

**A LITERATURE REVIEW OF THE ROLE OF SLEEP IN HEALTH AND ILLNESS**

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## ABSTRACT

**Background:** The role of sleep as an important component of health and illness is often neglected by health care practitioners. Scientific research on sleep is relatively new, beginning in the 1950s, and even today many important sleep topics have yet to be investigated.

**Objective:** To review current scientific information on how sleep is related to health and illness, specifically: What are the characteristics of a healthy, restorative sleep; what health care problems are related to insomnia/sleep deficit and oversleeping; what are the advantages and disadvantages of medical and alternative treatments for insomnia and sleep apnea.

**Results:** Pubmed and MANTIS searches resulted in thousands of journal articles of varying quality and relevance. The current review is based on a selection of 35 books and journal articles which best relate to the above mentioned objective of this literature review.

**Conclusion:** There are several trends apparent in a large body of good scientific literature on the topic of sleep in relationship to health and illness. The following represent the consensus of scientific opinion in the current review: 1. Adequate, restorative sleep requires about 7 1/2 to 9 hours continuous sleep per night for adults. 2. Too much or too little sleep are both associated with clearly identified negative health consequences. 3. Healthy “sleep aids” include exercise; getting to sleep between 9 and 10 pm; adequate light during the day and sleeping in total darkness; and not ingesting stimulants (including caffeine, nicotine, high glycemic index foods, etc.) in the evening; 4. Sleep loss has significant economic consequences; 5. Pharmaceutical sleep aids have potentially dangerous side effects and as a group are addictive with dependence, relapse and rebound as possible dangers – herbal and botanical sleep aids can be effective for some people and generally have fewer and less severe side effects than pharmaceutical drugs.

**Key indexing terms:** Sleep, sleep deprivation, insomnia, sleep apnea

## Introduction

Sleep, the ability to lie down, close ones eyes, and drift off is common to all living animals. Sleep is done on a daily basis, but the reason that we sleep has remained a mystery. Normally the person sleeps for approximately 8 hours. There has now been found evidence for problems if a person does not get enough sleep, as well as problems if a person sleeps too much. The lack of being able to sleep through the night, or not sleeping at all, insomnia, has it's own problems. Other problems like not breathing properly during sleep, sleep apnea, can present a different list of health consequences.

It was not until after the World War II that sleep began to be studied as a science. This was probably due to the fact that the electronics had developed to the point where the small changes in current, that happen in the brain, could be measured and recorded. It was then found that sleep is divided into two major subdivisions, Rapid Eye Movement (REM) sleep and non-rapid eye movement sleep (non-REM). These two subdivisions comprise the four major phases of sleep: beta, alpha, theta, and delta. Each of these has it's own brain wave frequency and body movements associated with it, as also which one is non-REM and which one is REM.

There are many things that can interrupt sleep. The two most common are insomnia, from the Latin, not sleep, and sleep apnea, absence of respiration. Currently three major forms of insomnia are known, sleep initiation, sleep maintenance (interruption) and phase advance syndrome (early morning awakenings). Each has it's own etiology and consequences. Sleep apnea, a form of insomnia in the subset of sleep maintenance, has three known reasons obstructive, associated with upper airway restrictions, central cessation of airflow and complete

cessation of all respiratory movements, and mixed - typically an initial central apnea component followed by an obstructive component (1). Each of these will be discussed later.

Further research into sleep has determined that not only is the time spent sleeping of value, but how, when and where one sleeps is also important. The number of hours an adult should sleep is between 7 ½ and 9 hours. Less than this can create a sleep debt, sometimes with severe consequences, and more than 9 may have consequences as well. This amount is needed by adults of all ages. Children's need for sleep has been explored, and most children are not getting adequate amounts of sleep as well.

There have been experiments with drugs to help people sleep, but the long term use of these drugs can render them ineffective, or have ramifications not studied enough. Herbs are sometimes used also. They have the ability to help a person with far fewer side effects for some people. Their use is also dependent on other medications that someone is taking, so great care must be used to avoid drug interaction.

### Discussion

Every animal sleeps. (2) Sleep is defined as unconsciousness from which the person can be aroused by sensory or other stimuli. (3) Sleep is not merely a "time out" from our busy routines, it is essential for good health, mental and emotional functioning and safety. (4) Sleep appears to play a significant role in brain development, but why the brain needs to sleep remains a mystery (2) Too little sleep has been linked to accelerated aging and an increased risk of diabetes, obesity and high blood pressure. (5) Lack of sleep has also been linked to such serious health

consequences as Parkinson, Alzheimer, Multiple Sclerosis, Gastrointestinal tract disorders, Kidney disease, and Cancer to name a few. (6) Many medical problems disrupt sleep and impair alertness. Moreover, sleep disorders may co-exist with medical problems in people of all ages. Improving sleep problems in the ill may enhance patient overall health and quality of life.

(6) Those with apnea, are likely to have higher blood pressure while they sleep and suffer from daytime sleepiness.(4)

At the beginning of the last century the average amount of sleep was 9 hours, while at the end of the last century this average was 7 with the remainder made up with work or recreation. (7). National sleep foundation emphasize that substantial research serves as the basis for the recommendations that adults obtain an average of seven to nine hours of sleep each night. (8) As a good rule, healthy adults need an average of eight hours of sleep a night. There are those who can function without sleepiness or drowsiness after as little as six hours of sleep. (4) In a ten-year study of 70,000 women, those that slept 5 hours or less a night were 34% more likely to develop diabetes, while those who slept 9 hours or more had a 35% greater chance of developing diabetes (9). Earlier research at the University of Chicago is “quite clear” that sleeping less than 6.5 hours will cause disruption in insulin receptor sensitivity which will increase a patients risk for diabetes, obesity and heart disease. (8) Another study reports that women who had slept 5 hours or less per night were 45% more likely to develop heart disease than women who had slept 8 hours a night, while those who slept nine hours or more had a 38% greater risk. Additionally, those that slept 6 hours a night had a 18% increased risk and those who slept 7 hours had a 9% increased risk. The study also went on with “the results remained even after other factors, including snoring, smoking, and body mass index were accounted for. (10) Chronically sleep-deprived children may not seem tired, and may actually appear to be overly energetic. Children

7 to 11 years of age need at least 9 hours of sleep each night. (11)

There are some new-found benefits to sleep. Sleep dramatically enhances changes in brain connections. The capacity for change or growth and strengthening, of connections between nerve cells is the basis of development in the brain. This growth, known as plasticity, is believed to underlie the brain's capacity to control behavior, including learning and memory. Plasticity occurs when neurons are stimulated by events, or information, from the environment. In a study from the University of California, San Francisco on evidence that sleep in early life may play a crucial role in brain development researchers examined the effect of sleep on brain plasticity after cats experienced an environmental challenge. They allowed the cats to sleep for six hours after that and found they developed twice the amount of brain change as those cats kept awake during that time. (2) It was discovered in another study that when people sleep after learning new motor skills, such as playing sports or performing surgery, they perform the task better than those who do not sleep. Sleep after practice optimized the formation of long-lasting memories of the newly acquired skills. They improved speed by 34% and reduced errors by 30%. (12)

It is also important to know when and how one should sleep. The more hours that you can sleep before midnight, and in synch with the sun, the better off you will be. (5) A study showed that women who continually worked the night shift had a 60% greater chance of developing breast cancer. Women who worked a rotating shift of 1 to 29 years had an 8% increase of breast cancer, while those who worked 30 or more years had a 36% chance of breast cancer. This may be explained that light at night suppresses melatonin production, which increases a women's level of estrogen, which stimulate growth of breast tissue, including some breast cancers. (13) Sleep in complete darkness or as close as possible to darkness. When light hits the eyes, it disrupts the circadian rhythm of the pineal gland and production of melatonin and

serotonin. (14) It should also be remembered that the need for sleep does not decrease with age. (4)

An article in the Lancet, suggests that only a few hours of sleep a night can hinder metabolism and hormone production similar to aging and the early stages of diabetes. Chronic sleep loss may speed the onset of type 2 diabetes, high blood pressure, obesity and memory loss. (7) Sleep deprivation also lowers the amount of CD 16 levels in the blood. This is a natural killer blood cell, which gives rise to a susceptibility to viral infections. (15) Sleeping less than six hours a night can create a “sleep debt”. This affects the normal cognitive abilities of the individuals and may also show why these individuals are unaware of their decreased abilities. These individuals reported being only “slightly sleepy” when performing at their worst during psychological testing. This puts these individuals at risk while driving or flying an airplane and makes them less able to multi-task effectively. (16)

Research into the nature of sleep has helped doctors see that it is more than passive absence of wakefulness. Today we understand that we live in three completely different states of being; wakefulness, non-rapid eye movement (NREM) sleep, and rapid eye movement (REM) sleep. (17) All these states result from different activating or inhibiting forces generated usually within the brain itself. (3).

During each night, a person goes through two types of sleep that alternate with each other, slow-wave sleep (NREM) and rapid-eye-movement (REM) sleep. This is called REM because in this type of sleep the eyes undergo rapid movements despite the fact that the person is still asleep. Most sleep during each night is of the slow-wave variety; this is the deep, restful type of sleep that the person experiences during the first hours of sleep. It is associated with a decrease in both peripheral vascular tone and many other vegetative functions of the body. There is a 10

to 30 percent decrease in blood pressure, respiratory rate and basal-metabolic rate. Dreams and even nightmares do occur during NREM sleep but are not consolidated into memory (3).

Bouts of REM sleep lasting 5 to 30 minutes usually appear on the average of every 90 minutes in a normal night. The first such period occurring 80 to 100 minutes after the person falls asleep. When the person is extremely sleepy, the duration of each bout of REM sleep is short and may even be absent. On the other hand, as the person becomes more rested through the night, the duration of the REM bouts greatly increases.

There are several characteristics of REM sleep. It is usually associated with active dreaming. The person is even more difficult to arouse by sensory stimuli than during deep slow-wave, NREM sleep, and yet people usually awaken in the morning during an episode of REM sleep, not from NREM sleep. The muscle tone throughout the body is exceedingly depressed, indicating strong inhibition of the spinal projections from the excitatory areas of the brain stem. The heart rate and respiratory rate usually becomes irregular, which is characteristic of the dream state. Despite the extreme inhibition of the peripheral muscles, a few irregular muscle movements occur. These include, in particular, rapid movements of the eyes. The brain is highly active in REM sleep, and the overall brain metabolism may be increased as much as 20 percent. Also the electroencephalogram (EEG) shows a pattern of brain waves similar to those that occur during wakefulness. This type of sleep is also called paradoxical sleep because it is a paradox that a person can still be asleep despite marked activity in the brain (3)

Non REM sleep occupies most of sleep in adults. Non REM sleep can be divided electrophysiologically into four stages with distinct EEG criteria. This is an arbitrary splitting into stages.



Stage 1. The EEG changes from alpha to a low-voltage mixed-frequency pattern with the development of central theta activity (4-7 Hz.) In association with slow eye movements at the EOG (electro-oculogram) and graded relaxation of EMG (electro-myogram) tone.

Stage 2. Usually a few minutes after the onset of Stage 1 sleep, Stage 2 commences with the characteristic sleep spindles and K complexes. Sleep spindles are 0.5 to a few seconds of 12 to 14 Hz activity. Spindles are absent in Stage 1, most prominent in Stage 2, but may be seen in Stages 3 and 4. K complexes are clear negative sharp waves which are immediately followed by a positive component, the whole complex lasting at least 0.5 seconds. EEG is low-voltage mixed frequency, but it is the occurrence of sleep spindles and K complexes which characterize this stage. The EMG shows tonic activity but at a lower level this is wakefulness. Slow eye movements may be evident early in this sleep period.

Stages 3 and 4 are often grouped together as either Stage 3/4 or slow wave sleep (SWS) as both are characterized by the presence of high voltage slow wave activity with frequency of 2 Hz or less. These delta waves occupy 20 to 50 per cent of the epoch in Stage 3 and over 50 per cent of the epoch in Stage 4. In both stages slow eye movements are absent and the EMG tone is reduced to a similar extent as in Stage 3.

The three characteristics of REM sleep are desynchronized EEG, marked reduction of EMG tone and intermittent rapid eye movements on the EOG. This is also known as the dream phase of sleep. (18) The atonia (loss of muscle tone) of REM sleep causes the skeletal muscles to become flaccid so that the arms and legs are paralyzed. Only a few muscles have the ability to move during REM sleep, such as the eye muscles, the auditory muscles, and the diaphragm for respiration.(1) With people who are vulnerable to depression there has been observed an earlier onset of REM state and a drop out in slow wave sleep. Overall with these people there is more

REM sleep and a quicker slide into this stage of sleep.(19) It has also been observed that people who spend the most or the least amount of time in this phase of sleep had a shorter lifespan than those with an average amount of time in REM. (20)

All of us have an internal clock, or circadian rhythm, that programs our bodies to have a biological day and night. During the night there are changes in hormone levels, body temperature and the tendency to sleep. Melatonin is secreted, cortisol concentration increases, core body temperature is lowered and sleepiness increases. It has been shown that a sudden exposure to light can upset a body clock, even if the person still remains sleeping. This nighttime exposure to light starts a chemical process which can function as a precise, selective, and very rapid neural switch controlling the sleep/wake cycle.

Almost everyone at one time or another may have poor sleep, but research has shown that those who have the greatest risk for poor sleep are students, shift workers, travelers, persons suffering from acute stress, depression, or chronic pain. Stress is considered the number one cause of short term sleep problems. This can be triggered by school or job stress, marital problems, serious illness, or death in the family. (4) Scientists have found increased blood levels of stress hormones, adrenocorticotrophin hormone (ACTH) and cortisol, in people with chronic insomnia. (21) Additionally, certain medications such as decongestants, steroids and some medications for high blood pressure, asthma, or depression can cause sleeping difficulties as a side effect. Research has found that people with chronic insomnia are more likely than others to develop several kinds of psychiatric problems, and make greater use of healthcare services.(4)

Sleep Disorders, according to the DSM-IV are organized into four major divisions.

Primary Sleep Disorders are those in which another mental disorder, a general medical condition, or a substance abuse is responsible. These disorders are presumed to arise from endogenous abnormalities in sleep-wake generating or timing mechanisms. One of the general divisions of sleep disorders is Dyssomnias, characterized by abnormalities in the amount, quality, or timing of sleep. These include primary insomnia, breathing-related sleep disorders and others.(24) There is also a sleeping disorder that may effect as many as 4 million Americans that is known as nocturnal sleep-related eating disorder. This is a rare condition marked by binge-eating during certain phases of sleep. The individual has no recollection of this nighttime eating, usually consuming high-caloric foods, milkshakes, butter, but also bizarre items such as cat food and cleaning products. (23)

Diagnostic Features of Primary Insomnia (307.42) is a complaint of difficulty initiating or maintaining sleep or of nonrestorative sleep that lasts for at least one month, and causes clinically significant distress or impairment in social, occupational, or other important areas of functioning. The disturbance in sleep does not occur exclusively during the course of another sleep disorder, or mental disorder and in not due to the direct physiological effects of a substance or a general medical condition.(22) Insomnia is also associated with impaired quality of life, functional impairment, physical symptoms and coronary heart disease.

Insomnia is not the absence of sleep, but the subjective definition of insufficient, inadequate or non-restorative sleep. Insomnia may be primary, that is it is unrelated to other mental or emotional problems or it may be secondary and the primary being the underlying mental, emotional or physical problem. There is also that the possibility of insomnia is related to drug dependence, prescribed or recreational, or alcoholism. There are three different types of primary insomnia. There is acute or short term insomnia, which is experienced normally by those with

no sleeping problem. This arises when there is a problem in the sleeping environment, psychological stress, drug initiation or withdrawal or the normal circadian rhythm of the person is disrupted. (18) Insomnia that has persisted for six months is termed chronic insomnia. Some patients have had insomnia most of their lives and this is known as primary insomnia. There are very few who have this problem. They may have a problem with the abnormal control of the sleep-wake cycle occurring with the neurons, however the mechanism is not understood. Some children may present with this problem, many outgrow this, only a few have this persisting into adulthood. There are others who have a learned sleep-preventing behavior with a psychological aspect to it. This is termed a 'psychophysiological' insomnia which makes up about 15 per cent of those seen in sleep clinics. There is a greater anxiety in trying to get to sleep, which sets up a difficult cycle where they have even harder time sleep and this becomes much harder to break. They may not equate their own bedroom as a good place to sleep and may find it easier to sleep when away from home. This problem is present long after the initial stress has long passed.

There are also medical causes of insomnia. This is due to drugs administered for another problem and the side effect being the insomnia. Common drug side effects occur with patients on drug therapies for chronic renal failure, lupus, chronic fatigue syndrome, etc . Other syndromes which report insomnia are Fibromyalgia and Tourette's syndrome.

Those afflicted with primary insomnia most often report a combination of difficulty falling asleep and intermittent wakefulness during sleep. There is also a less common complaint of nonrestorative sleep, a subjective feeling that their sleep was restless, light, or of poor quality. When a sleep history is taken, those with primary have noted being a "light" or easily disturbed sleep. Other factors associated with insomnia include anxious overconcern with general health and increased sensitivity to the daytime effects of mild sleep loss. There may also be a history of

mental disorders, particularly mood disorders and anxiety disorders. In addition the chronic sleep disorder of primary insomnia may be a risk factor, or early symptom of, mood disorders and anxiety disorders.

Individuals with primary insomnia may demonstrate poor sleep continuity such as increased sleep latency, increased intermittent wakefulness, and decreased sleep efficiency, increased stage 1 sleep, decreased stages 3 and 4 sleep, increased muscle tension, or increased amounts of EEG alpha activity during sleep. When in a laboratory setting, some individuals may report better sleep in the laboratory than at home, suggesting a conditioned basis for sleep complaints. Other lab tests, psychophysiological tests, may also show high arousal, increased muscle tension or excessive physiological reactivity to stress. Most patients with primary insomnia may also have elevated scores on self-report psychological or personality inventories, indicating chronic, mild depression and anxiety. An associated physical general condition of patients with primary insomnia may appear fatigued or haggard, but show no other characteristic abnormalities on physical examination. There has been consistent survey data that shows that complaints of insomnia are more common with increasing age and among women, however studies indicate better preservation of sleep continuity and slow-wave sleep in elderly females than in elderly males. (22)

In one study for insomnia, elderly hospital patients who were given diphenhydramine (Benadryl) to help them sleep had a 70% increase risk of symptoms of delirium. They also have an increase risk of symptoms of disorganized speech, poor attention level and altered ingredients in a range of antihistamines and sleep aids. When these people were studied individually they found that they were three times more likely to be inattentive, three times more likely to have altered consciousness and more than five times more likely to show disorganized speech

compared with patients not taking the drug. (24) A recent study by the Stanford University Medical School found that other side effects of sleep aids (drugs) given to elderly are confusion, falls, extended drowsiness, agitation, and interactions with other medications. Though they are only 20% of the population, older Americans receive almost half the medications prescribed to aid sleep. One other aspect of this study was the result that moderate exercise had on the ability to sleep. After 16 weeks of exercise subjects were able to fall asleep about 15 minutes earlier and sleep about 45 minutes longer at night. (25)

Another study had the assumption that lack of exposure to sunlight might explain why sleep disturbances grow more common as people age. The researchers exposed patients to artificial light for four hours a day for four weeks. This extra light sent their melatonin production to a level similar to a younger control group and improved their sleep quality. (26) It is now thought that older people who easily fall asleep and sleep through the night may live longer than their peers who have trouble with sleep. (20)

In Phytotherapy Research it was reported that people who are regularly kept awake at night plagued by thoughts of work deadlines, relationship problems, or other stressful life events might find relief in herbs kava and valerian. When given individually these herbs reduced stress levels and insomnia with only minor side effects, which included vivid dreams and dizziness in a recent study. (27)

There has been a small sampling of literature that deals with the insomniac. There is a report with children and constant awakenings in the night which were greatly helped with upper cervical adjustments appropriate for a child. (28,29) One report used 54 people who suffered from motor vehicle accidents and had trouble sleeping. The techniques here were chiropractic adjustments alone or with rehabilitation exercises or laser therapy to the extensor muscles. (30)

A study of Ischemic Compression and Spinal Manipulation in the Treatment of Fibromyalgia reported a 60% improvement of sleep disturbances. (31)

Sleep apnea belongs to the group known as Breathing-Related Sleep Disorder (780.59). The essential feature of breathing-related sleep disorder is sleep disruption, leading to excessive sleepiness or insomnia that is judged to be due to abnormalities of ventilation during sleep. This sleep disruption must not be better accounted for by a mental disorder and is not due to the direct physiological effects of a substance, including medications, or a general medical condition that produces sleep symptoms through a mechanism other than abnormal breathing. The most common complaint of individuals with apnea is excessive sleepiness. This results from frequent arousals during nocturnal sleep as the individual attempts to breathe normally. The patient's inability to control the sleepiness can be evident in boring meetings or while attending movies, theater, or concerts, and with extreme situations such as eating, walking, or driving. Individuals may minimize this problem by expressing pride about being able to sleep anywhere at anytime.

Obstructive sleep apnea syndrome is the most common form of breathing-related sleep disorder. It is characterized by repeated episodes of upper-airway obstruction during sleep. This syndrome usually occurs in overweight individuals and leads to a complaint of excessive sleepiness. Sleep Apnea syndrome is characterized by loud snores or brief gasps that alternate with episodes of silence that usually last 20-30 seconds. Snoring is caused by breathing through a partially obstructed airway. Usually the loud snoring has been present for many years often since childhood, but an increase in its severity may lead the person to seek evaluation. The cessation of breathing, sometimes lasting as long as 60-90 seconds and associated with cyanosis, may also be of concern to bed partners. The termination of the apneic event can be associated with loud "resuscitative" snores, gasps, moans or mumbling, or whole-body movements.(22)

Other features of Sleep apnea are that the individuals may complain of nocturnal chest discomfort, choking, suffocation, or intense anxiety in association with apneic events. Body movements associated with breathing difficulties can be violent, and individuals with this syndrome are often described as restless sleepers. They usually feel unrefreshed on awakening and may describe feeling more tired in the morning than when they went to sleep. The sleepiness can lead to memory disturbance, poor concentration, irritability, and personality changes. Mood disorders, major depressive disorder and dysthymic disorder, anxiety disorder, panic disorder, and dementia are commonly associated with breathing-related sleep disorder. Individuals can also have reduced libido and erectile ability.

Other features of nocturnal polysomnography in individuals with breathing-related sleep disorder include short sleep duration, frequent awakenings, increased amounts of stage 1 sleep, and decreased amounts of slow-wave sleep and rapid eye movement sleep. Cardiac arrhythmias commonly occur during sleep in individuals with this disorder, and may include sinus arrhythmias, premature ventricular contractions, atrioventricular block, or sinus arrest. Bradycardia followed by tachycardia is commonly seen in association with apneic episodes.(22) One of the first authors to successfully describe a person with sleep apnea was Charles Dickens in his 'Pickwick Papers' with his description of Joe, the fat boy. This character was based on a person who bullied Dickens in his childhood. In the novel Joe suffered from dropsy - right sided heart failure, and also polycythemia ( his ruddy complexion). These are now known to be hallmarks of end stage sleep apnea. (18)

Sleep apnea affects 15 to 20 million in the United States. There has been other found that those with this affliction have an increased risk of high blood pressure, heart attack, stroke,



adult-onset diabetes, and can lead to behavior problems and learning difficulties.(32) One of the most common treatments for this is a CPAP machine. This is a continuous positive airway pressure device in which the sleeper wears a mask over the mouth and nose and pressure from an air blower forces air through the nasal passages. This pressure is constant and continuous. More radical procedures are with dental appliances that reposition the lower jaw and tongue and having surgery. The surgeon removes adenoids, tonsils, nasal polyps, or other growths. There is also a procedure called uvulopalatopharyngoplasty which removes tissue at the back of the throat such as the tonsils, uvula, and part of the soft palate. None of these surgical procedures is completely successful or without risks. (33) There has been some success with the drug mirtazapine. This is an antidepressant which may help those with life-threatening sleep disorders, sleep apnea and heavy snorers. (32)

The chiropractic literature has had some success with those with sleep apnea. One of the doctors to write on this subject found that those that he treated successfully all had a similar history, that of falling on their chest prior to their symptoms. He reported that treating them for displaced ribs, intercostal muscle spasms with chiropractic adjustments in these areas as well as the thoracic area of the back relieved their problems. (34) Another chiropractic case report focused on diet and upper cervical/occiput adjustments. This report was over a 21 year period and showed the differences in different radiographic measurements of the upper cervical while the patient gain and then lost weight. (35)

## Conclusion

There is ample evidence that adequate sleep is one of the most over looked aspects of health. New research has confirmed old adages about the need for a 'good night's sleep', the time one starts to sleep, where one sleeps and how long one is to sleep. It is known that the natural circadian rhythm for sleep is between 7 ½ to 9 hours, and also getting to sleep by 9 to 10 at night. This and getting up at sunrise can optimize the effects of sleep. Sleeping too long is now recognized as being as harmful as not sleeping long enough. Missing sleep can create a 'sleep debt' that cannot be made up, but with diligence the effects can be minimized. Continuously not getting enough sleep may provoke obesity, heart attacks, cancer and type 2 diabetes to name just a few diseases. New research has also shown that the brain needs sleep in order to re-run events of the day and to help lay down neuropathways for this information.

The use of drugs to help sleep has been shown to have side effects that may be worse than not taking the drug itself. In some patients this is exhibited as confusion, delirium, and disorganized speech. Herbs such as Kava and Valerian have fewer side effects, but are only to be used on a temporary basis. Some of the more simple and natural methods for helping a patient get a good night sleep are chiropractic adjustments, exercise and exposure to light (sunlight preferred). These simple measures can increase the amount of sleep, the quality of sleep of sleep and the person's subjective experience of sleep.

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