

Review Article



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“CLASSICAL AUSHADHA SEVANA KALA AND CHRONOPHARMACOLOGY: A REVIEW”

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ABSTRACT

Introduction: The timing of drug administration plays a crucial role in determining therapeutic efficacy and safety. Ayurveda, through the concept of *Aushadha Sevana Kala* (time of drug intake), provides a highly individualized approach to pharmacotherapy, integrating factors such as *dosha*, *agni*, *vyadhi avastha*, and *dinacharya*. Modern biomedical sciences have developed the discipline of chronopharmacology, which studies how circadian rhythms influence drug absorption, metabolism, and response.

Methods: A comprehensive literature search was conducted across Ayurvedic classical texts (*Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*), PubMed, Scopus, and Web of Science. Search terms included *Aushadha Kala*, chronotherapy, circadian rhythm, drug timing, Ayurveda and pharmacology. Both classical references and modern experimental or clinical studies were included. Exclusion criteria involved non-peer-reviewed articles and anecdotal reports. **Results:** Ayurvedic texts describe more than 20 specific *Aushadha Kaalas*, such as *Pratah Kala* (morning), *Madhyahna* (noon), *Ratri* (night), *Annapana Purva* (before food), and *Annapana Paschat* (after food), each chosen according to disease, drug nature, and patient condition. These principles parallel modern findings, for example, antihypertensives being more effective at bedtime or chemotherapy showing improved tolerance when aligned with circadian cycles. Emerging research demonstrates that aligning medication timing with circadian rhythms enhances bioavailability and minimizes side effects.

Discussion: Ayurveda’s personalized *Aushadha Kala* can be interpreted as an early form of chronotherapy. However, gaps remain in experimental validation, standardized clinical protocols, and integration with modern chronobiology. Bridging these systems could lead to improved treatment compliance, efficacy, and reduced adverse effects. **Conclusion:** The classical wisdom of *Aushadha Sevana Kala* offers a sustainable, individualized model that complements modern chronopharmacology. Further interdisciplinary research is needed to establish evidence-based guidelines.

KEYWORDS: Ayurveda, *Aushadha Kala*, chronopharmacology, circadian rhythm, drug timing



INTRODUCTION

Time has long been recognized as a determinant of health and disease in both Ayurveda and modern medicine.^[1] In Ayurveda, the principles of *Kala* (time) are fundamental, influencing the manifestation of *doshas*, progression of diseases, and efficacy of therapeutic interventions.^[2-3] Among these, *Aushadha Sevana Kala* refers to the strategic timing of drug administration, tailored to the individual's constitution, digestive power, and disease state.^[4-5]

In contrast, modern chronopharmacology explores how biological rhythms—especially circadian rhythms regulated by the central clock—affect drug pharmacokinetics and pharmacodynamics. Numerous studies demonstrate that the timing of drug intake significantly alters therapeutic outcomes, for example, the administration of corticosteroids, antihypertensives, and chemotherapy agents.^[6-8]

This review aims to explore the concept of *Aushadha Sevana Kala* from classical Ayurvedic sources and compare it with modern insights from chronopharmacology.^[9] The objectives are to: (1) analyze references to drug timing in Ayurvedic classics, (2) review evidence from modern chronopharmacological studies, and (3) identify areas of convergence, gaps, and future research opportunities.^[10]

MATERIALS AND METHODS

A comprehensive literature review was conducted from January to May 2025. Ayurvedic references were sourced from classical texts including *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, *Kashyapa Samhita*, and relevant commentaries. Digital repositories such as Ayurveda e-*Grantha*, Ayurveda *Vijnana*, and institutional libraries were also accessed.^[11]

For modern studies, databases including PubMed, Scopus, Web of Science, and Google Scholar were searched using keywords: “*Aushadha Kala*,” “drug timing,” “chronopharmacology,” “chronotherapy,” “circadian rhythm,” and “Ayurveda pharmacology.”^[12] Inclusion criteria consisted of (a) peer-reviewed journal articles, (b) experimental and clinical studies on drug administration timing, and (c) integrative studies linking Ayurveda and chronobiology. Exclusion criteria included non-peer-reviewed content, anecdotal reports, and non-

English articles without translation.^[13-14]

In total, 58 classical references and 124 modern articles were screened. Of these, 42 studies (20 classical references, 22 modern clinical/experimental papers) were included in this review.^[15]

OBSERVATION AND RESULTS

1. **Classical Perspectives on Aushadha Kala**
 - Ayurveda describes more than 20 *Kaalias* depending on food intake, dosha predominance, and daily/seasonal cycles.
 - Examples: *Pratah Kala* (morning), *Madhyahna* (afternoon), *Ratri* (night), *Annapana Purva* (before meals), *Annapana Paschat* (after meals).
 - Therapeutic logic: before meals enhances systemic effect, after meals enhances local effect on the gut.
2. **Dosha-specific Timing**
 - *Kapha-dominant diseases*: drugs given in the morning (*Kapha Kala*).
 - *Pitta disorders*: mid-day administration.
 - *Vata disorders*: evening or night administration.
 - Example: Laxatives advised at night for *Vata-Anulomana* effect.
3. **Agni and Aushadha Kala**
 - Drug absorption and metabolism are linked to digestive capacity.
 - Strong *Agni* (midday) favors metabolism of heavy drugs.
 - Weak *Agni* periods (early morning/evening) are reserved for mild or supportive therapies.
4. **Comparison with Chronopharmacology**
 - Modern evidence shows circadian influence on drug metabolism (e.g., statins more effective in evening).
 - Antihypertensives: bedtime dosing reduces nocturnal blood pressure and stroke risk.
 - Chemotherapy: circadian-based scheduling improves tolerance and efficacy.
5. **Convergence of Ayurveda and Chronopharmacology**
 - *Aushadha Kala* aligns closely with circadian medicine principles.
 - Both stress personalization, disease-specific timing, and consideration of biological rhythms.
6. **Evidence-based Applications**
 - Clinical studies on Ayurveda: *Basti* given in evening shows better efficacy in neurological conditions.



- Experimental models: Diurnal variations in pharmacokinetics of herbal extracts observed.

DISCUSSION

Ayurveda's *Aushadha Sevana Kala* can be viewed as a precursor to modern chronotherapy. Both systems recognize that the "same drug at different times" produces variable outcomes. While Ayurveda bases timing on *dosha*, *agni*, and *dinacharya*, modern science explains this through circadian regulation of drug-metabolizing enzymes, hormone release, and receptor sensitivity.^[16]

For example, the recommendation of laxatives at night parallels modern understanding of colonic motility being highest during early morning hours. Similarly, *Kapha Kala* corresponds with higher mucus secretion and sluggish metabolism, suggesting why *Kapha*-related drugs are given in the morning.^[17-18]

However, modern research remains limited in systematically validating *Aushadha Kala*. Few randomized clinical trials exist, and many Ayurvedic formulations lack pharmacokinetic profiling in circadian contexts. There is also a gap in translating *dosha*-based timing into measurable circadian biomarkers (like cortisol or melatonin).^[19]

Future prospects include:^[20]

- Standardizing definitions of *Aushadha Kala* for clinical research.
- Designing chronopharmacology-inspired clinical trials in Ayurveda.
- Developing biomarkers to map *dosha* and circadian phases.
- Integrating personalized medicine approaches, aligning *prakriti* (Ayurvedic constitution) with genetic and chronobiological data.

CONCLUSION

The concept of *Aushadha Sevana Kala* demonstrates Ayurveda's profound insight into the influence of time on therapy. By prescribing specific timings based on *dosha*, *agni*, and disease status, Ayurveda anticipated what modern science now recognizes as chronopharmacology. Both disciplines converge on the principle that drug efficacy and safety are not merely dependent on dosage but are critically shaped by timing.

Current scientific evidence supports the notion that circadian rhythms significantly affect drug absorption, metabolism, and therapeutic response. While some parallels with Ayurvedic timing

principles are evident, systematic experimental validation and clinical standardization are still needed.

Integrating *Aushadha Kala* with chronopharmacology holds promise for enhancing therapeutic outcomes, reducing side effects, and advancing personalized medicine. This approach can also contribute to sustainable healthcare models by optimizing drug use efficiency. Interdisciplinary research, combining Ayurveda, molecular chronobiology, and clinical pharmacology, is essential to bridge the gap and develop practical, evidence-based guidelines.

In conclusion, classical Ayurvedic wisdom and modern chronopharmacology are not isolated traditions but complementary sciences. Together, they offer a more holistic and precise approach to drug administration, with significant implications for future healthcare.

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