

Insomnia: Causes and Management

Sarmad Nadeem ^a

ABSTRACT

Sleep is an essential physiological process that modulates various functions, such as neural development, learning, memory, emotional regulation, and cardiovascular and metabolic homeostasis. However, sleep quality and quantity are influenced by multiple factors and differ across individuals and age groups. Sleep disorders, particularly insomnia, are common and adversely affect health and well-being. Insomnia is defined by persistent difficulties in initiating, maintaining, or consolidating sleep, resulting in daytime impairments. Sleep also has a significant impact on the biopsychosocial aspects of human functioning, thus requiring clinicians from all specialities to have a comprehensive understanding of insomnia and its consequences on the body and how to manage it. This article offers a concise overview of the definition, epidemiology, physiology, and diagnosis of insomnia in adults, as well as the factors that determine sleep needs and patterns throughout the lifespan. The article also examines the current evidence-based treatment options and recommendations for insomnia, highlighting the role of cognitive-behavioural therapy and good sleep hygiene practices. The article aims to improve the understanding of insomnia and its impact on health and quality of life. Clinicians should always refer to local policies and guidelines for the choice of medications and treatment.

Key words: Sleep, Insomnia, Sleep hygiene, Cognitive Behavioural Therapy for Insomnia CBTi.

Sleep and its functions

Sleep is a fundamental biological process crucial in numerous bodily functions such as neural development, learning, memory, emotional regulation,^[1] and cardiovascular and metabolic processes. Sleep also plays a significant role in recovery, energy conservation, and survival.^[2] The definition of 'normal' sleep is not standardised, as the sleep needed for optimal health varies between individuals and across different age groups. People experience more frequent awakenings and reduced total sleep time as they age. The American Thoracic Society suggests that the optimal sleep duration in adults is 7–9 hours.^[1] Sleep disorders are common, cause significant morbidity, and have a substantial economic impact, but they are treatable.^[1]

Definition of insomnia and its prevalence

Insomnia is a common sleep disorder that can be defined in several ways: "a recurring and reversible neurobehavioral state characterised by relative perceptual disengagement from and unresponsiveness to the environment", "difficulty in initiating or maintaining sleep or experiencing early morning awakening those results in dissatisfaction with sleep quantity or quality",^[3] and "a disorder characterised by persistent difficulty with sleep onset, maintenance, consolidation, or quality".^[4]

Insomnia is estimated to affect approximately 30% of adults.^[5] According to the guidelines from the National Institute of Health and Care Excellence, both short sleep duration (≤ 6 hours per 24 hours) and long sleep duration (>9 -10 hours per 24 hours) are associated with

^a: Consultant Psychiatrist, Associate Medical Director, Honorary Lecturer, Pennine Care NHS Foundation Trust. Manchester University. **Email addresses:** sarmad.nadeem@nhs.net.

- Insomnia is a persistent difficulty with sleep onset, maintenance, consolidation, or quality.
- In Western countries, one-third of adults experience difficulty initiating or maintaining sleep at least once a week.
- More than 100,000 deaths can be attributed to medical errors caused by sleep deprivation.
- The relationship between poor sleep and mental health problems is complex and bidirectional.
- The first-line treatment for chronic insomnia recommended by the American College of Physicians is CBTi.

adverse health outcomes, including increased mortality risk. Long Sleep duration may also indicate underlying health issues or physical inactivity.^[6]

Physiology of sleep

Sleep-onset latency is the average time it takes for a person to fall asleep, which is typically less than 30 minutes.^[7] Sleep is characterised by cyclical alternations between non-rapid eye movement (NREM) and rapid eye movement (REM) sleep. The purpose of these sleep stage alterations is not fully understood, but irregular cycling and absent sleep stages are associated with sleep disorders. For instance, a sudden transition from deep sleep to light sleep or wakefulness can lead to night terrors.

Effects of age and gender on sleep: Sleep requirements change throughout an individual's life.^[8] Infants typically sleep for most of the day, with sleep duration gradually decreasing over the first year of life. By around the age of 10, children generally need between 9 and 11 hours of sleep. Sleep needs continue to decrease into adulthood, with older adults typically sleeping less than 8 hours. This reduction in sleep needs in older age can contribute to insomnia, as older adults often spend the same amount of time or more in bed but struggle to achieve the amount of sleep they got in their younger years.^[8]

Age also affects the characteristics of sleep. Older individuals often experience poorer objectively measured sleep, shorter sleep duration, reduced sleep efficiency, and increased arousal. A comprehensive study of older adults living at home in the USA found these changes more prevalent in men than women.^[9] The same study found a stronger association between subjective reports of poor sleep and older age in women who have physical health complica-

tions related to insomnia.

Diagnosis of insomnia

According to the criteria set by the International Classification of Sleep Disorders for Chronic Insomnia Disorder, insomnia is diagnosed when a person experiences at least one of the following sleep difficulties for a minimum of three nights per week over three months: difficulty falling asleep, difficulty staying asleep, or waking up too early. These sleep difficulties are often accompanied by at least one associated issue such as fatigue; impaired attention, concentration, and memory; compromised social, family, occupational or academic performance; mood disturbances or irritability; daytime sleepiness; reduced motivation or energy; a propensity for errors or accidents; and concerns or dissatisfaction with sleep.

Chronic insomnia

Insomnia frequently originates from a particular issue, such as a significant life stressor like job loss or transition to a more challenging role. It can also be triggered by events that alter sleep routines, like the arrival of a newborn or the commencement of shift work. For some individuals, this short-term insomnia evolves into a long-term condition.^[9]

The development of chronic insomnia can be conceptualised through various stages, as explained by the cognitive-behavioural model of "predisposing, precipitating, perpetuating and protective factors". Individuals may initially experience acute insomnia, which often resolves when a triggering event is no longer a concern. However, if acute insomnia persists, individuals may adopt various coping behaviours, such as altering their bedtime routines, to improve their sleep. These behaviours can

inadvertently become perpetuating factors that maintain insomnia over time.

Symptoms and impact of sleep

Insomnia symptoms can become deeply rooted due to perpetuating factors that lead to conditioned arousal or hyperarousal associated with sleep. Treatments aim to address these perpetuating factors, thereby reducing conditioned arousal and improving sleep patterns.

In Western countries, one-third of adults experience difficulty initiating or maintaining sleep at least once a week.^[10] Among these individuals, 6–15% are believed to meet the criteria for insomnia. A significant 75% of patients report symptoms persisting for at least a year.

About two-thirds of adults do not achieve the recommended hours of sleep.^[10] Insomnia, which is 1.5-2 times more prevalent in women than in men,^[11] is comorbid with a psychiatric disorder in 50% of diagnosed cases.

The economic impact of insomnia is substantial, with the overall costs exceeding US\$100 billion per year in the USA.^[12] A European study modelled the financial costs of insufficient sleep, including disruption from insomnia and other sleep difficulties, across five countries. In the UK, the estimated cost was 1.86% of Gross Domestic Product or US\$50 billion.^[13]

According to the Centre for Disease and Prevention, 35% of adults do not get enough sleep (7 hours per day). Furthermore, 40% of people aged 40–59 reported getting less than the recommended amount of sleep. Insomnia, the most common sleep disorder, affects 30% of the adult US population, with 10% suffering from chronic insomnia.

Living with insomnia has several adverse consequences. Approximately 75–90% of people living with insomnia have an increased risk of conditions such as hypoxaemia and glycogen storage disease. However, about 10 million individuals in the USA remain undiagnosed.^[14]

Insomnia and sleep deprivation not only harm the individual but can also endanger those around them. More than 100,000 deaths can be attributed to medical errors caused by sleep

deprivation, according to the National Centre for Biotechnology Information. Sleepiness, a common symptom of insomnia, contributes to almost 20% of all car accidents and injuries.^[15]

Insomnia can occur at any age but is most common in older adults.^[16] The prevalence of insomnia is also higher in people with comorbid conditions, such as chronic obstructive pulmonary disease, heart failure, chronic pain, and psychiatric conditions, including depression, anxiety, substance abuse, and post-traumatic stress disorder.^[6]

Approximately 50% of individuals diagnosed with insomnia have a comorbid psychiatric disorder,^[17] making insomnia a common diagnostic feature of several mental disorders.

Acute insomnia is prevalent and typically lasts for a few days or weeks, resolving once the triggering factor is removed. A longitudinal study in a UK population (n=870 with insomnia) found that 69% of people reporting insomnia at baseline had insomnia at 12 months of follow-up, with the persistence of insomnia significantly associated with older age.^[18] Additionally, a Canadian population-based longitudinal study (n=388 with insomnia) found that 74% of people had insomnia persisting for at least one year, and 46% had insomnia that lasted for three years.^[19] The persistence of insomnia was more prevalent in women and older adults with severe symptoms at baseline.^[20]

Various behavioural and environmental factors can perpetuate insomnia. These include premature bedtime, excessive time in bed, consumption of caffeine or alcohol, sleep-related worries, and engaging in activities such as reading or watching television before sleep. Factors like noise, bedroom temperature, light exposure, and lifestyle habits, such as frequent travel across time zones and extended sleep on days off, can also contribute to the persistence of insomnia symptoms. Identifying and modifying these factors is crucial to behavioural interventions for treating chronic insomnia.

Insomnia and mental health

The relationship between poor sleep and mental health problems is complex and bidirectional, but enhancing sleep quality can safe-

guard mental health. For instance, insomnia is a risk factor for the onset of major depressive episodes.^[21] Among patients with insomnia, 8% have major depression, and in patients with depression, 80% have insomnia.^[21] The treatment of sleep problems can improve depression. In the context of anxiety, 27% of patients with insomnia also have anxiety disorders.^[21] Among these, 90% have insomnia, of which 60%–90% have experienced trauma.^[22] Insomnia can precede, co-develop, or develop after the onset of mental health problems. It is a predictor of the development of depression,^[21] post-traumatic stress disorder, psychotic symptoms, anxiety, suicidality, and cognitive difficulties, such as impaired memory, attention, and concentration. Moreover, insomnia can decrease an individual's quality of life and functionality, including poor work performance, increased work absenteeism, increased risk of motor vehicle accidents, and increased risk of falls among older adults.

A meta-analysis of 21 longitudinal epidemiological studies found that persistent insomnia increased the risk of depression.^[21]

Insomnia and other comorbidities

Persistent insomnia is associated with an increased risk of cardiovascular disease and type 2 diabetes and a possible increase in all-cause mortality.^[22] Common comorbid conditions include obesity, sleep apnoea, cardiopulmonary diseases, chronic renal failure, diabetes, neurological disorders, chronic pain, hypertension, and cardiovascular diseases.

Assessment of insomnia

Insomnia, akin to depression, anxiety, and pain, lacks an objective test and is typically evaluated clinically. Key questions are essential in identifying treatment targets. For instance, if patients exhibit comorbid depression or anxiety, it is crucial to ensure that the treatment for these conditions is optimised. Alternatively, if a specific trigger, such as a snoring partner, disrupts their sleep, working with the patient to find solutions to mitigate the environmental trigger is vital.

The assessment of insomnia extends be-

yond merely diagnosing the condition. A comprehensive evaluation is crucial to understand the scope and impact of potential perpetuating factors. Various tools are available for this purpose, emphasising subjective sleep measurements using a sleep diary. Such an assessment facilitates the setting of expectations and the identification of treatment targets relevant to the patient. Moreover, screening for sleep disorders is vital; referral to a suitable sleep medicine specialist is warranted if necessary.

In a clinical interview for insomnia, several key areas should be addressed. The presenting problem, the current sleep issue, should be discussed first. This is followed by exploring the patient's sleep history, including early sleep patterns, chronotype, triggers, and changes. The impact of insomnia on daytime activities and how these symptoms are managed is also crucial. A comprehensive history should be taken, including family sleep history, personal and family medical history, current sleep-wake schedule, and sleep habits. The patient's sleep environment, including bedroom conditions, lifestyle, and sleep hygiene, should be evaluated. The patient's general health, including any comorbidities, should be assessed. Mental health comorbidities should also be considered. Finally, a diagnosis should be made, considering any differential diagnoses, necessary investigations, and the need for screening for other sleep disorders.

When managing insomnia, it is essential to consider and exclude other sleep disorders that may present with similar symptoms. A comprehensive differential diagnosis includes conditions such as restless leg syndrome, periodic leg movement disorders, obstructive sleep apnoea, and circadian rhythm disorders. Each situation requires specific management strategies and can contribute to sleep disturbances similar to those observed in insomnia. Poor sleep hygiene is another factor that often exacerbates sleep issues and is a critical area for intervention.

Management of insomnia

The interventions used to address insomnia can be summarised as follows:

1. Treating underlying medical or psychiatric conditions.
2. Psychoeducation.
3. CBTi.
4. Pharmacological interventions.

The primary treatment for chronic insomnia recommended by the American College of Physicians is cognitive behavioural therapy for insomnia (CBTi).^[23] CBTi is a structured program that helps individuals modify their thoughts and behaviours that contribute to insomnia. A meta-analysis by Okajima, Komada, and Inoue demonstrated that CBTi has moderate to significant effects on various sleep parameters, indicating its efficacy as a treatment.^[23]

CBTi employs various strategies, including:

1. Stimulus control: Restricting the bed to sleep and sex only, avoiding tossing and turning, and getting out of bed when unable to sleep to engage in a relaxing activity until sleepiness returns.
2. Sleep schedule: Setting a consistent wake time and appropriate bedtime.
3. Sleep restriction: Limiting bedtime to match the actual sleep time plus an additional 30 min with a minimum window of 5 hours to improve sleep efficiency.
4. Sleep environment optimisation: Adjusting bedroom temperature, reducing noise, and ensuring darkness to create a conducive sleep environment.
5. Cognitive approaches: Addressing irrational thoughts about sleep and employing relaxation techniques to quiet the mind.

The first-line treatment recommended by the American College of Physicians Meta-Analysis of randomised controlled trials compared CBTi to the control, and CBTi had moderate to significant effects on the following:^[23]

- Time to fall asleep
- Total time awake at night
- Wake time after falling asleep
- Time in bed
- Early morning awakenings
- Proportion of time in bed asleep efficiency (sleep efficiency)

CBTi is an effective treatment for insomnia when delivered individually, in a small group format, or digitally as a web or mobile intervention,^[24] particularly as an intervention for short-term treatment of chronic insomnia. Moreover, there are indications that the beneficial effects of CBTi may last well beyond the termination of the active treatment.^[24] Improvements in Sleep following CBTi for chronic insomnia mediate improvements in mental health symptoms, well-being, and quality of life.

The stages of CBTi start with assessment, followed by providing education about sleep, working on sleep scheduling and restrictions, and providing additional treatments, as appropriate.

Pharmacological interventions

Although CBTi is a first-line treatment, pharmacological interventions may sometimes be necessary. These include situations of acute insomnia, when starting selective serotonin reuptake inhibitors (SSRIs) that cause insomnia, or when chronic insomnia does not respond to CBTi. The choice of medication depends on specific sleep issues, such as difficulty in sleep initiation or maintenance.

Medications used for insomnia range from short-acting agents, such as zolpidem, for sleep initiation to longer-acting drugs, such as zopiclone or temazepam, for maintenance. Sedative antidepressants may be used when insomnia coexists with depression, and medications, such as amitriptyline, are used for patients with chronic pain. The general guidance is to prescribe when it is a short-lived insomnia when starting SSRI, the patient has Chronic insomnia that does not respond to CBTi, or CBTi is unavailable, or the patient is waiting for it. Also, we need to consider prescribing if the insomnia is causing significant distress or adversely affecting the patient's mental health. Insomnia is sporadic, and the medication is likely to be used occasionally.

According to the National Institute Guidelines on the use of Hypnotics,^[25] The choice of hypnotics must be considered carefully. The choice is tailored to the patient's needs and physical and mental comorbidities, and careful

discussion with the patient around the potential side effects, benefits, dependency, tolerance, and other risks must be discussed before initiating the treatment. With precise management of the patient's expectations and agreement on a timeframe to review the medication, if the stimulation is needed for sleep initiation, then a short-acting medication with a quick onset of action, such as zolpidem or melatonin, is needed. If it is for sleep initiation and maintenance, then we need to consider the longer-acting drug, zopiclone or temazepam. If the patient struggles with staying asleep, consider an option of antihistaminic, zopiclone or temazepam. [25,26]

When there are comorbidities, we need to consider the other medications the patients are on and the risks of interaction or worsening of the other conditions. For example, if the patient has depression, we can consider a sedative antidepressant to treat depression and insomnia. A similar consideration is needed if the patient is presenting with psychotic symptoms. The use of sedative antipsychotics would be a reasonable option to reduce polypharmacy interaction and provide the needed treatment for the two comorbid conditions of psychosis and insomnia. [25]

The administration of medications for insomnia is typically brief and specifically customised to the unique requirements of each patient, necessitating the continuous monitoring and review of the prescribed drugs. If the patient is already undergoing medication, it becomes crucial to deliberate on the necessity to decrease the dosage to circumvent potential side effects, tolerance, withdrawal symptoms, and dependency. It is advisable to consider a cautious reduction of the dose by approximately 25% every one to two weeks, establishing adaptable target dates, forewarning the patient about the possibility of rebound insomnia, and closely tracking the progress. [25,26]

CONCLUSION

Sleep disorders, prevalent in society, contribute significantly to morbidity and a diminished quality of life. Insomnia is the most

frequently observed sleep disorder, with obstructive sleep apnea trailing closely behind. It is imperative to conduct a comprehensive assessment and provide a clear explanation, along with a management plan that includes pertinent information about pharmacological and non-pharmacological treatment options. A thorough discourse on the potential risks, including tolerance, dependency, interaction, side effects, and risk-benefit analysis, is essential for considering the treatment option. It is always advisable to refer to the most recent local, national, and international protocols and guidelines to ensure the implementation of the latest evidence-based interventions.

REFERENCES

- Palmer CA, Alfano CA. Sleep and emotion regulation: An organising, integrative review. *Sleep Med Rev*. 2017 Feb; 31:6-16. Doi: 10.1016/j.smrv.2015.12.006. Epub 2016 Jan 14. PMID: 26899742.
- What Is the Link Between Anxiety and Insomnia? - Healthline. <https://www.healthline.com/health/anxiety-insomnia>
- American Academy of Sleep Medicine. (2014). The International Classification of Sleep Disorders – Third Edition (ICSD-3). Darien, IL
- Mellinger GD, et al. Insomnia and its treatment: prevalence and correlates. *Archives of general psychiatry*. 1985;42(3):225-232.
- Bhaskar S, Hemavathy D, Prasad S. Prevalence of chronic insomnia in adult patients and its correlation with medical comorbidities. *J Family Med Prim Care* 2016 Oct-Dec;5(4):780-4
- Mookerjee N, Schmalbach N, Antinori G, et al. Comorbidities and Risk Factors Associated With Insomnia in the Elderly Population. *Journal of Primary Care & Community Health*. 2023;14. doi:10.1177/21501319231168721
- Ree M, Junge M, Cunningham D. Australasian Sleep Association position statement regarding psychological/behavioural treatments in managing adult insomnia. *Sleep Med*. 2017 Aug;36 Suppl 1:S43-S47. Doi: 10.1016/j.sleep.2017.03.017. PMID: 28648226
- Dzierzewski JM, Sabet SM, Ghose SM, Perez E, Soto P, Ravvits SG, Dautovich ND. Lifestyle Factors and Sleep Health across the Lifespan. *Int J Environ Res Public Health*. 2021 Jun 20;18(12):6626. doi: 10.3390/ijerph18126626. PMID: 34202991; PMCID: PMC8296445.
- Wilson S, Anderson K, Baldwin D, Dijk DJ, Espie A, Espie C, Gringras P, Krystal A, Nutt D, Selsick H, Sharpley A. British Association for Psychopharmacology consensus statement on evidence-based treatment of insomnia, parasomnias and circadian rhythm disorders
- Roth T. Insomnia: definition, prevalence, aetiology, and consequences. *J Clin Sleep Med*. 2007 Aug 15;3(5 Suppl): S7-10. PMID: 17824495; PMCID: PMC1978319.
- Suh S, Cho N, Zhang J. Sex Differences in Insomnia: from Epidemiology and Etiology to Intervention. *Curr Psychiatry Rep*.

- 2018 Aug 9;20(9):69. doi: 10.1007/s11920-018-0940-9. PMID: 30094679.
12. Matheson E, Hainer BL. Insomnia: Pharmacologic Therapy. *A Family Physician*. 2017 Jul 1;96(1):29-35. PMID: 28671376.
 13. Daley M, Morin CM, LeBlanc M, Grégoire JP, Savard J. The economic burden of insomnia: direct and indirect costs for individuals with insomnia syndrome, insomnia symptoms, and good sleepers. *Sleep*. 2009 Jan;32(1):55-64. PMID: 19189779; PMCID: PMC2625324.
 14. Rosekind MR, Gregory KB. Insomnia risks and costs: health, safety, and quality of life. *Am J Manag Care*. 2010 Aug;16(8):617-26. PMID: 20712395
 15. Bollu PC, Kaur H. Sleep Medicine: Insomnia and Sleep. *Mo Med*. 2019 Jan-Feb;116(1):68-75. PMID: 30862990; PMCID: PMC6390785
 16. Daley M, Morin CM, LeBlanc M, Grégoire JP, Savard J. The economic burden of insomnia: direct and indirect costs for individuals with insomnia syndrome, insomnia symptoms, and good sleepers. *Sleep*. 2009 Jan;32(1):55-64. PMID: 19189779; PMCID: PMC2625324.
 17. Scott AJ, Webb TL, Martyn-St James M, Rowse G, Weich S. Improving sleep quality leads to better mental health: A meta-analysis of randomised controlled trials. *Sleep Med Rev*. 2021 Dec;60:101556. doi: 10.1016/j.smrv.2021.101556. Epub 2021 Sep 23. PMID: 34607184; PMCID: PMC8651630
 18. Morphy H, Dunn KM, Lewis M, Boardman HF, Croft PR. Epidemiology of insomnia: a longitudinal study in a UK population. *Sleep*. 2007 Mar;30(3):274-80. PMID: 17425223.
 19. LeBlanc M, Mérette C, Savard J, Ivers H, Baillargeon L, Morin CM. Incidence and risk factors of insomnia in a population-based sample. *Sleep*. 2009 Aug;32(8):1027-37. doi: 10.1093/sleep/32.8.1027. PMID: 19725254; PMCID: PMC2717193.
 20. Morin CM, Jarrin DC. Epidemiology of Insomnia: Prevalence, Course, Risk Factors, and Public Health Burden. *Sleep Med Clin*. 2022 Jun;17(2):173-191. doi: 10.1016/j.jsmc.2022.03.003. Epub 2022 Apr 23. PMID: 35659072.
 21. Baglioni C, Battagliese G, Feige B, Spiegelhalder K, Nissen C, Voderholzer U, Lombardo C, Riemann D. Insomnia as a predictor of depression: a meta-analytic evaluation of longitudinal epidemiological studies. *J Affect Disord*. 2011 Dec;135(1-3):10-9. doi: 10.1016/j.jad.2011.01.011. Epub 2011 Feb 5. PMID: 21300408.
 22. Ohayon MM. Epidemiology of insomnia: what we know and still need to learn. *Sleep Med Rev*. 2002 Apr;6(2):97-111. doi: 10.1053/smrv.2002.0186. PMID: 12531146
 23. Okajima I, Komada Y, Inoue Y. A meta-analysis on the effectiveness of cognitive behavioural therapy for primary insomnia. *Sleep Biol Rhythms* 2011 Jan;9(1):24-34.
 24. Sánchez-Ortuño MM, Edinger JD. Cognitive-behavioural therapy for the management of insomnia comorbid with mental disorders. *Curr Psychiatry Rep*. 2012 Oct;14(5):519-28. doi: 10.1007/s11920-012-0312-9. PMID: 22865156
 25. NICE (2019a) Hypnotics (Key therapeutic topics). NICE. <https://www.nice.org.uk/advice/ktt6>
 26. Wilson S, Anderson K, Baldwin D, Dijk DJ, Espie A, Espie C, Gringras P, Krystal A, Nutt D, Selsick H, Sharpley A. British Association for Psychopharmacology consensus statement on evidence-based treatment of insomnia, parasomnias and circadian rhythm disorders: An update. *J Psychopharmacol*. 2019 Aug;33(8):923-947. doi: 10.1177/0269881119855343. Epub 2019 Jul 4. PMID: 31271339.



Abbreviations list: Cognitive Behavioral Therapy for Insomnia (CBTI), Non-rapid eye movement (NREM), Rapid eye movement (REM), Selective serotonin reuptake inhibitors (SSRIs), United Kingdom (UK), United State of America (USA).

Conflict of interest: Author have nothing to declare.

Funding: None.