INSOMNIA IN THE AGEING POPULATION: CHARACTERISATION AND NON-PHARMACOLOGICAL TREATMENT STRATEGIES

***Katie Moraes de Almondes**

Department of Psychology, Federal University of Rio Grande do Norte, Natal, Brazil
**Correspondence to katie.almondes@gmail.com*

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ABSTRACT

Sleep problems represent a worldwide health concern among older adults, with an increasing prevalence of multimorbid conditions and a decreased quality of life. However, most elderly patients are not correctly diagnosed due to numerous confounding variables (e.g., medical and psychiatric disorders, polypharmacy, and psychosocial factors) affecting sleep and the confusion regarding the differential diagnosis in older adults between normal changes in sleep pattern as a result of ageing and sleep disorders. There are normal changes to the sleep architecture throughout the lifespan, and sleep disorders are not part of the ageing process; however, there are several sleep disorders that affect older adults. The most prevalent sleep disorder is insomnia, which is found in different forms and affects approximately 30–50% of the older adult population. The treatment strategies for sleep disorders are multivariate, with prescriptions of pharmacological treatments being the most common method among healthcare professionals; however, there is strong evidence that non-pharmacological treatments have better long-term effects. The aim of this review is to explain the difference between sleep disorders and sleep alterations as a result of ageing, to characterise insomnia in older adults, and, finally, to present the different effective non-pharmacological possibilities, accompanied by evidence, for the treatment of insomnia in older adults.

Keywords: Ageing, cognitive behavioural therapy (CBT), insomnia, older adults, sleep disorders.

INTRODUCTION

Across all the primary, secondary, and tertiary healthcare levels of both public and private healthcare systems, one of the major complaints that older adults seek medical advice for is changes in sleep behaviour. These subjective complaints are based on changes to the structure, quality, and quantity of sleep. Evidence for sleep alteration is confirmed through measuring objective polysomnographic and electroencephalographic data.

From the age of 60 years, there is a reduction in total sleep duration, with a redistribution of sleep episodes (naps) throughout the day and reduction of nocturnal sleep.[1,2] The sleep pattern of older adults is characterised by frequently disrupted sleep, with periods of being awake lasting >30 minutes, and individuals reporting a tendency to spend 15–20% of their time in bed being awake.[2,3] A meta-analysis conducted by Ohayon et al.[4] sampled 3,577 individuals aged 5–102 years. The study demonstrated that with increasing age, cycles of non-rapid eye movement sleep (NREM) 1 and NREM2 increase in duration, and there is less time spent in NREM3 and a decrease in the percentage of rapid eye movement sleep, impairing sleep efficiency. These data were corroborated by Dijk et al.[5] These changes in sleep pattern are explained by a set of anatomical and physiological modifications related to the circadian timing system and homeostatic regulatory mechanisms, as well as the contribution of social factors.[3,6]

The suprachiasmatic nucleus (SCN), the master pacemaker that adapts behaviour and physiology to recurring changes in environmental conditions, shows deterioration during the ageing process, whereby the ability to respond to information is

lost. The decreased expression of SCN genes that serve as the body's clock function indicators also interferes with the circadian rhythm by modifying the capacity of the SCN to generate rhythms or respond to external stimuli.[7]

In addition to these alterations, the quality of the optical transmission of the external temporal cues (day and night) from the retina to the SCN also undergoes deterioration with age, thus affecting the synchronisation of the rhythms, especially the sleep and wakefulness rhythm.[7] These altered sleep patterns are also reinforced by changes in light exposure time (exposure to early morning light, for example) by shifting the phase of sleep to earlier.[8]

The amplitude of rhythms also decreases with age, resulting in difficulty falling asleep and consequently encouraging naps during the day.[9] The amplitude of rhythms contributes to internal desynchronisation; an example is the effect of amplitude on the relationship between increased sleep propensity and melatonin. Melatonin, a hormone secreted at night by the pineal gland, enhances sleep propensity; however, its levels decrease with age, resulting in reduced sleep efficiency,[2] marked by the reduction of homeostatic pressure to sleep.[8] In addition, cortisol levels increase during the circadian phase of sleep (darkness), leading to increased sleep fragmentation;[10] this is because cortisol is associated with increased activity and low sleep propensity. Morgan et al.[11] showed that there was an association between sleep disorders and high levels of cortisol among the older population (aged 60–90 years).

In older adults, the changes observed in circadian regulatory mechanisms of sleep promote phase advances that influence homeostasis. An increased sleep requirement, reflected by going to bed earlier, occurs due to reduced sleep efficiency or sleep fragmentation; a decreased sleep requirement results in waking up earlier. Moreover, a lower circadian amplitude results in night-time insomnia and increased susceptibility for day-time napping, while a lower homeostatic sleep drive also results in sleep fragmentation.[6]

It is important to mention that social synchronisers, such as working hours and social activities, are not as relevant in the elderly population and are replaced by other social and temporal cues. Most of the older adult population are retired and do not have a regular daily routine. Sedentary behaviours and the lack of work and/or social activities can contribute to temporary disorganisation.

INSOMNIA: THE MOST PREVALENT SLEEP DISORDER

Considering that sleep patterns present alterations, as previously mentioned, it is imperative that a differential diagnosis be made between sleep disorders and sleep alterations in order to determine the most appropriate therapy. Sleep alterations are related to personal changes in the ageing process, whereas sleep disorders are disturbances that affect the diurnal functioning of the individual, seriously affecting their biopsychosocial range and quality of life, since sleep is fundamental for the maintenance of several physiological, psychological, cognitive, and social processes.

The sleep complaints of older adults most often lead to sleep disorders. The most prevalent complaint is the difficulty of initiating or maintaining sleep, which is seen in 30–50% of older adults.[3,12-15] Precipitating and perpetuating factors for sleep disorders include those that are also related to sleep pattern, such as inadequate behavioural sleep habits, age, and the use of medications. Invariably, insomnia is the most prevalent of all sleep disorders, with studies finding a wide range of insomnia rates. For instance, one study found rates of up to 40%, others found rates of around 20%, and other studies found lower rates.[2,12,16,17] Furthermore, insomnia rates have also been found to be on the rise, with Gamaldo et al.[12] reporting that insomnia rates among the elderly (≥60 years old) in the USA increased from 0.27% in 2002 to 1.29% in 2012.

Women are reportedly more commonly affected by insomnia than men, despite research data showing that there is a contrast between objective and subjective data.[13,18] This difference between subjective and objective sleep quality raises the question of whether standard objective sleep measures are appropriate for measuring women's experiences of poor sleep quality.[18] Additionally, it shows there is currently a lower demand from men for specialised healthcare services.

Insomnia is a sleep disorder and can also be a symptom of a medical and/or psychiatric condition. It is defined as a difficulty falling asleep or staying asleep, or waking earlier than expected and not

being able to return to sleep, even with adequate opportunity and the circumstances for sleep. There is also a poor quality of sleep and sleep tends to be non-restorative. It results in significant clinical distress and impairment in important areas of day-time functioning.[19,20]

Insomnia in older adults is more likely to be comorbid with other medical and/or psychiatric disorders, such as:

- Cardiovascular problems,
- Respiratory problems,
- Diabetes,
- Menopause,
- Cancer,
- Fibromyalgia,
- Parkinson's disease,
- Alzheimer's disease,
- Depression,
- Other sleep disorders such as obstructive sleep apnoea.[21-23]

Literature data have shown that insomnia in older adults is associated with falls and mood disorders and therefore may result in an increased risk of morbidity and mortality.[24-26] Alterations associated with cognitive performance are also observed, especially in relation to attention and concentration, memory problems, and executive functioning.[27,28] Furthermore, insomnia has been shown to be a predictor of cognitive decline, being considered an early sign and independent risk factor for dementia.[29]

Insomnia can be classified according to duration:

- Episodic insomnia (symptoms last between 1 and 3 months).
- Recurrent insomnia (when ≥2 episodes occur within 1 year).
- Acute insomnia (duration <3 months).[20]

Increasing age is not only associated with greater prevalence of insomnia,[12] but also with a decline in remission rates and greater persistence of the problem.[30] With ageing, there is also an increase in chronic insomnia, with many older people complaining of having had insomnia for years and some presenting with the condition for their entire lives.

In order to understand the chronic insomnia of older adults, Spielman et al.[31] explained how there are predisposing factors (a set of individual characteristics that increase the probability of developing insomnia, such as sex, age, neurotransmitter systems associated with sleep and wakefulness, and personality traits); precipitating factors (stressful events that precipitate the onset of the symptom, such as the death of a relative or unemployment); and perpetuating factors (behaviours that perpetuate sleep problems caused by attempts to compensate for poor sleep, even after the precipitating factors have been solved. Factors that maintain the condition include inadequate sleep habits, anxiety, medication, and many more).

TREATMENT

Pharmacological

Older adults make great use of both prescribed and non-prescribed hypnotic medications to improve their sleep problems and continue to use these medications over extended periods of time. It is well known that many risks associated with the use of medications in this age group exist. Due to altered pharmacokinetics, there is increased central nervous system sensitivity to the effects of these medications, as well as interactions with additional drugs taken for comorbid conditions. Use of benzodiazepines, non-benzodiazepine hypnotics, and diphenhydramine for treating insomnia results in an increased risk of cognitive impairment, acute respiratory insufficiency, vehicle accidents, dependence symptoms, and falls and fractures.[32-34] In addition, a review by McCall et al.,[35] based on retrospective and prospective cohort studies of suicide victims within the USA and other countries, showed that hypnotic medications are associated with suicidal thoughts. However, none of these studies were adequately controlled for factors such as depression, or other psychiatric disorders that may be linked to insomnia. It is important to mention that the adverse effects depend on the type of medication administered.[36-38] Frequent use of sleeping medications has also been found to be associated with a significantly increased mortality risk.[39]

There has been an effort to analyse appropriate pharmacological approaches. Recently, Edmonds and Swanoski[34] and Schroeck et al.[40] reviewed the safety and efficacy data associated with new therapeutic pharmacological alternatives approved by the U.S. Food and Drug Administration (FDA) for treating insomnia in the geriatric population (suvorexant, doxepin, ramelteon, and tasimelteon); however, these medications were demonstrated to have limitations and adverse effects.

Organisations such as the American Geriatrics Society (AGS)[41] do not recommend using benzodiazepines or non-benzodiazepine hypnotics in older adults. Despite these recommendations, benzodiazepines continue to be widely prescribed to older groups who are at the highest risk of developing serious adverse effects from these medications.[42]

Non-Pharmacological

There are several alternatives for treating insomnia in primary and secondary care settings, including non-pharmacological approaches such as cognitive behavioural therapy (CBT). The main advantages of CBT for insomnia are the lack of adverse effects and its long-lasting efficacy, with the changes in behaviour and beliefs allowing the benefits from this therapy to remain for a longer period of time. This is particularly relevant in the treatment of older adults due to the chronic nature and comorbidity of insomnia at this age; behavioural techniques have therefore been the proposed treatment approach.[43,44]

Several researchers have concluded that CBT should always be the first-line treatment for older adults.[17,44-46] For instance, Schroeck et al.[40] commented that "CBTI [chronic behavioural therapy for insomnia] is considered a first-line therapy approach for all forms of insomnia." An example of a case where researchers have argued for discontinuation of a pharmacological approach is Airagnes et al.,[33] who stated that, contrary to the belief of most clinicians, benzodiazepine can feasibly be discontinued with the use of psychotherapeutic or pharmacological strategies, and this can lead to long-term abstinence. They also commented that significant risk factors in the use of benzodiazepine include polypharmacy and the presence of comorbidities.

CBT for treating insomnia in older adults involves sleep hygiene (aims to change habits with an impact on sleep quality through psychoeducation); stimulus control (aims to associate sleep with relaxing activities only and avoid those that excite the individual and keep them awake); sleep restriction (limiting time in bed to sleeping time, thus increasing sleep efficiency); relaxation techniques (reduce somatic tension and intrusive thoughts that impair sleep); and cognitive therapy (disrupts dysfunctional beliefs and attitudes about sleep that lead to emotional distress and further sleep problems).[45,46]

Brasure et al.[47] demonstrated through a systematic review of >180 studies that CBT for insomnia improved global outcomes and nearly all sleep parameters in the general adult population, older adults, and adults who experienced chronic pain. These data were corroborated by the meta-analyses performed by van Straten et al.[48] and Vitiello,[49] who stated: "CBT for insomnia is effective, safe, and highly deployable". Studies show that using CBT is effective, with significant effects on the severity of insomnia, sleep efficiency, sleep quality, and sleep fragmentation.[17]

Digital forms of CBT for insomnia are also demonstrating promise as a therapeutic option, with some studies showing evidence of validity. For example, Chen et al.[50] demonstrated that a patient who successfully discontinued hypnotic treatment experienced restored sleep quality after intervention with a CBT mobile app, despite several limitations. Alessi et al.[51] studied community-dwelling veterans aged ≥60 years who met the diagnostic criteria of insomnia for ≥3 months. The researchers used stimulus control, sleep restriction, sleep hygiene, and cognitive therapy (individually or in small groups), in addition to weekly telephone behavioural sleep medicine supervision. The results showed significant improvements in sleep onset, sleep efficiency, and sleep quality in older adults with chronic insomnia.[52,53]

A complementary therapeutic measure involves social strategies and phototherapy. Diagnostic evaluation protocols should be investigated to indicate a requirement for this therapy. It should be determined whether the individual has decreased physical activity, social isolation, or reduced exposure to light, especially for residents of long-term institutions and those with dementia, including Alzheimer's disease. Therefore, one of the coadjuvant and effective therapeutic possibilities includes decreasing time spent in bed during the day, increasing physical activity and social activation, increasing daily exposure to sunlight (or artificial light), provision of structured sleep routines associated with night-time, decreased exposure to nocturnal light and noise, and, lastly, increased vigilance associated with the times of exposure to sunlight and/or artificial daylight (due to the circadian, homeostatic, and psychosocial changes, as previously explained).[46,54] Fiorentino and Martin[55] explained the efficacy and benefits of this technique in older adults, although there is no consensus about

the results.[56-58] Evidence regarding the efficacy of these protocols for dementia patients is still scarce.[59,60]

In addition to phototherapy, research shows that the introduction of structured social activities improves the parameters of sleep and sleep quality[54,61] and increases slow-wave sleep, with an impact on memory.[62] Literature data have demonstrated that low-impact aerobic activity, walking, and tai chi improve sleep in sedentary older adults with sleep disorders.[63]

CONCLUSION

The progress observed with the use of CBT is clear and has been proven in short, medium, and long-term periods of time. However, there is still a shortage of professionals trained to develop this type of therapy, especially with older adults. This perhaps is part of the explanation for the existing predominance of pharmacological treatments for insomnia in this population. An important issue is that, because many older adults have several contributing factors from different domains in their sleep, these complaints are best managed with a multifaceted treatment approach, that is, with a combination of pharmacological treatment and CBT.

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