Original Article
http://mjiri.iums.ac.ir
Medical Journal of the Islamic Republic of Iran (MJIRI)

Med J Islam Repub Iran. 2025 (3 Sep);39.116. https://doi.org/10.47176/mjiri.39.116

The Role of Sleep Hygiene in Different Patterns of Polycystic Ovary Syndrome (PCOS): Insights from Modern and Persian Medicine

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Received: 16 Apr 2025 Published: 3 Sep 2025

Abstract

Background: Polycystic ovary syndrome is a prevalent endocrine disorder and a major cause of infertility. Although lifestyle modification is emphasized in both Persian and modern medicine, the role of sleep is often overlooked. This review investigates the role of sleep in different patterns of PCOS management from both perspectives.

Methods: The study is a narrative review. Literature from both Persian and modern sources was analyzed regarding the impact of various factors on PCOS, with a focus on the impact of sleep. Modern databases were searched with defined keywords and criteria.

Results: Modern studies often describe sleep disorders as consequences of PCOS. However, Persian medicine considers poor sleep a potential cause of the disease, highlighting the need for personalized sleep recommendations.

Conclusion: It is recommended that sleep, like diet and exercise, be included in the lifestyle management of PCOS. For this purpose, more clinical studies are needed to prove the connection between improving sleep and reducing disease outcomes.

Keywords: Persian medicine, Modern medicine, Polycystic Ovary Syndrome, Sleep, Traditional medicine

Conflicts of Interest: *None declared*
Funding: *None*

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Cite this article as: Goodarzi L, Ahmadi MM, Ramezanirad M, Ahmadi F, Khosravi A, Zadeh Modarres S, Farjami M, Tansaz M. The Role of Sleep Hygiene in Different Patterns of Polycystic Ovary Syndrome (PCOS): Insights from Modern and Persian Medicine. *Med J Islam Repub Iran.* 2025 (3 Sep);39:116. https://doi.org/10.47176/mjiri.39.116

Introduction

Polycystic Ovary Syndrome (PCOS) is a complex and multifaceted endocrine disorder that poses significant challenges to women's health, extending far beyond its well-known impact on reproductive function (1). PCOS is a syndrome that primarily affects individuals of reproductive age, being one of the most common causes of infertility (2), manifesting in a combination of hormonal imbalances and metabolic irregularities, all leading to reproductive challenges (3). The condition involves a broad array of symptoms, including irregular menstrual cycles (4). Beyond its reproductive implications, PCOS intertwines with broader health concerns, including sleep hygiene, insulin resistance, and obesity (5). Studies about the prevalence of PCOS globally estimate a prevalence of 3%-20%, varying based on regions, with Australia, Turkey, and Denmark reporting the highest number of cases with a 15-20% preva-

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↑What is "already known" in this topic:
Lifestyle modifications, including diet and exercise, are key in PCOS management. Sleep disturbances are often seen as symptoms rather than causes of the condition.

→What this article adds:
This article suggests that poor sleep may contribute to PCOS, advocating for its inclusion in lifestyle interventions alongside diet and exercise.

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[DOI: 10.47176/mjiri.39.116]

lence (5). Studies in Iran have shown a prevalence rate between 3% to 11.4% (5, 6). Navigating the spectrum of PCOS treatment reveals a multifaceted approach that extends beyond conventional medical interventions. Lifestyle modifications, hormonal therapies, and reproductive assistance constitute common strategies (7).

Investigating these interconnected factors is essential for developing a comprehensive understanding of PCOS. Many of these risk factors are closely linked to lifestyle—an aspect that is often underemphasized in modern medical treatment strategies, despite recent advancements. Traditional medicine, with its strong focus on prevention and holistic care, offers valuable insights that can complement contemporary approaches to PCOS management. The World Health Organization (WHO) has actively encouraged its Member States to integrate traditional and complementary medicine (TCM) into national health systems. Through initiatives such as the WHO Traditional Medicine Strategy 2014–2023, the organization has emphasized strengthening the evidence base for TCM, promoting its safe and effective use through research and regulation, and integrating it into health services as a means to support universal health coverage (8). Traditional Persian Medicine (TPM), also known as Persian Medicine, is a comprehensive and historically rich medical system rooted in the natural philosophy of ancient Persia. Central to TPM is the concept of Mizaj (temperament, humors), which categorizes individuals and treatments based on the balance of qualities such as hotness, coldness, wetness, and dryness. TPM emphasizes preventive care and holistic approaches, utilizing herbal, mineral, and dietary therapies to maintain balance and health. The foundation of Iranian Traditional Medicine is based on the preservation of health through six essential principles, known as the 'Six Necessary Principles'. Among these, proper sleep management is considered one of the most important, playing a fundamental role in maintaining temperamental balance and the proper functioning of body organs (9). Within these lifestyle risk factors for PCOS, sleep disturbances play a significant role in PCOS complexity, requiring a nuanced approach to unravel its intricacies (10). This study explores the implications of sleep disturbances and sleep behaviors on polycystic ovary syndrome (PCOS), drawing unique insights from the perspective of Traditional Persian Medicine.

Methods

In this study, a combined approach was used, which included a review of modern medical literature and an analysis of TPM books.

Search of Modern Medical Literature: Scientific articles were searched in PubMed, Scopus, and Web of Science databases. The main keywords included "polycystic ovary syndrome", "insulin resistance", "sleep disorders", and "obesity". The search period was set from 2015 to 2025 to include the latest studies on epidemiology, metabolic mechanisms, and the relationship between sleep and PCOS. Inclusion criteria were original research articles and systematic reviews published in English. Irrelevant articles, non-English papers, and low-quality studies were excluded. Review of Iranian Traditional Medicine Sources for the analysis of Iranian traditional medicine, primary sources such as the classic books Avicenna's Canon of Medicine, Mofarah al-Qulub, and Kholase-al-hekma were examined. In the section on TPM, we utilized two categories of sources: books focused on the fundamental principles of TPM and books primarily dealing with treatments. The sleep-related information(Nom) was extracted from the foundational texts, while the section on polycystic ovary syndrome (PCOS) was derived from treatment-oriented books such as the comprehensive traditional medicine book "Exir Azam." Keywords related to PCOS symptoms and sleep were used to guide the extraction process.

Main keywords in TPM sources included "amenorrhea", "oligomenorrhea", "menstrual retention", "excessive hair", and "oghr". Contemporary studies interpreting PCOS from the viewpoint of temperament and traditional medicine were also analyzed. Concepts related to PCOS symptoms and sleep were extracted and compared with findings from modern medicine.

Data analysis the information extracted from both modern medicine and traditional medicine sections was qualitatively analyzed and integrated to provide a comprehensive view of the relationship between PCOS, sleep, and lifestyle interventions.

Results

Understanding PCOS Through the Lens of Modern Science

Polycystic Ovary Syndrome (PCOS) is one of the most prevalent endocrine conditions in women, typically marked by disruptions in hormone levels, menstrual irregularities, and polycystic ovarian appearance (11). PCOS manifests with a broad spectrum of symptoms that differ in intensity and can affect multiple dimensions of a woman's health, including reproductive function, metabolic balance, and psychological health (12). The clinical presentation of PCOS is diverse, with irregular menstrual cycles being a common feature. These cycles can manifest as infrequent, prolonged, or absent periods due to oligo or anovulation. Many women with PCOS also exhibit hyperandrogenism, characterized by elevated male hormone levels, leading to symptoms such as hirsutism, male-pattern hair loss, and acne. Polycystic ovaries, which contain multiple small follicles, are often observed and contribute to disrupted ovulation, further complicating menstrual irregularities and infertility (12, 13). Additionally, women with PCOS are more likely to experience mood disorders, such as depression and anxiety, as well as sleep disturbances like sleep apnea, which further impact quality of life (13, 14). The interaction between reproductive, metabolic, and psychological symptoms underscores the importance of early diagnosis and intervention to prevent long-term complications.

Metabolic Disruption in PCOS

Insulin resistance represents a key pathophysiological aspect in most women with PCOS, playing a significant role in promoting weight gain, hindering weight loss, and heightening the likelihood of type 2 diabetes development (15). Importantly, the resulting hyperinsulinemia—a compensatory mechanism—enhances ovarian androgen synthesis, thereby aggravating hyperandrogenemia and negatively

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influencing both reproductive and metabolic parameters (5). Furthermore, PCOS exhibits a strong link with metabolic syndrome, characterized by coexisting conditions such as obesity, hypertension, and dyslipidemia, which collectively raise cardiovascular disease risk (5).

Obesity, as one of the most well-known risk factors for PCOS, plays a significant role both in the pathophysiology and treatment of the disease. Obesity is commonly observed in individuals with PCOS and exacerbates the metabolic and reproductive manifestations of the syndrome (16).

Adipose tissue dysfunction in obesity contributes to insulin resistance, hyperandrogenism, and chronic low-grade inflammation, further complicating the clinical picture of PCOS (17). Understanding the mutual relationship between obesity and PCOS is vital for developing integrated management strategies that address both metabolic and reproductive features of the syndrome (16, 18).

The adipose tissue in women with PCOS frequently shows dysfunction, marked by modified secretion of adipokines like adiponectin and leptin, which are critical for insulin sensitivity and energy balance (5).

Obesity worsens insulin resistance, resulting in glucose intolerance and an increased risk of type 2 diabetes mellitus, a condition already prevalent in PCOS (19). Moreover, accumulation of visceral fat is linked to persistent low-grade inflammation, indicated by elevated levels of pro-inflammatory cytokines such as TNF-α and IL-6, which elevate cardiovascular risk (20).

This intricate relationship with metabolic derangement and specifically obesity has reflected itself in the approach of modern medicine to the treatment of this disease.

This complex association with metabolic disturbances, particularly obesity, has influenced the modern medical approach to treating this condition (21).

Role of Sleep in the Pathophysiology of PCOS

Sleep is a dynamic and active physiological process that is fundamental to physical recovery, immune modulation, and cognitive functions, including memory consolidation, learning, and emotional regulation (22, 23). During this state, the body restores tissues, maintains hormonal equilibrium, and strengthens immune defense by influencing inflammatory pathways. Non-Rapid Eye Movement (NREM) sleep predominantly contributes to bodily repair and energy conservation, whereas Rapid Eye Movement (REM) sleep is critical for processing emotional memories, creative thinking, and stress adaptation (22, 24). Disruption or lack of sufficient sleep has been linked to a myriad of health issues, including metabolic dysfunction, increased risk of obesity, type 2 diabetes, cardiovascular disease, and mental health disorders such as anxiety and depression (25, 14).

Cognitive processes like memory encoding and retrieval rely heavily on the interplay of NREM and REM sleep stages, where NREM supports declarative memory stabilization, and REM sleep enhances emotional and procedural memory consolidation (22). Poor sleep quality disrupts these physiological processes, leading to diminished attention, decreased learning ability, and emotional instability, underscoring the vital role of sleep in sustaining overall health and cognitive function. Recent studies underscore a strong association between inadequate sleep hygiene and the aggravation of PCOS symptoms. Irregular sleep schedules, short sleep duration, and poor-quality sleep have been linked to increased insulin resistance, elevated stress, and higher androgen levels—key characteristics of PCOS (29, 26). Sleep disturbances, particularly obstructive sleep apnea (OSA) and poor sleep quality are increasingly recognized as common comorbidities in women with Polycystic Ovary Syndrome (PCOS) and play a critical role in its pathophysiology. Women with PCOS are more likely to experience sleep disturbances, such as obstructive sleep apnea (OSA), insomnia, and reduced sleep quality, compared to women without PCOS (10). Women with PCOS face an elevated risk of obstructive sleep apnea (OSA), primarily due to contributing factors such as obesity, insulin resistance, and hyperandrogenemia, which can lead to airway collapse and disrupted sleep architecture (27, 28). OSA, in turn, intensifies insulin resistance and impairs glucose metabolism, establishing a bidirectional cycle that amplifies both metabolic and reproductive complications in PCOS (10, 29). Additionally, chronic sleep deprivation has been linked to elevated cortisol and androgens, which can perpetuate the hormonal imbalance central to PCOS (30).

Beyond metabolic consequences, sleep disturbances in PCOS significantly impact psychological and emotional well-being. Poor sleep quality is associated with mood disorders such as anxiety and depression, which are already prevalent among women with PCOS due to the chronic nature of the condition (31). Hormonal imbalances and inadequate sleep further disrupt melatonin secretion—a key hormone in regulating the circadian rhythm—which may account for the common sleep difficulties reported by women with PCOS (32). Sleep hygiene, such as maintaining consistent sleep schedules, minimizing blue light exposure before sleep, and optimizing the sleep environment, can positively influence PCOS management. Moreover, addressing specific sleep disorders, such as utilizing continuous positive airway pressure (CPAP) therapy for obstructive sleep apnea (OSA), has demonstrated improvements in both metabolic and reproductive parameters in women with PCOS (10, 33, 34). This body of evidence underscores the importance of incorporating sleep hygiene into the holistic management plan for PCOS, highlighting its potential to alleviate symptoms and improve overall health outcomes.

The Persian Medicine Approach to Diseases and Sleep

The main concept through which Traditional Persian medicine understands disease is Mizaj. Mizaj is a quality composed of many physical, psychological, and genetic traits, which are not necessarily considered or fully understood in modern medicine. In general, Persian Medicine defines nine types of Mizaj: hot, wet, cold, dry, moderate, hot and wet, hot and dry, cold and wet, cold and dry (35, 36, 37, 38). Neglecting health preservation measures disrupts the balance of an individual's Mizaj, leading to what is known as "Su-e-Mizaj" (Disturbed Temperament) (35, 36). This is the most fundamental principle of diseases in Persian Medicine, with the main approach to treatment being restoration of Mizaj balance (37).

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Treatment includes managing health maintenance, medications, and manual therapies (therapeutic actions). A significant part of Persian Medicine focuses on health preservation, known as the Six principles ”Setteh-e-zarurieh”. These principles include: air, food and drink, sleep and wakefulness, physical activity and rest, elimination and retention, and mental states. Sleep is one of the most important principles in maintaining health (38).

Persian Medicine Perspective on PCOS Types and the Role of Sleep

In Persian Medicine texts, PCOS is not defined as a separate disease. By analyzing the clinical signs of this syndrome in modern medicine and matching them with Persian Medical literature, we can develop an understanding of the disease through this lens and reach treatment and diagnostic strategies offered by this system of medicine.

TPM literature discusses many of the common symptoms of this syndrome including reduced or absent ovulation (referred to as “Ehtebas-e-tams”), hirsutism (referred to as increased “shaer”), acne (referred to as”bothur“), hair loss (referred to as ”Tasaqut-e-shaer”) (39) and a decrease in menstrual blood flow leading to accumulation of humors (40). Table 1 compares the symptoms of PCOS as described in Iranian traditional medicine with their corresponding terms in modern medicine.

According to this perspective, PCOS is divided into two principal groups: Wet and Dry PCOS (41). Table 2 presents the characteristics of the four common PCOS patterns and outlines the recommended sleep-related interventions based on Persian medicine for each pattern.

Wet PCOS

Characterized by excess wetness in the body or uterus and ovaries. Symptoms include drowsiness, lethargy, soft skin, excessive sleep, and thin and sparse hair. In addition, they are associated with signs of obesity, especially abdominal obesity, menstrual disorders, infertility, and enlarged ovaries on ultrasound. Patients with this pattern are divided into two groups based on the presence of cold or hot quality (41).

Wet-Hot PCOS

This group has a range of symptoms of hyperandrogenism, including hirsutism, acne, and hair loss.

Wet-Cold PCOS

Patients with excess wetness and cold, showing symptoms like oligomenorrhea, amenorrhea, hypermenorrhea, ovulation disorders, and infertility. Among cold symptoms, oligomenorrhea, amenorrhea, and infertility are predominant. The main feature of this group is obesity. This group does not have many symptoms of hirsutism, but they may have impaired glucose tolerance. The most common uterine Mizaj disorder in PCOS patients is related to this pattern.

Dry PCOS

Characterized by excess dryness in the body or uterus and ovaries. The main feature of this group is thinness. Other Symptoms include dry skin, joint dryness, thick hair and rapid hair growth, low appetite, insomnia, light sleep, anxiety, and restlessness. They may have excessive hair growth. Similarly, by considering the hot and cold qualities, we can divide the patients into 2 groups (41).

Dry-Hot PCOS

Patients with excess heat and dryness, showing symptoms like oligomenorrhea to amenorrhea, ovulation disorders, and hyperandrogenism symptoms such as excess hair on non-scalp areas, early hirsutism, hair loss, acne, and a masculine body appearance.

Dry-Cold PCOS

Patients with excess cold and dryness, showing symptoms like oligomenorrhea to amenorrhea, ovulation disorders, and infertility.

PCOS, Insulin Resistance, and the Role of Sleep in in Persian Medicine

Traditional Persian Medicine (TPM), while there is no term exactly corresponding to “insulin resistance”, related

Table 1. Comparison of the symptoms of PCOS in Iranian medicine with modern medicine

Type of Symptoms	Term in Persian Medicine	Term in Modern Medicine
Hyperandrogenism	Kesrat-e-shaer– کثرت شعر	Hirsutism
	Bothur بثور	Acne
	Tasaqut-e-shaer تساقط شعر	Androgenic alopecia
Oligo anovulation	Efrat-e-tams افراط طمث	Hypermenorrhea
	Ehtebas-e-tams احتباس طمث	Oligomenorrhea and amenorrhea
	Oghr عقر	Infertility
	Reduced of mani کاهش منی	Reduced or absent ovulation

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Table 2. Sleep characteristics in different patterns of PCOs in Persian Medicine

Category of PCOs		General characteristics of PCOs	Specifications and characteristics of PCOs	General Sleep lifestyle recommendations in PCOs	Specific Sleep lifestyle recommendations in PCOs
Wet	Warm	1. Obesity, especially abdominal obesity. 2.Drowsiness, lethargy, soft skin, excessive sleep, thin and sparse hair. 3. Ovulation disorders and infertility. 4.Enlarged ovaries in ultrasound. 5. Menstrual disorders (mostly hypermenorrhea). 6. Emtela* 7. Obesity	1.Symptoms of hyperandrogenism include hirsutism, acne, and Androgenic alopecia. 2.Oligo-amenorrhea (provided concentration due to heat). 3. Masculine body appearance	1.Sleep early at night 2. Wake up early. 3.Avoid sleeping during the day. 4.Keep a distance between eating and sleeping. 5.Sleeping: Adjusting the amount of sleep based on temperament. 6.Avoiding Little sleep and long sleep.	Sleep at the minimum required level (6 to 8 hours)
	Cold□		1.Oligomenorrhea, amenorrhea (due to concentration caused by severe cold). 2. Hirsutism (In case of severe cold) 3.Fat body		
Dry	Warm	1. Thinness. 2. Dry skin, joint dryness, insomnia, light sleep, anxiety, and restlessness. 3. A range of oligomenorrhea to amenorrhea. 4. Ovulation disorders.	1.Hyperandrogenism symptoms such as early hirsutism, hair loss, acne. 2.Possibility of masculine body appearance (Male body appearance)	7.Do not sleep in angry and nervous situations. 8. sleeping in a Soft and comfortable space. 9. Proper ventilation of the sleeping space 10.Sleeping clothes appropriate to the season 11.Presence of cover while sleeping	Sleep at the maximum required level (8 to 10 hours)
	Cold		1.Oligomenorrhea, menorrhea. 2. Hirsutism (In case of severe cold)		

□The most common uterine Mizaj(temperament) observed in patients with PCOS is the cold and wet temperament.
□Emtela refers to the accumulation of humors, which results from incomplete digestion of food.

concepts are discussed under terms such as Emtela, referring to the accumulation of humors due to incomplete digestion. This state can lead to impaired cellular function, resembling the pathophysiology of insulin resistance. In polycystic ovary syndrome (PCOS), insulin resistance is a core characteristic of the disorder and may be intensified by sleep disturbances (42).

TPM sources reflect similar insights, albeit articulated in different terminology (40, 43). Moreover, insufficient menstrual blood discharge is considered a factor that may further exacerbate insulin resistance (40).

Traditional texts also associate excessive sleep, daytime napping, and inadequate elimination of waste products with increased bodily moisture and disturbances in temperament—particularly the cold and moist temperament, which is frequently seen in women with PCOS (40).

Accordingly, regulating sleep and improving its quality may serve as part of the therapeutic approach to reducing insulin resistance from the TPM perspective.

Sleep hygiene principles emphasized in TPM include timely nighttime sleep, avoidance of daytime sleeping, and maintaining a 2 to 3-hour interval between eating and going to bed. These practices are believed to enhance digestion and help prevent disease (44-46).

The Contribution of Sleep Disturbances to PCOS: Insights from Persian Medicine

Considering that sleep disturbances are one of the most prominent risk factors in the pathophysiology of PCOS, it is important to address this condition through the lens of TPM. Given that sleep disturbances play a significant role in the pathophysiology of polycystic ovary syndrome (PCOS), examining this condition through the lens of Traditional Persian Medicine (TPM) may provide valuable insights. In TPM literature, the term Nom is used to denote sleep, highlighting its importance in maintaining health and preventing disease. In TPM books, the word Nom is used to express sleep (47). Nom is considered one of the important factors in maintaining body balance. Adequate sleep improves food digestion and prevents the accumulation of waste in the body, and as one of the factors of personal care that a person has an active role in managing, it plays a major role in maintaining health and treating diseases (47).

Principles of Sleep Hygiene in Persian Medicine

In Traditional Persian Medicine (TPM), sleep is considered one of the essential pillars of health maintenance and plays a crucial role in preserving the body's balance and overall well-being. Proper sleep—defined as deep, continuous, and occurring at night—supports optimal blood circulation and enhances the digestive process, thereby improving cellular digestion. Conversely, fragmented or shallow sleep can disrupt gastrointestinal circulation, leading to indigestion and disturbance of the body's temperamental balance.

The 4 pillars of proper sleep in TPM teachings are:
Sleep Duration
Sleep Quality
Sleep Timing
sleep environment

Sleep duration

Sleep duration, varies based on age, gender, Mizaj (temperament), season, geographic region, and activity level, ranging, on average, from 6 to 10 hours (47). The suggested sleep duration is 9 hours for ages 9 to 20 and 7 hours for youth. Older adults need less sleep (48). People with dry

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Mizaj need less sleep and are more prone to insomnia, which can be corrected with dietary measures (38). Long sleep can make the body colder and wetter and increase weight, leading to a higher risk for obesity development (44, 49).

Sleep should be deep and continuous; otherwise, it may disrupt digestive function and can lead to weakness, joint disorders, and memory impairment. Lack of sleep, on the other hand, reduces energy and disrupts the function of various body parts, especially the brain (44, 48). Insomnia initially increases body heat and dryness, while chronic insomnia leads to cold and dry Mizaj (temperament). Long-term insomnia is unsuitable for both hot and cold Mizaj (temperament) (39, 44, 48).

Sleep Quality

TPM suggests that Sleep should be deep and continuous. Interrupted and shallow sleep leads to maldigestion. A sign of good and moderate sleep is mild sweating. Sleeping on the stomach or back is not suitable for high-quality sleep (30, 44, 48).

Sleep Timing

The Proper sleep time is between 10 PM and dawn, with at least six hours of sleep (49). Sleeping one hour before midnight is twice as beneficial as sleeping after midnight (38). Daytime sleep is discouraged in Persian Medicine as it increases throat secretions, halitosis, memory loss, physical weakness, and skin dullness (44).

Sleep environment

Traditional Persian medicine suggests a sleep environment that is dim, quiet, clean, soft, and free from pests. Hard surfaces are considered harmful to the nerves, and the sleeping area should be free of unpleasant odors. The fabric should suit the individual's Mizaj and season (44). Cotton and silk are preferred for warm-tempered individuals, while linen is recommended for those with a cold temperament. The room temperature should align with the individual's Mizaj. The bedding should be of suitable thickness, ensuring it does not cause sweating. The sleep area should be pleasant-smelling, well-ventilated, and maintain adequate humidity. Sleeping in sunlight disrupts brain balance, causing headaches and heaviness. Moonlight may increase throat secretions, potentially leading to respiratory and neurological disorders. Excessively dry sleeping places hinder proper sleep. Soft, warm places cause body weight gain. Cold and damp sleeping areas cause numbness, weakness, and back pain (44, 48). According to Persian medicine, suitable sleep improves digestion, metabolism, toxin elimination, calmness, and vitality, brain function, aids tissue repair, and improves overall organ function. Proper sleep also supports hormone balance and immune function, improving quality of life (44, 48).

Sleep-Related Lifestyle Strategies in Persian Medicine

In addition to the four main principles of sleep discussed in TPM, several other recommendations are emphasized.

Sleep should follow food digestion, ideally 2 to 3 hours after eating (48, 50). Consuming foods like lettuce, rose petals, yogurt, spinach, and purslane before sleep improves sleep quality, while foods like beans, lentils, fenugreek, tea, and coffee disrupt sleep (44, 47).

Short naps after a bath are recommended (51).

Sleep duration varies by season. The need for sleep is average in spring and autumn. The need for more sleep in the summer season is due to the heat and dryness, and in winter, less amount is needed due to cold and wet (48).

Avoid sleeping when angry, because stress hormones increase alertness and affect the quality of sleep (48). Sleeping after anger causes nightmares and morning fatigue (52).

Before sleeping, it is recommended to empty the bladder and bowels, as fullness in these organs can disrupt sleep by increasing brain alertness. Accumulation of waste during sleep is thought to contribute to morning fatigue (52). Proper sleep positioning constitutes the use of comfortable bedding, covering the abdomen, and avoidance of sleeping prone for extended periods of time (44).

Keeping feet warmer and lower than the head enhances brain relaxation (48, 53).

Discussion

PCOS is a complex hormonal disorder with multifactorial causes. Understanding the mechanisms related to the effects of poor sleep on PCOS can provide new approaches for the prevention and treatment of this disease. According to TPM sources, many common symptoms of this syndrome, including decreased or absent ovulation, reduced menstrual blood flow, hirsutism, hair loss, and acne, have been discussed (39, 40).

Table 1 compares the symptoms of PCOS in TPM and modern medicine. In Table 2, patients were divided into two main groups (wet and dry temperaments), each further subdivided into cold and hot subcategories.

Sleep improvement plays a special role in lifestyle modification and in the prevention and treatment of diseases. The effects of sleep disorders on disease progression have been examined from the perspectives of both modern and traditional medical systems. The sleep patterns of patients differ according to their temperament. Some of them tend to sleep more, and some less. Those with a predominance of wet temperament tend to sleep more, and those with a predominance of dryness and heat tend to sleep less. For better disease management, it is recommended that in all four groups, the common sleep care principles from TPM be observed. In Table 2, patients were divided into two main groups (wet and dry temperaments), each further subdivided into cold and hot subcategories.

Previous studies mostly indicate that sleep disorders are complications of PCOS, while according to studies in modern medicine and TPM, correcting sleep through the following mechanisms can help improve the disease.

Sleep disorders disrupt the hypothalamic-pituitary-adrenal (HPA) axis and increase cortisol levels (30). Chronic elevation of cortisol causes insulin resistance and worsens PCOS problems. Cortisol also affects the secretion of gonadotropins (LH and FSH), leading to worse ovarian function and increased androgens (30). Women with PCOS usually have poor sleep quality, which itself increases cortisol

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and creates a vicious cycle between sleep, insulin resistance, and reproductive disorders (10, 27, 30).

From the perspective of TPM, emotional stresses, especially anger before sleep, disturb brain balance, cause nightmares, and fatigue (48, 52). Chronic insomnia leads to dryness and coldness of temperament, resulting in fatigue and weakness of the organs (44, 48). Also, sleep hygiene principles in TPM, such as not eating a heavy dinner, going to bed early, and avoiding daytime sleep, are recommended to maintain body balance (38, 44, 48), which aligns with the goal of controlling cortisol and improving metabolism.

Disruption of melatonin plays an important role in the development of PCOS. In affected women, serum melatonin levels decrease and follicular fluid melatonin increases, which is associated with poor sleep quality and ovulation disorders (5). This disorder can increase oxidative stress and reduce oocyte quality (5). In TPM, the importance of proper nighttime sleep, avoiding daytime sleep, and leaving a gap between meals and sleep is emphasized. Good sleep is important for the balance of humors, removal of waste, and the health of the brain and internal organs, including the ovaries (44, 47, 48), which is consistent with the role of melatonin in modern medicine.

Studies have shown increases in inflammatory markers such as CRP and TNF-α in women with PCOS, which contribute to insulin resistance and ovarian disorders (20). Sleep disorders increase chronic inflammation and worsen PCOS symptoms (20, 24).

From the viewpoint of TPM, poor sleep causes incomplete digestion, accumulation of waste, and ultimately inflammation (40, 44). Improving sleep is one of the important ways to reduce inflammation in TPM. Sleep disorders are associated with increased insulin resistance in women with PCOS, which occurs through long-term increases in cortisol, disruption of the HPA axis, and disturbances in carbohydrate metabolism (20, 22). Reduced duration and quality of sleep decreases insulin sensitivity and can increase androgens (20). In TPM, insulin resistance is similar to "Emtela" meaning the accumulation of undigested food and thick humors that cause metabolic disorders (40, 42, 43). Excessive sleep, daytime napping, and insufficient removal of waste increase moisture and the cold and wet temperament, which is common in women with PCOS (40). Correcting sleep habits to reduce excess moisture and restore temperamental balance is necessary. Deep nighttime sleep, avoiding daytime sleep, and leaving a two-hour gap between dinner and sleep are key recommendations in TPM (44-46). Women with PCOS usually experience anxiety and depression, which are made worse by sleep disorders, even if their disease is mild. (13, 14, 54) Sleep problems reduce emotional stability and increase stress, worsening both mental and hormonal health.

TPM texts such as Avicenna's Canon state that poor sleep causes brain dysfunction and psychological problems. Improving sleep can support mental and physical health in women with PCOS. Obstructive sleep apnea (OSA) was previously considered only a complication of PCOS. However, some recent studies have pointed to a two-way relationship between OSA and PCOS (10). Recent reviews have found that although obese PCOS patients have a higher risk of OSA, even non-obese patients have a higher risk than healthy individuals, and OSA is a potential risk factor for developing PCOS (29). Therefore, studies are needed to confirm the role of complete and nighttime sleep as an effective factor in the disease (Figure 1).

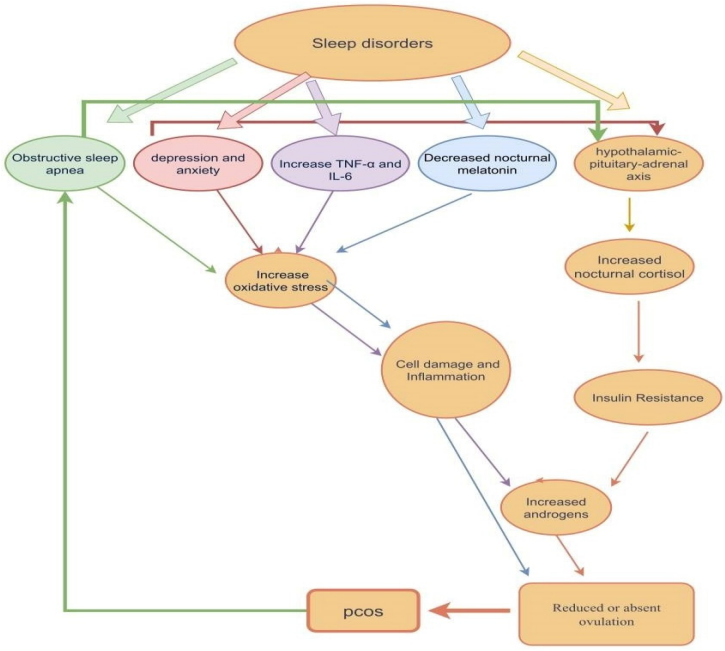

Figure 1. Mechanisms of the Impact of Sleep Disorders on Polycystic Ovary Syndrome

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[DOI: 10.47176/mjiri.39.116]

Conclusion

Modern Medicine Findings

-HPA Axis and Cortisol Dysregulation

Sleep disorders disrupt the hypothalamic-pituitary-adrenal (HPA) axis and increase cortisol levels, contributing to insulin resistance, hyperandrogenism, and reproductive dysfunction (10, 26, 27).

- Melatonin and Ovulation Disorders

Disruption of melatonin secretion is also implicated in ovulation disorders and reduced oocyte quality (5).

-Inflammation and Insulin Resistance

Additionally, sleep disturbances are associated with increased inflammatory markers such as CRP and TNF-α, which exacerbate insulin resistance and ovarian dysfunction (20, 24). Shortened or poor-quality sleep can decrease insulin sensitivity and raise androgen levels (20, 22).

-Mental Health Implications

Moreover, women with PCOS often experience psychological symptoms, including anxiety and depression, which are worsened by sleep disorders (13, 54).

-Obstructive Sleep Apnea (OSA)

Obstructive sleep apnea (OSA) shows a two-way relationship with PCOS and may act not only as a complication but also as a contributing factor in its development—even in non-obese women (10, 29).

Traditional Persian Medicine Findings

- Sleep and Temperament in TPM

In TPM, sleep patterns are closely related to a person's temperament. Excessive sleep increases bodily moisture, while insufficient sleep leads to dryness and heat (46, 48, 49).

- Poor Sleep and Inflammation

In TPM, insufficient sleep leads to poor digestion, accumulation of waste products, and internal inflammation—all of which are considered major contributors to disease progression (46, 50).

- Lifestyle Recommendations for Moisture Reduction

In TPM, insufficient sleep and eating heavy meals at night disturb digestion and increase bodily moisture. Women with PCOS often show a predominance of moisture. TPM recommends early bedtime, avoiding daytime sleep, and eating a light dinner to help restore balance (44, 48, 50).

- Emotional Factors and Brain Dryness

In TPM, anxiety and anger before sleep reduce sleep quality and lead to brain dryness and weakened mental functions. Good sleep plays a key role in maintaining emotional and hormonal balance (44, 47, 48).

Summary of findings

Sleep disturbances play a significant role in the development and progression of PCOS. Modern medicine links poor sleep to hormonal imbalances, insulin resistance, inflammation, and reproductive dysfunction (13, 24, 30). TPM emphasizes the importance of sleep patterns aligned with individual temperaments, highlighting that insufficient sleep disrupts digestion, increases bodily moisture, and causes emotional imbalance, leading to brain dryness (44, 48, 52). Both approaches agree that improving sleep quality through lifestyle modifications can help manage PCOS symptoms and improve overall health.

Considering that the primary treatment for PCOS is lifestyle modification focusing mainly on diet and exercise, future clinical research should explore the role of sleep in improving disease outcomes such as menstrual irregularities, infertility, obesity, and insulin resistance.

Authors' Contributions

(LG): Conceptualization, draft preparation, literature review, revision.
(MMA): Writing, review, editing.
(MR): Drafting and literature review.
(FA):Writing and review.
(AK): Editing.
(SZM): Scientific supervision (gynecology/obstetrics).
(MF): Methodology.
(MT): Conceptualization, supervision, final approval, corresponding author

Ethical Considerations

The process of collecting information and writing the article has not required contact with patients and their identities or any private information, nor has any intervention been applied.

Acknowledgment

This review is derived from the doctoral thesis in Traditional Medicine of Dr. Leila Goodarzi, Shahid Beheshti University of Medical Sciences, Tehran, Iran (License No. 43003506). The author gratefully acknowledges the valuable support and guidance of the professors and faculty members of the School of Traditional Medicine, Shahid Beheshti University of Medical Sciences.

Conflict of Interests

The authors declare that they have no competing interests.

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