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Importance of Yoga in Promotion of Sleep Quality - A Narrative Review

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Humans require essential biological resources including sleep for survival. Sleep consumption varies due to various circumstances, with most humans sleeping for 20-40% of the day. Sleep is crucial for physical, cognitive, and emotional health, enabling the body to recover from fatigue and prepare for the next day's functions. Short-term sleep deprivation negatively impacts cardiovascular health, immune system function, physical recovery, and psychomotor performance. It also affects cognitive deficits, mood, and overall quality of life. Insufficient sleep can lead to daytime exhaustion, lethargy, reduced cognitive function, emotional changes, and decreased quality of life. Disrupted sleep also threatens global health and financial resources allocated for health. Yoga techniques, such as postures, breathing exercises, meditation, and relaxation techniques, can be used to promote sleep quality. Studies have shown that Yoga can improve sleep quality and cognitive function in various populations, age groups, and conditions. Further research is needed to fully understand the benefits of Yoga in various settings.

Keywords: Sleep, Yoga, Sleep Quality, Nidra, Quality of Life

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Introduction

Food, water, air, and sleep are essential biological requirements for human beings. Air consumption is a perpetual and involuntary process essential for living. However, the consumption of sleep, water, and food is contingent upon volitional behaviours. Many of these behaviours are driven by inherent survival instincts; nevertheless, sleep consumption varies due to several circumstances.**[1]** Most humans sleep for 20 to 40% of the day. Generally, 1/3rd of life is spent by humans either sleeping or attempting to do so. Even prehistoric evidence implies that sleep is crucial in human life, which is consistent with archaeological and historical descriptions of sleep playing a prominent and important role in early human societies. Sleep's structure is extremely stable from night to night. Sleep is a complicated and dynamic physiologic process that occurs throughout the night, indicating that it is not simply a period of inactivity between wakeful episodes. The sleep has two separate states: NREM and REM, each with its own set of characteristics. A typical night consists of 4 to 6 NREM and REM cycles, each lasting 90-110 minutes. NREM sleep is separated into three stages (N1, N2, N3) with greater synchronous cortical neuron activity, steady autonomic function, and higher arousal thresholds. REM sleep includes periodic bursts of rapid eye movements, fluctuating autonomic activity, and skeletal muscle atonia. Deep sleep (N3) is considered restorative as it reduces sympathetic activity, resulting in lower heart rate, blood pressure, and stable breathing.**[2]**

Sleep and Health

Sleep is essential for physical, cognitive, and emotional health. Sleep enables the body to recover from the fatigue and be ready for the functions of the next day. This cycle is important for overall wellbeing, cognitive functions, longevity, and optimal daytime functioning.**[3]** Short-term sleep deprivation, even in healthy persons, adversely impacts cardiovascular health by raising blood pressure, stimulating the sympathetic nervous system, and enhancing inflammation. Sleep loss alters metabolic processes and impairs glucose regulation.**[4]** Sleep is universally acknowledged as crucial for a robust immune response. Insufficient sleep can impair the immune system, rendering persons more vulnerable to diseases.**[5]**

Sleep is essential for physical recuperation from injuries and daily exertion. While sleeping, the body heals tissues, develops muscle, and replenishes energy. Sleep deprivation adversely impacts psychomotor performance, especially in decision-making activities.**[6-7]**

Insomnia is linked to cognitive deficits, encompassing difficulties with memory, attention, focus, and the execution of basic activities. Numerous research investigations highlight a significant correlation between sleep and mood. Sleep disruptions frequently occur in individuals with chronic pain and are linked to sadness and anxiety. Moreover, inadequate sleep quality has been associated with mood issues in persons with traumatic brain injuries. REM sleep, the phase linked to dreaming, is thought to contribute to emotional processing and memory consolidation. Restorative sleep mitigates stress. Sleep is essential to overall quality of life. Insomnia and other sleep problems are associated with daytime exhaustion, lethargy, reduced cognitive function, emotional alterations, and a decreased quality of life.**[8-9]**

Sleep deprivation and economic burden

Sleep deprivation adversely impacts the health, wellbeing, safety, and productivity of individuals. Consequently, disrupted sleep endangers not only global health but also the financial resources allocated for health by nations.**[10]** An evaluation of the financial repercussions of insufficient sleep during the 2016–17 fiscal year in Australia approximated a total economic burden of US$17.9 billion (equating to 1.6% of the Australian gross domestic product) and a non-economic burden of $27.3 billion (constituting 4.6% of the overall Australian disease burden for that year).**[11]** Despite the absence of extensive sleep health data in many nations, a 2017 study created a model to predict the economic impact of inadequate sleep on Canada, the USA, the UK, Germany, and Japan. The projected annual financial loss was calculated at $680 billion.**[12]**

Yoga techniques for Sleep Promotion**[13-16]**

Various studies have shown that following *Yoga* techniques can be used for the promotion of sleep quality. Selection of the suitable techniques as per the target population is necessary. Few components may be modified and dropped as per the need of the target population.

Yoga Postures (*Asana*): *Tadasana, Ardha Kati Chakrasana, Ushtrasana*, Modified *Ushtrasana* with chair support, *Ardha Chakrasana, Padahastasana, Bhunamanasana, Setu Bandhasana, Bhujangasana, Pavanamuktasana, Vrikshasana, Surya Namaskara*, Supported squatting, Cat-cow movement, *Supta-Virasana, Adhomukha Shvanasana.*

Breathing Exercises (*Pranayama*): Hands in and out breathing, Tiger breathing, *Vibhagiya Pranayama* (Sectional breathing), *Ujjayi Pranayama*, *Bhramari Pranayama*, *Bahya Kumbhaka, Bhastrika Pranayama, Nadi Shuddhi Pranayama, Kapalbhati.*

Meditation (*Dhyana*): Mindfulness Meditation, *Nadanusandhana*, OM Chanting

Relaxation techniques: *Yoga Nidra*, Instant Relaxation Technique, Deep relaxation technique

Impact of *Yoga* on sleep quality across various populations, age groups and conditions

Young Adults: Verma *et al.* conducted an open-label randomized controlled trial in people aged 18 to 45 yrs. In three groups, namely *Yoga, Ayurveda* and control group, *Yoga* group showed better results on sleep quality as well as cognitive function. There was significant decrease in stress related to insomnia in *Yoga* group. Another study conducted on inexperienced young males aged 21 to 30 years assessed the effects of *Yoga Nidra*. Findings indicated a significant enhancement in nighttime sleep following *Yoga Nidra* practice among beginners.**[17]**

Datta et al. observed an enhancement in sleep efficiency, a reduction in wake after sleep onset (WASO), and a notable rise in the percentage of delta sleep during slow wave sleep.**[18]** A crossover clinical experiment applied *Yoga* in collegiate athletes following short-term sleep deprivation. The *Yoga* group exhibited enhanced sleep quality, evidenced by significant improvements in PSQI scores, sleep efficiency percentage, waking after sleep onset, and movement and fragmentation index.**[19]**

Middle Age population: Sulekha *et al.* evaluated sleep architecture in practitioners of *Sudarshan Kriya Yoga* and *Vipassana* meditation, finding that these practices facilitated the retention of slow wave sleep and improved the REM sleep state in middle-aged individuals (31 - 55 yrs old) compared to younger individuals. **[20]**

The Mind Sound Resonance Technique (MSRT) intervention was conducted for 30 minutes daily for one week at bedtime, approximately one and a half hours post-dinner, in middle-aged persons experiencing chronic musculoskeletal pain. Participants in MSRT reported feeling more rested in morning and required less time to initiate sleep. A notable decrease in nighttime awakenings occurred, while daytime sleep was substantially diminished. **[21]** A research study including female educators with chronic musculoskeletal pain investigated impact of a workplace *Yoga* intervention on musculoskeletal pain and sleep quality. After a 6-week, 60-minute structured Integrated *Yoga* intervention conducted four times weekly, *Yoga* group exhibited a significant decrease in pain severity and pain-related disability. Overall sleep quality, daytime dysfunction, and habitual sleep efficiency improved significantly. **[13]**

Elderly population: Sleep is disturbed in older people due to less physical activity, sedentary lifestyle, poor sleep practices, and psychological factors. Sleep related complaints like difficulty in going to sleep, less sleep time, and early morning insomnia are very common and nearly 60% of geriatric population report sleep disturbances.**[22-24]** Chen et al. discovered that self-reported Pittsburgh Sleep Quality Index (PSQI) indicated notable enhancement in habitual sleep efficiency and perceptions of physical health among older persons experiencing depression.**[22]** Manjunath et al. indicated that elderly individuals exhibited significant improvements in sleep duration, morning restfulness, and reduced sleep onset latency after six months of *Yoga* practice.**[25]** Chobe et al. designed a single-arm study including elderly people with Mild Cognitive Impairment (MCI). Research indicated that *Yoga* has markedly improved sleep quality and overall quality of life in older individuals with Mild Cognitive Impairment (MCI).**[26]**

Pregnant Women: A pilot study involving pregnant women demonstrated that weekly mindfulness meditation and prenatal *Hatha Yoga* classes over 7 weeks may reduce total number of nighttime awakenings and enhance sleep efficiency for women in their second trimester of pregnancy. **[27]**

Osteoarthritis cases: A pilot study conducted in elderly female patients suffering from osteoarthritis incorporated an 8-week *Yoga* program that included 75-minute weekly classes and 20 minutes of nightly home practice.

The Insomnia Severity Index and diary-reported metrics of sleep onset latency, sleep efficiency, and frequency of insomnia nights shown considerable enhancement post-intervention compared to pre-intervention. Additional sleep outcomes (Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, diary-reported total sleep time, and wake after sleep onset) demonstrated an enhancement in mean scores post-intervention; however, these results were not statistically significant. Actigraphic sleep outcomes exhibited no signif. alterations. **[28]**

Lymphoma cases: A randomized trial carried out in patients with lymphoma found that *Yoga* practice reduced sleep disturbances, sleep latency, sleep medication and enhanced subjective sleep quality, sleep duration as compared to wait-list control group.**[29]**

Long COVID cases: Long COVID is a post-COVID-19 condition characterized by symptoms such as fatigue, dyspnoea, cognitive impairment, and sleep difficulties. Bhargav *et al.* carried out an open-label, single-arm clinical trial including stressed adults diagnosed with long COVID. Tele *Yoga* for 16 weeks shown substantial enhancement in sleep quality, accompanied by a marked decrease in stress, anxiety, and insomnia.**[14]**

Probable mechanisms of sleep improvement through *Yoga*

The precise process by which *Yoga* influences sleep remains inadequately understood. The researchers propose that *Yoga* improves physical strength, vitality, energy, and emotional equilibrium. This could improve quality of life.**[30]** Moreover, *Yoga* alleviates physical and psychological stress while minimizing disruptions to regular routines.**[31]** Furthermore, *Yoga* Practices have been documented to diminish sympathetic activity and augment parasympathetic activity, hence modulating hypothalamo-pituitary-adrenal (HPA) axis response to stress.**[32-33]** *Yoga Nidra* is correlated with a transition to parasympathetic dominance, and elevated cardiac vagal control is linked to improved subjective and objective sleep quality. **[34]** This may extend sleep stage and reduce latent period, hence improving sleep quality.**[35]** Moreover, potential processes influencing sleep quality and subjective well-being may be associated with cognitive structuring effects of these practices, which facilitate a more relaxed mental processing of external stimuli. **[36]**

Conclusion

Hence, we can conclude that Individuals who regularly practice *Yoga* exhibit superior overall sleep quality, fewer instances of disrupted sleep, less time required to fall asleep, diminished daytime dysfunction, lower reliance on sleep drugs, and an increased sense of restfulness and vitality in the morning. More elaborate studies are required to establish exact mechanism through which *Yoga* has impact on the sleep quality.

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