

Sleep Disorders in the Elderly

Maryam Shiehmorteza
Clinical Pharmacist

Sleep

- Sleep is associated with well being, health and mortality
- Sleep is a vital physiological process with important restorative functions that are essential for optimal daytime functioning

Background

- By 2025 62 million Americans will be over the age of 65
- Annual direct costs associated with insomnia \$15.4 billion

Sleep Disorders: Insomnia

- Difficulty initiating sleep, maintaining sleep and/or unrestorative sleep leading to daytime impairments
- Affects 20-50% in western countries adult population
- Reported more in elderly women than men

- Normal sleep is affected by significant distress such as impairment in occupational or other important areas of functioning or social processes

- One Theory:
 - Total sleep time may not necessarily decrease with age but the way in which sleep is consolidated becomes altered and one study showed that healthy elderly persons were less sleepy and performed better in tests of alertness and attention than young subjects after sleep deprivation

A New Vital Sign

- Sleep disturbances affect not only nighttime sleep quality but are also a risk factor for daytime sleepiness which may negatively affect participation in physical exercise and ultimately functional ability
- Screening for sleep disorders as a new vital sign as sleep/sleepiness is emerging as an important aspect of health promotion and disease prevention.

Insomnia

- Chronic insomnia is associated with a wide range of health problems: mental disorders, discomfort, anxiety, substance abuse.
- Chronic insomnia can increase risk for new onset depression with persons with persistent insomnia 3 x more likely to develop depression within a 1 year period
- Possible causality between short sleep duration and development of diabetes mellitus in community dwelling middle and older age adults

Evidence based Standards of Care to Manage Insomnia

- Benzodiazepines and nonbenzodiazepines are effective in the management of chronic insomnia. However benzodiazepines, nonbenzodiazepines and antidepressants pose a risk of harm
- Benzodiazepines have a greater risk of harm than nonbenzodiazepines
- Melatonin is effective in the management of chronic insomnia in subsets of the chronic insomnia population and there is no evidence that melatonin poses a risk of harm (based on a small number of studies)
- Chronic insomnia is associated with older age
- Relaxation therapy and cognitive/behavioral therapy are effective in the management of chronic insomnia in subsets of the chronic insomnia population.

Table 1 Conclusions from the Agency for Healthcare Research and Quality Evidence Report/technology Assessment Regarding the Manifestations and Management of Chronic Insomnia. Review of Insomnia Pharmacotherapy Options for the Elderly: Implications for Managed Care Population Health Management Vol 12, no. 6, 2009

Normal Sleep

- Circadian rhythm- 24 hour dark/light cycle needs to be activated for sleep by entry of light via the eye
- Increased daylight exposure and physical activity may help normalize circadian rest/activity rhythm.

Benefits of Physical Activity

- Decreased risk of CV disease and osteoporosis
- Decreased blood pressure
- Increased glucose tolerance and insulin responsiveness
- Increased mental acuity
- Psychological well being

Sleep Architecture

- Normal sleep progresses through several stages in a predictable pattern.

Stages of sleep

- **Non REM sleep**

- N1 Stage 1**

- Transition stage**
 - Light sleep**
 - Reduced brain-wave activity**
 - Slow eye movement**
 - Muscle relaxation**

- N2 Stage 2**

- **Non REM sleep**

- Decreased body temperature**

- **Awake- “alert brain”, muscles relatively tense**

- Reduced heart rate**
 - Sleep spindles on EEG**
 - K complexes on EEG**

- N3 Stages 3 and 4**
(slow wave sleep)

- Deep sleep**
 - High voltage, low frequency brain waves**
 - Restorative sleep**

- REM sleep**

- Rapid eye movements**
 - Vivid dreaming**
 - Increased brain activity**
 - increased heart rate**
 - Increased respiratory rate**
 - Active inhibition of voluntary muscles**

- In infancy sleep duration is at a lifetime maximum- about 16 hours of sleep a day.
- Adults require 7-8 hours of sleep in in 24 hours.
- Some evidence shows that sleep duration further decreases from young adulthood into the older years but this is controversial

Age Related Changes in Sleep Architecture

- Meta analysis of 65 studies of healthy adults showed men more affected by aging than women with a decreased total sleep time, decreased percent of N3 and REM sleep and increased percent of N2 and wake time after sleep onset.
- Women with increased sleep latency compared to men. Also with shorter and poorer sleep

Predictable Age Related Changes in Sleep Architecture

- Sleep fragmentation
- Reduced sleep efficiency
- Decreased quality of sleep
- Decrement in amplitude of low frequency delta on EEG

- True sleep disorders are rare in healthy older adults- elderly with poor sleep often have comorbidities
- When controlled for comorbidity changes in sleep quality, high rates of insomnia become less
- Elderly person with insomnia often display poor sleep maintenance rather than problems with sleep initiation.

Sleep and Aging

- Nocturnal secretion of endogenous melatonin gradually decreases with age
- In every decade except for ages 30-39 the prevalence of insomnia is increased in women with prevalence of insomnia being 40% in women

Sleep Patterns and Aging

- It is not clear whether the need to sleep decreases with age- although this is a common belief.
- During the late decades of life sleep evolves even further.
- Ability to sleep decreases with age*
- Older adults report waking up earlier, increased sleep onset latency, increased time spent in bed, increased night time awakening, increased napping and decreased total sleep

*Some elderly report sleeping more than younger adults and report a more consistent sleep pattern (subjective)

- A meta analysis of 3577 healthy subjects showed that total amount of sleep decreases linearly with age at a loss of about 10 minutes per decade up to the age of 60
- The percent of REM sleep also diminishes but plateaus after age 60
- Sleep efficiency declines secondary to sleep

- Acetylcholine may play an active role in maintaining normal sleep hygiene

Variables Associated with Poor Sleep Quality

- Gender
- Marital status
- Chronic illness
- Presence of psychological stress, level of daily hassles, stress
- Level of social support
- Dietary habits
- Excessive daytime napping
- Medical conditions
- Depression
- Retirement
- Social isolation
- Comorbid disease
- Visual/hearing impairment (increase isolation and modify the circadian rhythm) In 1 study these factors were found more protective

- During hospitalization the prevalence of sleep deprivation seems to increase for multiple reasons: environmental factors, circadian dysregulation, acute clinical problems.
- These complaints of insomnia can persist for several months post discharge

Healthy People 2010 Study

- Showed a relationship between sleep disturbances, daytime sleepiness, exercise and physical function in community dwelling older adults.
- The Findings suggested that in healthy older adults sleep quality and daytime function were normally maintained.
- The aging process could not explain a decrease in physical activity.
- Increased age did not correlate with sleep disturbances in this study.

- Men- sleep time decreased on average of 27 minutes per decade from mid life until the 8th decade
- An association between the need for institutionalization and the presence of insomnia has been demonstrated in healthy males

- Many factors that impair sleep in older adults can be diagnosed and treated
- True sleep disorders are rare in healthy older adults. Elderly with poor sleep often have comorbidities

- In older patients, continuously decreased sleep homeostasis may contribute to the inability to maintain long sleep episodes, irregular mealtimes, decreased bright light exposure, nocturia and increased mobility and decreased exercise
- 50% of men and 70% of women over the age of 75 have no regular physical activity
- During the late decades of life, sleep evolves even further
- Elderly persons with insomnia often display poor sleep maintenance rather than problems with sleep initiation

Insomnia stable in middle years and abruptly jumps in decades 70-79 and 80-89.

Elderly Spend More Time in Lighter Stages of Sleep

- Decreased slow wave sleep
- Increased fragmentations of entire sleep cycle
- REM sleep may decrease overall
- Take longer to initiate sleep
- Decreased total sleep time
- Have early morning awakening
- Increased need to nap during the day
- Tend to fall asleep during the daytime faster
- Elderly women maintain sleep better with aging but with menopause have increased subjective complaints of insomnia

- Optical changes in the eye (senile miosis, increased crystalline lens opacity) decreases light reaching the retina and affect circadian rhythm.

Evaluation of Sleep Disorders

- History
 1. Multidisciplinary approach
 2. Past sleep history
 3. Detailed inventory of specific sleep complaints in the presence of bed partner
 4. Inquiry regarding alcohol, tobacco, caffeine and other meds (dose, time)

Hypnogram

- Displays distribution of sleep stages across the night
- Healthy adults – NREM, N1, N2, N3 followed by a period of REM
- REM occurs about 90 minutes into sleep
- Reduction in N3 and increased in REM as night progresses
- Punctuated by brief arousals and awakenings

Examples of Sleep-Related Questions That Can Help to Screen for Sleep Problems in the Geriatric Patient

- Do you have difficulties falling asleep or maintaining sleep?
- Do you feel excessively sleepy, tired or fatigued during the day?
- What is your sleep schedule during the weekdays and on weekends?
- How many hours do you sleep during the night?
- How long does it take you to fall asleep after deciding to go to sleep?
- How many times do you wake up during a typical night?
- Do you feel refreshed when you wake up in the morning?
- Do you have loud snoring and do you stop breathing at night?
- Do you have restless ness or crawling or acning sensations in your legs when trying to fall asleep?
- Do you repeatedly kick your legs during sleep?

Sleep in the Geriatric Patient Population p. 54 Table 1

Labs

- Polysomnography specifically with complaints of sleep stage abnormalities (restless leg syndrome, unusual behaviors and sleep disordered breathing)

Tests

- MSLT- multiple sleep latency tests
- Objective assessment of daytime sleepiness

Primary Sleep Disorders

- Sleep apnea
- Restless leg syndrome
 - Repetative/continuous leg jerks every 20-40 seconds during sleep
 - 5-6% of population affected
 - Treatment- benzodiazepines, sinemet, dopamine agonists, opiates, iron replacement

- One study showed that sleep restriction to 4 hrs per night increased BP, decreased parasympathetic tone, increased evening cortisol and insulin levels and increased appetite.
- Association between short sleep duration and CAD and overall increased mortality

Chronic Medical Conditions Impacting Sleep

- Medical Condition

Diabetes

- Increased incidence of obstructive sleep
- apnea
- Increased incidence of sleep disordered
- breathing
- Autonomic neuropathy leading to
- Ventilatory disorders

Chronic Medical Conditions Impacting Sleep

- Medical Condition

- Dementia**

- Delayed sleep induction
 - Prolonged wake time after arousal from sleep
 - Increased daytime sleepiness compared with age matched controls

Chronic Medical Conditions Impacting Sleep

- Medical Condition
 - Depression**
 - Exaggerated behavioral disturbances
 - Insomnia
 - Increased number of awakenings
 - Chronic Pain
 - Decreased sleep time
 - Delayed sleep onset
 - Increased nighttime awakenings
 - Increase in depressive symptoms

Chronic Medical Conditions Impacting Sleep

- Medical Condition

Parkinson's Disease

Decreased total sleep time

Malignancies

Excessive fatigue

Leg restlessness

Insomnia

Decreased sleep efficiency

Excessive sleepiness

Chronic Kidney Disease and incontinence

Restless leg syndrome

Periodic limb movement

Sleep apnea

Chronic Medical Conditions Impacting Sleep

- Medical Condition
 - **Chronic Obstructive Pulmonary Disease**
 - Reduction in arteriolar oxygenation
 - Decline in baseline oxygen
 - Decline in ventilatory response to hypoxia
 - Exaggerated breath to breath variability
 - Exaggerated increase in respiratory frequency sleep disordered breathing
 - Hypopneas (partial respiration)
 - Apneas (complete cessation of respirations)

The Effect of Chronic Disorders on Sleep in the Elderly p.29

- Possible causality between short sleep duration and development of diabetes mellitus In community dwelling middle and older age adults
- An association between the need for institutionalization and the presence of insomnia has been demonstrated in healthy elderly males

- Those who used hypnotics previously for sleep had more insomnia during hospitalization

- 1 study found that almost half of patients over 65 living at home were not happy with their sleep

- Those with longer sleep latency performed worse on measures of verbal knowledge, long term memory and fund of information and visual spatial reasoning

Medications with Negative Effect on Sleep

- Bronchodilators
- Corticosteroids
- Decongestants
- Diuretics
- Stimulating antidepressants
- Antihistamines (increased delirium, do not use with narrow angle glaucoma as it increases intraocular pressure)

Circadian Pacemaker

- Located in the supra chronsomatic nucleus (SNC) of the hypothalamus
- Synchronized to the 24 hour light/dark cycle

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Psychological and Behavioral Treatments for Insomnia

- **Stimulus Control Therapy:** A set of instructions designed to reassociate the bed/bedroom with sleep and to reestablish a consistent sleep/wake schedule: go to bed only when sleepy; get out of bed when unable to sleep; use the bed/bedroom for sleep only (e.g. no reading, watching TV); rise at the same time every morning and no napping
- **Sleep Restriction Therapy:** A method to control time in bed to the actual sleep time, thereby creating mild sleep deprivation, which results in more consolidated and more efficient sleep.
- **Relaxation Training:** Clinical procedures aimed at reducing somatic tension (e.g. progressive muscle relaxation, autogenic training) or intrinsic thoughts (e.g. imagery training, medication) interfering with sleep
- **Cognitive Therapy:** Psychotherapeutic method aimed at changing faulty beliefs and attitudes about sleep, insomnia and the next day consequences. Other cognitive strategies are used to control intrusive thoughts at bedtime and prevent excessive monitoring of the daytime consequences of insomnia
- **Sleep Hygiene Education:** General guidelines about health practices (e.g. diet, exercise and substance use) and environmental factors (e. g. light, noise and temperature) that may interfere with or promote sleep

Treatments

- **Nonpharmacologic**
- **Light treatment-** exposure to very bright light during the day and darkness at night can consolidate rest and activity patterns
- **Evening light exposure-** effective in consolidating rest/activity rhythms of patients and help them sleep better at night. Also helps to fall asleep later and wake up later
-

One Study Bright Light Treatment

- BP decreased with sleep at night,
- Limit naps to 30 minutes in early afternoon for elderly
- Timed bright light treatment (light is regarded as the strongest cure for the synchronization and stabilization of circadian rhythms and melatonin regulation.
- It may even reduce behavioral symptoms in person with dementia.
- No consensus on the best time of day for administering bright light therapy for dementia/depression
- Side effects: Headache, nausea, dry eye, dry skin.

Benzodiazapines in the Elderly

- Prolonged sedation
- Increased risk of falls/fractures
- Postural instability
- 1 study showed a 60% risk of hip fracture

- Pharmacological- Benzodiazepines
- Hypothesis- use of benzodiazepines is also expected to significantly be associated with 6 components of sleep-quality, latency, duration, efficacy, disturbances and daytime sleep dysfunction.

Study- Use of benzodiazepines was associated with poorer sleep quality (?secondary to physiological tolerance mechanism), longer sleep latency, lower subjective sleep quality, shorter sleep duration, higher sleep disturbance and daytime dysfunctions.

Zolpidem

- If used dose should be 5mg and for a short, limited period of time
- Concern about abuse/dependency
- Concern about confusion, hallucinations

Depression and Insomnia

- Early morning awakening-symptom most consistently related to depression over time
- Strongest predictor of future depression among those not depressed at baseline was sleep disturbance at baseline

Anxiety and Insomnia

- Poor sleep can be a consequence of anxiety disorder
- Important symptom of general anxiety disorder (most common among older adults)
- Panic attacks- One study found that both short and long sleepers were more likely to have depression or anxiety disorder
- Persons with depression spent more time in bed than non-depressed
- Persons with depressive disorder and comorbid anxiety disorder reported a substantially shorter total sleep time than other elderly persons.
- Poor sleep quality reported in 40-90% of patients with depression

Insomnia and Dementia

- Most frequent cause of insomnia in demented patients is a medical condition or side effect of a medication
- Sundowning- marked increase in agitation, confusion and wandering in late afternoon or evening.
- Treatment for sundowning- stimulate the circadian system improving sleep hygiene

Dementia and Sleep

- Complete cessation of breathing (apnea) or partial decreases in breathing (hypopnea).
- Sleep apnea in demented patients in greater prevalence than in age matched controls
- More episodes of apnea.
- Apnea increases with severe dementia.
- Association with increased sleep disorders and apolipoprotein E, chronic hypoxia in dementia leads to increased B secretase activity and production of B amyloid protein.
- Treatment of OSA in early stages of dementia may slow the progress of the disease by modulating cholinergic activity that influences upper airway opening. Donepezil will increase REM sleep (when apnea episodes are more frequent)
- One study showed that donepezil significantly improved apnea/hypopnea index and O2 sat levels

Pain and Insomnia

- One study showed that pain in 2 or more sites was independently associated with a 16-41% greater likelihood of having sleep difficulties
- Persons with more severe pain had a more than 2 times likelihood of having trouble getting to sleep on 1 or more days per week than those with the lowest pain severity score
- There was strong and consistent association between more severe and disseminated chronic pain and heterogeneous sleep complaints.
- Dysfunction of the hypothalamic pituitary adrenal axis has been found to be associated with increased risk of developing chronic widespread pain
- Severity and distribution of pain was strongly associated with sleep disturbances
- Consistent association were not found between individual sites of pain and sleep difficulties
- Diffuse distribution of pain is an important factor in the association between pain and sleep
- After adjustment for use of psychiatric meds and daily analgesics the association between pain and sleep difficulties decreased modestly.

Music

- Nonpharmacological method to promote mind-body interaction
- No side effects
- Multidimensional- touches physical and psychological
- Each system of body has its own preferential rhythm.
- Loss of this rhythmicity can lead to anxiety, distress and pain and increased adrenalin. Increasing the HR, PR and RR
- Sedative music induces relaxation and distraction response and reduces pain and stress and anxiety

Restless Leg Syndrome

- Iron deficiency
- RA
- Renal failure
- Peripheral neuropathy
- Excessive caffeine intake

داروهایی که در اختلال خواب تجویز می شوند

○ مسکن / خواب آور:
زولپیدم

○ آنتی هیستامین ها: دیفن
هیدرامین

○ بنزودیازپین ها:
لورازپام – اکسازپام

○ ضد افسردگی ها:
ترازودن

داروهای کوتاه اثر بهبود بیشتر با تأخیر خواب انصراف و وابستگی بیشتر عملکرد طولانی بهبود بیشتر با طول مدت خواب علائم روز بعد بیشتر (آرامش، اختلال شناختی، زمین خوردن) بیشتر داروها به طور گسترده در افراد مسن یا بیش از 6 ماه مطالعه نشده اند.

بنزودیازپین‌ها – گیرنده‌ها ی گابا

مزایا: ارزان، بهبود تاخیر خواب، کل زمان خواب، تعداد بیدار شدن‌ها، کیفیت خواب
معایب: اثرات روز بعد بیشتر (خواب‌آلود، سرگیجه) وابستگی/ترک بیشتر علائم بازگشت بیشتر فراموشی قدامی‌گرا

زولپیدم

نیمه عمر کوتاه (2.6 ساعت)

برای بی خوابی شروع خواب بهتر است کمترین تأثیر بر معماری خواب

برای شروع خواب بهتر است
می تواند کل زمان خواب و کارایی را افزایش دهد
می توان بعد از بیداری نیمه شب مصرف کرد.

Eszopiclone (Lunesta)

نیمه عمر متوسط (5-7 ساعت) برای حفظ خواب بهتر است افزایش زمان کل خواب
اثرات کمی در روز بعد (اما نیمه عمر طولانی تر نشان دهنده خطر عوارض روز بعد در افراد مسن است)
مورد تایید برای استفاده طولانی مدت

Ramelteon (Rozerem)

آگونیست گیرنده ملاتونین
بهبود اندک در شروع خواب (8 دقیقه)
بهبود زمان خواب کلی
افزایش سطح پرولاکتین، عوارض جانبی کمی .
با سایر داروها یا ملاتونین مقایسه نمی شود.
برای استفاده مزمن تایید شده است.

داروهای آرام بخش داروهای ضد افسردگی داروهای سه حلقه ای:

افزایش کارایی خواب، افزایش طول مدت خواب موج آهسته در افراد مسن این داروها :
برای بی خوابی به خوبی مطالعه نشده
افراد مسن بهترین استفاده برای افسردگی با بی خوابی

ملاتونین

سطوح با ریتم شبانه روزی مرتبط است کمبود در افراد مسن شایع تر است

مشکلات خواب تاثیر قابل توجهی بر سلامت و کیفیت زندگی دارد. در تشخیص اختلالات خواب تا حد امکان خاص باشید درمان باید شامل همه عوامل موثر باشد و باید شامل مشاوره باشد.

Specific Geriatric Issues

- **Menopause**
- Associated with prolonged sleep latency, decreased REM sleep and decreased total sleep time
- Menopause plays a pivotal role in modulating both the presence and severity of OSA (progesterone/estrogen dysfunction)
Progesterone is a respiratory stimulant.
Estrogen affects body fat distribution.

REMS Sleep Disorder Behavior

- Loss of normal muscle atonia which normally occurs during REM sleep
- Persons with this disorder may display a variety of movements during REM sleep including walking, thrashing limbs or engaging in complex activity

Narcolepsy

- Excessive daytime somnolence and fatigue
- Sleep attacks (irresistible urge to sleep)
- Hypnagogic hallucinations
- Sleep paralysis
- Cataplexy

The Wisconsin Sleep Cohort Study

- Demonstrated that a transition into menopause was associated with a significant increased likelihood of having OSA independent of known confounding factors.
- In post menopausal women a functional or physiological difference rather than upper airway anatomy may account for observed differences in severity and prevalence of apnea between pre and post menopausal women.

Sleep Apnea

- Most important and frequently occurring in the elderly
- Repetitive upper airway obstruction, arousals, O₂ desaturation, daytime sleepiness, snoring, impairment of cognition
- Hard to establish a diagnosis due to lack of normative data in the apnea/hypoxic index

Age Related Respiratory Physiology

- Decreased airway size
- Change in elastin to collagen ratio
- Decreased elastic recoil of lung
- Decreased O₂ diffusion capacity
- Premature airway closure causing decreased ventilatory/perfusion mismatch
- Increased alveolar/arterial O₂ gradient
- Small airway closure with air trapping
- Increased rigidity of thoracic cage leading to more diaphragmatic and abdominal breathing
- Decreased vital capacity
- Increased residual volume and functional residual capacity but a decrease vital capacity and inspiratory reserve volume

Changes in Sleep Apnea

- Upper airway: Smaller in caliber
- Studies of upper airway found that upper airway dimensions decrease with age
- Collapse easier
- Increased deposition of parapharyngeal fat
- Increased pharyngeal collapsibility during sleep
- Some contradiction when anatomy studied
- The ability of the genioglossus muscle (major pharyngeal dilator muscle) to respond to increase in pharyngeal negative pressure) impaired in the elderly

- Lung volume changes- an increased lung volume can apply a caudal traction force on the trachea and larynx inducing longitudinal tension on the upper airway reducing intraluminal pressure to close and reopen the airway and decrease pressure exerted on the airway walls by surrounding tissue. Studies have shown that increases in end expiratory lung volume can protect the upper airway from this collapse.

Sleep Apnea Physiology

- Arousal threshold: One is aroused from sleep due to upper airway obstruction when ventilatory drive reaches the “arousal threshold”. This is an important protective mechanism. Hypothesized that older adults may have a lower arousal threshold. This is controversial.
- Ventilatory control system- increased CO₂, decreased O₂. Suggestions that chemical control of breathing in the elderly may be unstable with increased proportion of central apnea in the elderly with sleep apnea owing to the prevalence of periodic breathing in the elderly especially those with CHF- controversial.
- Consequences of OSA- Sleep disturbance disorders occur more frequently in patients with AD than in non-demented elderly and increase with the degree of cognitive impairment. Neurocognitive- excessive daytime sleepiness decreased the quality of life from sleep fragmentation. Some studies show that SDB increased cognitive impairment especially in older women. Metabolic dysfunction and CV disease from intermittent hypoxia and sympathetic stimulation.

Increased Risks for Obstructive Sleep Apnea

- Hypothyroidism
- Acromegaly
- Disease states affecting the upper airway
- Obesity
- Thick Neck
- Crowded oropharyngeal inlet
- Presence of retognathia
- Mactognathia

Central Sleep Apnea

- Cheyne stokes respirations, waxing and waning of breathing and apnea
- Treatment
 - CPAP,
 - Wt loss,
 - Decreased alcohol intake,
 - Avoid supine position during sleep,
 - Avoid benzodiazepines.

Sleep Heart Study

- Large epidemiological study
- Prevalence of SDB (sleep disturbed breathing) with increased age
- About 20% of subjects greater than age 60 had an RDI (respiratory distress index) greater than 15 hrs. even healthy non-obese
- Asymptomatic for OSA men affect more than women

- Anatomically decreased pharyngeal airway was a key factor for most and showed developed upper airway obstruction ability to maintain a patent airway. Amount of soft tissue located in the body compartment created by the mandible and spinal column and the ability of strength of the pharyngeal dilator muscles to contract. The ability of the pharyngeal dilator muscles to respond to mechanical and chemical stimuli during sleep changes in lung volume and affect of ventilatory control stability.
- Aging may be associated with important changes in one or a combination of these factors.

- Elderly have a decreased (substantially) ventilatory response to hypercapnia and hypoxemia possibly related to a physiological decline in the ability to interpret and integrate information from the peripheral and central chemoreceptors and from mechanoreceptors to generate an appropriate neuronal feedback response

Physiology and Anatomy of Sleep Apnea in the Elderly

- Upper airway- smaller caliber
 - Studies found that all upper airway dimensions decreased with age
 - collapse easier
 - increased deposition of parapharyngeal fat
 - Increased pharyngeal collapsibility during sleep

*Some contradictions

Decreased ability of genioglossus muscle (major pharyngeal dilator muscle) to respond to increase in pharyngeal negative pressure) impaired in aging

Definitions

- Apnea- complete cessation of breathing
- Hypopnea- partial decreases in breathing
- Sleep apnea in demented patients in greater prevalence than in age matched controls
- Apnea increases with severe dementia

- Sleep apnea can exacerbate HTN

CPAP

- Gold standard of treatment
- Good long term compliance is difficult

Treatments of OSA

- CPAP- symptomatic treatment, not curative
- Avoid substances that may worsen sleep apnea (alcohol, sedating compounds, nicotine)
- Weight loss, even moderate can decrease symptoms
- Sleep position (avoid lying in supine position)

Senile Emphysema

- Increased lung compliance resulting from airspace dilation and remodeling of the lung parenchyma.

Sleep Apnea

- Decreased neurocognitive measures related to sleep apnea
- Decreased performance on measures of attention, concentration and complex problem solving
- Sleep apnea is associated with mood stability and depression
- In AD sleep apnea could be a consequence of cell loss in the brain stem respiratory center
- Neuronal degradation in AD could be hastened by nightly insults of intermittent cerebral hypoxemia related to sleep apnea
- Sleep apnea and sleep disturbed breathing have been associated with falls, decreased cognition and increased institutionalization

Evaluation

- Examine intranasal- nasoseptal deviation, allergic rhinitis
- US studies in persons over 65 using a questionnaire reporting snoring showed that 4 percent of older women and 13 percent of older men snored

Treatment for Sleep Apnea

- Oral appliances-
Reposition mandible improving upper airway space at the hypopharyngeal level
Made and fit by dentists
May cause TMJ, tooth and gum pain, proprioceptive malocclusion, impaired salivation and gum disease
- Surgical approaches-
Uvulopalatopharyngoplasty, mandibular reconstruction, genioglossus advancement.

- Some limited evidence indicates that the treatment of sleep apnea may reverse symptoms of dementia and sleep disturbance disorder should be included in the differential diagnosis of reversible dementia in older adults.
- Obesity/metabolic syndrome and increased OSA seem to be associated
- Suggestions for a link between OSA and HTN- hold for the middle age but not elderly
- Good evidence in the literature demonstrating that OSA may worsen LV function and the development of CHF (sleep Heart Study)
- One study demonstrated that the presence of severe OSA increased the risk for ischemic stroke in the elderly
- OSA and central sleep apnea appears commonly in patients with CHF.

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