# Insomnia in adults: a brief review

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Received: January 2024. Accepted: February 2024; Published: March 1, 2024.
Citation: Jakir Hussain Ullah. Insomnia in adults: a brief review. World Family Medicine. March 2024; 22(3): 57-61.
DOI: 10.5742/MEWFM.2024.95257628

## Abstract

Insomnia is a common and debilitating condition in adults, especially in the elderly.

It is associated with poor mental health and contributes to the development of a wide range of medical conditions, including obesity, cardiovascular disease, diabetes and dementia. The condition is frequently missed or underdiagnosed and poorly managed. This brief review summarises the aetiology, clinical features, diagnosis and latest management strategies.

Keywords: Insomnia, adults

## Introduction

Sleep disturbance or insomnia is a common problem affecting around 10% of the adult population, and its prevalence increases dramatically with age [1]. Based on its duration, insomnia can be classified as acute (less than three months) or chronic (more than three months). According to the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5), chronic insomnia is defined as a sleep disturbance that occurs at least three nights a week for three months or more and causes clinically significant distress or functional impairment, e.g. fatigue, reduced cognitive performance or mood disturbance [2]. The International Classification of Sleep Disorders (ICSD-3) defines insomnia as a problem initiating or maintaining sleep that results in daytime consequences, e.g., fatigue and daytime somnolence [3].

## Aetiology

The pathophysiology of insomnia is multifactorial, complex and not fully understood. Spielman et al. [4] proposed a three-factor model for the aetiology of insomnia disorders that has been widely adopted. The model consists of predisposing, precipitation and perpetuating factors as described below.

1. Predisposing factors: >45 years of age, female gender, menopause, being divorced, separated or widowed, lower levels of education, smoking, excess alcohol, reduced exercise and shift working. There also appears to be a genetic pre-disposition which may cause an imbalance in the sleep-wake system regulation in the brain [5], i.e., sleep-promoting neurotransmitters, including gamma-aminobutyric-acid (GABA), adenosine, melatonin and prostaglandin D2 are downregulated and wake-promoting mediators including orexin, norepinephrine and histamine are upregulated.
2. Precipitating factors include social stresses, physical and or mental illness, and medications, including beta-blockers, glucocorticoids and non-steroidal anti-inflammatory drugs.
3. Perpetuating factors: behavioural patterns that develop from insomnia, i.e., worrying about the inability to sleep, spending excessive time in bed trying to fall asleep and taking daytime naps to compensate.

## Changes with sleep with ageing

Current thinking is that there are four stages to sleep. The first three are non-rapid eye movement stages, designated N1, N2 and N3, accounting for approximately 18, 48 and 16% of sleep time, respectively. N1 is light sleep and gets progressively deeper through N2 and then N3 stage. The latter stage is characterised by very slow brain waves, called delta-wave sleep. The fourth stage is rapid eye movement sleep, designated R sleep, accounting for roughly 18% of sleep. In the R stage, brain activity increases to levels similar to being awake. Dreaming occurs in this stage. Total sleep time reduces with age from around 12 hours plus in children to 6.5-8.5 hours in young adults and 5-7 hours in older adults. Furthermore, as we age, the amount of time in N3 'deep' and R-stage sleep decreases [6].

## Clinical features and associated morbidity

Sleep disturbance can present as difficulty falling asleep (sleep onset insomnia), poor sleep maintenance, i.e. frequently waking up and finding it difficult to get back to sleep, or early morning waking (early morning insomnia). The impact includes daytime sleepiness, poor concentration, fatigue and increased risk of accidents due to the features above. If left untreated, insomnia is strongly linked to the development of mental illness; e.g. older adults with insomnia have a 23% increased risk of depression [6]. However, It is important to note there is a bi-directional relationship between insomnia and mental illness [6].

Insomnia is associated with an increased risk of cardiovascular disease, including hypertension, myocardial infection (MI), heart failure and possibly stroke [6]. The HUNT study reported a 27-45% increased risk of MI in patients with chronic insomnia [7]. Furthermore, the sleep heart study showed that middle-aged and older adults who slept 5 hours or less had a 2.5 times increased risk of diabetes compared to individuals who slept 7 to 8 hours per night [8]. Chronic insomnia is also thought to increase the risk of asthma symptoms and allergic rhinitis, although the mechanism is not well understood [9]. These comorbidities are thought to arise due to dysregulation of the hypothalamus-pituitary axis, leading to increased levels of adrenocorticotrophin hormone, sympathetic drive, and elevation of inflammatory mediators and c-reactive protein [5]. Shift work that involves night duty results in disrupted sleep patterns and has been linked to an increased risk of breast and prostate cancer [10]. Long-term insomnia is also associated with the development of dementia [11], and imaging studies have also shown a correlation between cortical atrophy and poor sleep [12]. Insomnia is also a common reason for sick leave, leading to reduced productivity in the workforce and work-related and motor vehicle accidents [1].

## Diagnosis

Insomnia is a clinical diagnosis. A thorough history is required and can be aided by sleep diaries (for 14 days) and sleep questionnaires, e.g., the insomnia severity index (ISI), which is a widely used diagnostic tool [13]. Sleep environment, lighting, temperature, timing, partner sleep pattern and collateral history, snoring, use of electronic devices, caffeine, nicotine, alcohol intake, and medical/psychiatric conditions, e.g., cardiorespiratory disease, depression, anxiety and medications, can all contribute to the development of insomnia. Sleep studies using wrist actigraphy can help determine the quality of the patient's sleep. Polysomnography is not required for the diagnosis of insomnia but helps rule out alternative sleep disorders

## Management

First-line management of insomnia involves the use of non-pharmacological methods such as sleep hygiene, cognitive behavioural therapy for insomnia (CBT-I) and brief behavioural treatment. Pharmacological options can be tried if first-line interventions fail or there is insufficient benefit.

## Non-pharmacological therapy

**Sleep hygiene**
Patients should be advised to have a consistent bedtime routine, i.e. going to bed at the same time every night, limiting caffeine, nicotine and alcohol in the evening, avoiding exercise within 6 hours of bedtime, avoiding daytime naps and not using electronic devices in bed [5, 11].

**Cognitive behaviour therapy for insomnia**
This involves a course of cognitive behavioural therapy addressing perpetuating factors associated with chronic insomnia. It is designed to identify, challenge and change misconceptions regarding sleep. It can be delivered face-to-face or online, although evidence suggests the former is more effective. Numerous meta-analyses have shown positive and long-lasting effects in treating chronic insomnia, and hence, CBT-I is considered the gold standard treatment [11, 15]. However, in-person CBT-I is often limited by the availability of trained practitioners, cost and the time commitment required. Several mobile apps and online options are available, including SLEEPIO, and SHUTi [5, 16].

**Brief behavioural treatment**

- Sleep restriction therapy: this involves limiting the hours in bed to actual sleep time until sleep efficiency improves. For example, limiting time in bed to 5 hours for a patient who reports an average sleep time of 5 hours. If the actual time slept in this period is less than 85% of the time, further time restriction is done by reducing time in bed by 15-30 minutes. When actual sleep time exceeds 85% of the time in bed, sleep time is increased by 15 – 30 minutes [5, 11].

- Stimulus control: this therapy aims to re-associate going to bed with sleeping only. It involves going to bed only when tired and not using the bed for other reasons such as reading, working or watching TV. If unable to sleep after 15-20 minutes, the patient should get out of bed, sit or walk around and only return to bed if feeling sleepy [5, 11].

- Relaxation techniques: this may involve paced diaphragmatic breathing, meditation, yoga and mindfulness to reduce pre-sleep arousal and worry in patients with insomnia[11].

## Pharmacological treatments

Pharmacological agents should be used as adjunct to non-pharmacological methods. The evidence base is generally weak, and the risks may outweigh the benefits; interestingly, several studies have reported that almost 60% of the effects of medications can be explained by the placebo effect [17]. Options include benzodiazepines, Z- drugs (zopiclone, zolpidem), anti-depressants, anti-histamines melatonin and orexin antagonists (Table 1).

Benzodiazepines and z-drugs are non-specific agonists of the GABA receptor. The former, in addition to causing sedation, has anxiolytic and muscle-relaxing effects. They are effective in treating short-term insomnia and have been shown to improve sleep latency and maintenance. However, they have significant side effects, including daytime drowsiness, cognitive impairment, reduced dexterity and increased risk of falls [18]. Furthermore, long-term use leads to tolerance, dependence, rebound insomnia and other withdrawal symptoms on cessation [18]. Benzodiazepines are contra-indicated in individuals with sleep apnoea and chronic respiratory disease due to the risk of respiratory drive suppression [18]. Based on the above, the Beers criterion for potentially inappropriate medication use in older adults advises avoiding benzodiazepines as a treatment for insomnia [19]. As a result, benzodiazepines and z-drugs are classed as controlled drugs or not available in many countries, including the Middle East.

Melatonin is widely used for insomnia and is available over the counter in many countries. It is a hormone released by the pineal gland, which is under the control of the hypothalamus and suprachiasmatic nucleus. Melatonin levels are higher at night than day and act as a feedback signal to the circadian rhythm [20]. The principle behind its use is that exogenous melatonin can be used to reset a disrupted circadian rhythm [21].

Dual orexin inhibitors, such as daridorexant, are a new class of medications that are effective and safe in treating chronic insomnia. Orexin A and Orexin B are neuropeptides that promote wakefulness. Inhibition of Orexin A and B receptors has been shown to reduce wakefulness and improve sleep latency and maintenance with little or no next-day functional impairment compared to placebo and z-drugs [22]. Adverse effects appear to be mild, and crucially, there seems to be little to no potential for abuse due to a lack of tolerance and withdrawal symptoms [22].

**Table 1: Medications for the treatment of short-term and chronic insomnia** [23].

| Medication class | Examples | Indications |
|---|---|---|
| **Benzodiazepines** | *Nitrazepam*<br>*Flurazepam*<br>*Loprazolam*<br>*Diazepam*<br>*Lormetazepam*<br>*Lorazepam*<br>temazepam | Indicated in short term insomnia only, for 3-5 days use. Not beneficial in chronic insomnia |
| **Z-drugs** | Zopiclone<br>Zolpidem | Licensed in the UK for short treatment of insomnia for up to 4 weeks |
| Tri-cyclic antidepressants | Doxepin<br>Amitriptyline<br>Mirtazapine<br>trazadone | Doxepin is a tricyclic anti-depressant that has FDA approval for use in insomnia. Amitriptyline is not helpful except in treating insomnia in the context of neuropathic pain |
| Other classes of anti-depressants | Trazadone<br>Mirtazapine | Indicated in treating insomnia in the context of co-existing depression only |
| Orexin inhibitors | Daridorexant | Indicated for treatment of chronic insomnia |
| Melatonin | Melatonin<br>Ramelteon | In the UK, melatonin 2mg MR is licenced to treat insomnia in individuals over 55 for a period of up to 13 weeks.<br><br>Ramelteon is a synthetic melatonin receptor agonist available in the USA. |
| Anti-histamines | Chlorphenamine<br>Diphenhydramine<br>Promethazine | These are recommended for use when sleep disturbance occurs in the context of eczema, hives, and other causes of itching. |

## Summary

Insomnia is a condition associated with significant morbidity that requires careful consideration and management. The current NICE guidelines, representing best practice, are summarised below [23].

Management of short-term insomnia (i.e. < 3 months duration)

- Refer to specialist services if suspecting sleep disorder other than insomnia, e.g. sleep apnoea, circadian rhythm disorders, narcolepsy or parasomnia.
- Address comorbid conditions if present, e.g. depression and anxiety
- Promote sleep hygiene techniques
- Insomnia due to an acutely stressful event or situation that would be expected to resolve within a few weeks but has failed to respond to sleep hygiene can be managed with a short course (3-7 days) of a z-drug, e.g. zolpidem
- Patients with insomnia that is likely to persist and is not due to an acutely stressful event or situation that has not responded to sleep hygiene techniques should be referred for CBT-I. In the meantime, a short-term Z drug (1-2 weeks) or prolonged release melatonin if over 55 can be tried as an adjunct

Management of chronic insomnia disorder (Insomnia for >3 months)

- Refer to specialist services if another sleep disorder is suspected other than insomnia, e.g. sleep apnoea, circadian rhythm disorders, narcolepsy or parasomnia.
- Address comorbid conditions, e.g. depression and anxiety if present
- Promote sleep hygiene techniques
- Offer CBT-I as the first line for all adults
- Short-term Z drug use may be indicated for one week or less to manage behavioural or cognitive symptoms due to lack of sleep
- If over 55, a 3-week trial of melato

## References


1. Shaha D. Insomnia Management: A Review and Update. The Journal of Family Practice; 72. Epub ahead of print 1 July 2023. DOI: https://doi.org/10.12788/jfp.0620.
2. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. Diagnostic and Statistical Manual of Mental Disorders; 5. Epub ahead of print 2013. DOI: https://doi.org/10.1176/appi.books.9780890425596.
3. 2014. International Classification of Sleep Disorders – Third Edition (ICSD-3) (Online) - American Academy of Sleep Medicine. learn.aasm.org, https://learn.aasm.org/Listing/a1341000002XmRvAAK.
4. Spielman AJ, Caruso LS, Glovinsky PB. A behavioural perspective on insomnia treatment. The Psychiatric Clinics of North America 1987; 10: 541–553.
5. Bollu PC, Kaur H. Sleep Medicine: Insomnia and Sleep. Missouri Medicine 2019; 116: 68–75.
6. Patel D, Steinberg J, Patel P. Insomnia in the elderly: A review. Journal of Clinical Sleep Medicine 2018; 14: 1017–1024.
7. Krokstad S, Langhammer A, Hveem K, et al. Cohort Profile: The HUNT Study, Norway. International Journal of Epidemiology 2012; 42: 968–977.
8. Gottlieb DJ, Punjabi NM, Newman AB, et al. Association of Sleep Time With Diabetes Mellitus and Impaired Glucose Tolerance. Archives of Internal Medicine 2005; 165: 863.
9. Sundbom F, Malinovschi A, Lindberg E, et al. Insomnia symptoms and asthma control—Interrelations and importance of comorbidities. Clinical & Experimental Allergy 2019; 50: 170–177.
10. Sigurdardottir LG, Valdimarsdottir UA, Mucci LA, et al. Sleep Disruption Among Older Men and Risk of Prostate Cancer. Cancer Epidemiology Biomarkers & Prevention 2013; 22: 872–879.
11. Riemann D, Baglioni C, Bassetti C, et al. European guidelines for the diagnosis and treatment of insomnia. Journal of Sleep Research 2017; 26: 675–700.
12. Sexton CE, Storsve AB, Walhovd KB, et al. Poor sleep quality is associated with increased cortical atrophy in community-dwelling adults. Neurology 2014; 83: 967–973.
13. Insomnia Severity Index, https://www.ons.org/sites/default/files/InsomniaSeverityIndex_ISI.pdf.
14. Gossard TR, Trotti LM, Videnovic A, et al. Restless Legs Syndrome: Contemporary Diagnosis and Treatment. Neurotherapeutics 2021; 18: 140–155.
15. Muench A, Vargas I, Grandner MA, et al. We know CBT-I works, now what? Faculty Reviews; 11. Epub ahead of print 1 February 2022. DOI: https://doi.org/10.12703/r/11-4.
16. Erten Uyumaz B, Feijs L, Hu J. A Review of Digital Cognitive Behavioral Therapy for Insomnia (CBT-I Apps): Are They Designed for Engagement? International Journal of Environmental Research and Public Health 2021; 18: 2929.
17. Winkler A, Rief W. Effect of Placebo Conditions on Polysomnographic Parameters in Primary Insomnia: A Meta-Analysis. SLEEP. Epub ahead of print 1 June 2015. DOI: https://doi.org/10.5665/sleep.4742.
18. Matheson E, Hainer BL. Insomnia: Pharmacologic Therapy. American Family Physician 2017; 96: 29–35.
19. American Geriatrics Society. American Geriatrics Society 2019 updated AGS Beers criteria for potentially inappropriate medication use in older adults. Journal of the American Geriatrics Society 2019; 67: 674–694.
20. Brown GM. Light, melatonin and the sleep-wake cycle. Journal of Psychiatry and Neuroscience 1994; 19: 345–353.
21. Sletten TL, Magee M, Murray JM, et al. Efficacy of melatonin with behavioural sleep-wake scheduling for delayed sleep-wake phase disorder: A double-blind, randomised clinical trial. PLOS Medicine 2018; 15: e1002587.
22. Jiang F, Li H, Chen Y, et al. Daridorexant for the treatment of insomnia disorder: A systematic review and meta-analysis of randomized controlled trials. Medicine 2023; 102: e32754.
23. . NICE, https://cks.nice.org.uk/topics/insomnia (2024, accessed 22 February 2024).