

# Yoga and sleep: Is there a scientific link?

**Lakshmi Ranganathan, Nagarajan Ramakrishnan**

Department of Sleep Medicine, Nithra Institute of Sleep Sciences, Chennai, Tamil Nadu, India

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## Abstract

Sleep disorders are widespread and a public health concern. Common sleep disorders encountered in sleep clinics include sleep deprivation, insomnia, snoring and sleep apnea, circadian rhythm disturbances, restless legs syndrome, parasomnias, and rare disorders such as narcolepsy. In addition to modern medicine, other forms of clinically effective and patient acceptable holistic treatments are also on the rise.

Yoga is a widely accepted holistic therapy and proclaimed to have positive effect on sleep disorders, mental health, and an overall sense of well-being. This article attempts to summarize existing evidence of impact of yoga on sleep. Although close to 2720 articles were found on "yoga," only a few of these have evaluated the effect of yoga on sleep. Existing scientific evidence suggests that yoga may be effective as a complementary therapy for improving sleep quality and for specific sleep disorders.

There is a paucity of studies evaluating effect of yoga on most of the common sleep disorders underscoring the need of further research in this field.

**Keywords:** Yoga, Sleep Disorders, Complementary Therapy.

## Introduction

Sleep disorders are widespread and are commonly encountered with changing lifestyle in today's fast-paced world. These can manifest in different ways and are classified using International Classification of Sleep Disorders, which lists more than 80 different sleep disorder diagnoses<sup>1</sup>. Sleep disturbances can have significant impact on the affected individuals, their immediate family, and society and, therefore, have significant public health implications<sup>2</sup>.

Sleep medicine is a medical specialty devoted to the diagnosis and therapy of sleep disturbances and disorders

Address for correspondence

**Nagarajan Ramakrishnan**

Senior Consultant & Director, Nithra Institute of Sleep Sciences, J Block, 13th Main Road, Annanagar, Chennai, Tamil Nadu 600 040, India  
Email: ram@nithra.com  
Phone: + 91-44-4350-2252

and is increasingly gaining acceptance and popularity as awareness is growing on the implications of sleep disorders on health and well-being.

In addition to mainstream therapies, other forms of clinically effective and patient acceptable holistic treatments are also on the rise. Complementary and alternative medicines have a long history of use for the treatment of sleep disorders<sup>3</sup>. Yoga is often accepted and proclaimed to have positive effect on sleep disorders, mental health, and an overall sense of well-being. Our objective was to review the existing scientific literature to explore the impact of yoga as a therapy on sleep disorders.

## Methods

Literature search was performed by using keyword searches of MEDLINE database through May 2014. Scientific data available only in abstract form were also included. Keywords "yoga" AND "sleep" and also "yoga"

AND “specific sleep disorders” (*insomnia, snoring, sleep apnea, circadian rhythm disturbance, restless legs syndrome (RLS), parasomnia, and narcolepsy*) were used. Studies relating to yoga and “sleep in any other disease conditions” were included; however, studies relating to effect of yoga on other disease conditions were excluded. Studies on meditation or other methods such as Tai-Chi were also excluded.

Search term “yoga” yielded close to 2720 results. Narrowing the search to “yoga, sleep” yielded a total of 156 results, of which 24 met criteria for the current review. No studies were identified that evaluated impact of yoga on circadian rhythm disturbances, parasomnia, or narcolepsy.

Analysis of specific articles (Table 1) focusing on yoga as a therapy for improving quality of sleep and/or treatment of sleep disorders is presented.

Table 1: Details of articles reviewed

Authors	Sleep problem addressed	Number of studies	Results
Vera et al.	Long-term yoga practice on subjective sleep quality	1	Positive
Ross et al. Telles et al.	Sleep quality (with respect to general well-being)	2	Positive
Bankar et al. Manjunath et al.	Sleep quality, latency, and efficiency in elderly	2	Positive
Beddoe et al. Field et al.	Sleep quality during pregnancy	2	Positive
Khalsa et al. Sobana et al.	Insomnia	2	Positive
Innes et al.	Restless legs syndrome	2	Positive
Sood et al.	Interest in yoga for obstructive sleep apnea	1	Positive
Chen et al. Hariprasad et al.	Sleep quality in depression (in assisted living facilities)	3	Positive
Mustian et al. Cohen et al. Bower et al. Palesh et al.	Sleep quality in pre- and posttreatment cancer patients	4	Positive
Yurtkuran et al.	Sleep quality in end-stage renal disease	1	Positive
Taibi et al.	Sleep quality osteoarthritis	1	Positive
Booth LaForce et al. Afonso et al.	Sleep quality in menopause	2	Positive
Elavsky et al.		1	Negative
Total		24	

## Sleep and related disorders

Sleep is a naturally recurring state characterized by altered consciousness with relatively inhibited sensory activity and inhibition of nearly all voluntary muscles<sup>4</sup>. Sleep affects our daytime productivity and our physical and mental health in many ways. Chronic sleep deprivation (sleep debt), defined as a state of inadequate or mistimed sleep, is a growing problem, which is underappreciated for its impact on health status. Sleep deprivation contributes to a number of physiological changes that lead to health disturbances, independent of primary sleep disorders. Sleep deprivation and the associated changes in the biological processes may serve as factors for the development and exacerbation of several diseases including but not limited to hypertension, cardiovascular, metabolic, and psychosocial disorders. Sleep deprivation could also cause indirect hazards by causing significant impairments in cognitive and motor performance increasing the risk of motor vehicle and workplace accidents<sup>5</sup>. The common sleep disorders encountered in sleep clinics based on our experience are insomnia, chronic sleep debt, snoring and sleep apnea, circadian rhythm disturbances (including shift work syndrome), RLS, parasomnias, and rare disorders such as narcolepsy (Fig. 1).

Yoga is an ancient system of exercises that originated and evolved in India<sup>6</sup> and is now widely practiced in

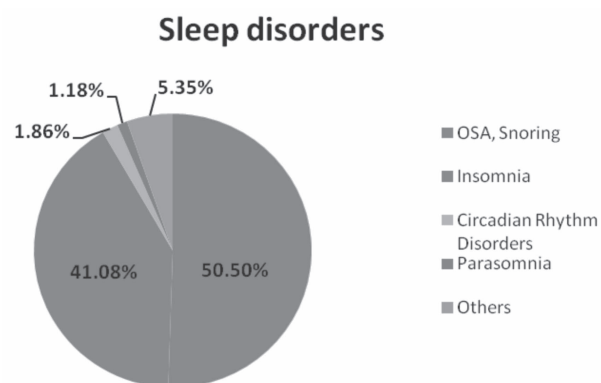


Figure 1: Common sleep disorders encountered in a sleep clinic\*

(Others: more than one sleep problem, 2.31%; narcolepsy, 0.71%; RLS/PLMD, 0.58%; nocturnal seizures, 0.55%; Bruxism, 0.42%; shift work syndrome, 0.42%; fragmented sleep, 0.38%).

\*Nithra Institute of Sleep Sciences: Data from August 2004 to July 2014.

many parts of the world. The goal of yoga precisely is to achieve physical health, psychological well-being, and spiritual peace. It represents a fascinating mind–body approach, wherein body movements (asana), breathing exercises (pranayama), and meditation are integrated into a single multidimensional practice. Numerous beneficial mental and physical effects have been classically ascribed to this holistic ancient method<sup>7</sup>.

Yoga is a multicomponent practice that consists of physical activity associated with specific postures, breathing exercises, and a specific philosophical attitude toward life. It has been shown to reduce anxiety levels and physiologic arousal<sup>3</sup>. It has been found to be helpful in the prevention and treatment of various diseases as it has no significant side effects.

### Yoga and sleep quality

Patients and treating physicians are often reluctant to use long-term pharmacological treatment for sleep disorders for fear of dependence, tolerance, and adverse effects. It is, therefore, common to explore nonpharmacological options, including psychological counseling, cognitive behavioral therapy, and relaxation techniques. Yoga as complementary therapy or as the sole therapeutic option has also been considered for this reason. Vera et al.<sup>7</sup> have shown that long-term practice of yoga has been associated with positive psychobiological changes including better sleep quality. Also, regular practice of yoga predicted better health than years or frequency of practice<sup>8</sup>.

Bankar et al.<sup>9</sup> evaluated the effect of long-term yoga exercises on sleep quality and quality of life in the elderly, and showed that both sleep quality and quality of life scores were higher in the yoga group than in the control group. Manjunath and Telles<sup>10</sup> studied the effect of yoga and Ayurveda on self-rated sleep in geriatric population. In this study, the yoga group showed a significant decrease in the time taken to fall asleep (reduced sleep latency) and improved sleep efficiency and overall sense of feeling rested and refreshed following sleep when compared to the Ayurveda and control groups. Similar results were reported by Halpern et al.<sup>11</sup>, who noted that those practicing yoga had significant improvement in a range of subjective factors relating to sleep including sleep latency, efficiency, and overall sleep quality.

Yoga practiced in second trimester has been shown to be effective in improving quality of sleep in pregnant

women<sup>12</sup>. Sleep variables, as estimated by 72 hours of continuous wrist actigraphy and the General Sleep Disturbance Scale, confirmed that yoga improves sleep efficiency in women in their second trimester of pregnancy when disturbances are often reported. Similar results were shown in depressed pregnant women, who had lower depression scores as well as lower sleep disturbance scores after yoga therapy<sup>13</sup>.

Yoga practice has benefited socially disadvantaged adults and children in a remand home. They showed significant improvement in sleep, appetite, and general well-being, as well as a decrease in physiological arousal<sup>14</sup>.

### Yoga for insomnia

An estimated 30%–50% general population is affected by insomnia and 10% have chronic insomnia<sup>15</sup>. Insomnia, defined as difficulty initiating (sleep onset insomnia) and/or maintaining sleep (sleep maintenance insomnia), is the most common disorder encountered in clinical practice of sleep medicine. Chronic insomnia is associated with reduced quality of life and impaired psychosocial functioning, including increased fatigue, cognitive impairments, negative mood swings, physical discomfort, and an increased utilization of medical services<sup>16</sup>. Suffering from sleep disturbances and chronic insomnia also increases the risk for developing psychiatric disorders, such as anxiety, depression, substance abuse, or dependency<sup>17–20</sup>. In addition, insomnia also has an impact on physical health and chronic diseases. Vgontzas et al.<sup>21</sup> showed an association between short sleep durations (<5 hours) and an increased risk for hypertension.

Mind–body interventions are increasingly being explored for management of insomnia to avoid long-term medications<sup>22</sup>. In a preliminary study<sup>23</sup>, a simple daily yoga routine was evaluated in a chronic insomnia population consisting of sleep onset and/or maintenance insomnia and primary or secondary insomnia. Participants maintained sleep–wake diaries followed by 8-week yoga practice. Statistically significant improvements were observed in sleep efficiency, total sleep time, wake time, and sleep quality measures at end of treatment period.

In a study<sup>15</sup> that evaluated the effect of 8 weeks of yoga therapy on selected psychological variables among men with insomnia, a significant improvement was observed in sleep, stress scores, and self-confidence scores

in the experimental group compared to the control group that did not receive any therapy.

### Yoga for restless legs syndrome

RLS is a common movement disorder with sensorimotor symptoms that are felt during quiet wakefulness and getting to sleep<sup>24</sup>. While relaxation therapies, including yoga, are often recommended for RLS management, supporting research is sparse. Innes et al.<sup>25</sup> conducted a study on women with moderate-to-severe RLS; the intervention was a gentle 8-week yoga program. After the therapy, participants showed striking reductions in RLS symptoms and severity, suggesting that yoga may be effective in attenuating RLS symptoms and symptom severity. A substudy<sup>26</sup> with the same population showed that yoga reduced perceived stress and improved sleep and mood in women with RLS.

### Yoga for obstructive sleep apnea

Obstructive sleep apnea (OSA) is a common and often underdiagnosed sleep disorder. There is increasing focus on early diagnosis and management of OSA as it could lead to hypertension (sometimes resistant to control with multiple medications), new onset of diabetes or poor control in those who are known diabetics, heart diseases, and stroke. OSA is characterized by snoring, frequent episodes of upper airway collapse during sleep, causing recurrent arousals, intermittent hypoxemia, sleep fragmentation, and poor sleep quality<sup>27</sup>. Practicing yoga has been found to help alleviate symptoms and lessen certain risk factors for developing sleep apnea and snoring by potentially causing weight loss and by breathing exercises that help maintain the tone of pharyngeal muscles<sup>28</sup>. However, there are no studies confirming this theory. Sood et al.<sup>29</sup> conducted a study at the sleep disorders center at a Midwest tertiary care center to assess the proportion of patients with OSA reporting previous or current use and interest in future use of complementary and alternative medicine including yoga. A high proportion of the participants reported previous or current use and showed interest in future use of alternative therapies for improving sleep quality in OSA, underscoring the need of further research in this field.

### Yoga for sleep in other health issues

In a study<sup>30</sup> that aimed to test the effects of a 6-month yoga exercise program in improving sleep quality and decreasing depression in the elderly who were in assisted living facilities, overall sleep quality of participants had significantly improved, whereas depression, sleep disturbances, and daytime dysfunction had decreased significantly. The study recommended that yoga exercise should be incorporated as an activity program in assisted living facilities or in other long-term care facilities to improve sleep quality and to decrease depression in institutionalized elders. A similar single blind controlled study<sup>31</sup> examined the effects of yoga intervention on sleep quality and quality of life in the elderly living in old age homes. Subjects in the yoga group had significant improvement in total sleep quality and all the domains of quality of life. Another cluster-randomized trial<sup>32</sup> tested the effects of yoga in promoting the mental health of older adults in eight senior activity centers and found yoga therapy to be effective in improving the sleep quality, depression, and self-perception of health status of older adults.

Mustian et al.<sup>33</sup> conducted a randomized, controlled clinical trial to determine the efficacy of yoga intervention compared with standard care for improving global sleep quality among cancer survivors and found that yoga participants showed greater improvements in global sleep quality, subjective sleep quality, daytime dysfunction, and wake after sleep onset, sleep efficiency, and medication use compared with standard care participants. Similar studies<sup>34-36</sup> have suggested that yoga program is feasible for patients with cancer and that such a program significantly improves sleep-related parameters. Yoga was found to be a complementary, safe, and effective clinical treatment modality that reduced pain, fatigue, and sleep disturbance in patients with end-stage renal disease<sup>37</sup>.

A pilot study<sup>38</sup> of yoga for sleep disturbance in women with osteoarthritis supports the feasibility and acceptability of a standardized yoga practice as a potential treatment option for osteoarthritis-related insomnia. Studies<sup>39,40</sup> that assessed the efficacy of yoga for menopausal symptoms also showed that significant pre- to posttreatment improvements were found in menopausal symptoms, sleep efficiency, and quality and that a specific sequence of yoga might be effective in reducing insomnia and menopausal symptoms as well as improving quality of life in postmenopausal women with insomnia. However, there was also one study<sup>41</sup> in which

4-month moderate-intensity walking and low-intensity yoga programs in middle-aged women during the menopausal transition were not effective in yielding statistically significant improvements in sleep quality. The authors conclude exercise interventions of longer durations or greater intensity may be needed for such improvements.

**Table 2: Impact of yoga on sleep: what we know and what we do not know**

What we know	What we do not know
<b>General health</b>	
Yoga practice improves subjective sleep quality	Effect of yoga on objective sleep quality, with quantifying techniques such as polysomnogram
<b>Patient groups/population</b>	
Improves sleep quality in <ul style="list-style-type: none"> <li>geriatric population</li> <li>pregnancy</li> <li>menopause</li> <li>socially disadvantaged adults and children</li> </ul>	Effect on sleep quality in <ul style="list-style-type: none"> <li>general population</li> <li>children and adolescents</li> <li>shift workers</li> <li>pre menstrual syndrome</li> </ul>
<b>Specific sleep problems</b>	
Evidence that it may help <ul style="list-style-type: none"> <li>insomnia</li> <li>restless legs syndrome</li> </ul>	Efficacy in <ul style="list-style-type: none"> <li>snoring and sleep apnea</li> <li>circadian rhythm disturbances</li> <li>parasomnia</li> <li>narcolepsy</li> </ul>
<b>Sleep in other health issues</b>	
Evidence to help sleep in <ul style="list-style-type: none"> <li>cancer and post treatment cancer patients</li> <li>end-stage renal disease</li> <li>osteoarthritis</li> </ul>	Effect on sleep in common chronic noncommunicable disease such as <ul style="list-style-type: none"> <li>hypertension</li> <li>diabetes</li> </ul>

## Conclusion

Studies so far have shown that yoga could be used as a complementary therapy for treating sleep disorders. There is scant literature that explores the effectiveness of yoga as a therapy for insomnia and no studies that have studied its benefits in sleep disorders such as apnea, parasomnia, and narcolepsy. While attempting to summarize the current evidence (Table 2), we realize that what we know about impact of yoga on sleep-related problems is fairly less. More studies comparing addition of yoga with standard therapies are needed to fully determine the effect of yoga for treating sleep disorders.

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