



## Review Article

# Sleeplessness and health

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## Abstract

Sleep influences each intellectual and physical health. It's essential for a person's well-being. The reality is when we see at well-rested people, they're working at an exclusive degree than people making an attempt to get by way of on 1 or 2 hours much less nightly sleep. Loss of sleep impairs your higher tiers of reasoning, problem-solving and interest to detail. Sleep deficit will additionally make people much less productive and put them at higher danger for creating depression. Sleep affects almost each tissue in our bodies. It influences growth and stress hormones, our immune system, appetite, breathing, blood pressure and cardiovascular health. Nurses play a foremost function in teaching and guiding the sleep deprived patients on the importance of sleep and its physiological and psychological effects.

## Introduction

Sleep is a vital indicator of wholesome development and one of the bio-behavioural organizations. Sleep in younger children and adults, has been related both with modern and future signs of emotional and behavioural problem as nicely as cognitive development. Sleep issues have been associated with anxiety, aggression, social and interest problems. Better sleep pattern and hygiene are associated with cognitive feature and college performance to obtain favoured goals.

Sleep is a naturally recurring state of mind and body, characterized by way of altered consciousness, extraordinarily inhibited sensory activity, inhibition of almost all voluntary muscles, and decreased interactions with surroundings [1]. During sleep most of the body's systems are in an anabolic state, helping to restore the immune, nervous, skeletal, and muscular systems, mood, memory, and cognitive function. The internal circadian clock promotes sleep daily at night [1].

## Sleep regulation and sleep hours

The physiology of sleep is reticular activating system (RAS) and bulbar synchronizing areas manipulate the cyclic nature of sleep. During sleep RAS experience few stimuli from the cerebral cortex and the periphery of the body. Wakefulness occurs when this system is activated with stimuli from the cerebral cortex and from periphery organs and cells. Nor epinephrine and acetylcholine, dopamine, serotonin and histamine are involved with excitation which consequences in wakefulness [3].

The degrees of sleep are categorized as Non Rapid Eye Movement (NREM) and Rapid Eye Movement (REM).

## REM

The interaction of brain stem cholinergic, aminergic, and GABAergic neurons which control the activity of glutamatergic reticular formation neurons results in REM sleep [4]. REM sleep is connected with vivid dreaming, rapid eye movement, muscle atonia

and other body homeostatic signatures. Desynchronized cortical EEG, hippocampal theta waves and ponto-geniculo-occipital (PGO) waves are electrophysiological characteristics of REM sleep. The other name associated with REM sleep is “paradoxical sleep” because of the observation of the desynchronized EEG during REM sleep which resembles wakefulness without muscle tone. The two periods associated in REM sleep are phasic and tonic periods. The phasic periods are characterized by bursts of rapid eye movements whereas no rapid eye movements occur during tonic periods [5].

### **NREM**

The slow alternation in neuronal membrane potentials between hyperpolarized down-states with neuronal quiescence and depolarized up-states with action potentials, which gives rise to slow-waves in local field potential (LFP) and electroencephalogram (EEG) recordings that propagate horizontally across the neocortex causing NREM sleep [6].

NREM consist of 4 stages. Stage I and Stage II represents for about 5% and 50% of a person’s sleep time which is referred to as mild sleep. Stage III and Stage IV, every represents for 10% of total sleep time and are known as deep sleep stages, additionally termed as delta sleep and slow-wave sleep. People who are woke up at some point of REM nation almost constantly record that they have been dreaming. The sleep required via quite a number age companies can be considered below. Some of the elements affecting the sleep are life-style habits, environmental factors, medications, pain, bodily illness, and psychological stress [3].

### **Gender differences in sleep**

Gender differences in time for sleep could be a function of compositional differences in time spent in paid and unpaid work by gender and age. This might result in expecting us to believe that men sleep less when compared to women as men do more paid work. However, actually women do twice the amount of housework and childcare. Women may face less sleep time compared to men when individuals enter into marriage and parenthood. In women sleep time varies based upon who were partnered or had children in the home when compared to women without children. Partnership and parenthood strongly alter sleep time for men and women. Women may sleep more but have poorer quality sleep while men have better quality of sleep [7]. The biological cause of gender differences in sleep impairment is mainly due to men suffering worse NREM sleep deterioration than women. The four major reason for the differences that we see across.

The circadian alerting signal changes in the gender specific results in greater sleep fragmentation, less consolidated sleep, and higher daytime nap propensity in older men when compared to women.

NREM sleep is regulated strongly by the preoptic region of the hypothalamus results in different sleep pressure and sexually dimorphic.

Slow wave sleep homeostasis is related to the locus coeruleus (LC) region and structural changes are identified in women and men in this region the gray matter accelerates atrophy in the core for older men when compared to women [8].

**Sleep and Human Aging:** Sleep duration has an inverse relationship with age and varies widely across the lifetime. The right amount of sleep varies from individual to individual due to genetic factors and other reasons. General assumption by many when it comes to a good sleep is if one wakes up feeling fresh, well rested and doesn’t feel fatigue throughout the day. However, there are more to a good sleep than just a fresh day and tire free day. Sleep quality, sleep quantity, and sleep timing (bedtime and wake-up time) are some of the important characteristics to be considered for a good sleep.

The sleep duration recommended by US for various age groups as follows.

Newborns (0–3 months) 14–17 hours

Infants (4–11 months) 12–15 hours

Toddlers (1–2 years) 11–14 hours

Preschoolers (3–5 years) 10–13 hour

Children (6–13 years) 9–11 hours

Teenagers (14–17 years) 8–10 hours

Young adults (18–25 years) 7–9 hours

Adults (26–64 years) 7–9 hours

Older adults ( $\geq 65$  years) 7–8 hours

In Newborns (0–3 months) circadian rhythm is not yet established which results in the distribution of sleep across the 24 hours. The circadian rhythm emerges only at 10–12 weeks. Infants become more nocturnal between 4 and 12 months. Daytime naps appear to be seen among 1 to 4 years of age where night wakings is a common phenomenon. After the age of 5 years the daytime naps stops and sleeping overnight decreases all through the childhood due to fixed wake times and late bedtimes

Physiological factors and exogenous exposures play a major role in sleep for adolescents. Sleep curtailment is attributed to extrinsic factors like artificial light, caffeine use, lack of physical activity, no bedtime rules in the household, and the increased availability of information and communication technologies. Apart from this, intrinsic factors such as pubertal hormonal changes, this leads to evening chronotype. In adolescents, this biological phase delay combined with the social clock, for which the main synchronizer is the fixed and early school start time, contributes to the sleeping pattern. The conflict between extrinsic and intrinsic factors, biological time and social time, is high at adolescence which has a huge hand in the sleeping behaviour.

In adults the sleep pattern is influenced by the work demands, social commitments, health and/or affective problems, and family dynamics (working mothers, children in family etc). Factors that were observed in adolescents like exposure to artificial light at night, lack of physical activity, caffeine consumption, and poor sleep hygiene also contribute to the sleep pattern in adults.

In elders, sleep patterns and distribution goes through quantitative and qualitative changes. Older adults have a hard time staying asleep and falling asleep. They go through a circadian shift to a morning chronotype compared to the evening chronotype in adolescence. Co morbidities and polypharmacy also influences the sleep pattern in elders. Other factors, such as life changes like retirement, physical inactivity, decreased social interactions, age-related changes in metabolism, and environmental changes also contribute to the sleep pattern [9].

### **Sleep disorder**

The frequent sleep disorders are the dyssomnias, insomnia, hypersomnia, narcolepsy, sleep apnea and restless leg syndrome.

Dyssomnias related with dysfunction of inside sleep mechanisms like insomnias or hypersomnias or secondary to a sleep-related medical disorder like sleep apnea, post-traumatic sleep disorders, and suicidal ideation [10]. A vast class of sleep problems are characterized by using either hyper somnolence or insomnia. The three essential

subcategories encompass intrinsic (i.e., arising from inside the body), extrinsic (secondary to environmental prerequisites or more than a few pathologic conditions), and disturbances of circadian rhythm [11].

**Insomnia:** The inability to fall asleep or to stay asleep as long as desired is a sleeping disorder called as Insomnia which is also known as sleeplessness. Insomnia is predominant in elders but can affect people of any age [12].

**Prevalence:** When participants were interviewed nearly 10% and 18.1% reported to be insomniacs. Insomnia complaints are seen in 4% to 11% of neurological or medical condition. 15% of individuals complaining of insomnia suffer from RLS too. Epidemiological studies suggest that mental disorder result in insomnia and it constitutes for a 30 to 60% [12].

**Causes:** Insomnia can be caused by use of psychoactive drugs (such as stimulants, amphetamines, methylphenidate, aripiprazole). Withdrawal from anti-anxiety drugs such as benzodiazepines or pain-relievers such as opioids results in insomnia. Chronic types of insomnia is seen due to use of antibiotic drug (fluoroquinolone). Restless legs syndrome and Periodic limb movement disorder (PLMD). Hormone shifts during the precedence of menstruation and during menopause results insomnia. Gastrointestinal issues, Mental disorders like anxiety disorder, depression) and medical conditions like hyperthyroidism and rheumatoid arthritis. Shift work and jet lags affect the circadian rhythm. Life events such as fear, stress, anxiety, emotional or mental tension has a huge say in insomnia [12].

**Pathophysiology:** Poor sleep and disturbances in the wake or sleep system are sufferings that are experienced by the insomniac patients which also results in wakefulness. Detectable abnormalities are seen in sleep duration, in the physiology of sleep, and in the architecture of sleep (sleep stages and progression of sleep cycles through the night) [12].

**Treatment:** Clients need to develop new behaviour patterns that bring sleep and maintain it is an important step in treatment for insomnia.

**Stimulus Control:** A sleep environment is created for promoting sleep. **Cognitive therapy:** Positive thoughts and beliefs about sleep are developed through learning. **Sleep restriction:** A program followed to limit the time in bed in order to get to sleep and stay asleep throughout the night [12].

**Medications:** Currently, five benzodiazepines (BZDs) are FDA-approved for the treatment of insomnia: triazolam short-acting (Halcion, Pfizer), estazolam (ProSom, Abbott), and temazepam (Restoril, Mallinckrodt intermediate-acting), quazepam (Doral, Questcor), and flurazepam long-acting [14].

**Excessive Sleepiness and Its Disorders:** Hypersomnia and excessive sleepiness is a term which is often used interchangeably. A variety of symptoms like prolonged nocturnal sleep, naps and inability to stay awake or alert in situations where alertness is required are various disorders associated with hypersomnia. Excessive sleepiness is trying to be labelled as a disease or disorder.

**Prevalence:** In Europe with rates varying from 4% and 20.6% was reported. The prevalence for excessive sleepiness was reported for 21.5% in Mexico and 2.5% for Japan [13].

**Causes:** Various factors such as poor sleep hygiene, work conditions, and psychotropic medication use results in excessive sleepiness. Breathing-related sleep disorders, psychiatric disorders, especially depression, and physical illnesses are also associated with excessive sleepiness [13]. Hypersomnia is not a medical condition but it is more of a subjective sleep complaint than an objective finding [15].

**Treatment:** Lifestyle adjustments improving sleep quality is known as good sleep hygiene will help in the treatment of hypersomnia. Stimulant drugs like modafinil, Gamma-hydroxybutyrate or sodium oxybate in its most recent form are used for the treatment of hypersomnia [16].

**Narcolepsy:** Narcolepsy is a neurological sleep disorder that exhibits excessive sleepiness. Sleep attacks seen in this sleepiness are irresistible and repeated. A person falls asleep suddenly in unusual situations like driving, eating and jogging when this attack occurs [12].

**Prevalence:** In Saudi Arabia the prevalence of narcolepsy amount to 40 per 100,000 inhabitants. A figure at 590 narcoleptics per 100,000 inhabitants is seen in Japa [13].

**Causes:** Inadequate sleep is not the reason behind the sleepiness in narcolepsy. In most cases the cause of narcolepsy is due to the loss of neurons in the brain which contains the protein called hypocretin whose function is to keep the brain alert [12].

**Pathophysiology:** Narcolepsy occurs due to the degeneration of the hypocretin/orexin (Hcrt)-producing neurons in the posterior hypothalamus occurring due to the disruption of neurotransmission through the HCRT-system.

**Treatment:** Changes in lifestyle will help in managing the symptoms. Having short naps in the day, following a strict and consistent sleep schedule will help in addressing the symptoms. The five pharmacotherapeutics approved by the FDA for treatment of narcolepsy are sodium oxybate, modafinil, armodafinil, methylphenidate, and amphetamine [17].

**Sleep apnea:** Sleep apnea is characterized by repeated breathe pauses during sleep lasting for at least 10 seconds. Cardiovascular problems might arise due to this breathing trouble. The number of apnea and hypopnea (respiratory disturbances) events per hour is called as respiratory disturbance index (RDI) or apnea/hypopnea index (AHI). A breathing pattern is determined to be normal or abnormal based upon RDI or AHI values.

**Prevalence:** In general population 2% to 4% are affected by Obstructive sleep apnea syndrome an. Obstructive sleep apnea syndrome prevalence is higher in men by two folds when compared to women [13].

**Causes:** Frequent night-time awakenings, excessive daytime sleepiness, and increased risk of adverse cardiovascular outcomes causes in sleep apnea [18]. Snoring, brainstem injuries and muscular dystrophy results in sleep apnea [19].

**Pathophysiology:** Sleep apnea is due to hyperventilation or hypoventilation. Post-hypocapnia hyperventilation is the underlying pathophysiological mechanism for central apnea associated with congestive heart failure, high altitude sickness, and primary CSAS. These patients chronically hyperventilate in association with hypocapnia during wake and sleep and demonstrate increased chemoresponsiveness and sleep state instability.

**Treatment:** Therapies like continuous positive airway pressure (CPAP) therapy, Nocturnal oxygen therapy, BPAP therapy *in a spontaneous timed (ST) mode*, and Positive airway pressure therapy helps in treating sleep apnea. Apart from therapies medications like acetazolamide, zolpidem, triazolam are used for the treatment of sleep apnea [20].

**Restless Legs Syndrome:** Restless legs syndrome (RLS) is a common neurological movement disorder, characterised by an unmanageable urge to move the legs combined with a painful sensation in the legs. RLS is also called as Willis-Ekbom disease (WED) [21].



**Prevalence:** The prevalence of RLS is higher in women compared to men. RLS prevalence is approximately 1.8% in men and 3% in women in Asian countries. RLS prevalence is 11% in 65 years or older and 4.5% in 20-25 years old among European and North American women.

**Causes:** Iron deficiency anaemia, pregnancy, end-stage renal disease are three major reversible causes for RLS. Vitamin B12/folate deficiency, peripheral neuropathy, rheumatoid arthritis, spinal disorders such as spinal nerve root irritation, Parkinson's disease, fibromyalgia, spinocerebellar ataxia and Charcot-Marie-Tooth disease are secondary causes which results in RLS.

**Pathophysiology:** A genetic component together with dopaminergic and brain iron dysregulation plays a major role in RLS. However, the pathophysiology for RLS is only partially known and we still got a lot to research on it.

**Treatment:** Severity and frequency of RLS symptoms are assessed using RLS severity scale and this helps in the method of RLS treatment. Mild RLS can be managed with reassurance and lifestyle changes while severe RLS would require drug therapy. Lifestyle changes like avoiding high intake of caffeine or alcohol before bedtime will help in the treatment of RLS. Following sleep hygiene like sleeping in a quiet, comfortable, cool environment, and following a regular bed and wake hours will also help in RLS treatment. Walking and stretching, massaging the affected limbs, bathing in hot or cold water, relaxation exercises will help in RLS treatments. Pharmacological treatment are carried out through medications like Ropinirole, Pramipexole, Clonazepam Levodopa, Pregabalin and Tramadol [21].

## Conclusion

Sleep disease take a serious toll on your intellectual and bodily health, leading to memory problems, weight gain, and a poor influence on your power and mood. Nurses are the one who plays a foremost role in instructing the sufferers related to specific drowsing problems and its unfavourable consequences and remedial measures for leading a accurate sleep which helps the patients in leading a wholesome life.

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