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NIDRA AND MALE REPRODUCTIVE HEALTH: AN INTEGRATIVE REVIEW OF AYURVEDIC PRINCIPLES AND MODERN SCIENTIFIC PERSPECTIVES

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ABSTRACT

Sleep (*Nidra*) one of the *Trayopasthambha* (three pillars of life) in Ayurveda is fundamental for maintaining physical health, mental equilibrium, and reproductive vitality. Classical Ayurvedic texts such as *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya* describe that proper sleep promotes *Bala* (strength), *Vrishya* (virility), and *Ayu* (longevity), whereas disturbed or insufficient sleep (*Anidra*) leads to *Vata Prakopa*, *Ksheena Shukra* (reduced semen quality), and *Kleebata* (impotency). In modern terms, these conditions correlate with hormonal imbalance, reduced testosterone, and impaired spermatogenesis. Contemporary research confirms that sleep deprivation disrupts the hypothalamic–pituitary–gonadal (HPG) axis, elevates cortisol levels, and suppresses gonadotropin and testosterone secretion, resulting in decreased sperm count, motility, and morphology. Oxidative stress and circadian misalignment further contribute to male infertility. Ayurvedic concepts such as *Nidra Samyak Charya* (proper sleep regimen) and *Vajikarana Chikitsa* (aphrodisiac therapy) offer preventive and therapeutic insights into maintaining reproductive health. Integrating these ancient principles with modern sleep

science provides a holistic framework for managing male infertility by restoring *Shukra Dhatu* and hormonal balance.

KEYWORDS: Ayurveda, Nidra, Shukra Dhatu, Male Infertility, Vata Prakopa, Vajikarana, Sleep Deprivation, HPG Axis, Testosterone, Circadian Rhythm, Rasayana, Reproductive Health.

INTRODUCTION

Ayurveda, the ancient Indian science of life, emphasizes the maintenance of health through the balance of physical, mental, and spiritual aspects of life. It upholds the concept of *Trayopasthambha*, three supportive pillars, namely *Ahara* (food), *Nidra* (sleep), and *Brahmacharya* (celibacy), which sustain life and promote longevity.[1] Among these, *Nidra* holds a significant role in maintaining physical strength, mental equilibrium, and reproductive capacity.

According to *Charaka Samhita*, *Nidra* arises when the *Manas* (mind) and *Indriyas* (sense organs) withdraw from their objects under the dominance of *Tamas guna*; this process rejuvenates the body and restores its functions.[2] *Ashtanga Hridaya* describes that adequate sleep provides *Bala* (vitality), *Vrishya* (virility), *Pushti* (nourishment), and *Ayu* (longevity), while disturbed or excessive sleep (*Anidra* or *Atinidra*) leads to *Vata prakopa* (Vata aggravation), *Kleebata* (impotency), and *Shukra Kshaya* (depletion of reproductive tissue).[3] Likewise, *Sushruta Samhita* regards *Nidra* as one of the vital sustaining factors of life and notes that its absence results in weakness, sterility, and dysfunction of *Shukra Dhatu*.[4]

In contemporary society, lifestyle changes, stress, and irregular work schedules have drastically reduced the quality and duration of sleep. Sleep deprivation and disturbed circadian rhythms are now recognized as public health challenges that adversely affect reproductive physiology.[5] Modern evidence suggests that inadequate or poor-quality sleep is associated with reduced testosterone levels, impaired spermatogenesis, and abnormal semen parameters, including reduced sperm count, motility, and morphology.[6] These physiological disturbances resonate with Ayurvedic principles, which state that *Ratri Jagarana* (night awakening) provokes *Vata Dosha* and disturbs *Apana Vayu*, the subtype governing ejaculation and reproduction.[7]

Male infertility accounts for approximately 30–40% of total infertility cases, with a growing contribution from stress, lifestyle irregularities, and hormonal imbalance.[8] Ayurveda describes analogous conditions such as *Shukra Dushti*, *Ksheena Shukra*, and *Klibata*, which correlate with oligospermia, poor sperm quality, and erectile dysfunction in modern terminology.[9] Since *Shukra Dhatu* is the final essence of all *Dhatus*, any disturbance in *Nidra* or metabolic balance (*Agnimandya*) can impair its formation and quality, leading to infertility.[10]

Recent integrative research demonstrates that inadequate sleep activates the hypothalamic–pituitary–adrenal (HPA) axis, resulting in elevated cortisol levels and suppressed hypothalamic–pituitary–gonadal (HPG) axis activity, which leads to reduced gonadotropin and testosterone secretion.[11] This mechanism parallels the Ayurvedic notion that *Vata prakopa* causes *Dhatu Kshaya* and *Klibata*, thereby reducing reproductive potential.[12] Both traditional Ayurvedic concepts and modern scientific understanding converge on the conclusion that proper *Nidra* is essential for reproductive and hormonal homeostasis.

Given the growing global burden of infertility and the prevalence of sleep disturbances, it is imperative to explore the interrelationship between *Nidra* and male reproductive function. This review aims to interpret classical Ayurvedic views on *Nidra* and *Shukra Dhatu* in the light of modern endocrinological and physiological evidence to emphasize the importance of holistic management in male infertility.

Literature Review

Ayurveda describes *Nidra* (sleep) as a fundamental physiological requirement that sustains life and contributes to *Dhatu Pushti* (tissue nourishment) and *Shukra Dhatu Vriddhi* (enhancement of reproductive tissue). Proper *Nidra* maintains *Sharirika Bala* (physical strength), *Manasika Prasannata* (mental clarity), and *Vrishata* (fertility).[13] Classical references from *Ashtanga Hridaya* emphasize that the absence or irregularity of sleep results in *Vata Prakopa*, leading to disorders such as *Kleebata* (impotency), *Ksheena Shukra* (oligospermia), and *Ayu Hani* (reduced vitality).[14] Similarly, *Charaka Samhita* classifies *Anidra* (insomnia) among *Vataja Nanatmaja Vyadhi*, describing its consequences as exhaustion, mental distress, and reduced reproductive potency.[15]

The *Shukra Dhatu* represents the culmination of all *Dhatu Parinama* (tissue transformation) processes and governs fertility, vitality, and psychological stability.[16] *Sushruta* states that

proper *Shukra* is *Snigdha* (unctuous), *Madhura* (sweet), and *Sphatika-abham* (crystal-like), and that any disturbance in *Agni* (metabolic fire) or *Vata* impairs its production.[17] Hence, sleep deprivation, a major cause of *Vata vitiation*, adversely affects *Shukra Dhatu* by inducing *Agnimandya* and depletion of anabolic activity.[18]

Pathak and colleagues observed that *Ratri Jagarana* (night awakening) and erratic sleep patterns elevate *Vata* and *Rajas Guna*, producing hormonal imbalance analogous to hypothalamic–pituitary–gonadal (HPG) axis suppression in modern physiology.[19] They also noted that individuals practicing regulated sleep patterns exhibit better *Dhatu Samyata* (tissue equilibrium) and improved reproductive parameters.

Vignesh (2024) reported that disturbed sleep alters circadian rhythm and reduces melatonin secretion, increasing oxidative stress and sperm DNA fragmentation.[20] He correlated these findings with *Vata-Pitta Dushti* (vitiation), which leads to *Shukra Kshaya* and poor *Beeja Shakti* (fertilizing potential). Modern evidence supports this concept: men sleeping less than six hours per night show lower serum testosterone and luteinizing hormone (LH) levels compared with those having 7–8 hours of sleep.[21] Similar studies reveal that sleep deprivation causes a decline in semen volume, sperm count, and motility, indicating impaired spermatogenesis.[22]

Reiter and Tan (2020) elucidated the physiological mechanism by which inadequate sleep disrupts the HPA axis, elevating cortisol and suppressing gonadotropin-releasing hormone (GnRH), resulting in reduced testosterone production.[23] This stress-induced endocrine disturbance parallels *Agnimandya* and *Vata-Pitta Prakopa* in Ayurveda, both leading to *Shukra Dushti* and infertility.[24]

Ayurvedic preventive measures emphasize *Nidra Samyak Charya*, proper sleep timing, mental relaxation, and abstention from late-night activities, to sustain *Shukra Dhatu* and overall vitality.[25] *Vajikarana* (aphrodisiac therapy) and *Rasayana* (rejuvenation) treatments including *Ashwagandha* (*Withania somnifera*), *Kapikacchu* (*Mucuna pruriens*), and *Gokshura* (*Tribulus terrestris*) are recommended to strengthen *Shukra Dhatu* and restore hormonal balance when combined with proper sleep hygiene.[26,27]

Fatima and Sonika (2021) emphasized that balanced sleep, regulated lifestyle (*Dinacharya* and *Ritucharya*), and *Vajikarana Dravyas* play a synergistic role in enhancing fertility and

reversing *Shukra Kshaya*.[28] Similarly, Sembulingam (2022) explained that deep sleep phases stimulate gonadotropin secretion, optimize testosterone release, and support spermatogenic function, validating Ayurvedic interpretations in biomedical terms.[29]

Thus, both Ayurvedic and contemporary literature confirm that *Nidra* is a crucial regulator of reproductive health. The physiological rest obtained through sound sleep ensures hormonal synchronization, stress reduction, and *Dhatu Pushti*. Conversely, chronic sleep loss induces *Vata Prakopa*, oxidative stress, and endocrine disruption, culminating in male infertility. Integrative approaches combining *Nidra Paripalana* (sleep regulation) with *Vajikarana Chikitsa* may offer a comprehensive strategy for managing infertility.

DISCUSSION

The analysis of Ayurvedic and contemporary literature indicates a close interrelationship between *Nidra* (sleep) and male reproductive health. Both traditional and modern frameworks highlight that proper sleep is vital for maintaining reproductive function, hormonal homeostasis, and overall vitality.[30]

Ayurveda considers *Nidra* to be governed primarily by *Tamas Guna* and *Kapha Dosha*, which promote stability and restoration. Deficiency or excess of either can disturb *Vata* and *Pitta*, leading to *Shukra Kshaya* and *Kleebata*.[31] *Charaka Samhita* explicitly states that *Alpanidra* (less sleep) or *Ratri Jagarana* (night vigil) causes *Vata Prakopa*, which interferes with *Shukra Dhatu Nirmana* (formation of reproductive tissue).[32] This aligns with current neuroendocrinological understanding that sleep deprivation increases cortisol secretion through activation of the hypothalamic–pituitary–adrenal (HPA) axis and suppresses gonadotropin-releasing hormone (GnRH) secretion.[33]

Reduced GnRH release diminishes luteinizing hormone (LH) and follicle-stimulating hormone (FSH), both of which are essential for spermatogenesis and testosterone production. Experimental evidence confirms that chronic sleep restriction decreases serum testosterone by up to 10–15% within one week.[34] Such findings correlate with the Ayurvedic pathophysiology of *Vata Vriddhi* and *Agni Mandya*, leading to tissue depletion (*Dhatu Kshaya*) and impaired *Shukra Dhatu*.[35]

Further, oxidative stress plays a key role in both Ayurvedic and modern perspectives. *Vata Prakopa* is considered to cause cellular exhaustion and tissue dryness, similar to the oxidative

damage and lipid peroxidation reported in sleep-deprived males.[36] Reiter and Tan (2020) described how diminished melatonin secretion disrupts antioxidant defense mechanisms, increasing reactive oxygen species (ROS) in seminal plasma and causing sperm DNA fragmentation.[37] This may explain the Ayurvedic notion of *Shukra Dushti* (vitiated semen), which presents with reduced viscosity, motility, and vitality.[38]

Ayurvedic *Vajikarana Chikitsa* offers a holistic framework for the restoration of *Shukra Dhatu*. Herbs such as *Ashwagandha* (*Withania somnifera*), *Kapikacchu* (*Mucuna pruriens*), and *Gokshura* (*Tribulus terrestris*) exhibit proven spermatogenic, antioxidant, and adaptogenic effects, which complement the neuroendocrine recovery achieved through adequate *Nidra*.[39,40] Modern studies confirm that *Ashwagandha* supplementation in men with oligospermia improves sperm concentration, motility, and testosterone levels by reducing cortisol and oxidative stress.[41]

Sleep quality also influences the parasympathetic nervous system, which plays a key role in sexual arousal and erection physiology. Ayurveda explains this through the equilibrium of *Vata subtypes*, especially *Apana* and *Vyana Vayu*, which coordinate reproductive function.[42] Chronic *Anidra* causes sympathetic overactivity, reducing erectile response and sperm release, an exact parallel of modern concepts of psychogenic and stress-related infertility.[43]

Incorporating *Nidra Samyak Charya* (sleep hygiene) in male infertility management offers a non-pharmacological, cost-effective, and sustainable approach. Regular sleep timing, avoidance of night work, digital detox before sleep, and intake of *Snigdha Ahara* (unctuous food) before bedtime are traditional practices that can enhance sleep quality and hormonal stability.[44] These interventions, when combined with *Rasayana* and *Vajikarana* therapies, create a synergistic effect on endocrine balance, sperm health, and psychological well-being.[45]

Hence, *Nidra* should be recognized as a critical therapeutic component in the management of male infertility. Integrating Ayurvedic *Vajikarana* principles with modern sleep science can lead to a more comprehensive, individualized, and preventive approach to male reproductive health.

CONCLUSION

The synthesis of Ayurvedic wisdom and modern scientific insight clearly establishes Nidra (sleep) as an indispensable pillar of male reproductive health. Ayurveda, through its doctrine of *Trayopasthambha*, identifies Nidra as a life-sustaining force that nurtures *Shukra Dhatu*, promotes vitality (*Bala*), and maintains equilibrium of *Doshas* and *Agni*. Classical texts consistently warn that *Anidra* (insufficient sleep) or *Ratri Jagarana* (night awakening) leads to *Vata Prakopa*, *Agni Mandya*, and *Shukra Kshaya*, manifesting as infertility, loss of vigor, and psychological distress.

Modern research mirrors these ancient observations: inadequate or disturbed sleep alters the hypothalamic–pituitary–gonadal (HPG) axis, elevates cortisol, reduces testosterone, and disrupts spermatogenesis. Oxidative stress and circadian misalignment further impair sperm quality and hormonal balance. Thus, both paradigms converge on the conclusion that sound, regular, and restorative sleep is critical for endocrine stability, reproductive efficiency, and overall well-being.

Incorporating *Nidra Samyak Charya* (healthy sleep regimen) alongside *Vajikarana* and *Rasayana* therapies, using herbs such as *Ashwagandha*, *Kapikacchu*, and *Gokshura*, offers a holistic and sustainable strategy for managing male infertility. This integrative approach not only revitalizes *Shukra Dhatu* but also harmonizes the mind-body axis, reduces stress, and enhances quality of life.

In essence, Nidra is not merely a passive state of rest but a dynamic process of rejuvenation, essential for sustaining reproductive vitality and the continuum of life itself. Recognizing and restoring the sanctity of sleep, as envisioned in Ayurveda, may well be the key to addressing the modern epidemic of stress-induced infertility.

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