

(REVIEW ARTICLE)



Harmonizing health through Biorhythms: Ayurvedic insight

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Abstract

Biological rhythms that sustain life exhibit periodic fluctuations in response to environmental changes. In the absence of external inputs, rhythms are maintained by this internal mechanism. Three primary types of rhythms can be distinguished: Circadian, Ultradian, and Infradian. The Tridosha theory, which forms the basis of Ayurveda, has a deep and innate relationship with the concept of biological rhythms. These rhythms are closely associated with an Ayurvedic theory called "Loka Purusha Samya Siddhanta," which postulates that humans are miniature of the cosmos. Understanding the cyclical variations associated with Tridoshas, Agni, and Sharira Bala concerning variables such as age, time of day, seasonal variations, and nutrition is the foundation of Ayurveda. To maintain maximum health, aligning with this natural cycle is imperative. Breaking from it can lead to a variety of mental and physical ailments. Ayurveda recommends activities like dinacharya, ritucharya, sadvritta, and ahara vidhis, as well as seasonal sodhana procedures and acharya rasayana to maintain the rhythmic balance of doshas in a healthy state. This review paper examines biological rhythm from contemporary and Ayurvedic perspectives. It addresses the physiological and pathological characteristics of these rhythms and their significance in the treatment and prevention of disorders associated with them.

Keywords: Biological rhythm; Dinacharya; Ritucharya; Tridosha; Circadian rhythm; Chrono pharmacology

1. Introduction

Biological rhythms, essential for life, refer to cyclical fluctuations in response to environmental changes. "Bio" pertains to life and "rhythm" pertains to the flow with regular movement. This internal process sustains rhythms even without external cues. The study of time, specifically biological rhythms, their underlying processes about living systems, and adaptation to these rhythms is known as chronobiology¹

The human body is masterfully designed, and hidden beneath its complex mechanisms lies a symphony of rhythmic patterns that govern physiological processes and even disease progression. These rhythms can be categorized into three main types: Circadian, Ultradian, and Infradian rhythms. The foundation of Ayurveda, rooted in the Tridosha theory possesses an inherent and profound connection with the concept of biological rhythms. Achieving a state of well-being necessitates aligning with the natural world and its inherent rhythms. These rhythms are inextricably linked to the ever-changing time and our environment, resonating with an ayurvedic concept known as "Loka Purusha Samya Siddhanta," which suggests that humans are miniature representations of the universe itself.² A never-ending cycle of change occurs within the dynamic world of nature, including the change from day to night and the constantly changing seasons. Biophysical and biochemical parameters, such as blood pressure, heart rate, hormone levels, etc reflect the body's physiological condition, and these parameters also fluctuate based on factors like age, physical activity level, environmental conditions, and post-meal status. Ayurveda's principles are rooted in recognizing the cyclical variations related to Tridoshas, Agni, and Sarira Bala concerning factors like age, time of day, seasonal changes, and diet. Deviating

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from this natural rhythm can result in a range of physical and mental ailments, underscoring the vital need to align with these rhythms for optimal health. Yet, in the modern era, our work patterns and the allure of convenience have distanced us from this innate connection with nature. As a consequence, we often struggle to maintain a balanced daily routine, leading to severe repercussions such as lifestyle disorders and heightened stress levels. To ensure the rhythmic balance of Doshas in a healthy state, Ayurveda prescribes practices such as *dinacharya*, *ritucharya*, *sadvritta*, *ahara vidhis*³, and *sodhana* procedures according to seasons, *achara rasayana*⁴, etc.

Objective of the study

This comprehensive review paper explores the concept of biological rhythm from Ayurvedic and contemporary perspectives. It seeks to explore the physiological and pathological dimensions of these rhythms while examining their significance in the prevention and management of associated disorders.

2. Material and Methods

The study's objectives were accomplished through extensive reference in the Samhitas of Ayurveda, including their commentaries, as well as various other Ayurvedic texts. The search for articles was conducted on online databases including PubMed and Google Scholar, with keywords – biorhythm, circadian rhythm, *loka purusha samya*, *dinacharya*, *chrono pharmacology*, *tridosha* etc. Additionally, contemporary medical science publications, relevant articles, periodicals, journals, and information from books and websites were consulted to gather comprehensive insights.

2.1. Biological rhythm

Biological rhythms refer to the cyclical fluctuations that occur within an organism in response to periodic changes in its environment⁵. These rhythms can be categorized into three main types: Circadian, Ultradian, and Infradian.⁶

2.1.1. Ultradian Rhythms

Ultradian rhythms involve bodily functions that repeat multiple times within a single day. These shorter cycles within the 24-hour framework govern processes like hormonal secretion, digestion, and alertness throughout the day.

2.1.2. Infradian Rhythms

Infradian rhythms encompass cyclical bodily changes that persist for longer than 24 hours but shorter than one year. These rhythms occur weekly, monthly, or yearly, regulating phenomena like menstrual cycles, seasonal adaptations, and more.

2.1.3. Circadian Rhythms

Circadian rhythms, often referred to as diurnal rhythms, revolve around a 24-hour cycle. The term "circadian" is derived from the Latin words "circa" (around) and "Diem" (day), emphasizing their synchronization with the daily alternation of light and darkness. These rhythms are governed by a master clock located in the brain's Suprachiasmatic nucleus (SCN). Circadian rhythms play a significant role in an organism's well-being, and their disruption can lead to susceptibility to diseases. Environmental factors like light exposure and meal timing influence these rhythms. Night-time light exposure, irregular sleep patterns (due to factors like jet lag and shift work), and late-night eating can disrupt these rhythms, affecting both central and gastrointestinal circadian rhythms.⁷ Precisely synchronized by biological timekeepers, found in virtually every tissue and organ, these rhythms govern essential activities like eating, sleeping, and responding to environmental cues like light and temperature. The cyclical fluctuations in melatonin production, by the pineal gland, play a significant role in the maintenance of a normal circadian rhythm.⁸ External factors, known as *Zeitgebers*, including light, temperature, and social interactions, play a pivotal role in aligning these internal rhythms with the external world, ensuring a delicate balance in the life rhythms of organisms.

2.2. Core Concepts for Understanding Rhythms in Ayurveda

In Ayurveda, health is not viewed as a static condition but as a dynamic state of equilibrium. Ayurveda perceives health as not merely the absence of disease but as a harmonious balance of the body, mind, and spirit.⁹ It is a state where an individual is in equilibrium with their constitution (*Prakriti*), environmental influences, and their unique biological rhythms. Achieving and maintaining *Swasthya* is a fundamental aim of Ayurveda, guided by principles that align with nature's rhythms. The concept of *Lok Purusha Samya* in Ayurveda, which states that every living organism mirrors the universe, finds a remarkable resonance with the study of biological rhythms or biorhythms. Ayurveda emphasizes the shared elemental composition between the human body and the cosmos, with both comprised of the same five

fundamental elements. Likewise, biorhythms explore the concept that our internal biological rhythms respond to external celestial elements and environmental triggers, unveiling the inherent connection between individuals and their surroundings. Both paradigms provide comprehensive perspectives on human existence, recognizing the multifaceted aspects of diverse elements in shaping our overall health and wellness. When an individual adapts to the shifts in their environment, whether through seasonal changes, alterations in diet, or modifications in daily routines, they facilitate the maintenance of optimal health. In contrast, resisting or disregarding these external variations can disrupt the balance of the Doshas, potentially leading to vyadhi, which encompasses a range of disrupted health conditions and imbalances. Ayurvedic physiology provides a comprehensive explanation of how doshas vary based on factors such as time of day, age, and the digestive process¹⁰ [Table 1]. This not only prevents seasonal imbalances and related health issues but also enhances vitality and immunity. Ritu, dosha, and Bala (immunity) exhibit cyclical variations synchronized with environmental cues, with their dominance shifting under seasonal changes^{11,12}. [Table 2,3]. By adjusting lifestyle choices and dietary preferences to match the seasons, individuals can adapt more effectively to their surroundings. The selection of substances during various seasons based on their pharmacological characteristics was also mentioned in the classics¹³[Table 4]. Vata, Pitta, and Kapha doshas tend to worsen during the rainy, autumn, and winter seasons, respectively.¹¹ To restore balance in these doshas, Ayurveda suggests the utilization of seasonal Panchakarma treatments during their aggravated (Prakopa) periods.

2.3. The Influence of Time on Conception and Fetal Development

Ayurveda highlights the importance of "Kala" (time) in conception and fetal development. It stresses the need for a balanced combination of "Ritu" (season), "Kshetra" (uterus), "Ambu" (bodily fluids or Rasa), and "Beeja" (reproductive elements) for a healthy fetus. Conversely, unfavorable "Kala," along with factors like sperm quality, ovum, actions tied to the soul (Aatmakarma), uterus condition (Aashaya), and maternal diet and lifestyle (Aahara-Vihara), can lead to fetal abnormalities¹⁴

2.4. Rhythms of Tridosha

Table 1 Variation of doshas based on site, age, day, night, and digestion in normal state

SN		vata	pitha	kapha
1	site	Below Nabhi	Between nabhi and hridaya	Above hridaya
2	age	Vrdhavastha	youvana	balya
3	Day	evening	midday	morning
4	night	Late night	midnight	Early night
5	Stage of digestion	End of digestion	During digestion	Begning of digestion.

2.5. Seasonal Variations in the Physiological State of Agni, Dosha and Sharira Bala

2.5.1. Ritus and agni relation

Additionally, Agni, the transformative agent responsible for metabolism, is not constant and varies according to daily cycles, seasons, and age, influencing metabolic rates accordingly. Research suggests that such disruption can have adverse effects on gut microbiota, potentially contributing to metabolic issues and the development of conditions like metabolic syndrome and risk of cardiovascular diseases.¹⁵ This aligns with Ayurveda's ancient understanding of variations in Agni's functional state.

Table 2 Ritu and dosha relation

SI	Dosha	Sanchaya	prakopa	prasara
1	Vata	grishma	varsha	sarath
2	pitha	varsha	sarath	hemantha
3	Kapha	sisira	vasantha	grishma

The inherent components of each season and their natural stages are essential to the equilibrium of Tridoshas. When the Tridoshas are disturbed by ritus, it might result in Dosha-Vridhi (predominance) or Dosha-Kshaya (depletion), which in turn affects the attributes of the Doshaja deha prakriti. The prevalent diseases associated with a dominant Dosha are typically common during the corresponding season.

Table 3 Ritu and bala (Immunity)relation

Sisira/hemantha	pravara
Vasantha/sarat	Madhyama
Varsha/greeshma	avara

2.5.2. Ritu and preferred rasa and Guna

Table 4 Selection of substances during various seasons based on their pharmacological characteristics

SI	RITU	DRAVYA	
		Preferred rasa	Preferred Guna
1	Sisira	Sweet, sour, salt	ushna
2	vasantha	Bitter,pungent,astringent	Rooksha
3	Grishma	Sweet	Sita
4	varsha	Sweet,sour,salt	usna
5	Sarat	Sweet,bitter,astringent	sita
6	Hemantha	Sweet,sour,salt	ushna

Ayurveda underscores seasonal alignment in diet and lifestyle to prevent ailments and imbalance.

2.6. Yamadamshttra and the Ritu sandhi Concept

The last eight days of Kartika masa (the third week of November) and the first eight days of Avagrahayana (the fourth week of November) are included in Yamadamshttra kala. During this period, eating a moderate amount of food is linked to sustaining excellent health¹⁶. Due to environmental stress and increased vulnerability to infectious diseases, this period promotes the growth of a variety of microorganisms that might compromise immunity. It is essential to take seasonal precautions to avoid diseases caused by sudden changes in climate. Between the final seven days of one season and the first seven days of the next is the ritusandhi, or transitional period between seasons. To prevent imbalances, it is best to progressively switch from the previous season's routines to the new ones.¹⁷

2.7. Harmonizing Circadian Rhythms in the Era of Technology: A Contemporary Health Dilemma

The suprachiasmatic nucleus of the brain controls circadian rhythms, which regulate physiological processes. These cycles are disturbed by current problems like jet lag and night shifts, which impair mood, memory, and sleep. The digital age increases circadian disorders; screen time, late-night gadget use, and blue light inhibit melatonin, which leads to sleep disorders. The demands of modern labor, such as remote work and shift work, further impair the body's ability to align with its surroundings. consequences of these disruptions extend beyond sleep disturbances and mood alterations.¹⁸ Emerging scientific research has linked chronic circadian disruptions to a range of health issues, including cardiovascular disease, metabolic disorders, and an increased risk of certain cancers. Pediatric populations offer a unique opportunity for early cardiovascular intervention. Circadian rhythms, varying with age, impact cardiovascular events differently. Conditions like type 1 diabetes and obesity disrupt rhythms, influencing cardiovascular risk. Behavioral modifications, such as reducing screen time at night, addressing alcohol use, and adjusting early school start times, present viable avenues for reducing cardiovascular risk in children.¹⁹ According to Ayurveda, diseases originate primarily from three factors: excess (atiyoga), deficiency (ayoga), and improper (mithayoga) interactions of sensory experiences (artha), actions (karma), and time-related factors (kaala).²⁰

2.8. Rhythmic Patterns in Disease Expression: Examples

Several health conditions in both modern medicine and Ayurveda demonstrate rhythmic patterns. Skin diseases, like eczema and psoriasis often worsen with seasonal changes, particularly in winter or spring.²¹ Respiratory disorders like asthma can show night time aggravation or worsen with specific weather conditions.²² Fevers and infectious diseases follow circadian rhythms, with temperatures typically rising in the late afternoon and night. A study, "Circadian Rhythm and the Seasonal Variation in Childhood Febrile Seizure," reveals a significant link, highlighting heightened evening occurrences and increased winter incidence in pediatric febrile seizures.²³ Central, neuropathic nociceptive, and mixed pain all showed circadian patterns of pain. Some pain conditions peak in the evening or at night, such as migraines and fibromyalgia, which show increased morning discomfort²⁴. Disorders related to the digestive fire may worsen at specific times, such as after heavy meals or in the evening. Rhythmic manifestations of illnesses include Vataja Shotha during the day²⁵ and worsened Kaphaja Shotha at night.²⁶ Tamaka Shvasha, gets worse when there are clouds and winds from the east²⁷ raktapitta (bleeding disorders) is easily cured in sisira²⁸. vataja²⁹ and Kaphaja Arsha³⁰ is more prominent in the winter, and Pittaja Arsha in the summer.³¹

2.8.1. Dinacharya³²

Lifestyle choices have a significant influence on overall health, and they are increasingly important in a globalized world where people are exposed to a wide range of cultural practices, dietary options, and environmental factors. Dinacharya, on the other hand, is the practice of harmonizing daily activities with these rhythms to promote overall health and prevent illness. This includes consistently consuming nourishing food, engaging in regular exercise, practicing situational awareness and appropriate responses, avoiding excessive emotional intensity, engaging in thoughtful acts of charity, maintaining equilibrium, speaking truthfully, showing compassion, and seeking wisdom from elders.³³ These practices typically encompass various aspects of life, including diet, physical activity, hygiene, and mental well-being.

2.8.2. Sadvrutha

In the contemporary era, we observe disturbances in mental health, as reflected in rising instances of violence, strained interpersonal connections, and decreased levels of tolerance among individuals. Ayurveda advocates Sadvrutha³⁴ to restore balance, manage mental doshas (Rajas and Tamas), and promote a peaceful mind with Sattva Guna. This approach considers the various functions of the mind, including thinking, contemplation, focus, sensory control, determination, and imagination. Emphasizing righteous conduct, especially mindful eating, is pivotal, involving eating only after complete digestion, in moderate amounts, and promptly attending to natural urges.

2.8.3. Bala and biological rhythm

To be in sync with biological cycles, the body's strength and immunity, or Bala, is essential. Sahajam (natural), kalajam (controlled by ritu and age), and yukti-krtam (depending on healthy habits relating to nutrition, activities, etc.) are the three categories of bala.³⁵ The ability of the body to adjust to the different demands of various times of the day (dinacharya) or year (ritucharya) and respond to environmental signals (desha and kala) depends on the strength of bala (ojus).

2.8.4. Nidra and biological rhythm

For restorative and revitalizing sleep, circadian rhythms must be synchronized with sleep patterns. Misalignment, as seen in sleep disorders and disruptions to circadian rhythms due to irregular work schedules or time zone changes.

2.8.5. Seasonal therapeutic interventions

Panchakarma, which functions as a therapy with preventative, preservative, promotive, curative, and rehabilitative elements, is a key component of Ayurvedic medicine. To correct imbalances of Tridosha, specific Panchakarma therapies are employed, such as Vamana for Kapha Dosha, in the Vasantha ritu, Virechana for Pitta Dosha, in the Sarath ritu, and vasti for Vata Dosha, in the varsha rithu with an emphasis on aligning these therapies with seasonal variations³⁶.

2.9. Chrono pharmacology

Chrono pharmacology explores how biological cycles affect the efficiency of medications and metabolic functions. It is used in chronotherapy, which involves administering drugs at precise times for the best therapeutic results. Investigations into chrono pharmacology have often shown rhythmic patterns in several areas of drug pharmacokinetics. These patterns cover renal elimination, hepatobiliary excretion, gastrointestinal and gastric absorption, and drug metabolism in the liver.³⁷ Acharya Charaka emphasizes that, medicines should be prescribed after carefully taking into account the factors of habitat (desha), season (kala), dosage (pramana), adaptability (satmya), and

non-adaptability (asatmya). When these factors are thoughtfully considered, the treatment is considered beneficial to the body systems; otherwise, it may not be beneficial.³⁸ In addition, taking into account unique constitutions and imbalances, administering internal medications by Ayurvedic Bhesaja Kala, specifies precise times for the administration of medication. Ayurveda provides guidelines across various domains of medicine, including the collection of medicinal substances, the preparation of medicines, the implementation of therapeutic procedures, and the administration of treatments tailored to the variations in individual constitutions and time.

3. Conclusion

In today's fast-paced world, the demands of shift work and modern lifestyles often disrupt our circadian rhythms, contributing to various health issues and psychological stress. Ayurveda offers valuable guidance to harmonize our biological rhythms through practices like dinacharya, ritucharya, and ritu sodhanas. By aligning our diet and lifestyle with the natural rhythms of our body and Prakriti (constitution), we can proactively prevent lifestyle-related diseases. These rhythms are intricately connected to the ever-changing flow of time and the environment, echoing Ayurveda's concept of "Loka Purusha Samya Siddhanta," which portrays humans as microcosms of the universe. Nature itself undergoes an unending cycle of change, from day to night and through the seasons. Ayurveda's wisdom is deeply rooted in recognizing these cyclical variations, encompassing tridoshas, agni, and sharira Bala, with factors like age, time of day, seasonal shifts, and dietary choices. Straying from these natural rhythms can lead to various physical and mental health challenges, emphasizing the importance of realigning with these rhythms for overall well-being.

Compliance with ethical standards

Disclosure of conflict of interest

All authors declare that no conflict of interest exists for this work.

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