

Sleep and Orofacial Pain

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KEYWORDS

- Sleep • Sleep disorders • Orofacial pain • Chronic pain • Sleep stages • Screening
- Management strategies

KEY POINTS

- Sleep and pain share a bidirectional relationship.
- Sleep and pain are essential physiologic processes for the survival and continuation of all animal species, from humans to insects.
- Insomnia and chronic orofacial pain conditions involve many common neuroanatomic structures and neurochemical transmitters.
- It is important for practitioners who manage sleep disturbances and/or pain to routinely perform screening procedures for each entity in order that a multidisciplinary approach to management is instituted for enhanced patient care.

INTRODUCTION

Sleep (or at least a physiologic period of quiescence) is a natural physiologic function that is required for survival and continuation of all animal species from insects (fruit flies) to mammals. It is an active neurobehavioral state that is maintained through a highly organized interaction of neurons and neural circuits in the central nervous system (CNS). In humans, it is essential for recovery from fatigue and for tissue repair (eg, heart and skeletal muscles), memory consolidation, and brain function at both the cellular and CNS network levels. Individuals who are totally or partially sleep deprived may develop mood alterations, impaired memory and reduced cognitive abilities, immune system changes, and somatic pain-related complaints.^{1,2} This is considered

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nonrestorative sleep because it commonly refers to the unrefreshed feeling on awakening and is present in approximately 10% of the general population.^{1,3}

In order to classify and describe sleep disorders, the American Academy of Sleep Medicine developed the International Classification of Sleep Disorders, Third edition (ICSD-3).⁴ ICSD-3 includes 7 major categories: insomnia, sleep-related breathing disorders, central disorders of hypersomnia, circadian rhythm sleep-wake disorders, parasomnias, sleep-related movement disorders, and other sleep disorders.⁴ The ICSD-3 divides these 7 major categories into 60 diagnoses, and it also includes an appendix for classification of sleep disorders associated with medical and neurologic disorders.⁴

Overall, in most adults, sleep onset normally occurs within 20 to 30 minutes after the individual goes to bed and sleep typically endures for 6 to 9 hours. However, there is considerable individual variation as a result of different sleep habits, employment requirements, and so forth.

Sleep is customarily divided into 2 distinct categories: non-rapid eye movement (NREM) and rapid eye movement (REM) sleep (Table 1). During a typical night, there are 3 to 5 NREM to REM cycles (ultradian rhythm cycle), with each cycle having a duration of approximately 90 to 120 minutes. NREM sleep is further divided into 3 distinct stages based on electroencephalogram (EEG) activity: Stages N1 and N2 (lighter stages of the sleep cycle) and stage N3 (formerly called stages 3 and 4, which is dominated by slow wave brain activity, or slow wave sleep [SWS]). REM sleep, often referred to as paradoxical sleep, because all skeletal muscles are in a hypotonic state, as if the body is paralyzed, involves high activity in the CNS and autonomic nervous system. Normal sleep has an oscillatory rhythm

Sleep Stage	Time in Sleep Stage (%)	Sleep Characteristics
Relaxed wakefulness (stage W)	<5	Alpha + beta activity (neural oscillations ranging from 7.5 to 12.5 Hz + from 12.5 to 30 Hz)
NREM		High-amplitude/low-frequency activity + decreased muscle tone with slow rolling eye movements
Stage 1 (transitional) N1	2–5	Alpha activity gradually decreases (presleep 8–12 Hz) + theta activity (4–8 Hz) appears, the eyes move slowly + muscle activity slows
Stage 2 (sleep onset) N2	45–55	^a Spindle waves (7–14 Hz) + ^b K-complexes appear on EEG, body temperature decreases + heart rate slows
Stage 3 (slow wave)	3–8	Delta/slow wave activity (1–4 Hz) starts to dominate the EEG
Stage 4 (slow wave)	10–15	
REM (stage R)	20–25	Low-voltage fast activity (beta + theta waves), muscle hypotonia, dreaming, brain activity with rapid eye movements

Note: stage 3 + 4 now considered N3.

Abbreviations: EEG, electroencephalogram; Hz, Hertz.

^a Spindle waves: (burstlike trains of waves in the 11-Hz to 16-Hz range with a total duration \geq 0.5 seconds).

^b K-complexes: well-defined biphasic waves lasting greater than or equal to 0.5 seconds and usually maximal over the frontal cortex.

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