

Sleep in the Elderly

Unanswered Questions

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KEYWORDS

• Sleep • Elderly • REM behavior disorder • Insomnia • Sleep apnea

KEY POINTS

- Sleep normally changes with aging, with implications for healthy elderly individuals as well as for those with disease states.
- Less slow wave sleep (deep sleep) is expected, along with more awakenings, and a tendency toward earlier sleep times.
- Rapid eye movement sleep behavior disorder is seen primarily in elderly individuals, in whom it often represents the earliest sign of a chronic and progressive neurologic disease.
- Complaints of difficulty initiating and maintaining sleep (insomnia) become more common with aging.
- Irregular breathing with sleep also becomes more common, with an increased Apnea Hypopnea Index that may not always be clinically important.

Elderly individuals represent the fastest growing segment of the world's population. Sleep problems in elderly individuals are so common that it is difficult to know with certainty what is normal in this group. This is even more difficult in elderly subjects with nearly any chronic medical condition, as the effects on sleep are often significant. In this article, we first briefly review normal sleep, and then 3 common clinical problems in this population: rapid eye movement (REM) behavior disorder, insomnia, and sleep-disordered breathing.

NORMAL SLEEP

Human consciousness can be thought of as having 3 states: wake, non-REM sleep, and REM sleep. Our current system for scoring sleep has changed very little since its first description by Rechtschaffen and Kales in 1968.¹ Polysomnography (ie, a

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sleep study) involves at a minimum the recording of electroencephalography (EEG), muscle tone via electromyography (EMG), and eye movements (electrooculography). Respiration is monitored by recording airflow with nasal pressure sensors and thermistors, respiratory effort with measurement of chest and abdominal movement, and oximetry. Electrocardiography is monitored. Leg movements are often recorded using EMG on the anterior tibialis muscle. Additional recordings may be occasionally necessary.

An outline of the characteristics of normal human sleep stages is shown in [Table 1](#). EEG during wakefulness is mostly a low-amplitude, high-frequency signal with relatively high muscle tone on EMG. During relaxed quiet wakefulness, alpha activity predominates on the EEG (8–12 Hz), shown in [Fig. 1](#). The transition from wake to sleep is characterized by a reduction in EMG amplitude, and the disappearance of alpha activity on the EEG, which is replaced by a low-amplitude mixed-frequency signal. Slow (“rolling”) eye movements may be seen. Stage 1 non-REM sleep is light sleep during which the subject can be easily awakened, and is considered transitional to deeper sleep stages. In stage 2, making up approximately half of the total sleep period, characteristic sleep spindles (brief episodes of 12–14-Hz activity lasting at least 0.5 seconds) and K complexes (fast biphasic waves beginning with a sharp upward deflection) are seen. Examples of spindles and K complexes are shown in [Fig. 2](#). In stage 3 sleep, slow waves of 0.5-Hz to 2.0-Hz frequency with an amplitude of greater than 75 μ V make up at least 20% of the tracing. Examples of slow waves are seen in [Fig. 3](#). This is the deepest stage of human sleep.

REM sleep has been said to be as different from non-REM sleep as it is from wakefulness. It was originally termed “paradoxical sleep”; the paradox being that the brain appears active with voluntary muscles being nearly paralyzed. The EEG combines aspects of wakefulness and stage 1 sleep. Striking REMs are seen ([Fig. 4](#)). There is a decrease in muscle tone on the EMG to the lowest level of the night. Most well-defined dreams are thought to occur in REM sleep. REM is also the time of greatest cardiac and respiratory instability during the sleep period.

WHAT IS NORMAL SLEEP IN HEALTHY ELDERLY INDIVIDUALS?

Defining normal sleep in elderly individuals is problematic. Changes occur in both sleep timing and quality. Two popular assumptions are that older people need less sleep and are more likely to be sleepy during the day. Neither may be true, at least in healthy elderly individuals. It does at least appear to be true that with aging, subjects get less nocturnal sleep.

Insomnia can be defined as difficulty falling asleep, difficulty staying asleep, or the perception of nonrestorative sleep. Some of these complaints may be the norm in

Stage	Characteristics	Significance
Wake	Alpha activity	
1	Alpha absent, slow eye movements	Light (“transitional”) sleep
2	Spindles, K complexes	Approximately 50% of normal night
3	Slow waves (“delta waves”)	Deepest, most restorative sleep
Rapid eye movement	Rapid eye movements, reduced muscle tone	Most dreaming occurs

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