



The Influence of Hormones on Sleep

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Dr. Attarian stated that women's sleep problems are poorly recognized and studied because most of our knowledge on the subject comes from research done only on men. He pointed out the least studied group is that of non-pregnant women of child-bearing age. The forum covered the mechanics of sleep and the sleep problems that are unique to women in all stages of life.

The key hormones involved in women's sleep include cortisol, estrogen, FSH/LH, melatonin, progesterone, prolactin and TSH. Key to the flow of the hormones resulting in sleep are the hypothalamus, which controls the pituitary glands, which affects the ovaries and cycles back to the brain. Also important to sleep are Circadian Rhythms, the physical, mental and behavioral changes that follow a roughly 24-hour cycle, responding primarily to light and darkness in our environment.

The terminology for sleep and its stages are Rapid Eye Movement (REM) sleep, which accounts for 20-30% of the night and is considered dream sleep. During REM there is paralysis of all muscles except those in the eyes and the ones that allow breathing. Throughout the night, we cycle from wakefulness to REM multiple times. Non-REM takes up the other 70-80% of the night and is divided into three categories: N1 is drowsiness; N2 is light sleep; and N3 is deep sleep.

The sleep-wake cycle is regulated by the brain and melatonin, which chemically causes drowsiness and lowers the body temperature. Morning exposure to sunlight sends signals to the suprachiasmatic nucleus, stimulating the pineal gland to suppress the production of melatonin. Not surprisingly, night workers suffer from "shift work disorder" because when they try to sleep during the day, exposure to light inhibits melatonin, fragmenting sleep and resulting in stress-related dysfunction of hypothalamic, pituitary and ovarian axis. Shift work disorder can result in painful irregular menses; infertility and small and premature births; and increased risk of breast cancer.

Sex/Gender Sleep Differences. Males and Females have different sleep patterns. Beginning at around 9-10 months of age, girls usually sleep more than boys. Then around the age of 3, boys have longer stage N1 and more stage N2, while girls have increased amounts of stage N3.

During the teen years, girls need more sleep between the ages of 14-19, while boys experience the need for more sleep later on, between the ages of 16-21.

In adulthood, women continue to need more sleep than men but because of life demands, they usually get less than men and complain of more daytime sleepiness. Younger women nap less but have lower sleep efficiency while older adult women nap less and higher sleep efficiency.

Menstrual Cycles and Sleep. Estrogen is secreted during the follicular phase of the menstrual cycle, which activates possible antidepressant effects. Dr. Attarian noted that the production of melatonin drops sharply during ovulation—his personal theory is that this keeps women more awake and alert in order to propagate the species. Ironically, menopausal women on estrogen replacement therapy find their sleep improves at night.

Over the course of the menstrual cycle, REM sleep declines gradually. In the luteal phase, sleep latency decreases and sleep efficiency increases but total night sleep does not change—instead naps increase. Body temperature rises at the end of the follicular phase.

Pregnancy and Sleep. Many hormonal changes occur in pregnancy and only a few affecting sleep are mentioned here. During the first trimester, the rapid rise of progesterone leads to daytime sleepiness and increase sleep duration. Progesterone related inhibition of smooth muscles leads to frequent bathroom visits at night.

In the second trimester, sleep duration returns to pre-pregnancy values, but reflux, fetal movements and restless legs syndrome appear near the end of this trimester, disrupting sleep.

Finally, in the third trimester of pregnancy, overall sleep duration dramatically decreases to 85% of pre-pregnancy values. Back pain, uterine compression of sciatic nerve, overall discomfort, reflux, nightmares and worries about labor and childcare interrupt sleep. Women who slept less than 6 hours in their last trimester had longer labors and 4.5 times more likelihood of C section. Additionally, trouble falling sleep during third trimester is associated with postpartum depression.

Menopause, Fibromyalgia, Depression and Sleep. Up to 50% of menopausal women complain of insomnia. For those who have fibromyalgia, both sleep complaints and pain complaints get worse with menopause. Additionally, those with depression may find that the prevalence of depressive symptoms doubles after menopause. Sleep disturbances also can impact mood and result in anxiety.

Obstructive Sleep Apnea Syndrome (OSA) and Menopause. The prevalence of OSA more than quadruples after menopause. Female sex hormones may exert a protective effect against OSA. Body fat distribution associated with menopause, especially an increase in waist/hip ratio and neck circumference, predisposes one to OSA.

Treatment for Sleep Disorders and Insomnia. While hormone therapy (HT) may help, all benefits and risks must be carefully weighed. What is known in sleep disorders is that the role of HT is more preventative than curative. HT with either estrogen or estrogen/progesterone improves sleep in all perimenopausal women regardless of vasomotor symptoms. Additionally, HT reduces the risk of OSA in menopausal women by about 2/3.

Other treatments include Gabapentin SNRIs, isoflavones, SSRIs, clonidine, mirtazapine and slow release melatonin, acupuncture, aerobic exercise.

Dr. Attarian works at The Women's Neurology Center which focuses on research, education and clinical care in the areas of sleep disorders as well as headache, multiple sclerosis and epilepsy. Information about the clinic can be found at www.nmff.org/womensneurology or 312-695-1962.