

pregnancy - periods when breathing stops lead to disrupted sleep and decreased blood oxygen levels that can also adversely affect the fetus. This should be treated very seriously due to a higher risk for developing preeclampsia (high blood pressure, swelling especially in the ankles, protein in the urine, headaches).

*RLS and periodic leg movements (PLMs).* RLS is an irresistible urge to move the legs, especially in the evening and with rest. The feeling of leg discomfort is reduced by movement e.g. getting up and walking, so that people experience difficult getting to sleep. If the movements and twitches continue through the night with PLMs, sleep becomes fragmented and in turn leads to daytime sleepiness. These symptoms generally go away with childbirth. Iron and/or folate deficiency are known causes of RLS. Women who develop RLS during pregnancy should have their iron status checked and should probably be prescribed a multi-vitamin preparation containing folic acid.

*Childbirth and the new mother.* Expect to be sleep deprived, especially in the first six-months after childbirth. Do what you can to optimize sleep and try to catch up on your sleep when your baby sleeps. A word of caution, sleeplessness is associated with depression and in a small proportion of women it will be problematic and may predispose them to post-partum depression. Women who have a history of depression or bipolar affective disorder should make every effort to protect their sleep by involving their partner or family members in nighttime feeding.

### **3. Menopause and the transition to menopause**

Between the ages of 45-55 years production of estrogen and progesterone starts to decrease and menstrual cycles become irregular. This transition period, called peri-menopause for "around menopause", occurs over 4-8 years. Up to 80% of women experience hot flashes - suddenly feeling hot then flushed enough to sweat. Hot flashes can be extremely uncomfortable, occur during sleep - night sweats that can soak bedclothes followed by chills as the body cools down - and lead to sleep disruption. Only when menstrual periods have stopped for a year is menopause confirmed. Hot flashes, insomnia and other symptoms can start in the peri-menopause, but may continue into menopause. Other symptoms that can be disruptive to sleep either directly or indirectly include mood changes, vaginal dryness and irritation, urinary problems, weight gain.

*Insomnia.* Difficulty falling asleep, repeated awakenings, waking too early in the morning have been associated with hot flashes, palpitations and mood swings particularly during peri-menopause. Interestingly, laboratory studies do not show that

sleep quality is worse during the menopause than pre-menopausally. Although self-reports of improved sleep with hormone replacement therapy (HRT) have not been consistently found, for some women HRT provided relief from hot flashes and fragmented sleep thereby improving daytime functioning and mood. For those women whose menopausal symptoms and sleep were (or may be) improved on HRT, the recent research urging caution with HRT certainly poses a dilemma. Family history and potential risk of heart attacks, stroke, certain cancers and Alzheimer's disease should be taken into account when considering using HRT for relief from disturbed sleep.

*Depression.* Clinical depression affects about 10-15% of the population and is often associated with sleep problems. If you experience negative mood, loss of enjoyment of pleasurable activities, tearfulness or sadness that lasts for more than 1 month and is accompanied by poor sleep quality and either insomnia or hypersomnia, you should contact a health care professional to discuss possible treatment for depression.

*Sleep-disordered breathing.* Hormone-related changes, weight-gain including a change in fat distribution, and increased age are all contributing factors that increase the risk of breathing disorders during sleep. Older, overweight women with high blood pressure should be considered high risk for having OSA. Women who use HRT have OSA less frequently than post-menopausal women not on HRT. However, many other factors need to be considered before recommending HRT to treat apnea in women. The focus should be on using standard therapy such as continuous positive pressure (CPAP) or an oral appliance (for milder OSA), and weight loss.

### **Conclusion**

A woman's changing hormone profile influences her sleep. In general, more disruption can be anticipated with abrupt changes and the withdrawal of female hormones, pregnancy being an exception. Some sleep disorders, such as OSA and RLS, may also be influenced by reproductive stage. Women experiencing dissatisfaction with their sleep could gain more insight into the nature of the problem by tracking whether there is a cyclical change.

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## **SLEEP IN WOMEN**



**CANADIAN SLEEP SOCIETY**

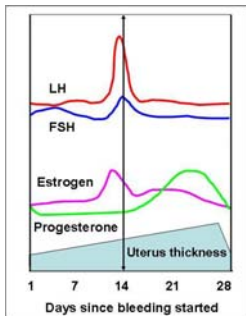
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Good quality sleep is important for optimal daytime performance and mood. Complaints of insufficient or non-restorative sleep affect between 10 to 35% of the general population. These complaints are more common in women than in men, yet women also report having a greater sleep need and that their sleep is disturbed by worries and concerns.

Across a woman's reproductive lifespan there are complex changes that include varying levels of two hormones, estrogen and progesterone. Pregnancy is a time when the levels of both hormones increase. With menopause the levels decline and it is the loss of the effects of estrogen and progesterone that may underlie many of the physical and psychological symptoms women experience. The interaction of the changing hormones on the body and the brain is delicately balanced, ideally without disrupting sleep, although at certain times and with some conditions, sleep is adversely affected.

### 1. Menstrual cycles

As shown below, during menstrual cycles, usually lasting 28 days - with a range of 25 to 35 days, there are changes in reproductive hormones and body temperature. Starting the cycle from menstruation, concentrations of the four main reproductive hormones, luteinizing hormone (LH), follicle stimulating hormone (FSH), estrogen and progesterone, are low. The next phase before ovulation is the follicular phase, which varies slightly in length depending on how long it takes for ovulation (when an egg is released) to occur. After ovulation is the luteal phase, which lasts 14 to 16 days until the next menstrual period begins. In the luteal phase progesterone increases and body temperature is elevated (about 0.4°C) compared to before ovulation. Reduction of both estrogen and progesterone levels precedes menstruation. It is during the last 4-8 days of the cycle and the first few days of menstruation that most negative menstrual symptoms are experienced.



Based on a few controlled laboratory studies in young women with no menstrual-associated complaints, sleep across the menstrual cycle is remarkably stable. Using self-report data, about 70% of women report that their sleep is affected by menstrual symptoms such as bloating, tender breasts, headaches and cramps, on average 2.5 days every month (Telephone survey, National Sleep

Foundation, USA, 1998). Even young women without significant menstrual-associated complaints report poorer sleep quality three to six days premenstrually and during four days of menstruation compared to other times of the menstrual cycle. Mood, discomfort and pain can affect sleep during this period.

*Premenstrual symptoms and premenstrual syndrome (PMS).* Many women experience premenstrual disturbances that vary in severity and type of symptom. Approximately 60% of women experience mild PMS symptoms, but for 3-8% of women the symptoms are severe. Common symptoms that occur in the last week of the luteal phase and lessen after menstruation include irritability/anger, anxiety/tension, depression and mood swings, change in appetite, bloating and weight gain, and fatigue. Sleep disturbances include insomnia, hypersomnia, unpleasant dreams, awakenings during the night, failure to wake at the expected time and tiredness in the morning.

*Painful Menstrual conditions - Dysmenorrhoea and Endometriosis.* Women who suffer from dysmenorrhoea experience extremely painful cramps during menstruation every month. Women with endometriosis have misplaced tissue, of the same type that lines the inside of the uterus, which grows elsewhere in the abdominal and pelvic area and follows the menstrual cycle. These women with painful menstrual cramps complain of poorer sleep quality and higher anxiety during menstruation compared to symptom-free women. In turn, the disturbed sleep may worsen mood and alter the pain threshold.

*Polycystic Ovarian Syndrome (PCOS).* In this condition of irregular or no menstrual cycles, the ovaries produce too much of the male sexual hormones (androgens) which causes infertility, facial hair and weight gain. These women are also more likely to develop obstructive sleep apnea (OSA) - a condition associated with snoring.

*Oral contraceptives (OC) or birth control pills.* OC pills contain synthetic estrogen and/or progestin with 21 days of active hormone and the last 7 days inactive. Monophasic pills provide the same dosage of hormones through the entire active cycle; triphasic pills give different dosage levels during each week of the month more closely duplicating the natural hormonal pattern. These are called combined pills (estrogen and progesterone) whereas "minipills" contain progestin only. Women taking OCs have persistently raised body temperatures, similar to those of naturally-cycling women in the luteal phase (due to progesterone). When compared to naturally-

cycling women in the luteal phase, women taking OC had less deep sleep. For some women with premenstrual and menstrual symptoms, regularization of the menstrual cycle with OCs can reduce their symptoms and thereby improve sleep.

### Strategies to relieve sleep disruption due to menstrual and menopausal symptoms

- To reduce bloating, reduce salt intake, drink more water during the day.
- Avoid caffeine especially in the 8 hours before bedtime.
- Avoid large meals and excessive fluid intake before bedtime.
- Limit alcohol intake - it may help you get to sleep but disrupts later sleep and can increase bloating.
- Exercise regularly and in moderation - try a late afternoon or early evening stretch or yoga class.
- Some women try herbal preparations. Be cautious taking these unregulated products and check that they are safe for use especially if you are taking prescription medication. For example, ginger tea may help relieve menstrual cramps; evening primrose oil may help relieve PMS symptoms.
- For relief from night sweats and hot flashes - sleep in a cool environment, wear light-weight clothes. Soy foods (containing phytoestrogens) may reduce hot flashes.
- Medications: For pain an over-the-counter medication containing ibuprofen; for significant bloating your doctor may prescribe a mild water pill (diuretic); for severe PMS some antidepressants of the category selective serotonin reuptake inhibitors (SSRIs) have been recommended to take in the luteal phase; oral contraceptives to regulate the menstrual cycle.

### 2. Pregnancy

Getting enough sleep is especially important during pregnancy. During the first trimester (first 12 weeks), sleepiness increases due to the rise in progesterone, but it also brings on sleep disruption due to morning sickness - waking with nausea, increased urinary frequency and breast tenderness. The second trimester (weeks 13 through 26) is more of a settling in period and can see an improvement in sleep; however, at this time snoring may start, some women experience heartburn, and leg cramps (restless legs syndrome, RLS) may begin. The third trimester (weeks 27 through 40) is when sleep is most disrupted. Problems include difficulty getting comfortable (many women will sleep on their side with a pillow between their knees), heartburn, leg cramps, snoring, increased need to urinate, more time awake and morning fatigue.

**Snoring and OSA.** Some women begin to snore during pregnancy. OSA may start, or worsen, during