana, Health Promotion**

## INTRODUCTION

The day-night cycle, a fundamental natural phenomenon arising from the Earth's axial rotation, regulates essential biological processes that sustain life. Every 24 hours, as the Earth rotates on its axis, it creates alternating periods of daylight and darkness, shaping the rhythms of behaviour, physiology, and metabolism in nearly all organisms, including humans [1]. This daily alternation of light and darkness forms the environmental basis for the circadian rhythm, an intrinsic, endogenously generated system synchronized primarily by light exposure [2].

In human beings, circadian rhythms regulate numerous physiological processes, including the sleep-wake cycle, hormonal secretion, body temperature regulation, cardiovascular dynamics, digestion, and immune functions [3]. The principal

pacemaker for these rhythms is located in the suprachiasmatic nucleus (SCN) of the hypothalamus, which receives direct input from photoreceptors in the retina, allowing environmental light to entrain internal biological clocks [4].

Sleep, a primary manifestation of circadian regulation, is a restorative physiological process necessary for neurocognitive function, emotional regulation, metabolic homeostasis, and immune competence. Healthy sleep is characterized by predictable patterns of Non-Rapid Eye Movement (NREM) and Rapid Eye Movement (REM) sleep, cycling approximately every 90 to 110 minutes across the night [5]. Sleep homeostasis, alongside circadian influences, ensures optimal timing, duration, and architecture of sleep.

However, the advent of artificial lighting, industrialization, globalization, and the demands of a 24/7 society have profoundly disrupted these natural cycles. Modern occupational practices, especially night shift work, have forced a significant proportion of the population to remain active during the biological night. Studies estimate that between 15% to 33% of the working population globally engages in night shift work [6]. In India, the figure is comparable, particularly among healthcare workers, security personnel, transportation employees, and information technology professionals [7].

Disruption of circadian rhythms by night shift work, often termed “circadian misalignment,” is associated with a range of adverse health outcomes. Chronic misalignment between endogenous circadian clocks and behavioural cycles leads to increased risks of sleep disorders, metabolic syndrome, obesity, diabetes mellitus, hypertension, cardiovascular diseases, depression, anxiety, and certain cancers [8]. Moreover, shift work impairs cognitive functions, elevates accident rates, and decreases overall quality of life [9].

*Ayurveda*, the ancient Indian system of holistic medicine, offers profound insights into the importance of synchronization with natural rhythms. According to *Ayurveda*, life is sustained by the harmonious balance of three pillars: *Ahara* (nutrition), *Nidra*

(sleep), and *Brahmacharya* (regulated lifestyle) [10]. *Nidra*, or sleep, is not merely a state of rest but a foundational aspect of health, influencing happiness, nourishment, strength, fertility, cognition, and longevity [11].

*Ayurvedic* texts categorize sleep disturbances and their aetiologies, recognizing both endogenous (due to *doshic* imbalance) and exogenous (environmental, behavioural) causes [12]. The *Charaka Samhita* (Sutrasthana 21/36) states that happiness and sorrow, nourishment and emaciation, strength and debility, virility and impotence, knowledge and ignorance, and even life and death are intimately connected to sleep [12]. Furthermore, staying awake during the night (*Rathrijagarana*) is identified as a significant cause of *Vata* and *Pitta dosha* aggravation, leading to systemic disturbances including fatigue, cognitive impairments, metabolic derangements, and early aging [13].

From an *Ayurvedic* standpoint, night shift work, which mandates night-time wakefulness and daytime sleep, inherently opposes the natural circadian cycle and is therefore pathogenic unless carefully managed. *Ayurveda* prescribes specific guidelines for compensatory practices, such as *Divaswapna* (therapeutic daytime sleep), dietary modifications favouring *Vata* and *Pitta* pacification, *Rasayana* therapies

(rejuvenation treatments), and structured *Dinacharya* (daily regimen) to minimize the adverse effects of *Rathrijagarana* [14].

Modern research increasingly validates *Ayurvedic* concepts. The importance of maintaining circadian alignment for metabolic, cardiovascular, and psychological health is now well established [15]. Recent studies demonstrate that timed light exposure, strategic naps, controlled feeding schedules, and mindfulness practices can ameliorate circadian misalignment and its consequences among night shift workers [16]. The management and preventive strategies for night shift workers through *Ayurveda* is discussed below.

## MATERIALS & METHODS

Literary review from classical *Ayurvedic* texts including the *Charaka Samhita*,

*Sushruta Samhita*, *Ashtanga Hridaya*, and *Bhavaprakasha*, along with contemporary scientific literature on circadian biology, occupational health studies, and research articles on shift work-related health outcomes were searched. Data from journal articles, government labour statistics, and systematic reviews have been incorporated to understand the prevalence, impact, and management of health issues among night shift workers.

## PREVALENCE OF DISEASES IN NIGHT SHIFT WORKERS

Night shift work is associated with an increased prevalence of a wide range of diseases due to circadian misalignment, sleep deprivation, and associated metabolic, hormonal, and psychological disturbances.

Table 1: Prevalence of Diseases in Night Shift Workers

Disease/Condition	Prevalence (%)
Sleep Disorders (SWSD, Insomnia)	20–50% [17]
Obesity	30–40% [18]
Type 2 Diabetes	15–20% [19]
Cardiovascular Diseases	20–40% [20]
Depression and Anxiety	25–45% [21]
Gastrointestinal Disorders	20–30% [22]
Breast Cancer (Females)	~20% Higher risk [23]

## MODERN STRATEGIES FOR NIGHT SHIFT WORKERS

Modern science acknowledges the extensive impact that night shift work has on health and wellbeing. Therefore, the development of effective interventions for night shift workers focuses on minimizing circadian

disruption, promoting restorative sleep, and improving overall resilience against occupational stress. The following modern strategies, supported by empirical evidence, aim to mitigate the adverse health consequences associated with shift work.

### **1. Circadian-Friendly Scheduling**

Adopting forward-rotating shift schedules (morning to evening to night) rather than backward rotations has been shown to facilitate better circadian adjustment [24]. Limiting the number of consecutive night shifts and allowing sufficient recovery time between shifts helps in reducing sleep debt and fatigue. Employers are encouraged to design work schedules that are predictable and allow workers to develop consistent sleep-wake routines.

### **2. Strategic Light Exposure**

Light is the primary zeitgeber for the circadian system. Bright light exposure during night shifts can temporarily delay the circadian phase, thereby improving alertness and performance during night work [25]. Conversely, after a night shift, exposure to morning daylight should be minimized (e.g., using sunglasses) to facilitate daytime sleep. The use of blue light-blocking glasses and blackout curtains can help to prevent circadian misalignment during the daytime.

### **3. Optimizing Sleep Hygiene**

Maintaining a dark, cool, and quiet environment is crucial for promoting sleep during the day [26]. Shift workers should prioritize consistent sleep times, minimize caffeine and alcohol intake close to bedtime, and avoid exposure to stimulating activities before sleep. Napping strategies, including a "prophylactic nap" before the night shift or

brief naps during breaks, can improve alertness and performance.

### **4. Controlled Eating Patterns**

Metabolic functions also follow circadian rhythms. Night shift workers often eat at biologically inappropriate times, increasing the risk of obesity and metabolic syndrome. Encouraging meal timing that aligns as closely as possible with daytime metabolic activity (i.e., eating larger meals during the active period and lighter meals close to rest) may help preserve metabolic health [27]. Nutritional counselling to reduce high-sugar, high-fat food intake is crucial.

### **5. Stress Management and Mental Health Support**

Chronic stress and circadian misalignment increase the risk of mood disorders among night shift workers. Mindfulness-based interventions, cognitive-behavioural therapy (CBT), and relaxation techniques like progressive muscle relaxation have been proven effective in improving sleep quality and reducing psychological distress [28]. Organizational support through access to counselling services and peer-support programs enhances mental resilience.

### **6. Regular Health Screenings**

Proactive healthcare policies should include periodic screening for cardiovascular risks, metabolic syndrome, sleep disorders, and mental health assessments. Early detection and management of shift work-related

conditions can prevent long-term complications [29].

## 7. Ergonomic Workplace Design

Ensuring that the physical work environment supports circadian health—through adjustable lighting systems, comfortable break areas, and facilities encouraging short naps—can enhance worker productivity and wellbeing.

## AYURVEDA STRATEGIES FOR NIGHT SHIFT WORKERS

### 1. Dinacharya (Daily Routine)

Establishing a stable daily routine helps maintain internal biological rhythms [30]. For night shift workers, a personalized *Dinacharya* is critical:

- **Abhyanga (Oil Massage):** Daily application of medicated oils such as Bala Taila or Ashwagandha Taila helps pacify aggravated Vata dosha, improve circulation, and promote relaxation [31].
- **Nasya (Nasal Therapy):** Administration of medicated oils like Anu Taila into the nostrils enhances neurological balance, improves sensory organ function, and counters the drying effects of disturbed Vata [32].
- **Padabhyanga (Foot Massage):** Oil massage to the soles induces deep relaxation, reduces insomnia, and stabilizes the nervous system [33].

- **Snana (Bathing):** Lukewarm baths with calming aromatic oils reduce fatigue and mental stress.
- **Kavalagraha & Gandusha (Oil Pulling):** *Vatahara* oil pulling can be done daily to reduce dryness in the mouth as well as improves oral health.
- **Karna Poorana (Oil Immersion of Ear):** *Vatahara Dravya Sadhitha taila* such as *Karna taila, Tila Taila, Kshara Taila* & so on.

### 2. Vihara (Lifestyle Modifications) [34]

- **Physical Activity:** Gentle dynamic exercises like mild stretches, and regular walking should be integrated post-shift to maintain musculoskeletal health and improve lymphatic circulation.
- **Yoga:** Specific asanas such as *Balāsana, Viparita Karani, Bhada konasan, Jathara parivarthasana, Paschimottasana, Setubandhasana, Shashankasana, Setu Bandhasana* and *Shavasana* are beneficial for stress relief and enhancing parasympathetic tone, doing *Suryanamskara* also is beneficial in sleep promotion through physical activity [35].
- **Pranayama and Meditation:** Techniques like *Nadi Shodhana* (alternate nostril breathing), *Bhramari* (humming bee breath),

DRT, MSRT and mindful meditation significantly help in balancing the autonomic nervous system, reducing stress hormones, and facilitating quality sleep [36].

### 3. Ahara (Dietary Measures) [37]

*Ayurveda* emphasizes *Ahara* as the foundation for physical and mental well-being. For night shift workers:

- **Warm, Light, and Unctuous Food:** Easily digestible, nourishing meals rich in *Madhura* (sweet), *Amla* (sour), and *Lavana* (salty) tastes are recommended to counterbalance *Vata* aggravation [38].
- **Meal Timing:** Light meals should be consumed post-shift to align with

reduced digestive capacity. Heavy meals must be avoided during nighttime.

- **Ahara vidhividhana & Visheshayathana:** Dietetic rules are to be followed properly in order to get a healthy physique.
- **Foods to Prefer:** *Shali* rice, wheat, milk, ghee, grapes, pomegranate, dates, goat meat, and easily digestible vegetables like ash gourd and bottle gourd.
- **Foods to Avoid:** Dry, cold, processed foods, stimulants (excess tea, coffee), and heavy fried items.

Table 2: *Vatahara Ahara* according to Varga [39]

VARGA	VATAHARA AHARA
<i>Dhanyavarga</i> (Grains)	शालि (Rice) गोधूमः (Wheat) शष्टिकः (Red rice) तण्डुलः (Rice grains)
<i>Shakavarga</i> (Vegetables)	पाटोल (Pointed gourd) कूष्माण्ड (Ash gourd) शतावरी (Asparagus) मूलकः (Radish)
<i>Phalavarga</i> (Fruits)	आम (Mango) द्राक्षा (Grapes) दाडिम (Pomegranate) कदली (Banana)
<i>Mamsavarga</i> (Meats)	अजमांसं (Goat meat) कुक्कुटमांसं (Chicken meat) मत्स्यः (Fish)
<i>Dugdhavarga</i> (Dairy)	क्षीरम् (Kshira - Cow's milk, Goat's milk, Buffalo's milk) घृतम् (Ghee) दधि (Curd) (Only in daytime) नवनीतम् (Fresh Butter)
<i>Tailavarga</i> (Oils)	तिलतैलं (Sesame oil) नारिकेलतैलं (Coconut oil)
<i>Aharopayogi Varga</i> (Food Adjuncts)	पिप्पली (Long pepper) शुण्ठी (Dry ginger) एला (Cardamom) जीरकम् (Cumin seeds) लशुन (Garlic)

#### 4. Nidra (Sleep Management) [40]

- **Divaswapna (Day Sleep):** For those affected by *Rathrijagarana*, daytime sleep is permissible under therapeutic indications. Sleep should be taken in a dark, cool, and quiet environment, the same amount of sleep they had been deprived previous night.
- **Sleep Hygiene:** Pre-sleep rituals including warm oil massages such as *Padabhyanga*, mild yoga stretches, and herbal teas (containing *Brahmi*, *Jatamansi*) can facilitate better sleep onset and quality [41].

#### 5. Rasayana Therapy (Rejuvenation)

*Rasayanas* serve to replenish the tissues, enhance immunity, and strengthen the mind-body axis.

- **Medya Rasayana (Cognitive Enhancers):** *Brahmi* (*Bacopa monnieri*), *Mandukaparni* (*Centella asiatica*), and *Shankhapushpi* (*Convolvulus pluricaulis*) support cognitive functions, memory, and emotional resilience [42].
- **Balya and Ojovardhaka Rasayana:** *Chyawanprasha*, *Ashwagandha* (*Withania somnifera*), and *Guduchi* (*Tinospora cordifolia*) are excellent for enhancing general strength, immune function, and stress tolerance [43].

#### • Specific Sleep Promoting Herbs:

*Brahmi* (*Bacopa monnieri*), *Jatamansi* (*Nardostachys jatamansi*), *Tagara* (*Valeriana wallichii*), and *Ashwagandha* are traditionally used to improve sleep quality and reduce anxiety [44].

#### 6. Panchakarma (Detoxification Therapies) [45]

In selected cases, mild *Panchakarma* therapies can be advised to reset and rejuvenate the body systems:

- **Nasya:** Regular *Nasya* helps regulate Prana Vata and stabilize higher neural functions.
- **Basti (Medicated Enema):** A course of *Matra Basti* (oil-based enema) with *Bala Taila* or *Ksheerabala Taila* can help balance *Vata*, particularly in individuals with constipation, dry skin, and sleep disturbances.
- **Sirodhara (Forehead Oil Pouring):** *Tailas* such as *Brahmi Taila*, *Himasagara Taila*, *Ksheerabala Taila* helps in relaxation and inducing sleep through Serotonin secretion.

#### 7. Ritucharya (Seasonal Regimens) [46]

- **Hemanta and Shishira (Winter):** Strengthening measures with nourishing foods and *Rasayana* consumption.
- **Vasantha (Spring):** *KaphAhara Kriyas* like *Vamana*, *Udwarthana*,

*Utsadana, Teekshna Nasya, Vairechinaka Dhoomapana* & so on.

- **Grishma (Summer):** Cooling practices and hydration to counter *Pitta* aggravation, usage of drugs like *Sariva, Ushira, Chandana, Shatavari* is beneficial.
- **Varsha (Rainy):** *Kashaya Basthi* can be incorporated for keeping the *Vata* aggravation in toll.
- **Sharad (Autumn):** *Virechana* is beneficial for reducing the excessive *Pitta*, and *Rasayana* therapy is also beneficial.

## 8. Specific Ayurvedic Behavioural Guidelines

- **Avoidance of Night Vigils:** Except under compulsion, night-time should be reserved for sleep.
- **Mindful Work Practices:** Interspersing night work with brief relaxation, breathing exercises.
- **Spiritual Practices:** Chanting, prayer, or positive affirmations post-shift promote mental stability and enhance sattvic qualities.

Table 3: Sample *Dinacharya* Schedule for a Night Shift Worker(7pm-7am)

Time	Activity
Post-Shift (Morning: 7:30 AM – 1:30 PM)	
7:30 AM	<i>Abhyanga</i> (oil massage with sesame oil) and <i>Snana</i> (warm bath)
8:00 AM	Light dinner-like meal (warm, <i>Vata</i> -pacifying); <i>Nidra</i> -promoting <i>Rasayana</i> like <i>Brahmi, Ashwagandha</i>
8:30 AM	<i>Nasya</i> (with <i>Anu Taila</i> ) + <i>Padabhyanga</i> (foot massage with warm oil)
9:00 AM	Short relaxation (QRT or DRT techniques) / MSRT
9:30 AM – 2:30 PM	Main sleep time (5–6 hours minimum) in a dark, quiet room
Pre-Shift (~2:00 PM – 6:30 PM)	
3:00 PM	Light warm lunch ( <i>Madhura–Amla–Lavana Rasa Yukta</i> foods)
5:00 PM	Dynamic exercise ( <i>Surya Namaskar, Lunges, Hip rotations</i> )
6:00 PM	Heavier meal of the day (nourishing, warm, <i>Vatahara</i> foods)
6:30 PM	<i>Dhyana</i> (meditation), <i>Pranayama</i> , and <i>Rasayanas</i> like <i>Chyavanaprasha, Ksheera + Ghrita</i> intake

## DISCUSSION

The modern scientific understanding of biological rhythms aligns remarkably with the foundational principles of *Ayurveda*. Ancient *Ayurvedic* practices like *Dinacharya* (daily regimen), *Ritucharya* (seasonal regimen), *Ahara* (diet), *Vihara* (lifestyle practices), and *Yogic* disciplines demonstrate preventive and promotive roles, especially critical for populations such as

night shift workers prone to circadian misalignment and disease predisposition [47].

*Dinacharya* involves activities synchronized with the natural diurnal variations of doshas (*Vata, Pitta, Kapha*) which closely parallel circadian hormonal fluctuations recognized today. For instance, *Abhyanga* (oil massage) stimulates mechanoreceptors in the skin, enhancing

parasympathetic tone via vagal nerve activation [48]. Studies show that regular massage therapy reduces cortisol levels while increasing serotonin and dopamine, promoting relaxation and better sleep [49]. Nasya (nasal administration of oil) targets olfactory pathways that influence the limbic system, modulating stress responses and potentially regulating the hypothalamic-pituitary-adrenal (HPA) axis [50]. *Ritucharya* reflects an understanding of seasonal variations in metabolism and immunity. For example, *Vasant Ritucharya* recommends *Vamana* (emesis) and *Udwartana* (powder massage) to counter Kapha accumulation. Modern research shows mucous accumulation and reduced lymphatic drainage during winter and early spring [51]. Dry massages and emesis activate lymphatic flow and improve immune functions, helping reduce seasonal disease vulnerability [52]. Seasonal variations in melatonin and cortisol levels have also been established, supporting *Ayurveda*'s seasonal lifestyle modifications [53].

*Ahara* (Diet) in *Ayurveda* emphasizes Vata-pacifying foods like warm, unctuous meals, essential for night shift workers who experience *Rathrijagarana* (night vigil). Modern research supports that foods rich in tryptophan (like milk, rice) enhance serotonin and melatonin production, aiding sleep regulation and mood stability [54].

Moreover, avoiding heavy meals at night helps maintain metabolic clock synchronization, reducing risks of obesity and insulin resistance [55]. *Vihara* (Lifestyle modifications), including yoga and light exercise, profoundly influences autonomic balance. Yoga asanas like *Viparita Karani* stimulate baroreceptors and enhance parasympathetic activity, reducing sympathetic overdrive [56]. *Pranayama* practices, particularly *Nadi Shodhana*, have been shown to increase heart rate variability (HRV) — an indicator of vagal nerve activity — and to enhance parasympathetic tone [57]. Moreover, slow breathing increases GABAergic activity in the brain, promoting calmness and reducing anxiety [58].

Meditative practices like *Dhyana* (meditation) promote structural changes in the brain. Studies demonstrate that mindfulness meditation increases cortical thickness and grey matter density in areas like the anterior cingulate cortex and hippocampus, responsible for emotional regulation and memory [59]. This finding aligns with *Ayurveda*'s focus on enhancing *Sattva*. *Rasayana* therapies integrate seamlessly with modern pharmacology. Herbs like *Ashwagandha* (*Withania somnifera*) show GABA-mimetic activity, lowering stress-induced cortisol and promoting sleep [60]. *Brahmi* (*Bacopa monnieri*) increases expression of brain-

derived neurotrophic factor (BDNF), supporting neuroplasticity and memory improvement [61]. Circadian research also reveals that blue light exposure at night suppresses melatonin secretion [62], validating *Ayurveda*'s advice to avoid stimulation and excessive light exposure during nighttime. Practices like *Padabhyanga* (foot massage with oil) enhance melatonin secretion by stimulating peripheral skin receptors and improving thermoregulation [63].

Thus, the convergence of *Ayurvedic* wisdom with modern scientific findings offers a robust, evidence-based approach for promoting health and resilience, especially among populations vulnerable to circadian disruption such as night shift workers.

## CONCLUSION

Night shift work has become inevitable in the present era due to industrialization, globalization, and the demands of a 24/7 society. However, even during ancient times, *Ayurveda* recognized the concept of *Rathrijagarana* (night vigil) and its potential health impacts. Detailed measures were prescribed to counteract its adverse effects, emphasizing the need for appropriate lifestyle, dietary practices, and therapeutic interventions.

In the modern context, scientific advancements have deepened our understanding of circadian biology, metabolism, neurophysiology, and

occupational health. These insights mirror and validate the foundational principles laid down in *Ayurvedic* classics. By thoughtfully integrating the time-tested wisdom of *Ayurveda* — such as *Dinacharya*, *Ritucharya*, *Ahara*, *Vihara*, Yoga, and *Rasayana* therapies — with contemporary scientific strategies like strategic light exposure, sleep hygiene, controlled eating patterns, and stress management, a holistic approach can be crafted.

Such an integrative model not only mitigates the deleterious effects of night shift work but also fosters the overall betterment of night shift workers in terms of physical health, mental resilience, emotional stability, and lifestyle adaptation. This synergistic application of ancient and modern knowledge promises a sustainable, comprehensive strategy for maintaining optimal health and enhancing the quality of life among individuals engaged in night shift duties.

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