Nonpharmacologic Management of Excessive Daytime Sleepiness

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KEYWORDS

• Excessive daytime sleepiness • Behavioral management • Sleep restriction • Sleep need • Sleep extension • Sleep debt • Sleep banking • Sleep deprivation

KEY POINTS

- A sleep duration of 7 to 8 hours has been associated with the lowest risk of mortality. At a population level, this information is important; however, for individuals reporting excessive daytime sleepiness, determining personal sleep need is likely to provide the most clinical benefit.
- Excessive daytime sleepiness has been linked to reduced performance, increased work-related accidents, and motor vehicle crashes. Therefore, treating sleepiness is critically important.
- Increasing time in bed before a period of sleep deprivation may help to moderate performance decrements during short periods of reduced sleep.
- Progressively increasing time in bed can help reduce excessive daytime sleepiness in those with chronic partial sleep deprivation. However, care should be taken not to increase time in bed too much at one time because this may result in reduced sleep efficiency.

INTRODUCTION

The focus of this article is to investigate behavioral strategies for improving daytime sleepiness. Other high-quality reviews on this topic have been published in the last several years, including one published in this publication in 2012.[1] In general, previous reviews have focused on sleepiness or hypersomnia secondary to conditions such as sleep apnea, circadian rhythm disorders, narcolepsy, and depression. However, somnolence is so commonly present in these conditions that, often, residual sleepiness is more a function of inadequate treatment of the primary disorder than a separate symptom that needs to be treated independently. Therefore, the goal of this article is to look mainly at sleepiness not stemming from another medical or psychological condition. The only caveat I make to this theme is to briefly discuss behavioral options to address sleepiness associated with narcolepsy because this group of patients develops a unique pattern of somnolence over the course of the day, which makes behavioral management more challenging.

To achieve the goal of understanding behavioral management of sleepiness, it is necessary to first define how nighttime sleep is thought to impact daytime somnolence and performance. Therefore, the literature investigating and discussing optimal sleep in terms of sleep duration, sleep insufficiency, and sleep need is reviewed. This review is followed by prophylactic measures that can be implemented when reduced nighttime sleep is anticipated for short periods of time (banking sleep). As mentioned earlier, behavioral treatment of narcolepsy, including sleep extension and prophylactic naps, is discussed and followed by a description of a technique I have been developing

Disclosure Statement: The author has nothing to disclose.
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Sleep Med Clin ■ (2017) ■–■
http://dx.doi.org/10.1016/j.jsmc.2017.03.020

in clinical practice to determine sleep need in individuals in order to optimize subjective daytime alertness.

EXCESSIVE DAYTIME SLEEPINESS

Excessive daytime sleepiness (EDS) is a condition characterized by a pressure to sleep during the day, which causes either social or occupational problems for the individual. This condition is different from (idiopathic) hypersomnia, which involves daytime somnolence despite 11 hours or more of sleep.[2] Excessive sleepiness can be defined both objectively with tests, such as the multiple sleep latency test (MSLT)[3] and/or the maintenance for wakefulness test (MWT),[4] or with questionnaires either focused exclusively on sleepiness, such as the Epworth Sleepiness Scale,[5] the Stanford Sleepiness Scale,[6] or the Karolinska Sleepiness Scale,[7] or with questions regarding somnolence imbedded in other surveys. According to the National Sleep Foundation's 2008 Sleep in America poll, 18% of American's are excessively sleepy.[8]

Daytime sleepiness has been investigated in several studies throughout the world, with prevalence ranging from 9% to 26%.[9] This wide range in prevalence of sleepiness is likely due as much to differences in study design and method used to query sleepiness as it is to true differences in the underlying alertness of populations. However, cultural differences in patterns of sleep, genetic variation, work schedules, and social activities in different countries may also play a role in level of sleepiness. Nonetheless, sleepiness is a major public health concern worldwide and has been found to significantly affect performance when induced experimentally.[10–13] Moreover, sleepiness has been linked to increased motor vehicle and work place accidents.[14–17] A study investigating the optimal duration of sleep to prevent deficits in psychomotor vigilance found that an average of 8.2 hours is needed per night for peak performance.[18] However, the US Department of Health and Human Services estimates that only 65% of Americans get a healthy amount of sleep.[19]

OPTIMAL SLEEP (SLEEP NEED VERSUS SLEEP DURATION VERSUS SLEEP INSUFFICIENCY)

In this section, 3 different but related concepts are examined in relation to optimal sleep. These concepts are sleep duration, sleep insufficiency, and sleep need. Understanding the differences in the terminology used to describe ideal sleep is critical to comprehending the previous research in this area, which can otherwise seem contradictory. Moreover, appreciating these distinctions is necessary to develop a thoughtful treatment approach to behaviorally induced chronic partial sleep deprivation, which seems to be a substantial source of daytime sleepiness.

Sleep duration refers to the total amount of sleep obtained without factoring in whether or not individuals feel rested. More research has been done in this area than in sleep insufficiency or sleep need because questions related to sleep duration are more common than inquiries about whether the current total sleep amount is acceptable in existing large-scale data sets. Sleep duration is also easier to define both objectively and subjectively than other terminology related to optimal sleep.

Several studies have looked at the relationship between sleep length and death. Two relatively recent systematic reviews have shown a U-shaped curve for the association between sleep duration and all-cause mortality.[20,21] The lowest risk of death was found in individuals sleeping 7 to 8 hours per night. Those sleeping more or less than this amount showed an increased risk of mortality. More specifically, coronary heart disease, hypertension, and problems with glucose metabolism have been found to be linked to both short and long sleepers.[22–26] In one study, very short sleep of less than 5 hours per night was associated with increased risk for hypertension, hyperlipidemia, diabetes, and obesity.[27] Interestingly, this study did not find an elevated risk for any of these outcomes for the group self-reporting sleep duration of greater than 9 hours. A study by Altman and colleagues[28] found a significant relationship between sleep duration of less than 5 hours and body mass index, obesity, hypertension, myocardial infarction, and stroke. However, a sleep duration greater than 9 hours was only significantly associated with myocardial infarction and stroke.

A study performed by Van Dongen and colleagues[18] in which subjects were experimentally sleep restricted to 4, 6, or 8 hours in bed found that over the course of 14 days those in the 4- and 6-hour groups had significant decrements in cognitive performance. In fact, the investigators of this study state that 2 weeks of chronic partial sleep deprivation is equivalent to 2 days of total sleep deprivation. This finding is consistent with other studies, which have shown the cumulative effects of sleep restriction on psychomotor performance, mood, and objective measures of daytime sleepiness.[29–31]

In contrast to sleep duration, sleep insufficiency describes when the current amount of sleep is inadequate regardless of total sleep time. For