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DISTURBED SLEEP, DISTRESSED HEART: AYURVEDIC INSIGHTS ON *Ratrijagarana* AND CARDIOVASCULAR DYSFUNCTION

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ABSTRACT

Objective: *To bridge the gap between ancient wisdom and contemporary science by exploring how Ratrijagarana, when viewed through the Ayurvedic lens, leads to Hrudroga (cardiac disorders) and how holistic Ayurvedic approaches can aid in its prevention and management.*

Data Source: *Classical Ayurvedic texts such as Charaka Samhita, Sushruta Samhita, Ashtanga Hrudaya, and their commentaries; research articles focusing on sleep physiology, circadian disruption, and cardiovascular risk.*

Review Methods: *A comprehensive qualitative review approach was adopted, combining classical Ayurvedic literature analysis with modern scientific evidence. Collected data were utilized and analyzed to understand the effect of Ratriijagarana on cardiovascular health and draw meaningful conclusions.*

Result and Conclusion: *Ayurveda identifies Nidra as Trayopastambha and its disturbance as a trigger for Vata and Pitta vitiation. It induces an intense form of physiological stress, disturbing the normal functioning of the Hrudaya and eventually leading to Hrudroga. Chronic sleep deprivation elevates sympathetic nervous system activity, promotes systemic inflammation, impairs endothelial function, and increases cortisol levels. These pathophysiological changes are strongly linked with hypertension, arrhythmias, myocardial ischemia, and metabolic disorders. In young adults, increased nightlife is increasing the risk for myocardial infarction; the derangement of Doshas due to Ratrijagarana reflects the same hormonal irregularities observed in insomniacs and those engaged in night shift duties. An integrative preventive approach – emphasizing proper sleep, physical and external therapies, and lifestyle regulation – may offer effective solutions in cardiovascular risk management.*

KEY WORDS: *Ratrijagarana, Cardiovascular disorders, Hrudroga, Nidra, Heart health, Rasavaha Srotas.*

INTRODUCTION

In today's fast-paced world driven by technology, late-night work and screen time chronically disrupts natural sleep—*Ratrijagarana* (night vigil), [1] quietly fuelling the cardiac disorders. [2]

Ayurveda upholds *Trayopasthambha* [3]—and warns that its loss provokes *Vata-Pitta* imbalance, [4] depletes vitality, and injures the *Hrudaya* (heart). Modern findings on sympathetic overdrive and metabolic stress mirror these classics. [5], [6], [7] This article bridges ancient Ayurvedic wisdom and modern science by examining how *Ratrijagarana* contributes to *Hrudroga* (cardiac disorders) [8] and how holistic Ayurvedic approaches can help prevent and manage its impact.

Nidra and *Ratrijagarana*

Nidra is considered more than a passive state of rest but a vital physiology essential for maintaining *Dhatu-Samyata* (tissue equilibrium). [9] Charaka Samhita regards *Nidra* as life-sustaining, comparing it to a nurturing mother: —*Bhootadhatri.* [10] The sleep-wake cycle, explained in Ayurveda through *Dosha* dynamics, parallels the modern concept of the circadian rhythm. Naturally, as the sets night *Ratri Swabhava* (the inherent nature of night) [11] and *Tamah Pravesha* (predominance of darkness) induce natural inactivity. Along with this, there is a natural sluggishness owing to the absence of the sun in the environment, where all living beings and surroundings tend to slow down and become less active. Following the *Loka-Purusha Samya Siddhanta*, this external stillness helps withdraw the *Indriyas* (senses) and calm the *Manas* (mind), initiating *Nidra Utpatti* (onset of sleep). [12]

Natural and timely sleep leads to *Gunayukta Swapna*, which confers *Sukha* (comfort and well-being), *Pushti* (nourishment), *Bala* (strength), *Vrushata* (reproductive vitality), *Jnana* (mental clarity and knowledge retention), and *Jeevana Karma* (life-sustaining actions). [13]

Ayurveda classifies sleep into: [14]

- *Ati Yoga* – excessive sleep,

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- *Heena Yoga* – insufficient sleep,
- *Mithya Yoga* – improper sleep, including *Ratrijagarana* and *Diwaswapna* (daytime sleep).

Mithyayoga of *Nidra* causes *Dukha* (discomfort or distress), *Karshya* (emaciation or wasting), *Abala* (loss of strength), *Kleebata* (loss of virility or courage), *Ajnana* (mental dullness or ignorance), and disturbed *Jeevana Karma* (disruption in vital physiological processes). Moreover, *Ratrijagarana* in particular, is termed *Prajnaparadha*—a deliberate violation of natural order—resulting in long-term imbalance of *Doshas* and lifestyle disorders.

Ayurvedic understanding of physiology of *Hrudaya*

In Ayurveda, the *Hrudaya* is more than a physical organ—it is the seat of *Chetas* (consciousness), *Ojas* (vitality), and vital physiological functions. Its activity is governed by:

- *Prana Vata* and *Udana vata*– regulate respiration and heart rhythm. [15]
- *Vyana Vata* – drives circulation of Rasa (nutrient fluid) and *Rakta* (blood). [16]
- *Sadhaka Pitta* – manages emotions, clarity, and cardiac coordination. [17]
- *Avalambaka Kapha* – provides lubrication to the heart and lungs. [18]
- *Ojas* – sustains cardiac strength and immunity. [19]
- *Chetas* – integrates mental and emotional consciousness. [20]

The functionality of the *Hrudaya* is likened to *Arka* (sun) [21] and *Pundarika* (lotus) [22]—both of which are more active during the daytime, and less active at night. Furthermore, the *Hrudaya* governs the flow of *Ahara Rasa* through *Rasagati,* which occurs in three forms: *Shabdavat, Archivat*, *Jalavat,* [23] all modulated by *Jataragni* (digestive fire).

Contemporary understanding of physiology of *Hrudaya*

The human heart is a muscular organ that maintains continuous blood flow through rhythmic contractions, regulated by its intrinsic conduction system—primarily the SA node, the heart's natural pacemaker. This system ensures a steady cardiac rhythm and adapts to physiological demands.

Its activity is modulated by the autonomic nervous system (ANS): [24]

- **Sympathetic**: increases heart rate and blood pressure
- **Parasympathetic**: slows the heart rate and promotes relaxation

Sleep, especially the deep stages of Non-Rapid Eye Movement sleep, is characterized by reduced sympathetic activity and increased parasympathetic dominance. This balance results in a decrease in heart rate, blood pressure, and vascular resistance, allowing the heart to rest and repair, which is perhaps described in Ayurveda as *Prabhudda Hrudaya* (~ supports more sympathetic activity / active functioning) [25] and *Mlana Hrudaya* (~ supports more parasympathetic activity / reduced activity). [26]

Circadian rhythm and *Hrudaya*

Ayurveda aligns the functioning of the *Hrudaya* with the natural circadian rhythm. The functioning state of the *Hrudaya* and associated S*rotas* (channels) varies distinctly at day and night, in tune with the body's physiological needs and external world respectively.

***Prabhudda Avastha* (Active State)**

During the daytime, due to factors such as: *Vyayama* (physical activity), *Vihara* (sensory and mental engagement), and *Vikshipta Chetas* (active mind), the heightened *Prabhudda Avastha*—an active, alert state—is achieved. This state is associated with increased wear and tear in bodily tissues due to heightened activity and *Aklinna Avastha* (dry and non-lubricated condition) due to the sun's influence in *Srotas* and *Dhatus*, reflecting the catabolic phase of daily physiology where energy is expended. [27]

***Mlana Avastha* (Restorative State)**

At night, during the *Nidra*, the *Hrudaya* enters a *Mlana Avastha*—a subdued, restorative phase. In this state, the *Srotas* and *Dhatu* become *Kledayukta* (well-lubricated and nourished). The Hrudaya performs its function of rejuvenation and nourishment of the body, supporting anabolic activities essential for recovery and tissue replenishment during the night. [28]

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Pathogenesis in *Ratrijagarana*

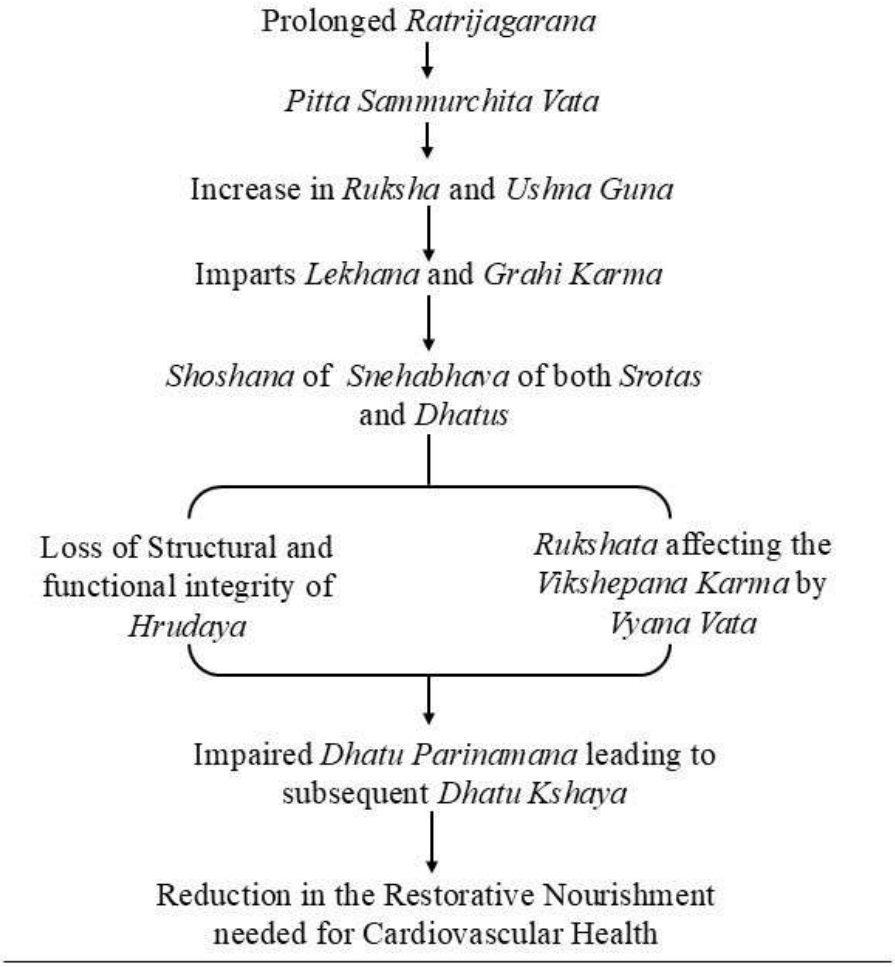

Figure 1 –Pathogenesis in *Ratrijagarana.*

Dhatu-Kshaya Janya Samprapti

Figure 2 – *Dhatu Kshaya Janya Samprapti* – Generalised deviation of Physiology to Pathology.

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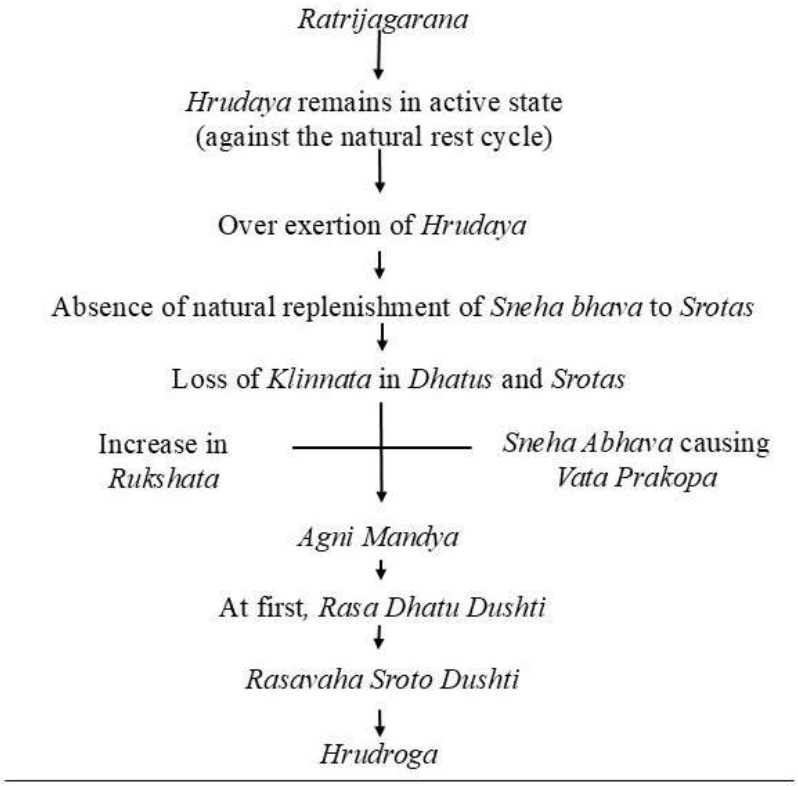

Figure 3 – Dhatu *Kshaya Janya Samprapti* –Pathology Specific to *Hrudaya*.

Sl No	Dhatu Kshaya	Effect on Hrudaya
1.	Rasa	Depletion of *Rasa Dhatu* impairs *Hrudaya Vishuddhi* (clarity and purity of the heart channels) and causes *Vyana Vata Dushti*, leading to disruption of the *Preenana Karma* (nourishing function).
2.	Rakta	Leads to *Sira Shaithilya* (loss of tone in vessels), impairing blood flow dynamics.
3.	Mamsa	Causes *Dhamani Shaithilya* (loss of vascular integrity), ultimately disturbing circulatory physiology and resulting in *Vikrita Rasa-Rakta Gati* (abnormal flow of *Rasa* and *Rakta*).

Figure 4 – Dhatu *Kshaya Janya Samprapti* – Effect on *Hrudaya.*

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Together, these *Dhatu* deficits critically compromise the functional integrity of the *Hrudaya*, manifesting as early stages of *Hrudroga.*

Avarana Janya Samprapti

In individuals practicing *Ratrijagarana* alongside *Kapha-Pittakara Nidanas*, a pathological cascade arises involving *Tridosha Dushti, Rakta Abhishyandata* (blood stagnation), and *Kapha-Meda Dushti.* These changes may result in *Upalepa* (morbid coating) [29] within and around the *Hrudaya*, disrupting its function.

- **Internal *Upalepa:***
  Vikruta Kleda from *Kapha-Meda Dushti* may accumulate in *Dhamanis*, causing *Dhamani Upalepa / Dhamani Praticchaya* (narrowing or clogging of vessels), [30] leading to *Srotorodha.* This resembles conditions like dyslipidaemia, atherosclerosis, and plaque formation.
- **External *Upalepa*:**
  The same morbid secretions may coat the pericardial coverings, affecting the circulation and nourishment of the *Hrudaya*, impairing its normal activity.

Hormonal regulation, sleep, and cardiovascular dysfunction

Sleep is not merely a period of rest but a biologically dynamic process, vital for neurological recovery, hormonal balance, and cardiovascular regulation. It is composed of alternating stages—non-REM and REM sleep—each playing distinct and essential roles in tissue repair, immune modulation, and autonomic nervous system resetting.

When this sleep cycle is regularly disrupted—especially in conditions like *Ratrijagarana*—the finely tuned coordination between the central nervous system and the endocrine system becomes imbalanced. This leads to autonomic dysregulation, characterized by sympathetic overactivation (a persistent fight-or-flight state), which contributes to several cardiovascular disturbances such as tachycardia (increased heart rate), hypertension (elevated blood pressure), insulin resistance, endothelial dysfunction, and metabolic syndrome. Modern studies have shown that individuals who sleep less than six hours per night are at a significantly higher risk of developing atherosclerosis, arrhythmias, myocardial infarction, stroke, and heart failure.

One of the central mechanisms linking sleep and heart health is the circadian rhythm, governed by the suprachiasmatic nucleus (SCN) in the hypothalamus. This internal clock regulates the release of several critical hormones, each with a key role in cardiovascular and metabolic homeostasis:

1. Cortisol

- **Normal role:** Cortisol follows a diurnal rhythm—highest in the early morning to help wakefulness and energy mobilization.
- **Effect of disruption:** In *Ratrijagarana*, cortisol may remain elevated at night, contributing to persistent sympathetic tone, increased blood pressure, and vascular inflammation, predisposing to hypertension and atherosclerosis. [31]

2. Melatonin

- **Normal:** Produced at night, melatonin promotes sleep and exhibits antioxidant and cardioprotective effects, including vasodilation and blood pressure regulation.
- **Disruption:** Suppressed melatonin levels due to nighttime light exposure led to loss of cardioprotection, poor sleep quality, and higher oxidative stress on cardiac tissues. [32]

3. Leptin

- **Normal role:** Leptin helps regulate satiety and plays a role in energy expenditure and cardiovascular function.
- **Effect of disruption:** Sleep deprivation reduces leptin levels, leading to overeating, weight gain, and increased cardiac workload—all risk factors for heart disease. [33]

4. Ghrelin

- **Normal role:** Ghrelin stimulates appetite and plays a role in energy balance.
- **Effect of disruption:** Ghrelin levels increase with sleep deprivation, enhancing hunger and fat accumulation, especially visceral fat, which is strongly linked to cardiometabolic disorders. [34]

5. Insulin

- **Normal role:** Regulates blood glucose levels by facilitating cellular uptake of glucose.
- **Effect of disruption:** Lack of sleep contributes to insulin resistance, a hallmark of metabolic syndrome and a strong predictor of cardiovascular disease. [35]

6. Growth Hormone

- **Normal role:** Secreted primarily during deep sleep, GH supports tissue repair, lipid metabolism, and cardiac muscle maintenance.
- **Effect of disruption:** Poor sleep decreases GH release, impairing myocardial recovery and increasing lipid accumulation, further stressing the heart. [36]

Preventive and curative measures for *Ratrijagarana*-induced cardiac dysfunction

1. *Nidana Parivarjana* (Avoidance of Causative Factors)

The first and foremost step in prevention is *Nidana Parivarjana*—the avoidance of the causative factor itself. In this context, the practice of *Ratrijagarana* should be minimized or completely avoided. [37]

2. *Diwaswapna* (Daytime Sleep as a Compensatory Measure).

For individuals who have already undergone *Ratrijagarana*, *Diwaswapna* is recommended as a compensatory therapy. This helps in: *Shamana* (pacification) of aggravated *Vata Dosha*, relief from *Kshobha* (irritability, mental unrest), and restoration of physiological equilibrium. [38]

Key considerations while administering *Diwaswapna*:

- It should be done for *Ardha Kala*—half the duration of the time spent awake during the night.
- It should be performed on an empty stomach. Sleeping after food can lead to *Agni Mandhya* and may aggravate *Kapha*, resulting in further complications.

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3. *Santarpana Chikitsa* (Replenishing/Nourishing Therapy)
Since *Ratrijagarana* leads to *Apatarpana* (undernourishment or depletion), *Santarpana Chikitsa* (nourishing treatments) should be incorporated. This includes: [39]

- Medicated milk or ghee preparations
- *Rasayana Dravyas* (rejuvenating herbs)
- Nutrient-rich *Ahara* to restore tissue strength and vitality

This approach is especially beneficial for *Dhatu Kshaya Janya Samprapti*, where tissues like *Rasa*, *Rakta*, and *Mamsa* are depleted.

4. *Vata Vyadhi Chikitsa* (Management of *Vata* Disorders)
Given that *Vata dosha* plays a central role in the pathogenesis of *Ratrijagarana*-induced disorders, general *Vata Shamaka Chikitsa* should be adopted: [40]

- *Snehana* (oleation) and *Swedana* (sudation).
- *Vatahara* diet.

Lifestyle modifications and rejuvenative measures in ayurveda for countering *Ratrijagarana*
Beyond direct curative treatments, Ayurveda emphasizes *Dinacharya* (daily routine), *Rutucharya* (seasonal regimen), and mental well-being as part of a preventive and promotive health approach. In the case of individuals exposed to *Ratrijagarana*, these supportive therapies help restore balance, enhance resilience, and mitigate long-term systemic damage.

1. Behavioral & Lifestyle Interventions

- **Sleep Hygiene Education:** Encouraging proper sleep practices such as fixed bedtime, screen-free wind-down routines, and a calming environment. [41]
- ***Dinacharya & Rutucharya* Implementation:** Aligns internal rhythms and prevents *Dosha* aggravation. [42]
- ***Satwavajaya Chikitsa:*** Incorporates psychological and emotional care through: Counselling, stress management techniques, meditation and pranayama, mindfulness practices. These interventions help control *Vikshipta Chetas* and promote *Manasika Dhairya* (mental stability). [43]

2. *Rasayana and Gorasa Varga*

- ***Rasayanas:*** Administration of rejuvenating herbs such as *Ashwagandha*, *Brahmi*, *Mandukaparni*, and *Shankhapushpi* to replenish *Ojas*, support *manas*, and rejuvenate dhatus affected by night wakefulness.
- ***Gorasa Varga* (cow derivatives):** Use of *Ksheera* (milk), *Ghruta* (ghee), and *Takra* (buttermilk) help in *Santarpana* (nourishment) and *Agni Deepana* (digestive stimulation)—counteracting the *Rukshata* and *Dhatu Kshaya* caused by *Ratrijagarana*. [44]

3. *Bahya Chikitsas* (external therapies)

- ***Abhyanga*–** Daily oil massage with *Vatahara Tailas* like *Bala-Ashwagandhadi Taila* to restore *Sneha* in dhatus and reduce *Vata Prakopa*. [45]
- ***Utsadana*–** Herbal powder massage for enhancing circulation and stimulating the skin. [46]
- ***Snana*–** Therapeutic bath, particularly after *Abhyanga,* helps in refreshing the body and resetting the biological rhythm. [47]
- ***Samvahana*–** Gentle massage techniques for calming the mind and improving circulation. [48]

4. Dietary & Supportive Practices

- ***Gramya-Anoopodaka Sevana* –** Consumption of nourishing and easily digestible local foods with proper hydration.
- ***Ksheerapana*–** Nourishes *Ojas* and *Hrudaya.* [49]
- ***Madyapana*–** Controlled use of *Arishtas* like *Draksharishta, Arjunarishta* for digestion and cardiac health. [50]
- ***Snehapana*–** Medicated ghee for *Vata*-pacification and *Rasayana* effect. [51]

5. Sensory and Mind-Calming Interventions

- ***Chakshutarpana* –** Rejuvenative eye therapies to alleviate strain from screen exposure and reduce mental fatigue. [52]
- ***Manoanuguna Gandha and Shabda* –** Use of soothing aromas and pleasant auditory experiences (*Gandha – Chandan*, *Shabda* – soft music) that align with *Manasika doshas* and promote *Satva.*

DISCUSSION

The *Hrudaya* is a central site for the functioning of multiple *Doshas*, especially *Prana Vata*, *Vyana Vata*, *Sadhaka Pitta*, and *Avalambaka Kapha*. Disruption in sleep due to *Ratrijagarana* disturbs this delicate balance, predisposing the *Hrudaya* to dysfunction. According to Ayurveda, *Nidra* facilitates *Dhatu Poshana* and *Manasika Sthirata*. Sleep deprivation leads to *Ojas Kshaya*, *Vata Prakopa*, and ultimately *Hrudroga* through *Rasa Dhatu Kshaya* and *Srotodushti*. Modern science supports the Ayurvedic view by linking poor sleep hygiene with increased sympathetic tone, hormonal imbalance, and cardiovascular risks like hypertension, arrhythmias, and atherosclerosis.

The Ayurvedic concept of circadian rhythm is subtly embedded in the daily activity of *Hrudaya*, *Prabuddha Avastha* - more active during the day and *Mlana Avastha*- restrorative at night. *Ratrijagarana* inverts this pattern, leading to pathological wear and tear.

In *Hrudroga* caused by *Ratrijagarana,* preventive measures such as *Nidana Parivarjana*, *Diwaswapna*, *Rasayana* administration, and *Satwavajaya Chikitsa* play a significant role in reversing the early pathological changes and maintaining *Hrudaya Sthirata*. Reinforcing *Dinacharya* and *Rutucharya*, along with therapies like *Abhyanga*, *Snehapana*, *Ksheerapana* and *Rasayana* supports the restoration of internal balance and counteracts the *Rukshata* and *Doshaprakopa* produced by sleep deprivation. Further clinical studies are needed to evaluate the impact of ayurvedic approaches on cardiac biomarkers and autonomic balance in individuals with chronic *Ratrijagarana*.

CONCLUSION

Ratrijagarana is harmful because it disrupts the natural flow of the body's rhythms. It induces an intense form of physiological stress, disturbing the normal functioning of the *Hrudaya* and eventually leading to *Hrudroga*. In light of the changing trends in the sleep-wake cycle, although *Ratrijagarana* cannot be

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entirely avoided today, ayurveda offers specific preventive and curative measures to mitigate its impact.

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