

The Ophthalmic Sequela of Sleep Disorders
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Description: Sleep disorders are a group of common diagnoses that impact overall health. Inadequate sleep impacts physical, mental, social, and emotional function. We will discuss the most common sleep disorders and how they directly and indirectly impact ocular health. Also, we will discuss how technology is assisting with monitoring sleep.

Objectives:

1. Understanding of the stages of sleep.
2. Discussion of the most common sleep disorders.
3. Understanding of the impact sleep disorders have on the circadian cycle.
4. Discussion of the impact sleep disorders have on general medical health.
5. Discussion of the impact sleep disorders have on ocular health.
6. Discussion of how the ocular effects of sleep disorders are treated.
7. Discussion of the impact modern technology has on how sleep may be monitored.

Course outline:

- I. What is sleep and why do we need it?
 - A. Universal function in living species
 - B. Reversible state of human unconsciousness in which there are reduced states of metabolism and motor activity.
 - C. Recommended adult sleep duration ranges from 7 to 9 hours
 1. Comprises one-third of human life.
 2. 40% of Americans 6 hours or less per night
 - D. The many reasons why we need sleep (the function of sleep)
 1. Brain hypotheses
 - a. Cognitive – higher order, proposes that sleep serves functions such as memory of brain plasticity.
 - b. Housekeeping – restorative and detoxification, essential neural processes that support higher-order cognitive functions.
 - 1.) Restorative – sleep restores, and repairs neural substrates degraded by wakefulness. “Metabolic clearance”.
 - 2.) Detoxifications – detoxifies substances that accumulate while awake
 2. Other quantitative observations
 - a. Aid to control body mass index (BMI)]
 - b. Need for the body to rest to recover from physical activity
 - E. The stages of sleep
 1. NREM Stage N1 – (non-rapid eye movement) **falling asleep**, last a few minutes, heartbeat and breathing slow down.
 2. NREM Stage N2 – **light sleep**, heartbeat and breathing slow down further, body temperature drops, brain produces “sleep spindles”, lasts 25 minutes.
 3. NREM Stage N3 – **deep sleep** (slow wave sleep), heartbeat and breathing at slowest

rate, no eye movements, body is fully relaxed, delta brain waves are present, tissue and cell repair, growth and regeneration occur. The immune system strengthens.

4. REM Stage R – (**rapid eye movement**) primary dreaming stage, eye movements occur at a rapid rate, breathing and heart rate **increases**, limb muscles become temporarily paralyzed, brain activity **increases**.

II. Sleep disorders

A. International classification of sleep disorders

1. Insomnia
2. Sleep related breathing disorders
3. Central disorders of hypersomnolence
4. Circadian sleep-wake disorders
5. Parasomnias
6. Sleep-related movement disorders
7. Other sleep disorders (group of less common conditions)

B. Disorders frequently associated with ocular sequela

1. Sleep related breathing disorder: Obstructive sleep apnea syndrome (OSAS)
 - a. Symptoms
 - b. Signs
 - c. Diagnosis
 - d. Treatment
 - e. Ocular sequela
 - f. Treatment
2. Circadian sleep-wake disorders
 - a. Multiple disorders
 - 1.) Jet lag, shift work, delayed sleep phase type (not enough sleep)
 - b. Symptoms
 - c. Signs
 - d. Diagnosis
 - e. Treatment
 - f. Ocular sequela
 - g. Treatment
3. The others that result in sleep disruption
 - a. Insomnias – from diagnosis and/or treatment of medical or psychological condition
 - b. Sleep-related movement disorders
 - 1.) Restless leg syndrome (RLS)
 - 2.) Periodic limb movements in sleep (PLMS) – involves all 4 limbs

III. The potential impact on ocular health

- A. Disruption on the circadian cycle – melatonin release adversely affected
- B. Ophthalmic complications from treatment of sleep disorders
- C. Vasculopathic compromise

IV. Ophthalmic diagnoses associated by sleep disorders and the treatment

A. Anterior segment diagnoses

1. Dry eyes
2. Floppy eyelid syndrome
3. Adnexa dermatitis

B. Glaucoma

C. Posterior segment diagnoses

1. Non-arteritic anterior ischemic optic neuropathy
2. Idiopathic intracranial hypertension
3. Idiopathic central serous chorioretinopathy
4. Worsening diabetic retinopathy, hypertensive retinopathy
5. Demyelinating disease (and narcolepsy)