Nonpharmacologic Therapy for Insomnia in the Elderly

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Sleep changes over the life span. Approximately 50% of older Americans report chronic difficulties with their sleep [1]. Complaints of insomnia are more common in women and their prevalence increases with advancing age [2]. Objective evidence for these complaints has been demonstrated by polysomnography. Aging is associated with several well-described changes in sleep architecture [3]. The most significant change is a phase advance of the normal circadian cycle. Thus, the elderly tend to have an earlier onset of sleep that is accompanied by an earlier morning wake signal. The elderly often go to bed early and report being early risers [4]. A recent meta-analysis revealed that with age, percentages of stage 1 and 2 sleep increased, whereas the percentage of rapid eye movement (REM) and slow-wave sleep decreased. Thus, more of the night was spent in the lighter stages of sleep [5].

Older adults have a decrease in their ability to maintain sleep; however, the absolute need for sleep does not decrease with age. Sleep becomes more fragmented in older adults, resulting in a decrease in sleep efficiency (amount of time spent in bed asleep) which continues to decrease after the age of 60. Though sleep is shorter in duration, shallower, and more fragmented in the elderly, poor sleep is not an inevitable consequence of aging [6].

Insomnia is frequently multifactorial. Sleep complaints in the older adult may be comorbid with chronic medical and psychiatric conditions. Several factors have been implicated in the development of insomnia in the older adult. These include:

- Comorbid medical and neurologic conditions
- Medications
The above factors, either alone or in combination, can compromise an individual’s sleep quality [7,8]. Older adults with more than three medical conditions are more likely to complain of insomnia and excessive daytime sleepiness [9]. Medications may cause or contribute to insomnia.

Sleep disturbances are associated with significant morbidity and mortality. Studies have revealed that chronic insomnia is associated with a higher risk of death [10,11]. Insomnia is also thought to be a risk factor for depression, anxiety, substance abuse, and suicide [12]. Sleep disorders may also have a negative impact on health-related quality of life by increasing the risk of accidents, malaise, and chronic fatigue [13]. Insomnia may be associated with decreased memory and concentration, and impaired performance on psychomotor tests. Chronic insomnia independently predicts incident cognitive decline in older men [14,15].

Nonpharmacologic and pharmacologic approaches are effective for the short-term management of insomnia in late life; however, current evidence suggests that sleep improvements are better sustained over time with behavioral treatment [16–19]. This article provides an overview of nonpharmacologic approach for the treatment of insomnia.

**Nonpharmacologic management of insomnia**

Management of insomnia that is secondary to medical illness should start with treatment of the primary disease process. If the individual’s history suggests a primary sleep disorder or a sleep-related movement disorder, the patient may need nocturnal polysomnographic recordings to establish the diagnosis. Nondrug treatment of insomnia is quite effective and underutilized by health care professionals. Nondrug treatments involve behavioral, cognitive, and physiologic interventions. Common methods of cognitive behavior therapy (CBT) for insomnia include:

- Relaxation
- Stimulus control
- Sleep restriction
- Cognitive interventions or therapy
- Sleep education and sleep hygiene
- Light therapy
- Chronotherapy

Numerous controlled studies have shown improvement in the quality and quantity of sleep in primary insomnia. CBT is safe and effective, and its various components can be used alone or in combination for the treatment of
Relaxation therapy and imagery

Thoughts can be detrimental to sleep and anxiety may cause sleep onset insomnia. Relaxation training originally used to alleviate anxiety is used for the treatment of sleep onset insomnia. Several techniques have been used in the treatment of insomnia. These modalities include [21–23]:

- Progressive muscle relaxation
- Autogenic training—this relaxation technique focuses on increasing blood flow to the legs and arms. Induction of sensations of warmth and heaviness are used to promote somatic relaxation.
- Imagery—pleasant imagery can be used along with relaxation to improve sleep.

Individuals must practice the chosen technique at least twice a day. It may require several weeks of practice before the skill is acquired. This technique must not be used initially to induce sleep.

In a study by Lichstein and Johnson [24] of older women with insomnia, the treatment effect with relaxation therapy was dependent on the medication status (hypnotic versus nonhypnotic) of the insomniac. There was substantial sleep improvement among nonhypotically medicated insomniacs and substantial sleep medication reduction (47%) was seen among hypnotically medicated insomniacs.

In another study, community dwelling older adults with insomnia were randomized to relaxation, sleep compression, and placebo desensitization. The study involved collection of data using questionnaires and polysomnography at baseline, posttreatment, and 1-year follow-up. The study showed an improvement in self-reported sleep, but objective sleep was unchanged. However, results partially supported the conclusion that individuals with daytime impairment respond best to treatments that extend sleep, as in relaxation, and individuals with low daytime impairment respond best to treatments that consolidate sleep, as in sleep compression [25].

Stimulus control

To cope with being awake during the night, many individuals with chronic insomnia engage in behaviors in the bedroom that contribute to insomnia. These may include worrying, reading, and watching television,
among other behaviors. In a study of subjects with sleep onset insomnia, there was an improvement in sleep in 70% of the subjects when they consistently followed the practice of having only 10 minutes to fall asleep (20 minutes in the elderly) [26]. The purpose of stimulus control is to break the association between maladaptive behaviors and arousal. Instructions to patients for stimulus control include:

1. Go to bed only if you feel sleepy
2. Avoid activities in the bedroom that keep you awake, other than sex
3. Sleep only in your bedroom
4. Leave the bedroom when awake
5. Return to the bedroom only when sleepy
6. Arise at the same time each morning, regardless of the amount of sleep obtained that night
7. Avoid daytime napping

Stimulus control treatment instructions have been modified slightly for older adults. These modifications include increasing the estimated sleep-onset latency to 15 to 20 minutes and the permissibility of one short nap [27]. In a controlled comparative investigation of psychologic treatment of patients with chronic insomnia, subjects were randomly allocated to progressive relaxation, stimulus control, paradoxical intention, placebo, or no treatment. Active treatments were associated with significant improvement in sleep. However, gains varied depending on the nature of treatment. Stimulus control was associated with improved sleep pattern, whereas relaxation affected perception of sleep quality. All improvements were maintained at 17-month follow-up [28]. The efficacy of stimulus control therapy has been shown by several controlled studies to be efficacious in the treatment of both sleep-onset and sleep-maintenance insomnia [28–31].

Sleep restriction therapy

Sleep restriction therapy has been shown to be an effective treatment for common forms of chronic insomnia. In a study by Spielman and colleagues [32], sleep restriction in subjects with chronic insomnia increased total sleep time ($P<0.05$) as well as improved sleep latency, total wake time, sleep efficiency, and subjective assessment of insomnia (all $P<0.0001$). Improvement remained significant for all sleep parameters on follow up at 36 weeks posttreatment. The efficacy of sleep restriction alone or in combination with other modalities has been shown in controlled trials [33,34].

Sleep restriction therapy causes sleep deprivation, resulting in an increase in sleep drive. Before initiation of sleep restriction therapy the individual is required to keep a sleep log for 2 weeks. This helps in estimating the average sleep time versus time spent in bed. The allowed sleep time is the average subjective sleep time, but is never less than 5 hours. The time
in bed is adjusted by 15-minute increments or decrements, depending on the sleep efficiency. Sleep efficiency is defined as the average sleep time or time in bed times 100%. If sleep efficiency is greater than 90%, the time in bed is increased by 15 minutes, and if it is less than 85%, the time is decreased by 15 minutes. Approximately 25% of patients benefit from this treatment [35].

Cognitive interventions

Research shows that CBT can be used successfully in the treatment of insomnia [18,36]. Although formal cognitive therapy is increasingly used as part of CBT, it has not been evaluated as a single therapy for insomnia. CBT addresses maladaptive behaviors, dysfunctional cognition, and misconceptions related to insomnia. It helps the patient identify beliefs that are counterproductive. Cognitive therapy is designed to identify dysfunctional cognitions and reframe them into more adaptive substitutes to short-circuit the self-fulfilling nature of this vicious cycle. Treatment targets may include unrealistic expectations, faulty causal attributions, and amplification of the consequences of insomnia. It challenges behaviors incompatible with sleep [37].

In a randomized controlled trial of 63 adults with chronic sleep-onset insomnia, CBT was found to be superior to pharmacologic management with zolpidem [18]. Current evidence suggests that CBT may be as effective as prescription medications for brief treatment of chronic insomnia. Additionally, the beneficial effects of CBT are sustained beyond the treatment period. There is no evidence that CBT is associated with adverse effects [16–19]. However, the relative efficacy of nonpharmacologic therapies remains to be established. In a meta-analysis of 59 trials sleep hygiene measures alone did not show efficacy. Also, when used on their own, sleep restriction and stimulus control therapies were more effective than relaxation therapy [16]. The 2005 National Institutes of Health State-of-the-Science Conference on Insomnia concludes that CBT is as effective as prescription medications for the treatment of chronic insomnia [38]. However, clinical benefits of CBT may not be seen until a few weeks after initiation of treatment [39].

Sleep education and hygiene

Sleep hygiene measure alone are not sufficient for the treatment of insomnia; however, they may be useful when used in conjunction with other modalities. Sleep hygiene addresses health practices, habits, and environmental factors that impact sleep. Physicians need to educate patients regarding sleep and its disorders. It is important to emphasize that simple lifestyle changes can help in the treatment of insomnia. Box 1 lists some of the sleep-related practices and habits that may interfere with sleep. It is important to foster good sleeping habits.
Several factors may contribute to insomnia in the elderly. Behavioral factors particularly in the elderly may include alcohol, caffeine, nicotine intake, and exercising too close to bedtime. An unfavorable sleep environment, such as too much light or noise, may be disruptive to sleep. Excessive daytime napping, lack of exercise, and inadequate light exposure during the day can contribute to insomnia. Many older individuals may be taking over-the-counter or herbal medications with stimulant properties. Patients may not volunteer this information unless specifically asked, and simple measures may help with improved sleep in the elderly.

**Light therapy**

The circadian system is responsible for the 24-hour sleep and wake cycle. In human beings the endogenous circadian rhythm is slightly longer than 24 hours. This predisposes the endogenous rhythm to gradually shift later in time. Genetic determinants for the circadian rhythm have been identified in animals and human beings [40–43]. Circadian rhythm disorders can cause insomnia because of a lack of synchronization between an individual’s internal clock and the external schedule. Sleep disorders seen with circadian rhythm disorders include delayed sleep phase disorder, when sleep time is delayed in relation to the desired clock time, and advanced sleep phase disorder, when the patient goes to sleep in the early evening and wakes up earlier than desired in the morning.

Exposure to bright light can stabilize or shift the endogenous rhythm [44,45]. Early morning light exposure is used to treat patients with a delayed
sleep phase. Bright light exposure is administered in the morning as close to the patient’s scheduled arising time as possible. Light therapy counters the inherent shift toward a later phase and can be useful in maintaining a 24-hour circadian period [46]. Evening bright light exposure has been used to treat patients with advanced sleep phase disorders and tends to delay the circadian sleep phase [47].

The endogenous circadian rhythm responds to the shorter wavelengths of the visible spectrum. The peak sensitivity is at a wavelength of about 470 nm, which corresponds to blue color. Light therapy can be achieved with natural sunlight or artificial light using a light box. Light therapy with artificial light is done using 10,000 lux for 30 to 40 minutes upon awakening. Evening light exposure must be reduced to achieve the desired results in individuals with delayed phase sleep disorders. Blue-blocking sunglasses may be worn to counter the phase-delaying effect of evening light exposure. Response is usually seen in 2 to 3 weeks and maintenance of response frequently requires indefinite treatment [48–53]. Similarly, in individuals with advanced phase disorder a light box should be used in the evenings. The use of sunglasses that block blue light in the morning may be helpful [47].

*Chronotherapy*

Chronotherapy involves a progressive delay of bedtime, usually 2 to 3 hours per night, until the desired earlier bedtime is achieved. This treatment modality has shown success in individuals with delayed phase disorder, which is relatively common in adolescents and young adults [54]. It is not a modality of choice for the treatment of insomnia in the elderly.

*Nonpharmacologic treatment of insomnia in long-term care setting*

Sleep is fragmented among nursing home residents, who often stay in bed awake for prolonged periods of time [55,56]. A study by Alessi and Schnelle [57] showed that nursing home residents slept only 58% of the time while in bed. Also, studies done by Ancoli-Israel and colleagues on nursing home residents, have revealed that residents at the nursing home are seldom awake or asleep for a full hour at any point during the day or night [58,59].

Multiple factors contribute to abnormal sleep-wake patterns in nursing home residents. Certain potentially reversible behavioral and environmental factors may contribute to sleep problems in the long-term care setting. These potentially modifiable factors include limited sunlight exposure, large amounts of time spent in bed, lack of physical activity, a disruptive nighttime environment, and other factors that lead to poor sleep hygiene [60,61]. A randomized, controlled trial of nonpharmacologic intervention
Box 2. Practice parameters for nonpharmacologic treatment of chronic insomnia [66]

Recommendations according to type of insomnia

- Psychologic and behavioral interventions are effective and recommended in the treatment of chronic primary insomnia.
- Psychologic and behavioral interventions are effective and recommended in the treatment of secondary insomnia.
- Stimulus control therapy is effective and recommended therapy in the treatment of chronic insomnia.
- Relaxation training is effective and recommended therapy in the treatment of chronic insomnia.
- Sleep restriction is effective and recommended therapy in the treatment of chronic insomnia.
- Cognitive behavior therapy, with or without relaxation therapy, is effective and recommended therapy in the treatment of chronic insomnia.
- Multicomponent therapy (without cognitive therapy) is effective and recommended therapy in the treatment of chronic insomnia.
- Paradoxical intention is effective and recommended therapy in the treatment of chronic insomnia.
- Biofeedback is effective and recommended therapy in the treatment of chronic insomnia.
- Insufficient evidence was available for sleep hygiene education to be an option as a single therapy. Whether this therapy is effective when added to other specific approaches could not be determined from the available data.
- Insufficient evidence was available for imagery training to be an option as a single therapy. Whether this therapy is effective when added to other specific approaches could not be determined from the available data.
- Insufficient evidence was available for cognitive therapy to be recommended as a single therapy.
- Insufficient evidence was available to recommend one single therapy over another, or to recommend single therapy versus a combination of psychologic and behavioral interventions.

Recommendations relevant to specific patient groups

- Psychologic and behavioral interventions are effective and recommended in the treatment of insomnia in older adults.
- Psychologic and behavioral interventions are effective and recommended in the treatment of insomnia among chronic hypnotic users.
to improve abnormal sleep-wake patterns in nursing home residents reported decreased daytime sleeping and increased participation in social and physical activities and social conversation [62]. Another randomized controlled trial of nonpharmacologic intervention among nursing home residents, suggested that these interventions may effectively improve the robustness of rest and activity rhythms [63]. However, a multicomponent, nonpharmacologic intervention trial by Ouslander and colleagues [64] was unable to demonstrate any effect on nighttime sleep.

The treatment of insomnia in the nursing population can be challenging; however, simple measures, such as limiting daytime naps to 1 hour in the early afternoon, avoiding stimulating medications, foods and beverages, providing a bright daytime environment, quiet, and dark night environment may be helpful [65].

**Summary of evidence**

The evidence regarding the efficacy of nonpharmacologic treatments for insomnia has been reviewed by a task force appointed by the American
Academy of Sleep Medicine and published in the journal Sleep in 2006 [66]. This report reviewed 37 clinical trials to develop practice parameters for nonpharmacologic management of chronic insomnia. A summary of the American Academy of Sleep Medicine Practice Parameters for nonpharmacologic treatment of chronic insomnia is included in Box 2.

The task force concluded that nonpharmacologic therapies produce reliable and durable changes in several sleep parameters of chronic insomnia sufferers. Data also indicate that between 70% and 80% of patients treated with nonpharmacologic interventions benefit from treatment. Nondrug treatment of insomnia is likely to reduce the symptoms of sleep onset latency or wake time after sleep onset. It is also associated with an increase in sleep duration by a modest 30 minutes, and improved sleep quality and patient’s satisfaction with sleep patterns. Sleep improvements achieved with these behavioral interventions are sustained for at least 6 months after treatment completion [39].

An evaluation of behavioral treatments for insomnia in the older adult population indicated that sleep hygiene, stimulus control, progressive relaxation alone or in combination were effective in improving the sleep diary assessed awakenings, naptime, and feeling refreshed upon awakening. Stimulus control appeared to be most effective in improving sleep in the posttherapy period. In addition, behavioral treatments were found to be effective in improving perception of sleep in older adults with insomnia [67].

Outcome research is needed to examine the effectiveness of nondrug treatment of insomnia in the elderly when it is implemented in clinical settings by nonsleep specialists, and in insomnia patients with medical or psychiatric comorbidity.

Summary

Insomnia is prevalent in the elderly. It is associated with an increased morbidity and mortality. Older adults have a decrease in their ability to maintain sleep; however, the absolute need for sleep does not decrease with age. Poor sleep is not an inevitable consequence of aging. Older adults often have multiple comorbid conditions, are on multiple medications, and are therefore predisposed to adverse drug reactions. Evidence suggests that nonpharmacologic treatments are effective and well suited for the clinical management of insomnia in the elderly. Non pharmacologic modalities may be used alone or in combination with pharmacologic therapy for effective treatment of insomnia in the elderly.

References


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