

Insomnia:

Natural Solutions for a Better Sleep

Nearly everyone has experienced difficulty sleeping at some time in their lives. Insomnia is defined as the inability to obtain an adequate amount or quality of sleep. Individuals with insomnia may have difficulty falling asleep, difficulty remaining asleep, early morning awakenings or poor quality, non-restorative sleep.^{1,2} There are different classes of insomnia, depending on the severity and duration. In general, transient insomnia refers to occasional sleep disturbances lasting from days to weeks. Acute insomnia refers to the inability to achieve normal sleep for a period of three weeks to six months, and chronic insomnia can last for years.¹

In general it is estimated that about 30% of individuals report symptoms of insomnia, with about 10% suffering from chronic insomnia.^{1,3} A report on insomnia in Canada found that approximately 13.4%, or 3.3 million Canadians over the age of 15 years suffer from insomnia. These individuals declared that they experienced trouble going to sleep or staying asleep most or all of the time. On average, individuals reporting insomnia slept 6.5 hours per night, compared to 7.5 hours per night in non-insomniacs. 18% of insomniacs reported getting less than five hours of sleep per night.

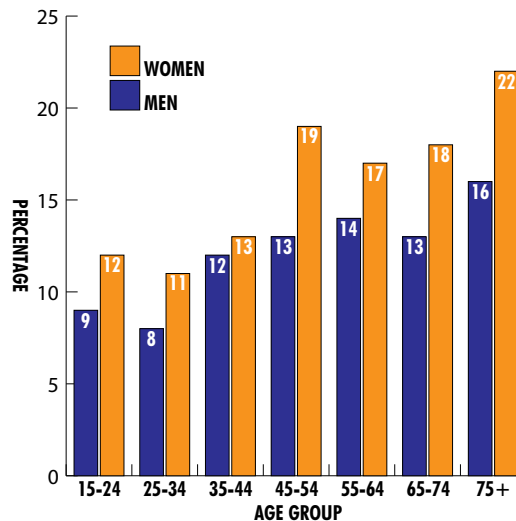


Figure 1. Percentage of Canadians aged 15 and older reporting insomnia by sex and age group in 2002.²

The causes of insomnia are highly varied. In fact, insomnia is one of few conditions that can be categorized as both a symptom and as a condition in its own right. However, to fully understand insomnia as well as its causes and consequences, we must first take a closer look at sleep itself.

What is Sleep?

Sleep is not merely a period of rest or “down time” for the body, but is actually a complex sequence of stages with specific and important purposes. While you sleep your brain is performing a variety of vital tasks like forming pathways for learning as well as consolidating memories. Sleep is divided into two main types, REM or “rapid eye movement” sleep and non-REM sleep, which has 4 stages.⁴

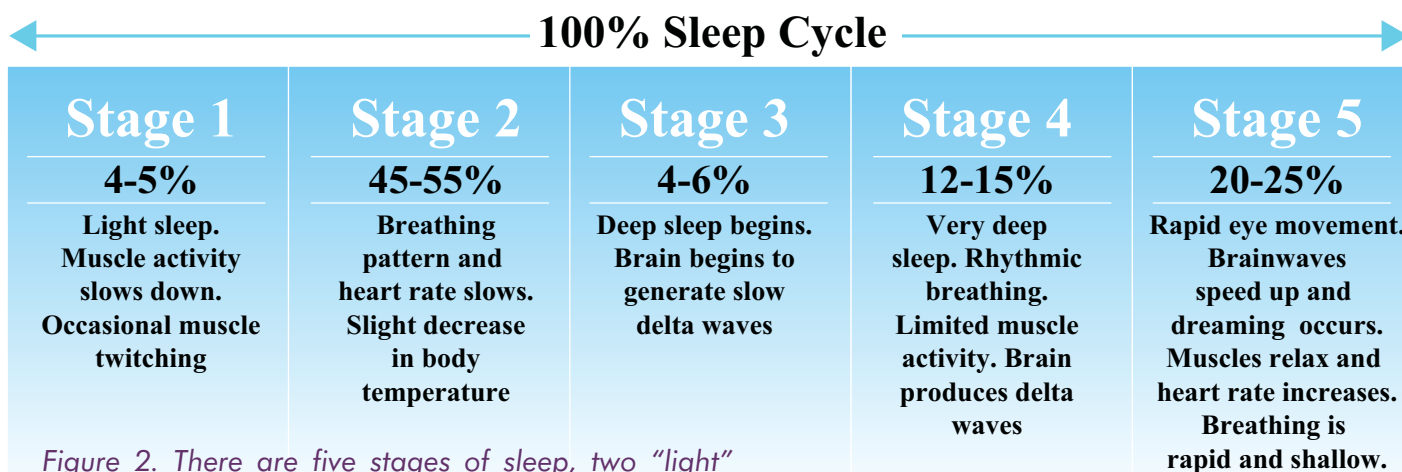


Figure 2. There are five stages of sleep, two “light” sleep stages, two “deep” sleep stages and REM or “rapid eye movement” sleep.

Generally, sleep begins in non-REM sleep. Stages 1 and 2 are the lightest stages of sleep during which individuals are easily awakened by noises and movements. As sleep progresses through stages 2 - 4 of non-REM sleep, eye movement stops and brain wave patterns become slower. Stage 4 is characterized by very slow brain wave patterns. Stages 3 and 4 of non-REM sleep are considered "deep sleep" and are the restorative portion of sleep, during which one is not easily awakened. This part of sleep is considered necessary for feeling well rested and energized the next day.⁴

REM sleep follows stage 4 of non-REM sleep. This first occurs about 90 minutes after one initially falls asleep. During REM sleep your eyes move rapidly, and breathing rate, heart rate and blood pressure increase. Dreaming occurs during REM sleep, and the centres of the brain responsible for learning and memory are stimulated. It is suggested that dreaming is the brain's way of sorting and storing new memories

and information acquired while awake.⁴ However, the other stages of sleep are also important for learning and memory.⁴

Throughout the night the brain continuously cycles through the stages of sleep. As the night progresses the duration of REM sleep increases, and the time spent in stages 3 and 4 of non-REM sleep decreases. Overall one spends almost half of their total sleep time in stages 1 and 2 of non-REM sleep, with the rest of the time being divided between stages 3 and 4 and REM sleep. Interestingly, infants spend about half their time sleeping in REM sleep.⁴

These various sleep stages mean that it is not just the quantity of sleep that is important, but also the quality. When sleep is frequently interrupted, or cut short, this can result in not enough time being spent in REM sleep or in non-REM stages. Both types of sleep are important for learning, memory and restorative processes, and a loss of the correct balance of sleep types can have negative consequences.⁴

A Note on Sleep: How much is enough?

Recent times have definitely seen a decrease in the average amount of sleep. The current average for adults is about six to seven hours of sleep per night.^{4,5} This is a great change from 1910, when most people slept around nine hours a night!⁴ Our 24/7 lifestyles and an effort to balance all of the responsibilities of life and work have led many individuals to sacrifice sleep in order to get things done. However, this strategy can have a negative influence on both health and day to day performance. While "catching up" on sleep on the weekends can help, it cannot totally erase the sleep debt accumulated during the week, and can make it harder to get up at the right time during the week.⁴

When given unlimited opportunity for sleep, most adults will sleep about eight to eight and a half hours per night, although sleep needs vary both between individuals and by age. Studies suggest that the optimal amount of sleep needed to achieve good daytime performance, avoid sleep debt and sleepiness during the day, as well as for preventing health problems related to inadequate sleep is about seven to eight hours per night for adults and nine hours or more for children and teenagers. Keep in mind, however, that the quality of this sleep is also vital to achieve these goals.⁴

One interesting study has suggested, that not only is too little sleep a potential problem, but so is too much.⁵ The study examined the sleeping habits of over one million men and women as part of the American Cancer Society's Cancer Prevention Study II, and associated these with the risk of mortality. Surprisingly, reports of insomnia were not associated with increased risk of mortality once the data was corrected for other factors. In fact, the best survival was found among individuals sleeping seven hours per night. Sleeping eight hours or more, or six hours or less, were both associated with a slightly increased mortality risk. This increased risk was highest (reaching 15%) for individuals sleeping more than 8.5 or less than 4.5 hours per night.⁵ The finding that longer periods of sleep are associated with an increased risk of mortality is surprising, and currently, the reason for this is not known. But it seems that either too much or too little sleep can be potentially harmful.

Causes of Insomnia

Physical Causes

In many cases insomnia is caused by some type of underlying condition. It is estimated that this is the case for approximately 75-90% of insomniacs.³ Often these conditions are medical in nature. A number of studies have demonstrated a strong link between insomnia and poor physical health, chronic health conditions or pain.^{1,2,5,6,7} Pain in particular seems to be a major cause of insomnia.^{2,7} Obviously, when a person is experiencing a high level of chronic pain, it becomes very difficult to sleep. Many chronic diseases are also associated with an increased risk of insomnia. This could be due to the fact that many diseases result in painful conditions, or it could also be a result of the stress and worry experienced by an individual when they are suffering from a disease.²

Among Canadians, a wide range of chronic conditions have been found to be related to sleeping difficulties.² These conditions include: fibromyalgia, arthritis, rheumatism, back problems, migraine, heart disease, cancer, chronic bronchitis, emphysema, chronic obstructive pulmonary disease, stomach, intestinal ulcers, and bowel disorders. For example, over 20% of individuals with arthritis, back problems or migraines and over 40% of individuals with fibromyalgia, reported insomnia. This is compared to only around 12-13% of individuals without these problems.

Sleep disorders, including restless leg syndrome and sleep-related breathing disorders such as sleep apnea, dyspnea and snoring, are also commonly associated with interrupted sleep and insomnia.^{1,3}

Mood and Psychological Disorders

Another major cause of insomnia is psychological or mood disorders. Anxiety and depression have long been associated with sleeping difficulties. In fact, psychological causes are estimated to account for approximately 40% of all cases.³ Among Canadians, about one third of individuals reporting a mood disorder (such as depression or panic attacks) also reported suffering from insomnia. This is compared to only 12% of individuals without mood disorders.²

In general, individuals suffering from anxiety or other mood disorders have a very high probability of also experiencing insomnia. What is much less certain is whether the insomnia is a result of the mood disorder, or whether insomnia precedes and actually contributes to the development of depression and anxiety disorders.^{1,3} Although it has been traditionally assumed that insomnia is a secondary consequence of

depressive disorders, other research has shown that in some cases, insomnia may be a risk factor for the development of psychological disorders.¹ In fact, one large-scale European trial found that more often than not, insomnia actually precedes the mood disorder rather than following it.⁸ Furthermore, several long-term studies have shown that insomnia is a significant risk factor for the development of depressive disorders.^{9,10} As to whether insomnia causes depression or vice versa, it has been suggested that both conditions have a very similar pathology, making an individual who is susceptible to one condition highly susceptible to the other as well.

Lifestyle Factors

Lifestyle factors are another major cause of insomnia. Such factors include work schedule, stress at home and at work, obesity, physical activity, alcohol and drug use, education, income, age and marital status.^{2,7,11} For example, it has been found that a high proportion of obese individuals suffer from insomnia. In a study of insomnia in Canadians, 22% of highly obese individuals reported insomnia, as compared to 12% of individuals with normal weights. The study also found a slight relationship between physical activity levels and insomnia; with moderately active individuals reporting less insomnia than sedentary individuals.² These results match those of a Japanese study that reported that habitual exercise was associated with a lower incidence of sleeping difficulties.¹²

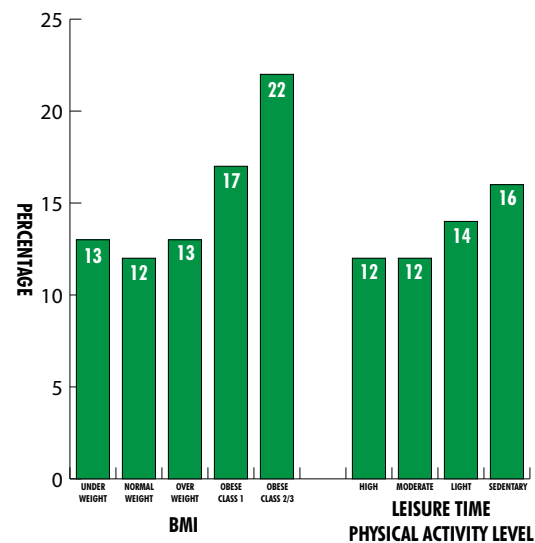


Figure 3. Percentage of Canadians over 15 years of age reporting insomnia, grouped by Body mass Index (BMI) and physical activity level.²

Not surprisingly, drinking coffee or other high caffeine beverages can also negatively affect sleep. Caffeine consumption has been linked to reduced overall sleep time, delayed onset of sleep and disrupted sleep quality in individuals drinking coffee throughout the day.¹³ Consumption of caffeine before bedtime has also been shown to disturb normal sleep patterns, shifting REM sleep into the earlier part of the night and stages 3 and 4 of non-REM sleep into the later part of the night.¹⁴ Research suggests that caffeine may decrease secretion of melatonin, the main hormone responsible for sleep synchronization.¹⁵

Higher rates of insomnia have also been reported among heavy drinkers, smokers, individuals with low income or no formal education, women, shift workers, older individuals, widows and widowers and unemployed individuals.^{2,7} In some cases these sleeping problems are related to changes to circadian rhythms, or sleep wake cycles. For example, this is

experienced by shift workers, whose schedule is constantly changing. This is also the cause of “jet lag”. In many of these cases, however, the actual cause of the insomnia may be the stress associated with an individual’s situation.

Stress and Insomnia

Stress is a very common cause of insomnia. In fact, in a number of studies it has been the primary cause identified.⁷ Among Canadians, nearly a quarter of those who reported their days as “quite a bit” or “extremely” stressful also reported suffering from insomnia.² The type of stress experienced also influenced the risk of suffering from insomnia, with the highest incidences occurring in those reporting stress related to a physical health problem, the death of a loved one, personal/family responsibilities or difficulties related to a personal relationship.²

Table 1: Percentage of Canadians reporting insomnia by main source of stress²

Own physical health problem	31.7%	Health of family members	14.4%
Death of loved one	24.6%	Other	14.2%
Own emotional/mental health problem	24.0%	Caring for own children	12.1%
Personal and family’s safety	16.6%	Own work situation	11.9%
Other personal/family responsibilities	16.4%	Time pressures/not enough time	8.1%
Personal relationships	15.8%	None	8.0%
Caring for others	15.6%	School	7.5%
Employment status (unemployment)	14.6%		
Financial situation	14.5%		

Although life stress is more strongly associated with insomnia than work stress, stress at work is another significant cause of sleeping difficulties. In one study it was found that a poor psychosocial work environment doubled one’s risk of developing sleeping problems!¹¹ Furthermore, as mentioned previously, insomnia seemingly caused by a medical or psychological problem may actually be due to the stress and worry associated with having the condition, rather than the condition itself.

Primary Chronic Insomnia

In a few cases, there is no obvious underlying condition behind an individual’s chronic sleeping difficulties. These individuals are said to suffer from primary insomnia. In these cases the person experiences hyperarousal, meaning that they are more “revved up” than a normal individual.

This hyperaroused state prevents normal sleep from occurring. In these cases there is usually increased activity evident in both the autonomic nervous system (the part of the nervous system that regulates organ systems and bodily processes) as well as certain

hormonal pathways.¹ This results in higher cortisol levels, higher body temperatures, faster heart rates, and a different pattern of brain waves during sleep.^{1,4}

The Negative Effects of Insomnia

Obviously there are negative consequences to not getting enough sleep. Studies in rats have shown just how important sleep can be. Normal rats have a lifespan of between 2 and 3 years. However, when deprived of REM sleep they live for only five weeks, and when deprived of sleep altogether, they live only two to three weeks.⁴ While the consequences for humans experiencing insomnia are not this drastic, they can still be quite debilitating.

Insomnia can cause a number of problems during the day, such as excessive sleepiness, fatigue, a lack of energy, difficulty concentrating, depressed mood, and irritability. Because of this, insomnia can impair quality of life as much as, or even more than other chronic medical problems.⁴ In several studies examining quality of life in insomniacs, decreased quality of life was reported for virtually all dimensions of the 36-item Short Form Health Survey of the Medical Outcomes Study (SF-36). This survey assesses eight aspects of life quality including: physical functioning, role limitation due to physical health problems, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional health problems and mental health.¹⁶⁻¹⁸ In fact, insomniacs were found to score worse in many areas than individuals with congestive heart failure or depression!¹⁹



Reduced performance at school or work is another obvious consequence of insomnia. Individuals with sleep problems have been reported to be less able to focus at work, to have less job satisfaction and to be more likely to miss work due to health problems than good sleepers.^{3,20}

Insomnia can also have negative effects on a person's health. As discussed above, individuals with insomnia are much more likely to develop depression.^{9,10} Another very recent finding is that sleep deprivation may increase food intake, and could possibly contribute to obesity.¹⁸ In a study conducted on 12 healthy men, it was found that a night of sleep deprivation (4 hours of sleep) resulted in increased food consumption the following day.²¹ Although further research would be required to determine if this effect is maintained for persistent insomnia, it is a very interesting finding.

Finally, one of the most dangerous side-effects of insomnia is an increased risk of accidents. Research has shown that insomniacs are two to four times more likely to have an accident than non-insomniacs.^{22,23} In one study involving over 8000 individuals, it was found that eight percent of individuals with insomnia had been involved in an industrial accident in the preceding year, as compared to only one percent of non-insomniacs.²⁴

Natural Solutions for Insomnia

Many individuals rely on prescription drugs to help them get to sleep. Unfortunately, many of these drugs have potential side effects, and can lead to dependence. The good news is that there are a number of natural alternatives that can help you get a good night's sleep. For example, more and more research is showing that in many cases certain behavioural changes or patterns can actually be as effective as pharmaceutical sleep aids! There are also a number of natural supplements that have been shown to help induce relaxation and healthy sleep patterns with far fewer negative side effects than sleeping pills.

Behavioural Changes

Behavioural therapies have come a long way from counting sheep! Often they will involve sleep restriction techniques or stimulus control procedures or both. Sleep restriction procedures involve limiting the time spent in bed to the actual time spent sleeping. For example if individuals report spending 6 out of 8 hours spend in bed actually sleeping, then they would begin spending only 6 hours in bed, and then increase the time in bed as sleep efficiency increases. Stimulus control procedures help to create a positive association with the bedroom, instead of one of anxiety and frustration. These procedures include going to bed only when sleepy, using the bedroom

only for sleeping, not reading or TV. watching etc., moving to another room if unable to sleep within 15-20 minutes, arising at the same time every morning regardless of amount of sleep obtained and limiting naps to only one hour prior to 3:00pm.



In one study, involving 78 adults with chronic insomnia, these behavioural strategies were found to be more effective than pharmaceutical treatment, with longer lasting effects.²⁴ Furthermore, a large meta-analysis showed that stimulus control alone could reduce sleep-onset time from an average of 64 minutes to an average of 33 minutes.²⁵

Another common strategy that has been used is progressive relaxation. Numerous studies have found that this technique, which involves progressively relaxing the various parts of the body, effectively reduces the time it takes to fall asleep. In one study this technique was found to reduce sleep onset time by over 22 minutes. This was compared to a set of arbitrary relaxation exercises, which reduced sleep onset time by only 2.8 minutes.²⁶

Paradoxical intention is yet another strategy that has been shown to be effective in some cases. It is based on the premise that the fear of not being able to sleep reduces sleep quality. This technique involves a person actually trying to stay awake in bed in a dark room. As the patient stops trying to fall asleep, their anxiety about not being able to sleep dissipates, and they have an easier time sleeping.²⁵

Neurotransmitters

For individuals who would like to avoid pharmaceutical sleep aids, there are a number of effective, natural options. Some of these include naturally occurring neurotransmitters and hormones. Neurotransmitters are chemical messengers in the brain that transmit signals from one neuron to another. These brain chemicals act to modulate an enormous number of functions in the human body, including sleep. Supplementing with some of these natural sleep regulating molecules has been shown to be effective for combating the effects of insomnia.

GABA

Gamma-aminobutyric acid (or GABA) is the most important inhibitory neurotransmitter in the brain. GABA acts like a "brake" during times of stress or anxiety, regulating brain excitability and inducing relaxation. GABA receptors are highly concentrated in the hypothalamus; the region of the brain associated with sleep. Studies have shown that chronic insomniacs have 30% less GABA in their brain than people who don't have trouble sleeping. This chemical imbalance may be an underlying cause of primary insomnia.²⁷

Supplementation with GABA has been shown to affect the brain directly, increasing α -brain waves (those associated with relaxation) and reducing β -brain waves (those associated with anxiety and stress). In one small study, GABA supplementation reduced sleep latency (transition time from wakefulness to stage 1 of Non-REM sleep) by 20%, and increased the time spent in late-stage deep sleep by another 20%.²⁸



Melatonin

Melatonin is a sleep hormone that acts as a neurotransmitter in the brain. Melatonin is produced by the pineal gland, and its main action is to control the body's internal clock. Melatonin has been shown to increase sleep time and reduce the time it takes to fall asleep. It can also help to reset the body's sleep-wake cycle, a benefit to those suffering from jet lag or a similar schedule disruption.²⁹

Supplemental melatonin's effects on sleep are extensive and well documented. In one study, supplemental melatonin reduced sleep latency times by an average of 115 minutes in a group of insomniacs. Supplemental melatonin is particularly well-researched with respect to dealing with disruptions in the body's internal clock, such as jet lag and shift work, with no fewer than 10 clinical studies demonstrating its ability to resynchronize the body's altered circadian rhythms governing sleep.²⁹ Another important aspect of melatonin is that in addition to

improving sleep quality, it has also been shown to improve morning alertness and does not produce withdrawal symptoms when discontinued.³⁰

5-HTP

Serotonin is a neurotransmitter that is essential for sleep modulation in its own right, and that can also be converted by the body into melatonin. 5-HTP is L-5-hydroxytryptophan, a metabolite of the amino acid tryptophan and a precursor to serotonin. 5-HTP boosts serotonin levels, and can also increase REM and deep sleep phases, making sleep more restful.

Supplemental 5-HTP has been successfully studied for the treatment of a number of conditions, including anxiety, depression, chronic fatigue, and migraines. Studies examining its positive effects on sleep go back to the early 1970's, and a recent study revealed that 5-HTP supplementation was able to reduce the number of sleep-terror episodes in children by nearly 84%.³¹ Also, since 5-HTP can help reduce symptoms of depression and anxiety, this could be beneficial for insomnia related to an underlying mood disorder.

Other Natural Sleep Aids

L-Theanine

L-Theanine is a non-essential amino acid found in green tea, and is the component that is responsible for the relaxing effect of this famous beverage.



Research has shown that L-theanine can act directly on the brain, influencing brain wave patterns in a similar fashion to GABA, and also indirectly by stimulating GABA production. Supplemental L-theanine helps to reduce anxiety by increasing α -brain waves, which the brain produces in significant quantities only in states of effortless and relaxed alertness.³² This is precisely the kind of state that precedes stage I sleep. The relaxing effects of L-theanine also occur very quickly, setting in only 15-30 minutes after ingestion³², making L-theanine a very convenient and effective sleep aid.

Valerian Root

Valerian root has been used for millennia in the traditional folk remedies of a wide range of cultures (from ancient China to ancient Greece) to promote calmness, relaxation and sleep. Valerian root contains essential oils which provide most of its sedative effect, while fractions known as valepotriates add a regulatory effect on the central nervous system. It is thought that the key to Valerian's overall efficacy is its ability to stimulate the production of GABA.³³



A number of large placebo-controlled human studies have provided scientific evidence of Valerian's effectiveness against insomnia, particularly via the reduction of sleep latency and an improvement in sleep quality. One study including 128 individuals reported that the greatest benefit of valerian was for self-described "poor sleepers".³³ Evidence has also suggested that valerian could help to improve sleep in individuals suffering from withdrawal from benzodiazepines, a commonly prescribed pharmaceutical sleep-aid.³⁴

Passionflower

Passionflower, or *Passiflora incarnata*, is officially listed as a natural sleep aid in the monographs of the European Medicines Agency as well as the National Health Products Directorate of Health Canada.



Passionflower has a long history of use in traditional medicine and preventative health circles, and is often used in combination with other herbal sleep-aids, like valerian root. For example, in one study including 20 patients with psychosomatic disorders, patients were administered either a passionflower/valerian root combination or the drug Propaphenin®. The effects of these treatments on brain activity were then assessed using EEG brain mapping. It was found that the drug required six weeks to reduce brain hyperactivity while the passionflower/valerian root extract combination accomplished this in only two weeks. This led the scientists to conclude that the valerian/passionflower combination was more efficient than Propaphenin® and that it had great potential as a natural, herbal sedative.³⁵ These relaxing effects of passionflower are key to its ability to help improve sleep.

Lemon Balm

Melissa officinalis, commonly known as lemon balm, is classified as a sleep aid in the monographs of the British, European and German Commission E Pharmacopeias as well as in the compendium of the Natural Health Products Directorate of Health Canada. With roots originating in the folk medicine traditions of southern Europe, lemon balm - like passionflower - has demonstrated its greatest efficacy when used in combination with other herbal extracts.³⁶



At least half a dozen human studies have examined lemon balm's effects on various sleep disorders, often in combination with valerian root. These studies have shown consistently positive results. In one multicentre, double-blind, placebo-controlled study among 98 healthy volunteers with minor sleep disorders, 33.3% of the study group reported an improvement in sleep quality vs. only 9.4% of the placebo group. Another major study included 225 patients with difficulties falling asleep, staying asleep, and experiencing states of nervous agitation. After taking the lemon balm-containing combination for two weeks, 89% of individuals saw improvements in their ability to fall asleep, 80% saw improvements in staying asleep, and 82% experienced reduced levels of nervous agitation.³⁶

Sleep better, Live better

Sleeping well is essential for maintaining a high quality of life. A good night's sleep makes us feel refreshed and ready to meet the challenges of the day. Unfortunately, many people have problems sleeping, due to a medical condition or simply due to the stress and worries of everyday life. The good news is that there are many natural strategies for improving sleep quality and duration. Behavioural strategies have proven to be extremely effective. Oftentimes individuals just need to approach sleep differently, and to shed their preconceived notion that they won't be able to sleep! Being more active, reducing coffee consumption or developing better strategies for coping with stress can all be effective solutions for sleeping difficulties. Finally, for those that still need help getting to sleep, there are natural sleep aids available that are clinically demonstrated to improve sleep quality without the side-effects of pharmaceutical sleeping pills.

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