Menopausal Sleep Disturbance

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Currently, more than 35% of women in the US have reached the median age of menopause (51 ± 5 [SD] years), and approximately 80% of these women have experienced or will experience hot flashes.[1] Disturbed sleep has been reported in the majority of descriptive studies of menopause (Table 1),[2-11] and it is generally assumed that this is due to hot flashes. However, recent studies—conducted in our laboratory and also by other investigators—have called this relationship into question. It is the purpose of this article to briefly review the occurrence of sleep disturbance in menopause, the role of hot flashes in this disturbance, and the effects of estrogen upon it.

Hot Flashes and Sleep

In our first investigation[12] we found no significant differences between age-matched cycling women, asymptomatic postmenopausal women and symptomatic postmenopausal women with regard to any physiologic or self-reported sleep measure, the Multiple Sleep Latency Test (MSLT; an objective sleep measure) or any performance or psychological test. Moreover, physiologic hot flash recordings showed that these tended to occur after, rather than before, arousals and awakenings. If hot flashes were producing the arousals and awakenings, one would have expected those hot flashes to occur first.

This was further elucidated in our second investigation.[13] Because rapid eye movement (REM) sleep suppresses thermoregulatory effector responses (such as hot flashes)[14] and is more frequent in the second half of the night, we analyzed the data by halves of the night. In doing so we found that in the first half of the night, the hot flashes did, indeed, precede the arousals and awakenings; in the second half of the night, this order was reversed (Figure, page 10). Thus, it is possible that hot flashes are producing objective sleep disturbance in the first half of the night, the first such evidence reported.

The findings of our first study are supported by those of the Wisconsin Sleep Cohort Study,[15] which measured sleep quality by complete laboratory polysomnography and by self-reports in a probability sample of 589 pre-, peri-, and postmenopausal women. Sleep quality was not worse in peri- or postmenopausal women, nor in symptomatic (versus asymptomatic) women on any physiologic measure. This study

Table 1. Do Hot Flashes and Sleep Disturbance Occur with Menopause?

Study	Design	Self-Reported	
		Hot Flashes	Sleep Disturbance
McKinlay, Jefferys (1974)[2]	Cross-Sectional	+	+
Bungay et al (1980)[3]	Cross-Sectional	+	+
Hunter et al (1986)[4]	Cross-Sectional	+	+
Matthews et al (1990)[5]	Longitudinal	+	–
Hunter (1992)[6]	Cross Sectional	+	+
Holte (1992)[7]	Longitudinal	+	–
Shaver, Paulsen (1993)[8]	Cross-Sectional	+	–
Avis et al (1994)[9]	Longitudinal	+	+
Kuh et al (1997)[10]	Longitudinal	+	+
Kravitz et al (2003)[11]	Longitudinal	+	+

did, in fact, reveal significant elevations in reported sleep dissatisfaction in post- versus pre-, and in peri- versus premenopausal women.

More recently, we completed a study in which 102 women, ages 44-56 years, complaining of poor sleep were recorded in the laboratory.[16] These women also were assessed using the Pittsburgh Sleep Quality Index (PSQI)[17] and the Hamilton Depression and Anxiety scales. Results were analyzed by multiple regression. We found that 53% of the women had apnea, restless legs syndrome, or both. The best predictors of objective sleep quality (laboratory sleep efficiency) were apnea, periodic limb movements and arousals. The best predictors of subjective sleep quality (PSQI total score) were the Hamilton anxiety score and the number of hot flashes in the first half of the night.

Thus, primary sleep disorders (apnea and restless legs syndrome) are common in midlife women. Amelioration of hot flashes may reduce some complaints of poor sleep, but will not necessarily alleviate underlying primary sleep disorders. Because these can result in significant morbidity and mortality, they require careful attention in peri- and postmenopausal women.

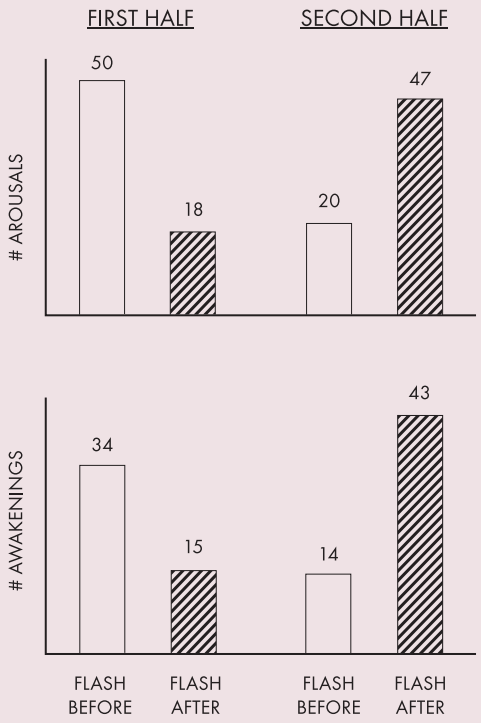

Figure. Arousals and awakenings within 5 min. of a hot flash by halves of night

Estrogen and Sleep

There are eight published studies of the effects of estrogen on laboratory-recorded sleep, although different stud-

Table 2. Effects of Estrogen on Hot Flashes and Sleep

Study	Hot Flashes	Objective Sleep	Subjective Sleep
Thomson, Oswald (1977)[18]	No difference	↓ wake time, ↓ arousals, ↑ REM	No difference
Schiff et al (1979)[19]	↓	↓ sleep latency, ↑ REM	No difference
Erlik et al (1981)[20]	↓	↓ awakenings	Not assessed
Purdie et al (1995)[21]	↓	No difference (room at 16° C)	No difference
Scharf et al (1997)[22]	↓	↓ awakenings & stage changes ↑ sleep efficiency (no control group)	↑ sleep quality
Polo-Kantola et al (1998),[23] (1999)[24]	↓	↓ movement arousals, ↑ alpha arousals	↑ sleep quality
Antonijevic et al (2000)[25]	Not assessed	↓ wake time, ↑ REM	↑ sleep quality

ies reported different measures.[18-25] Table 2 shows that some investigators reported decreased wake times and arousals,[18,20,22,23] whereas one study revealed decreased sleep latency.[19] Increased REM sleep was reported in three studies.[18,19,25] Interestingly, the single study reporting no objective sleep improvement recorded subjects at an ambient temperature of 16° C.[18] Previous research has shown that hot flashes are suppressed at ambient temperatures <19° C.[13,16] In half of the studies listed in Table 2, estrogen was found to improve subjective sleep quality;[22-25] in the remaining studies, such an improvement was not reported.[18-21,24] None of the studies employed an objective assessment of sleepiness, such as the MSLT.

Summary and Recommendations

Sleep disorders are relatively common in peri- and postmenopausal women. Although complaints of poor sleep in this population are often attributed to the effects of hot flashes, this is often not the case. We, and others, have shown that apnea and restless legs syndrome are common in these women. Women suspected of having sleep apnea (ie, obese women who snore and have a large neck circumference) should be referred to a sleep disorders center accredited by the American Sleep Disorders Association for evaluation and treatment. Women complaining of periodic limb movements should be referred in the same manner.

As shown above, the effects of estrogens on sleep are equivocal. Women complaining of hot flash-induced sleep disturbance should first be instructed to reduce the ambient temperature to 64° F for the first 4 hours of sleep, since this will suppress hot flashes. If this is not effective, pharmacologic treatments should be considered. ■

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This article discusses off-label use of medications.

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