

## Review Article

# Influence of sleep in polycystic ovarian syndrome: an ayurvedic appraisal

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## ABSTRACT

Polycystic ovary syndrome (PCOS) is a complex endocrine disorder which affects the reproductive, metabolic and psychological health of women. Now a day's incidence rate of PCOS is incising in reproductive age of woman due to sedentary lifestyle and faulty daily routine. Clinical studies indicate that sleep disturbance and disorders including obstructive sleep apnea and excessive daytime sleepiness are more common in the woman with symptoms of PCOS. Despite proof of the high prevalence of sleep disorders in these patients, modification of sleep is not considered as major point for treatment protocol in modern therapeutics. Ayurveda as a holistic medicine lays great emphasis on lifestyle modification under *Aahaara* (Diet)- *Vihaara* (Daily regimen)- *Oushadha* (Medicine) - triad for the prevention and treatment of all diseases. Among *Vihaara*, *Nidra* (Sleep) is considered as a very influencing factor in Ayurvedic classics. Balanced sleep at night maintains the health. Disturbance of sleep pattern can lead to *Dosha* vitiation which hampers regular metabolic activity of the body and leads to various disorders. Hormones affecting metabolism, appetite and blood glucose are regulated with circadian rhythms. When circadian rhythms are out of sync, the body's metabolic health hampers. Irregular metabolic function disturbs the hormonal cycle including hypothelamo-pitutory-ovarian axis, hypothalamic-pituitary-adrenal function, and so on. These can ultimately lead to PCOS in reproductive age of women. It seems that if lifestyle modification should be expanded in PCOS patients including sleep hygiene alongside food and exercise positive outcome can be obtained. With this background this study is aimed to determine the importance of sleep hygiene in PCOS from the view of Ayurveda.

**Keywords:** Ayurveda, Hormonal cycle, Metabolic health, *Nidra*, Polycystic ovary syndrome

## INTRODUCTION

Polycystic Ovarian Syndrome (PCOS) is a hormonal disorder that affects between 5-10% of women in reproductive age and remains the most enigmatic reproductive disorders.<sup>1</sup> There are no racial or ethnic influences on the prevalence of PCOS worldwide and the studies are incomparable because of biased group selections, small sample sizes, inconsistencies between diagnostic criteria, treatments.<sup>2,3</sup> The primary underlying defect in PCOS remains unknown, pathogenesis is uncertain but few studies valued potential contributors

including insulin resistance, hereditary and genetic factors, ovarian factors, impaired gonadotropin dynamics, and androgen excess even though lifestyle may be the main contributing factor.<sup>4-8</sup>

Ayurveda believes in concepts of *Tridosha* (*Vata*, *Pitta* and *Kapha*), *Saptadhatu* (*Rasa*, *Rakta*, *Mamsa*, *Medas*, *Asthi*, *Majja* and *Shukra*), *Trimala* (*Mutra*, *Pureesha* and *Sweda*). Balanced condition of *Dosha* (Humors), *Dhatu* (Tissues), *Mala* (Excreta) is Health. Imbalances in these three factors affect the human health and produce various diseases. *Nidra* (Sleep)-*Aahaara* (Food)-*Brahmacharya*

(Abstinence) are three sub-pillars to maintain healthy lifestyle. Disturbance in these leads to vitiation of *Dosha* and produce various ailments. Adequate Sleep at night (*Ratriswabhav Prabhava*) provides health, immunity and rejuvenates body as well mind and in adequate sleep at night or day time sleep leads to weakness, non-attendance, reduction in memory and plenty of disorders.<sup>9</sup>

Recent studies show that many hormones related to metabolism follows day-night cycle called circadian rhythm. Disturbance in quality quantity or timing of the sleep directly affect regular metabolism and hormonal activity. Recurrent nights of insufficient sleep can cause insulin resistance in healthy adults. Insulin resistance is one of the prime cause for PCOS. Sleep disturbances are very common in PCOS patients with negative effects on quality of life in these patients.

There are many treatment modalities available for PCOS such as drug administration, few surgical interventions but lifestyle correction is the important foremost protocol. Thus, before initiating any treatment lifestyle changes fall under first priority.<sup>10</sup> Along with conservative line of treatment sleep management also should be focused for treatment protocol of PCOS. Ayurveda provides different techniques for pacification of mind and body which can restore the normal sleep pattern and maintenance of sleep hygiene.

Aim and objective of this study was to Conceptual study of PCOS, to understand the importance of Sleep for improving the quality of life in PCOS patients through Ayurveda.

Online and offline available sources including classical texts of Ayurveda, Modern text books, research journals etc. are reviewed and compiled for the proper understanding of the concept.

## PCOS

PCOS is an endocrine disorder of women with the basic symptoms of hirsutism, amenorrhea and enlarged polycystic ovaries. Though these symptoms varies from one woman to another. It is often associated with abdominal adiposity, obesity, metabolic disorders and cardiovascular risk factors. The aetiology of this syndrome is largely unknown, but various evidence suggests that PCOS might be a complex metabolic disorder with strong epigenetic and environmental influences, including diet and lifestyle factors such as sleep. One of the key factors in relation to PCOS is hyperinsulinemia- increased level of insulin in the blood. This indicates a direct link between obesity and PCOS. Increased level of insulin in the blood is due to desensitization of cells to insulin i.e. insulin resistance, Increased insulin in the blood stimulates androgen secretion from theca cells of ovarian stroma. Insulin also inhibits hepatic synthesis of serum Sex Hormone Binding Globulin (SHBG) resulting in increased level of free

testosterone. Under the influence of high level of androgen in ovary, the follicular maturation process in the ovarian cycle is affected causing anovulation of that particular follicle. Presence of insulin also affects apoptosis i.e. natural death of a defective cell which leads to follicular survival for long time which would be perished in normal circumstances.<sup>11</sup>

Ovarian cycle is controlled by hormonal feedback system moderated by hypothalamus. With Positive and negative feedback mechanism GnRh (Gonadotropin Releasing Hormone) secretion from hypothalamus, FSH (Follicular stimulating hormone) and LH (Luteinizing Hormone) secretion from the anterior pituitary and oestrogen and progesterone from ovaries are regulated. This hormonal level balance and HPO axis is disturbed in the PCOS where due to increased insulin resistance, Leptin and hyperandrogenemia Positive feedback is received by the hypothalamus resulting increased pulse frequency of GnRh leading to increased pulse frequency of LH resulting elevated level of LH. Due to reduced SHBG estradiol level increases. FSH level will not be increased due to follicular inhibin and estradiol. Hence LH:FSH ratio increased.

## PCOS AYURVEDIC POINT OF VIEW

Reproductive system in Ayurvedic classics represented by Aartavavaha Srotasa by which means the channel which supplies, nourishes and enables functional action of carrying ovum and excrete the ovum in case of fertilization do not achieved. Ovum is represented by word *Artava*.

In Ayurvedic classics PCOS can be considered due to *Kapha* Predominant *Tridoshas*. Normal function of *Tridoshas* leads to regular reproductive function. *Vata* is responsible for maturation and movement of Ovum during ovarian cycle and excretion of menstrual blood from uterine cavity through vagina if fertilization not been achieved. *Pitta* is related to transformation, metabolism and heat. Hormonal influence in the different stages of menstrual cycle and transformation of follicles reflects nature and natural action of *Pitta*. *Kapha* with its heavy cool qualities nourish the development of tissues. Follicular nourishment and growth in ovarian cycle express influence of *Kapha* in menstrual cycle.

PCOS can be understood with the concept of *Aavrana* (Blockage). PCOS is due to *Kapha* blocking *Vata* and *Pitta*, hence the basic feature of *Vata*- Movement and *Pitta* - Transformation process are suppressed.

*Kapha* affects first to the *Agni* - Metabolic process of the body including digestive fire - *Jatharagni* and metabolic aspect of 7 tissues-*Dhatvagni*. Each *Dhatvagni* is responsible for the formation and nourishment of that particular tissue - *Dhatu*. In PCOS *Dhatu*s that affected are *Rasa Dhatu*- Lymph and Plasma, *Meda Dhatu*- Adipose tissue and *Artava Dhatu* - Ovum and Menstrual

blood. Due to factors that aggravate *Kapha*, it suppress digestive fire in the stomach - *Jatharagni*. Indigested food produces toxins- *Ama*. Aggravated *Kapha* mixed with *Ama* moves out of GI tract and enters channel of tissues- *Srotasa* and hampers normal function by blocking them - *Srotosanga*. Due to *Srotosanga Vata* is blocked and cannot move freely into the *Srotasa* as well in *Artava* -*Vaha Srotasa* hence hampers ovulation and menstruation. Blockage of *Vata* leads to *Pitta* blockage which hampers regular metabolism, hormonal influence and transformation of follicles into ovaries.<sup>12,13</sup>

### PHYSIOLOGY OF SLEEP (NIDRA)

Sleep is a normal phenomenon of the body which follows a periodic pattern accompanied by a reduction in its physiological role.<sup>14-17</sup> During the sequence of night, an individual's sleep is divided into non-rapid eye movement (NREM) sleep and rapid eye movement (REM) sleep. REM sleep is also called dreaming sleep since it is associated with dreaming, or paradoxical sleep because the brain waves in the electroencephalogram come to be activated during this state of sleep. NREM sleep is considered to be orthodox sleep or slow wave sleep (SWS), because of falling of physiological and psychological activities.<sup>18,19</sup>

Sleep is described among sub-pillars of the body. When *Mana* (mind) is exhausted and dissociates with sensory and motor organs, *Nidra* occurs. This phenomenon can be understood in this manner i.e. sleep is due to cerebral ischemia. Cerebral cortex is the base of higher centres like pre and post central gyrus, association area etc. Due to the reduction in cerebral blood supply brain gets exhausted which causes Sleep. Further during sleep, *Indriyas* (sensory and motor perceptions) become sedentary by the detachment from their sense organs and from their work.

### IMPACT OF NIDRA ON DOSHAS

As a rule of nature, sleep resembles quality of night because night is predominant of *Tamo Guna* and *Kapha Dosha* *Kapha* as a *Shareerika Dosha* and *Tamas* as a *Manodosha* share common qualities. Predominance of *Kapha* and *Tamoguna* causes the blockage of *Sanjnavaha Srotas* which causes mutual loss of contact between the different factors which are responsible for perception. The process leads to the Physiological sleep (*Prakruta Nidra*) which has been termed as *Swabhavika Nidra* or *Ratri Swabhava Prabhava*. While *Kapha Dosha* and *Tamo Guna* are responsible for Physiological sleep, the involvement of *Rajo Guna* and other physical *Dosha* induces a *Vikruta Nidra* (pathological sleep). Physiological sleep (*Ratri Swabhava prabhava*) leads to balanced condition of *Doshas* and healthy status of individual. Other than all kind of sleep leading to Imbalance of *Dosha* (*Doshavaishamyata*). Day time sleep (*Divashayana*) Aggravate the *Kapha Dosha*, produces *Ama*, blocks *Srotasa* and leads to various diseases.<sup>20</sup>

### PCOS AND SLEEP

Previous clinical research on PCOS reveals that sleep disorders have a significantly higher prevalence in patients with PCOS compared to healthy individuals.<sup>21-23</sup> Thus, sleep disturbance could be an important feature of PCOS.<sup>24</sup> PCOS patients usually seen with poor quality of sleep at night with sleeping disorders such as Insomnia, Obstructive sleep apnea that leads to Lethargy, daytime sleep and metabolic dysfunction. Poor sleep in PCOS patients is associated with depression, increased insulin resistance, obesity, cardiovascular diseases etc.<sup>25,26</sup>

In Ayurvedic classical literature Day time sleep (*Divashayana*) is considered as prime causative factor for *Kapha* vitiation which further blocks *Srotasa* (Channels in the body), Decreases *Jatharagni* (Digestive and Metabolic power) and produces *Ama*(toxins). It leads to *Artava vaha Srotodushti* including *Abeejatva* (Anovulation) which is a prime symptom of PCOS.

### ENDOCRINOLOGY RELATED TO SLEEP IN PCOS PATIENTS

Recent research indicates that many hormones and body systems operate on a daily cycle. i.e. Circadian clock of the body. It directs hormonal cycle by affecting the timing of the production and release of the hormone such as insulin. Circadian rhythms can be thrown off sync by Irregular sleep schedules, patterns of poor quality-restless sleep, presence of sleep disorders, such as insomnia and sleep apnea.

Disruption to circadian clocks shows one of the leading cause to decrease insulin sensitivity and insulin resistance. Lack of sleep also appears to affect the health of cells in the pancreas, where insulin is made and released. In an experimental study carried to investigate the effects of sleep deprivation on cell function, it was found that insufficient sleep creates stress in pancreatic cells, and also disrupts blood glucose levels. Both the cellular stress and the disruptions to blood sugar were more pronounced in older mice, suggesting the body becomes less adept at coping with the impact of sleep deprivation over time.<sup>27</sup> Insulin resistance leads to Type II diabetes and PCOS.

Recent studies have shown that a reduced sleep duration and poor quality of sleep can affect hypothalamic-pituitary-adrenal (HPA) axis activity.<sup>28</sup> The sympathetic system is more active in PCOS patients with poor sleep, especially in people who sleep during the day. Study shows that the levels of adrenaline and noradrenaline are found to be higher in PCOS patients compared to non-PCOS women. They also showed that the levels of cortisol in PCOS women who wake up early and women with the proper sleep of about 8 hours were significantly lower than other PCOS women. These findings show that the level of cortisol as an indicator for the HPA axis can be influenced not only by the time of sleep and

awakening but also by the duration of nocturnal sleep.<sup>29</sup> Increase level of cortisol makes cells more resistant to insulin leading to PCOS.

Stress hormones and melatonin are the neuro hormones involved in the sleep-wake cycle. Melatonin synthesized in the pineal gland, plays a pivot role in the regulation of sleep-wake cycle (circadian rhythm).<sup>30</sup> Melatonin is produced and released in rhythmic way during the day-night cycle. It secretes more in darkness and suppressed by light.<sup>31,32</sup> Sleep for a shorter duration in night and day sleep is a leading cause for lower levels of melatonin.<sup>33,34</sup> Melatonin plays a vital role in reproductive processes, normal function of HPO axis and specially in ovarian function.<sup>35</sup> It affects gonadal function such as secretion of sexual hormones, follicular development, oocyte maturation, ovulation, and qualitative oocyte formation.<sup>36,37</sup>

Leptin is a peptide secreted by fat cells helps to maintain energy balance in the body. It curbs appetite, sending signals of consumption of enough energy through calorie intake-signals that translate into feelings of fullness. Leptin also helps regulate metabolism and the rate at which the body burns fat. Lower leptin levels slow metabolism down. Poor sleep may also make the body resistant to leptin's appetite-curbing effects. Hence obesity increased.

At the same time poor sleep lowers leptin, it also increases levels of another hormone important to energy balance and weight: ghrelin. Which is also referred to as the "hunger hormone." ghrelin stimulates appetite, increasing hunger and the desire to eat, and throwing the body's energy balance off kilter. Which can be one of the cause for obesity in PCOS patients.

## DISCUSSION

Assessment of the health status in PCOS should include a concern of sleep quality and the right approach to reduce these disorders and improve the quality of life in these patients.<sup>38,39</sup> However, recent studies suggest that more than 90% of physicians, who manage PCOS women, are rarely trained about the sleep disorders in these patients.<sup>40</sup> Hence, it indicates that modification of sleep patterns in PCOS patients could be used for regularization of hormones in the HPA and brain-ovary axis which may play an important role in the management of PCOS.<sup>41</sup>

Ayurveda science believes in the balance of life. Equilibrium state of all three component of tripod - *Ahara* as balanced healthy diet, *Nidra* as adequate sleep according to circadian rhythm and *Brahmacharya* in the form of abstinence or indulging in controlled manner of sexual activity which do not hamper to health; are leading to the health. Disturbance of this tripod leads to various unhealthy situations, which may worsen and can lead to various diseases. In PCOS circadian rhythm play a vital role for the manifestation of the symptoms. Hence with

dietary regulation sleep management is also necessity of the era. Some ayurvedic protocol, can help to regulate the sleep pattern in PCOS which are as per follow.<sup>42</sup>

- *Nidana Parivarjana* (avoidance of aetiological factors) - before starting any medicine viz. smoking, excessive consumption of coffee or caffeinated drinks, alcohol, work beyond ability or watching to be avoided.
- *Panchakarma* procedures followed by *Shamana Chikitsa* (Palliative therapy) can be beneficial. *Vamana* (Emesis), *Virechana* (Purgation), *Nasya* (Nasal drop) therapies helps to expel out the *Doshas*, enhance *Jatharagni*, Clear blockage of *Srotasa*; by that increases quality of sleep, regulates metabolism and hormonal cycle.
- *Abhyanga* (body massage), *Padabhyanga* (foot massage), *Shirobhyanga* (head massage) *Shirodhara*, *Pichu* - These procedures help to increase quality of sleep.
- *Ashtanga Yoga* focuses on mental balance through *Yama*, *Niyama*, *Asana*, *Pranayama*, *Pratyahaara*, *Dharana*, *Dhyana*, and *Samadhi*. Yogic Practices helps for induction of qualitative sleep and pacification of mind.
- *Pranayama* techniques like *Anuloma Viloma*, *Ujjayi*, *Bhramari*, *Sheetali* and Meditation along with the practice of *Yama* and *Niyama* are potent to cure breathing irregularities and obstructive sleep apnea hence improve sleep quality.
- *Yogasana* practice such as *Suryanamaskara*, *Tadaasana*, *Matsyaasana*, *Mandookaasana*, *Bhujangaasana*, *Padmaasana*, *Paschimottaanaasana* and *Shavasana* helps to pacify mind, regulate sleep, enhance metabolic function and regulate hormone cycle.

## CONCLUSION

Women with insufficient sleep are at increased risk of insulin resistance which leads to PCOS. Sufficient sleep can protect women against ovulatory dysfunction, possible fertility problems and insulin resistance. Ayurveda focuses both on preventive and curative aspects of diseases. Quality of life of PCOS patients can be improved through lifestyle modifications and Ayurvedic interventions. Disturbed Sleep patterns in PCOS can be better managed through Ayurvedic techniques.

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