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Sleep is extremely important for human health. During sleep, the body and mind go through a restoration process that makes us more alert, more energetic, more functional, and happier. Yet, due to the fast pace of modern society, many people neglect this crucial rest period, which can have negative repercussions on immune function, metabolism, memory, learning and concentration capacity, mood and general disposition.

Furthermore, studies show that long-term sleep disorders significantly increase the risk of several health problems, such as obesity, hormonal imbalances, diabetes, cardiovascular disease, hypertension, and impaired immune function. An article from Harvard's Division of Sleep delves into how sleep habits can correlate with these diseases.

Regarding obesity, the researchers point out that individuals who sleep less than six hours a night may have a higher Body Mass Index (BMI), compared to those who enjoy eight hours of sleep. That is, not sleeping is a risk factor for higher BMI, in addition to lack of exercise and overeating.
This is because during sleep the body releases hormones that regulate appetite, energy metabolism and glucose processing. When there is a lack of sleep there is an increase in the production of the "stress hormone" cortisol. This in turn leads to changes in insulin secretion after meals, which is crucial in glucose regulation and fat storage. This disruption is directly associated with weight gain.

The harmful effects don't stop there. The relationship between inadequate sleep and type 2 diabetes was also investigated by the researchers, who found that lack of sleep disturbs glucose processing in healthy individuals that can increase the risk of developing diabetes. In addition, disorders such as obstructive apnea, characterized by breathing difficulties and frequent awakenings during sleep, are also associated with impaired glucose control, similar to that observed in diabetes.

According to the Harvard article, other health issues like cardiovascular disease and hypertension are also linked to sleep deprivation. Studies show that even a single night of relatively poor sleep can raise blood pressure. Thus, inadeuqate sleep over the long term, may explain the relationship



between lack of sleep and cardiovascular risks, as well as mood swings, irritability, depression and anxiety, and even a drop in life expectancy.

While you sleep, your brain is active, engaging processes throughout the body in service of your health. It consolidates memories, processes emotions, and eliminates toxins. Over the course of and sleeping braing process move through distinct phases that are essential for physical and cognitive health and emotional balance.

There are two central processes that involve the body that are linked to our sleep: the homeostatic sleep drive and the circadian cycle. The homeostatic process is what allows us to have periods of waking and periods of sleep. While we are awake the brain stores substances that induce sleep; the longer we are awake the more substance is stored, which we experience as a pressure for sleep. When we do go to sleep, the brain releases these substances. They eventually dissipate in the system, reaching a low after a good quality sleep, and then build back up after we are awake.

The circadian cycle, on the other hand, works like our internal clock, regulating the sleep-wake cycle throughout the 24 hours of our day. It uses light and melatonin as a reference. It is important to note that in the absence of light, we produce melatonin that leads to sleep. These two processes work independently, and if we sleep poorly or at different times than usual, we can misalign the balance between the two and impact our health.

Some neuroscientists have dedicated themselves to unraveling the complexity and importance of these processes, and how their regulation is associated with quality sleep and balanced mental health. A deeper understanding of these neuroscientific aspects offers us valuable insights into how to get restful and healthy sleep.

I believe it's critical to understand why we sleep, but we need to go further to know how to better prevent and manage sleep disorders, especially to prevent the development of others diseases that are impacted by our sleep, such as those mentioned above. Finding efficient and effective resources for long-term good sleep is vital.

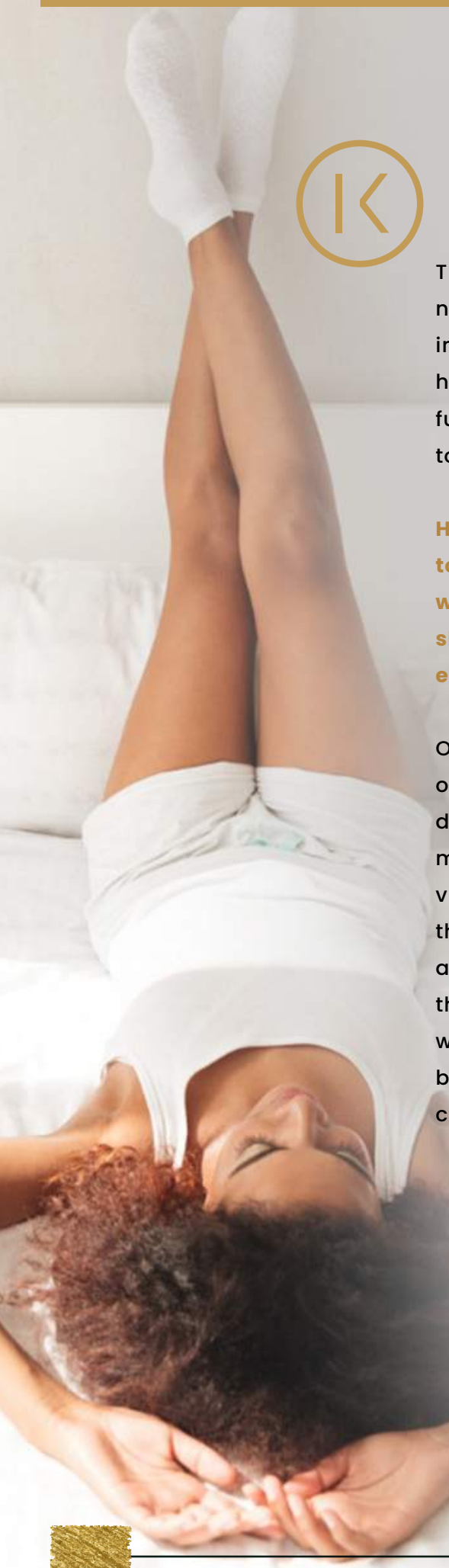
As an ancestral practice to promote health and well-being, yoga emerges as an alternative to treat and prevent sleep disorders. Yoga delivers physical and emotional well-being, and most notably can have a powerful impact on the parasympathetic nervous system which is central experiencing a state of calm and rest. Accessing such states supports quality sleep in the immediate and long-term.

This e-book looks at current scientific evidence that sheds light on the complexities and importance of sleep for us as humans, and the factors that impact and can aid sleep. We also look at how yoga can be part of this process.

Enjoy reading!

Francisco Kaiut





Why do wee need sleep?

There is much to be learned about how sleep works, as numerous studies highlight its dynamic complexity and its impact on every system in the body, including the brain, heart, lungs, metabolism, emotions, and even immune functioning. Because of this, the importance of sleep is equal to the need for food and hydration.

Harvard's Sleep Division points to several theories that seek to explain why we sleep, although there is no consensus on which one is correct. Better understanding the reasons for sleep not only leads us to value its functions, but also to enjoy the health benefits it brings.

One such theory is that of Inactivity, also known as adaptive or evolutionary theory. This theory suggests that inactivity during the night is an adaptation that served as a survival mechanism, keeping organisms safe in times of particular vulnerability. Those able to remain still and calm during these vulnerable periods gained an advantage over other animals that remained active. However, dissenters argue that remaining conscious to react to emergencies, even while standing still and in the dark, could be safer. And that being unconscious and asleep in situations where safety is crucial is not advantageous.

Another theory is that of Conservation of Energy, also based on natural selection. This theory postulates that the main function of sleep is to reduce energy demand and expenditure, especially at less efficient times to search for

food. During sleep, there is a reduction in metabolism by about 10%, resulting in a drop in body temperature and caloric expenditure compared to the waking state. This evidence supports the idea that one of the main functions of sleep is to help organisms conserve their energy resources, and this theory is often associated with the theory of inactivity.

A third theory of sleep is the Restoration Theory, which indicates that sleep has a restorative character. Evidence collected from studies shows that animals deprived of sleep for long periods lose immune function and can die within weeks. Many of the body's restorative functions, such as muscle growth, tissue repair, protein synthesis, and growth hormone release, occur primarily during sleep. In addition, sleep also has specific rejuvenating aspects for the brain and cognitive function.

The more recent Synaptic Homeostasis Theory posits that sleep is necessary to reduce neural connections or synapses in the brain. During the day, there is an increase in the number of synapses resulting from daily activity, and it is essential to prune unnecessary synapses and strengthen essential ones during sleep.

Finally, the Theory of Brain Plasticity highlights that sleep is correlated with changes in the structure and organization of the brain. This link between sleep and brain plasticity is critical in the brain development of infants and children, as well as in learning and task performance in adults.

Although there is no definitive proof of these theories, significant advances in science have revealed the processes during sleep and the mechanisms that control the sleep-wake cycles that define our lives. While not directly answering the question "Why do we sleep?" such research is paving the way for a new understanding of this crucial aspect of life, generating essential knowledge on the subject.





Stages of sleep

The National Institute of Neurological Disorders and Stroke (NINDS) (an institute of the US government) funds research into disorders of the brain and nervous system. In their comprehensive sleep guide they detail the two basic types of sleep: rapid eye movement (REM) and non-REM. These different types of sleep are differentiated based on brain waves and neural activity. Non-REM sleep has three stages, here's what happens to us during these stages:

Stage 1:

- Transition from wakefulness to sleep.
- Brief period of light sleep.
- Heart rate, breathing, and eye movements slow.
- Brain waves begin to slow down.

Stage 2:

- **Light sleep before deeper sleep.**
- **Heart rate, breathing, and muscle tension reduce even more.**
- **Body temperature decreases, eye movements cease.**
- **Brain waves present brief bursts of electrical activity.**

Stage 3:

- Deep sleep, vital for feeling refreshed.
- Occurs predominantly in the first half of the night.
- Heart rate and breathing slow down considerably.
- Difficult to wake up, brain waves become slower.

Rem Sleep:

- Appears approximately 90 minutes after falling asleep.
- Rapid eye movement behind closed eyelids.
- Brain waves resemble the activity seen in wakefulness.
- Breathing and heart rate increase, as does blood pressure.
- Most dreams occur at this stage, although some can happen in non-REM sleep.
- Dreams can cause temporary muscle paralysis in the arms and legs.
- The duration of REM sleep decreases as we age.

Memory consolidation probably requires both types of sleep, non-REM and REM.



The NINDS guide also details the function and role of each brain structure in relation to sleep.

The hypothalamus is a deep structure in the brain. It is often cited in relation to the regulation of body temperature, blood pressure, hunger and thirst, and mood, to name a few. Not surprisingly then it also plays a vital role in regulating sleep, housing nerve cells that control sleep and arousal. The suprachiasmatic nucleus within the hypothalamus regulates behavioral rhythms based on light information taken in by the eyes. Damage to this region can result in irregularities in sleep/wake cycles, especially in visually impaired people.

The brainstem, located at the base of the brain, interacts with the hypothalamus to manage transitions between waking and sleeping states. By producing the neurotransmitter GABA, it reduces the activity of the arousal centers. During REM sleep, it sends signals to relax essential muscles, preventing them from performing movements corresponding to dreams.

The thalamus, which is responsible for transmitting sensory information to the cerebral cortex, remains inactive during most stages of sleep, allowing a disconnection from the external world. However, in REM sleep, it stimulates the cortex, which can contribute to the experience of dreams.

The pineal gland, on the other hand, regulates the production of melatonin, an essential hormone for inducing sleep when ambient light decreases. This mechanism is crucial for adjusting sleep/wake cycles. This production has the function of regulating the circadian cycle, that is, physiological, metabolic and behavioral events.

Both the basal forebrain and midbrain are involved in the regulation of sleep and wakefulness, with the release of adenosine as an impetus for sleep. Caffeine works by blocking the action of adenosine, counteracting the feeling of drowsiness. Finally, the amygdala, the structure responsible for emotional processing, becomes more active during REM sleep.

These brain structures play interconnected and essential roles in regulating the human sleep cycle. With so many complex brain processes involved in our sleep, how long do we need to be asleep to have all these processes working well so we can enjoy the benefits of the rest period?

According to the Sleep Booklet, prepared by the Brazilian Sleep



Association, people have different needs for hours of sleep. Adults should sleep 8 hours a day, on average, but there are individuals who only need 6 hours and others 10. In view of this, it is recommended that each one identify the period that best suits them.

The document also states that as the years go by, the necessary sleep time can be changed. The elderly, for example, tend to sleep 7 to 8 hours, however, they wake up during the night, go to bed earlier, and wake up earlier. In addition, they tend to nap throughout the day.

The particularity of sleep in each person also involves their biological rhythm. Because of this, there are those who prefer to sleep and wake up early to perform better at the beginning of the day, and there are those who prefer to sleep and wake up later, and feel better engaging in activities in the afternoon and evening. And, of course, there are still those who adapt to more advanced or delayed schedules, as long as they are stable. Precisely because of these factors, it is important to respect each one's preferences.

If each of us has its own particularities regarding the time of sleep, in our body, the process is the same for everyone. Watching a person sleep can lead to a false impression that the entire system has been shut down. In fact, during the sleep cycle, the body undergoes a number of remarkable physiological changes.

While we are awake, our temperature, blood pressure, and metabolic activities remain relatively stable, when we sleep, everything changes.

Recent findings from Harvard's Division of Sleep Medicine, have debunked the belief that the brain is inactive when we sleep. On the contrary, it remains highly active, exhibiting distinct patterns between sleep stages and influencing intense dreams.

When sleeping, the regulation of body temperature changes, because the body gradually loses heat to the environment, leading to a reduction in core temperature. Especially during REM sleep, this drop is more pronounced. Covering yourself with blankets during this stage is one way to preserve body heat.

The breathing pattern also undergoes changes, after all, when we are awake, breathing is affected by several factors, becoming irregular. However, in the non-REM sleep phase, the respiratory rate slows down and becomes very regular. During REM sleep, this regularity dissipates, and the respiratory rate usually increases. The oscillations are not limited to breathing; cardiac activity also varies. In non-REM sleep, an overall reduction in heart rate and blood pressure is observed. However, during REM sleep, this cardiovascular activity varies more, showing significant increases in blood pressure and heart rate.

An interesting finding pointed out by the Sleep Division is the increase in the release of growth hormone, suggesting a key role of sleep in cell repair and growth.





Circadian rhythms

and sleep regulation

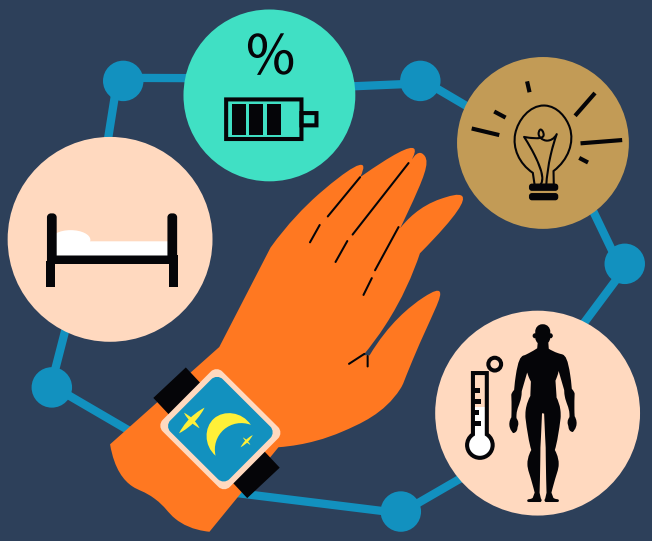
In the human body, natural rhythms dictate the pace of our health. They are intricate, integrative processes that govern our nature and coordinate cells, tissues, organs and systems. Endowed with a kind of biological clock, the so-called circadian rhythms influence sleep patterns, hormonal action, appetite, digestion and even body temperature.

According to the National Institute of General Medical Sciences (NIGMS), these rhythms are the physical, mental, and behavioral fluctuations of the entire organism over a 24-hour cycle. Light and dark play a crucial role in these rhythms, but diet, stress, physical activity, social environment, and temperature also shape them.

In humans, almost every tissue and organ has its own circadian rhythm, all of which are attuned to the daily cycle of light and dark. Behind them, there is a combination of proteins that activate and deactivate thousands of genes that regulate these rhythms. At the helm of all of these activities is the brain, specifically a group of nerve cells called the suprachiasmatic nucleus (SCN).

The nucleus regulates the production of the hormone melatonin based on exposure to light, influencing the feeling of sleep. In addition, it synchronizes circadian rhythms in different organs and tissues of the body. Some factors can misalign the functioning of these rhythms, such as neurological diseases, travel between time zones, shift work, genetic factors, and nighttime exposure to light from electronic devices.

The effect of lack of synchrony can lead to drowsiness, incoordination, and short-term learning and concentration difficulties. In the long term, sleep loss and the continued disruption of these rhythms can increase the



risk of obesity, diabetes, mood disorders, heart problems, high blood pressure, and even cancer, as well as aggravating existing health problems.

In relation to sleep, the sleep-wake cycle stands out as one of the most essential and evident examples of the influence of circadian rhythms. Throughout the day, exposure to light triggers the body's internal clock, triggering states of alertness that keep you awake and active. While at night, it promotes the production of melatonin, the hormone that stimulates sleep, and continues to transmit signals that sustain uninterrupted sleep. This is how circadian rhythms maintain the cycle of rest and rest over a 24-hour period.

In the article "Daily Rhythms of the Body and the Biological Clock", published in the journal Frontiers for Young Minds, the researchers explain that the molecules that identify light that influence the circadian rhythm are sensitive to blue light (present in today's smartphones). Considering the modern world, in which we are constantly exposed to light bulbs, computer screens, and cell phones, our circadian rhythm is constantly impacted.

Another feature of modern life that disrupts the rhythm is when we travel to a distant country. In these moments, our biological clock has difficulty returning to normal and we experience the unpleasant sensations of jet lag (body aches or headaches, tiredness and drowsiness, digestive problems, insomnia, among others). According to the article, studies show that people who frequently suffer from jet lag are at higher risk for cancer and other chronic diseases.

The same can occur in people who work at night, who effectively suffer from prolonged jet lag. They warn that to reduce the damage to health caused by the alteration of the circadian rhythm, it is recommended that we be exposed to daylight as much as possible and avoid light from screens at night.

According to the Sleep Foundation, an organization dedicated to disseminating information about sleep health, disturbances in this cycle can lead to difficulty falling asleep, frequent awakenings at night, and morning insomnia. The Organization gathers data on the relationship between lack of sleep and various diseases, such as mental health.

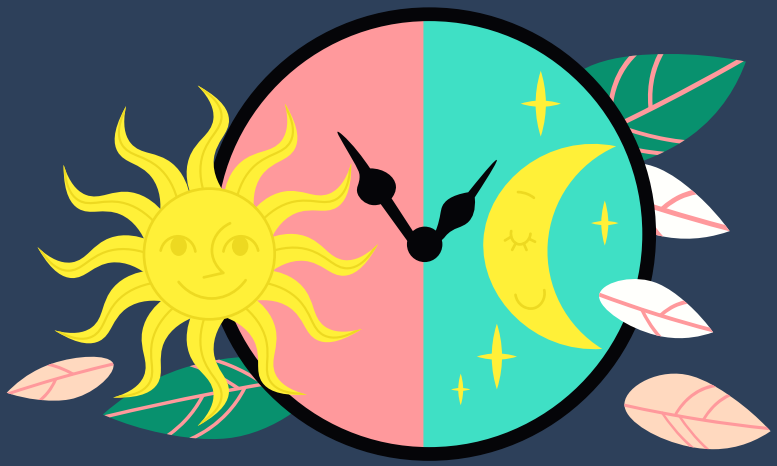




Among them, a study by the respected medical journal JAMA, present in the scientific community since 1883. Work reveals that 40% of people who suffer from insomnia may have a mental health diagnosis.

Individuals with Seasonal Affective Disorder (SAD) often face fatigue during the winter. About 70% of them feel tired during this period, while only 44% of people without this disorder report this exhaustion. Another alarming fact is that 83% of adults diagnosed with depression manifest at least one symptom of insomnia.
Stress and anxiety play a major role: 54% of adults say that these are the main reasons for their difficulty falling asleep, with Sunday evening of the week being the most difficult to fall asleep.

The emotional impacts can be even more profound. About 91% of adults with



Post-Traumatic Stress Disorder (PTSD) experience symptoms of insomnia. In addition, 80% of people with PTSD experience nightmares up to three months after the trauma.

Surprisingly, environmental situations such as wildfires can lead to up to 135 hours of sleep lost annually for affected adults. Of the adults impacted by the fire, 77% associate anxiety as the main reason for difficulty sleeping. This data demonstrates the connection between a person's emotional health and their sleep quality.



How to Maintain a Healthy Circadian Rhythm

The Sleep Foundation offers recommendations for healthy circadian rhythm and thus good sleep. Maintaining the balance of our internal clock is essential for health.

Seek sunlight: Exposure to natural light, especially in the morning, reinforces the primary circadian signal.

Establish a routine: Going to bed and waking up at regular times helps your body adjust to a stable circadian rhythm.

Avoid stimulants: Stimulants like caffeine can interfere with sleep. Avoid consumption after noon if you face difficulty sleeping.

Reduce light exposure before bed: Artificial lights at night can disrupt the circadian rhythm. Dim the lights and turn off electronics before bed.

Short, early naps: Long, late naps can affect your nighttime sleep schedule.

Create an environment conducive to sleep: The comfort of your bedroom affects the quality of sleep. Invest in a good mattress, proper bedding, and sleeping accessories.

Exercise daily: Physical activity throughout the day supports your internal clock, making it easier to fall asleep at night.

How can practicing yoga help regulate circadian rhythms?

The ancient practice of yoga has been analyzed by researchers as a resource for improve the quality of sleep, in addition to offering other benefits in the physical, mental and emotional aspect.

A study conducted by the Centers for Disease Control and Prevention (CDC), an agency of the United States Department of Health and Human Services, provides an enlightening overview of the effects of the practice on sleep.

The data show that more than 55% of the followers of this practice report that they felt an improvement in the quality of their sleep, while 85% say that they had a reduction in the level of stress. These numbers highlight the connection between yoga and the enhancement of a state of rest.

A relevant point in the studies focused on the relationship between yoga and sleep is the clarification that the quality of rest should not be represented by quantity. Given this, it is possible to understand that although the duration of sleep is important, the true essence of a good night's rest is related to the quality of this period.

The quality can be perceived in the absence of interruptions and also in the vitality presented by the individual upon awakening, contributing to overall well-being. So much so that many practitioners report experiencing the feeling of renewed energy at the start of the day, a common point among those who engage in regular practice.

Therefore, scientific evidence shows us the connection between the practice and the improvement of sleep quality, making it possible to understand that yoga strengthens the body, but also calms the mind, providing an avenue for a revitalizing night's rest that is essential for the practitioner's overall health. Importantly, this effect can be experienced by young people, adults and the elderly.

An article published by the Sleep Foundation explores the benefits of yoga for all ages. Based on the analysis of some studies supported by the National Library of Medicine, in the United States, a group of children who face the challenges of Autism Spectrum Disorder (ASD) and who tried the practice of yoga were able to reduce stress and improve mental health, contributing to improve sleep quality. Consequently, the situation reverberated



in well-being for the parents and the whole family.

Adult women experiencing sleep problems have also found a solution in yoga. Pregnant women in particular experienced improved sleep, as well as a decrease in anxiety and depression levels during the prenatal period. In menopause, regular practice proved to be equally positive, contributing to improvements in sleep, along with relief from depression and anxiety in this transitional stage.

Older people who commonly suffer from sleep disorders and who have started doing yoga have started to sleep better. The syndrome of restless legs, snoring and insomnia, which have such an impact on the quality of life at this stage of life, had a progressive improvement when yoga began to be incorporated into the routine as a regular habit.

An article from Harvard Health Publishing identified a number of reasons for why yoga practice is a resource to improve sleep. These include reducing stress, anxiety, and excitement. One of the studies analyzed considered the effects of meditation practice and Kundalini breathing from the analysis of a group of 20 people with sleep issues. After 8 weeks of practice, the researchers found that those involved slept an average of 36 minutes longer and woke up less during the night. Overall, sleep quality was 11% better.

The text also addresses the results obtained by a study done with a group of 35 adults aged 60 years or older who regularly practiced for at least two years. The data collected by the researchers revealed that the elderly practitioners had a significant improvement in several aspects related to sleep.

Compared to those who did not do yoga, the group took an average of 10 minutes less to fall asleep and slept an hour longer, having a vigorous awakening daily. The practice has also proven to be a powerful resource for treating insomnia. In a study that compared the effectivexness of yoga practice with conventional methods for getting a good night's sleep, he presented surprising data.

After eight weeks of regular yoga practice, participants had a 37 percent faster time to fall asleep compared to those who only received conventional guidance, which achieved a 28 percent reduction. Scientific evidence reveals a remarkable "dose-response" phenomenon associated with yoga practice and sleep quality. In other words, the more frequent and consistent the practice of yoga, the less sleep disturbances tend to occur and the more restorative nighttime sleep becomes. Even for those who don't face specific difficulties falling asleep, yoga is touted as an effective tool for improving sleep quality.

Researchers from the Government Medical College of India, and the University of North Texas Health Science Centre, in the United States, published in the Journal of Ayurveda and Integrative Medicine a study on the impact of prolonged yoga practice on the quality of sleep and life of the elderly. The study group consisted

of individuals over 60 years of age, residing in the city of Nagpur, India. Divided into two distinct groups, the comparative study included 30 non-yoga practitioners and 35 students from the Patanjali Yoga Center, who had maintained a daily yoga practice for more than two years. Practice took place regularly at the center, with daily sessions led by a certified instructor from 6 a.m. to 7 p.m.

The results revealed that older adults engaged in regular yoga practice showed significant improvements in overall sleep quality. These benefits were evidenced by a reduction in sleep latency, fewer interruptions during at night, reduction in the time it takes to fall asleep, less use of sleeping medications, in addition to reporting feeling more refreshed and energized in the morning.

The reasons for the improvements presented are due, in the researchers' analysis, to the yoga exercises. The postures are focused on stretching and muscle relaxation, so they were pointed out as one of the main catalysts for the observed improvements. These practices result in lower sleep latency, greater sleep depth, and better overall efficiency. Another point is that continuous practice for an average of 5.26 years has been shown to maintain these benefits over time.

The study also explored the physiological mechanisms underlying yoga's benefits for sleep. Evidence indicates that yogic breathing exercises strengthen the muscles of the upper airways, reducing snoring and breathing disorders during sleep. In addition, regular practice has been shown to reduce physiological arousal, which is associated with better sleep quality.

In addition to the positive impact on sleep quality, study participants also experienced benefits in other spheres. Yoga has been shown to improve joint flexibility, prevent the decline in physical function, and improve cognitive function in the elderly. These results suggest that regular practice can influence the autonomy and quality of life of the elderly.

In summary, prolonged yoga practice by seniors has proven to be highly beneficial, promoting not only better sleep quality but also improvements in physical and cognitive function. These results corroborate previous studies and reinforce the role of yoga as a tool to promote holistic well-being in old age. A deeper understanding of the physiological mechanisms related to these benefits could guide more precise interventions in the future, offering valuable alternatives to improve the health and quality of life of older adults.



Yoga & Sleep Neuroscience

The study "Yoga Effects on Brain Health: A Systematic Review of the Current Literature", published in Brain Plasticity, a journal dedicated to the publication of articles on all aspects of neurogenesis, gliogenesis and synaptic plasticity. It reports on the positive effects of yoga practice on brain structures and functions, revealing significant implications for cognitive health.

From the review of eleven studies, the researchers found that mind-body behavioral interventions are associated with anatomical changes in key areas of the brain, such as the frontal cortex, hippocampus, anterior cingulate cortex, and insula. Regular practice has consistently demonstrated a positive relationship with measures of brain structure, such as gray matter volume and density, especially in practitioners with more experience or after the intervention.

Differences in brain function between practitioners and non-practitioners were observed in regions such as the dorsolateral prefrontal cortex, showing less activation during specific cognitive tasks.

In addition, significant differences were noted in the ventrolateral prefrontal cortex, superior frontal gyrus, and amygdala, suggesting an influence of yoga on different aspects of cognitive and emotional processing.

Studies on functional brain connectivity after practice have revealed increases in the default mode network, associated with improvements in memory. These findings indicate that yoga not only affects structure but also brain function, pointing to its beneficial effects.

The holistic practice of yoga, which combines physical, meditative, and breathing exercises, reflects neuroprotective effects similar to those seen in physical activities and mindfulness practices. This suggests, according to the researchers, potential benefits in preserving brain health, especially related to cognitive aging.

Specifically, yoga positively influences the volume of the hippocampus, a region crucial for learning and memory, aligning with findings in aerobic exercise and mindfulness. Another point identified during the review was that the practice of It has been shown to increase the volume of several brain areas involved in cognitive control, coordination of actions, and evaluation of rewards.

The relationship between yoga and areas such as the anterior cingulate cortex shows positive correlations with verbal memory and improvement in the connectivity of regions associated with the default mode. The results suggest that yoga may be a valuable intervention to promote brain health at older ages, possibly reducing the risk of neurodegenerative diseases.

These findings are promising and demonstrate the impact on brain structure and function, and also provide opportunities for future comparative research between the practice and other physical activities and mindfulness, providing valuable insights into public health and cognitive aging issues.

Through understanding these neurobiological changes induced by yoga practice, we are closer to recognizing its potential as an effective intervention in promoting brain health and protecting against cognitive decline as we age. An article by the Kaiut Yoga Institute, published in the journal Ciência Latina, explored the connection between yoga practice and neuroscience, focusing on the neurobiological changes resulting from the practice and how they can impact circadian rhythms.

To do this, recent studies on yoga and sleep were analyzed. The analysis found that sleep quality is crucial to human health, so a disruption in circadian rhythms — the internal timing patterns that regulate sleep-wake cycles — has detrimental effects on physical and mental health. At the same time, integrative and complementary practices, such as yoga, can regulate and



balance these rhythms.

Some studies analyzed show how yoga can have an efficient therapeutic effect for circadian issues, even though there is still a need to deepen the understanding of underlying mechanisms. The fact is that the understanding of how body and mind practices can be integrated into traditional medicine to improve health and well-being is advancing in the scientific community.

According to the study, advancing this field of research would represent not only confirmation of the healing properties of Yoga, but could also guide it in more exploratory research directions. These may include, but are not limited to, the study of yoga in the neurobiological processes of sleep and the effectiveness of different styles of practice in adapting circadian rhythms. Furthermore, an in-depth understanding of the interaction between yoga, sleep, and the circadian cycle could have significant implications for sleep research and the overall benefit of human health.

To expand the evidence on the effect of the practice on sleep quality, let's look at the considerations of the study “The effect of yoga on sleep quality and insomnia in women with sleep problems: a systematic review and meta-analysis”, published in the journal BMC Psychiatry. The study highlighted the positive impacts of the practice both on sleep quality and on reducing the severity of insomnia in women.



To this end, a review of 19 randomized controlled trials found that yoga is associated with a substantial improvement in sleep quality, represented by an average reduction of 1.2 points in the Sleep Quality Index Score (PSQI). **This systematic review and meta-analysis is a pioneer in focusing specifically on the effects of yoga on sleep quality in women. Compared to previous reviews, which did not focus exclusively on a specific gender, the study highlights the effectiveness of yoga in improving subjective sleep quality in female participants.**

However, some limitations have been identified, including heterogeneity in practice interventions, differences in participant types, and lack of in-depth assessment of long-term and adverse effects. Such limitations are common to yoga studies more generally. These limitations point to the need for future studies with more rigorous methodology, including a standard protocol, full safety reporting, and more comprehensive consideration of participants and interventions.

Finally, the authors of the review underscore the significant benefits of yoga in managing sleep problems in women. The results suggest that the practice is most effective in specific subgroups, such as women without breast cancer or peri/postmenopausal.



Conclusion

As we have seen above, the practice of yoga has been increasingly recognized as a powerful resource for human health, more recently the academic world has sought to understand how the practice also impacts the quality of sleep and the regulation of the circadian rhythm.

In the face of comprehensive research and advances in sleep neuroscience, it becomes clear that sleep is not restricted to rest but is also linked to the vital process for the healthy functioning of the brain and body. Many studies have explored the link between sleep, memory, and learning consolidation and have found that sleep phases are critical for memory retention, and that when sleeping, the brain reinforces memories and consolidates experiences.

In addition, researchers have found that sleep plays a key role in removing brain waste, a process that is crucial for long-term neural health. Sleep not only allows for the elimination of toxic metabolites, such as beta amyloid, which is associated with Alzheimer's disease, but also reduces the production of these wastes during the resting period.

These findings broaden the understanding that sleep is a time of cleansing and reorganizing the brain, which is critical for cognitive and emotional health. However, despite the numerous scientifically proven benefits of sleep, social and professional issues can lead many individuals to compromise their hours of rest.

In this scenario, the regular practice of yoga has been shown to be an ally in improving sleep quality and regulating the circadian rhythm. Through breathing techniques, meditation, and physical postures, yoga offers a holistic approach to reducing stress, relaxing the mind and body, thus facilitating a deeper, more restorative sleep.

It is essential to encourage and promote strategies such as yoga, which demonstrate not only effectiveness in sleep quality but also a positive impact on overall health. Investing in a deeper understanding of the mechanisms underlying sleep, along with the implementation of practices such as yoga, can be a promising avenue for improving individual and collective health, thereby optimizing vital aspects of human existence.



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