SLEEP AND WOMENS HEALTH
Jeremy Tabak M.D.
Medical Director
Baptist Hospital Sleep Laboratory
Baptist Sleep Lab at Galloway

Disclosures

- I do not have any relevant financial disclosures.

National Sleep Foundation 2007 Poll

- More than ½ of women say then only get a good nights sleep a few nights/wk or less
- 67% say the frequently have a sleep problem
- 43% say daytime sleepiness interferes with their daily activities
Sleep and Women’s Health - Rationale

- Unique sleep problems related to menstrual cycle, pregnancy, menopause
- Difference between sexes in frequency of common sleep disorders, and in associated symptoms
- Some sleep problems related to women’s social roles

Sleep and Women’s Social Roles

- Inadequate sleep time
- Balancing work, family, chores and personal time
- Sleep disrupted by children
- Sleep disrupted by elderly parent
- Sleep disrupted by snoring spouse

Health Effects of Inadequate Sleep

- Daytime fatigue and excessive daytime sleepiness
- Weight gain
- Glucose intolerance
- Increased cardiovascular risk
- Increased mortality?
Women are 2x as likely as men to report sleep problems

- Insomnia is more prevalent in women than men, and the gender disparity increases with age
- Difference partially attributed to menopause
- Women have more sleep related complaints, but better objective measures of sleep

Insomnia in Mid-Life

- Insomnia: difficulty initiating or maintaining sleep, with nonrestorative sleep
- More frequent in perimenopausal women
- Major contributing factors
  - Hot flashes
  - Chronic pain
  - Poor health
  - Depression and anxiety

Obstructive Sleep Apnea in Women

- Repeated obstruction of airflow
- Associated with hypoxemia and arousals
- Daytime sleepiness
- Associated with HTN, arrhythmias, MI, stroke, MVAs
OSA IN WOMEN

- OSA occurs in women
- Less frequent than in men
- Frequency increases after menopause
- Less likely to be referred for evaluation
- Different symptoms in women
- PSG different: lower AHI, more REM events, more upper airway resistance syndrome

SLEEP AND POLYCYSTIC OVARY SYNDROME

- Affects 4-12% of women
- Irregular cycles, excess androgens, bilateral polycystic ovaries
- Obesity in 50%
- Insulin resistance
- 80% have daytime sleepiness
- High incidence OSA
  - Related to obesity and increased androgens
  - 41-58% of women with PCOS have OSA

Sleep Apnea in PCOS

- PCOS associated with obesity and diabetes
- OSA present in 50% of women w PCOS
- Prevalence and severity of glu intolerance related to severity of the OSA
- CPAP improves insulin sensitivity and decreases sympathetic output
Menopause and Sleep Apnea

- Wisconsin Sleep Cohort Study
  - 2.6x more mild OSA
  - 3.5x more moderate and severe OSA
  - Incidence increases throughout the menopause
- Mechanism not clear
  - Decreased estrogen, progesterone
  - Weight gain
  - Age-related effects
- Less OSA in women on HRT
  - Sleep Heart Health Study
  - HRT users had ½ prevalence of OSA

MENOPAUSE

- Average age 51.4 years, range 40-58
- Early transitional phase, variable cycle length
- Lower levels of estrogen and progesterone leading to high FSH
- Late transitional stage, longer cycle length, amenorrhea > 60 days
- Vasomotor symptoms - hot flushes and night sweats, vary between individuals

Normal Sleep Patterns During Menopause

- Disturbed sleep and daytime fatigue are common during menopause
- Sleep studies unremarkable, may show increased arousals first ½ of night
- Vasomotor symptoms may disturb sleep
- Aging affects sleep
- Obesity, depression, thyroid disease more common in mid and later life
Vasomotor Symptoms and Sleep
- Hot flushes associated with menopause but also with some medical treatments
- Variation between individuals and different ethnic groups
- Associated with diminished sleep quality
- On PSG, hot flushes associated with increase in awakenings, decreased sleep efficiency
- Fewer awakenings from hot flushes during REM sleep

Treatment of Vasomotor Symptoms
- Hormonal replacement therapy reduces hot flushes and improves sleep quality but associated with increased risks
- SSRIs, gabapentin
- Alternative medicine
- Relaxation therapy
- Environmental factors
  - Cooler bedroom
  - Lighter bedclothes and blanket

Causes of Perimenopausal Sleep Symptoms
- Menopause
- Other causes of insomnia
  - Aging
  - Mood disorders
  - Medical problems
  - Nocturia
  - Medication
- Social issues, sleep hygiene
- Other sleep disorders
  - OSA
  - RLS
Age-related Changes in Sleep

- Sleep complaints are common in older adults, but in part related to medical co-morbidities and sleep disorders
- Polysomnogram shows:
  - Decreased total sleep time
  - Decreased sleep efficiency
  - Increased WASO
  - Decreased slow wave sleep
- Circadian rhythm changes
  - Advanced sleep phase
  - Decreased circadian rhythm amplitude

Gender Differences in Age-related Sleep Changes

Greater age-related changes in men:
- Longer sleep latency
- More stage I
- Greater decline in SWS
- Greater deterioration in SE
- Greater tendency to nap
- Growth hormone, prolactin secretion

Fibromyalgia and Sleep

- Musculoskeletal pain disorder
- Female predominance 7:1
- Majority complain of poor sleep
- Associated with menopause
- Associated with depression
- PSG shows alpha rhythm in nREM sleep
- Gender difference may be due to differences in CNS substance P
- Treatment: antidepressants, exercise, improved sleep
SLEEP DISTURBANCES IN THE MENOPAUSE - SUMMARY

- Sleep complaints common
- Sleep studies unremarkable
- Vasomotor symptoms affect sleep
- Estrogen relieves vasomotor symptoms but associated with potential health risks
- Antidepressants, herbal medications may help

Sleep During the Menstrual Cycle

- Women with normal cycles
- Sleep in women with PMS
- Sleep and oral contraceptives

NORMAL MENSTRUAL CYCLE
Sleep and the Menstrual Cycle

- Symptoms: reduced sleep quality 3-6 days premenstrually and first 4 days of menstruation
- Polysomnography:
  - Increase in spindle frequency in mid to late luteal phase
  - Increased N2 sleep in luteal phase
  - Slight reduction in REM sleep in luteal phase associated with higher body temperature
  - No effect on sleep latency or sleep efficiency

Progesterone and Sleep

- Sedating effect
- Stimulates GABA receptors
- Increased spindles in luteal phase may be a progesterone effect
- Premenstrual drop off in progesterone associated with sleep difficulties
- Different progesterone preparations – MPA vs micronized
- Respiratory stimulant

Estrogen

- Increases REM sleep
- Decreases sleep latency, awakenings
  - Increased arousals in luteal phase associated with drop in estrogen
- Increases total sleep time
- Estrogen affects the core body T
Sleep and Premenstrual Syndrome

- Mood and/or physical symptoms in late luteal phase and first few days of menses
- Mild in 60% of women, more severe in 5%
- Symptoms include:
  - Irritability
  - Anxiety/tension
  - Depression
  - Mood swings
  - Change in appetite
  - Bloating, weight gain
  - Sleep symptoms
- Premenstrual dysphoric disorder (PMDD)

Sleep symptoms in PMS:
- Difficulty falling or staying asleep
- Hypersomnia
- Unpleasant dreams
- Nocturnal awakenings
- Daytime fatigue and sleepiness
- Polysomnography not abnormal
- Circadian rhythm abnormal in PMDD

Circadian Rhythm and PMDD

- Abnormalities of circadian rhythm seen in PMDD
  - Abnormal melatonin rhythm
  - Higher body T with sleep
  - Changes in cortisol, TSH rhythm
- Treatment of the circadian rhythm has been beneficial in some studies
  - Light therapy
  - Sleep deprivation: improved mood after recovery sleep
- Effect of sleep deprivation different than in MDD
SLEEP AND ORAL CONTRACEPTIVES

- Estrogen and progesterone suppress normal cycle
- Affect body temperature cycle
- Shorter sleep latency
- Increased N2 sleep, decreased SWS
- Shorter REM latency
- No effect on sleep efficiency or subjective sleep quality
- Overall, the effects of OCs on sleep are modest

Circadian Rhythm and the Menstrual Cycle

- Rise in body T during luteal phase
- Decreased amplitude of secretion of melatonin, cortisol, TSH during luteal phase
- Estrogen receptors in SCN
- Shift work affects menstrual cycle

Sleep in Pregnancy: 1st Trimester

- Sleep complaints are common in pregnancy
- Related to different factors at different stages of pregnancy
- Hormonal changes with pregnancy
- First trimester associated with sleepiness and fatigue
  - 37.5% report daytime sleepiness at 6 weeks
  - Related to increased progesterone level
- Reflux, nausea, nocturia, backache contribute
Sleep in 2nd Trimester
- During 2nd trimester women acclimate to hormonal changes, nausea and nocturia improve, daytime sleepiness improves
- Later in 2nd trimester sleep disrupted by
  - Braxton-Hicks contractions
  - Reflux
  - Back pain
  - Restless legs
  - Snoring

Sleep in 3rd Trimester
- 30.8% report restless sleep, 98% report nocturnal awakenings
- Fatigue and daytime sleepiness in up to 65%
- Related to nocturia, leg cramps, reflux, backache, forced position in bed
- Some report vivid dreams or nightmares
- Restless legs common: 20% of women in 3rd trimester

OSA IN PREGNANCY
- 25% of pregnant women snore
- Women relatively protected against OSA
  - Progesterone increased ventilatory drive and pharyngeal muscle activity
- OSA can develop in pregnancy especially in very obese individuals, may be associated with adverse outcomes
  - Pre-eclampsia
  - Gestational diabetes
  - Unplanned Cesarean section
- OSA improves post-partum
Restless Legs Syndrome

- Uncomfortable sensations in legs in evening
- Onset at rest and improve with movement
- Disrupts sleep
- More common in women
- Associated with uremia, diabetes, pregnancy, menopause
- Periodic limb movements often seen on sleep study
- Related to Fe deficiency
- Respond to treatment with dopaminergic agents

RLS and Pregnancy

- Frequency of RLS increases in pregnancy, especially 3rd trimester
- Improves with delivery
- May be related to elevated levels of prolactin, progesterone, estrogen?
- Treat with Fe and folate supplementation
- Usual medications contraindicated in pregnancy
- Nonpharmacologic measures: exercise, massage, stretching, warm bath, limit caffeine, naps

Summary

- Obstructive sleep apnea is male predominant in younger age group, but becomes more common in women after the menopause
- Obstructive sleep apnea is common in premenopausal women with polycystic ovary syndrome
Assessment of sleep complaints in women should consider the relationship of sleep symptoms to the menstrual cycle.

Sleep in menopausal women affected by hormonal changes, but also by age, presence of other sleep disorders, and other medical problems.

Inadequate sleep time is a common problem can be associated with weight gain and poor health.

Fibromyalgia is associated with poor sleep, and a characteristic EEG pattern of alpha intrusion into nREM sleep on PSG.

Sleep disruption is common in pregnancy.
Snoring is common in pregnancy but OSA is not.
When OSA present in pregnancy it can be associated with adverse outcomes.
RLS is common in pregnancy but usual medications can’t be used.
FURTHER READING

- Gender Differences in Sleep and SDB Collop et al Clinics in Chest Med(25)2004
- Menopause Related Sleep Disorders Eichling et al, J of Clinical Sleep Med 2005
- Sleep in Women from Adulthood thru Menopause, Moline et al, MCNA(88)2004