Sleep and Hypertension
Burning the Candle at Both Ends Really Is Hazardous to Your Health

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The article by Gangwisch et al1 in this issue of Hypertension identifies another significant health hazard associated with inadequate sleep. The authors document 2-fold greater risk for hypertension among adults in their fourth to sixth decades who sleep ≤5 hours each night. Whereas the independent risk of short sleep duration for developing hypertension is attenuated to ≈1.6-fold after adjusting for obesity and diabetes, short sleep duration is a risk factor for obesity and diabetes.2,3

The investigators provide plausible mechanisms linking short sleep duration to hypertension.1 Potential mechanisms include an increased blood pressure (BP) load resulting from prolongation of higher BP while awake and truncation of the BP dip characteristic of sleep. A decrease in sleep duration leads to both greater BP load1 and prolonged exposure to an activated sympathetic nervous system,4 which could accentuate structural remodeling and augment renal sodium retention. Structural changes in key target organs participating in BP regulation including the kidney, heart, and vasculature could serve to perpetuate and accelerate age-related increases in BP, especially in those at risk.

In this regard, it is interesting to note a study of rapid eye movement sleep deprivation in spontaneously hypertensive, normotensive Wistar-Kyoto, and borderline hypertensive rats, which are the first generation offspring of a cross between spontaneously hypertensive and Wistar-Kyoto rats.5 Rapid eye movement sleep deprivation raised BP only in borderline hypertensive rats. Additional evidence from human studies further suggests that sleep deprivation causes physiological changes that can raise BP. For example, among sleep-deprived and stressed college students preparing for final examinations, significant reductions were noted in both endothelium-dependent but not endothelium-independent vasodilation and intracellular magnesium, which could foster elevated BP.6 Moreover, fatal familial insomnia leads to total sleep deprivation along with dysautonomia, adrenal overactivity, and hypertension.7 Thus, the link between sleep deprivation and hypertension has biological plausibility.

The public health significance of the report by Gangwisch et al1 deserves consideration even if the biological links between sleep duration and hypertension are not definitively established. Hypertension, diabetes, and obesity represent growing and interrelated epidemics. The average sleep time in the United States has fallen dramatically during the past century, from 9.0 hours in 1910 to 7.5 hours in 1975 and 6.8 hours in 2005.8 The percentage of adults reporting that they get <6 hours of sleep per night in surveys conducted by the National Sleep Foundation has risen from 12% in 1998 to 16% in 2005 and ranges from a low of 12% among people living in the Western United States to 18% in those residing in the Northeast and South.

Other responses in the 2005 report suggest that sleep duration may continue to shrink. Men are more likely than women to report getting <6 hours of sleep (17% versus 14%), whereas 18% of men and 34% of women report getting ≥8 hours of sleep nightly.9 Moreover, men are more likely than women to report that <6 hours of sleep are required to function optimally during the day (26% versus 17%) and that they are getting more sleep than needed (49% versus 37%), although men report sleeping less. Thus, not only is a high proportion of adults getting <6 hours of sleep per night, an even higher proportion, especially men, think this is sufficient for an optimum level of functioning and that they are already sleeping too much.

The practical implications of the report by Ganwisch et al1 are manifold. Short sleep duration is a risk marker and a plausible risk factor for future hypertension in addition to insulin resistance, obesity, and diabetes.1–4,9 Americans are attempting to fit ever more into 24 hours, and many appear willing to “burn the candle at both ends” to accomplish that objective. Moreover, 17% to 35% of men and women are troubled by other factors that limit sleep duration, including difficulty falling asleep, waking frequently during the night, and difficulty falling asleep again after waking early. Of concern, 36% of men and 39% of women report waking up feeling unrefreshed at least a few times each week. To address these problems, 32% of adults reported using some aid to facilitate sleep at least a few nights each month including alcohol (11%), over-the-counter products (9%), prescription medication (7%), eye masks or earplugs (3%), and melatonin (2%). However, only 29% reported that their doctor ever asked them about sleep.

The emerging picture suggests that a growing proportion of Americans is at increased risk for hypertension and other features of the metabolic syndrome based on short sleep duration. Of concern, many adults believe that <6 hours of sleep allows them to function optimally, and an even larger proportion indicate they are already sleeping too much.8 Thus, sleep duration is likely to continue its downward trend.
over the past century, which could continue to fuel the epidemic of metabolic-syndrome–related risk and disease. It seems likely that many of the same factors that contribute to short sleep duration are also participating in disrupted sleep patterns, which further exacerbates the problem of short sleep duration.

Public health messages to emphasize the health benefits of adequate sleep and the risks of short sleep duration may be useful. Perhaps we should be mindful of the centuries-old wisdom of King Solomon, who wrote, “In vain you rise early and stay up late toiling for (fill in the blank)—for he grants sleep to those he loves,” (Psalm 127:2) and “A heart at peace gives life to the body,” (Proverbs 14:30). The available data suggest that physicians should ask patients about sleep and encourage them to get ≥6 hours nightly, particularly for those <60 years old. This advice may be an especially important component of hygienic measures recommended for patients with prehypertension, who are at increased risk for hypertension. Whether prescription medications will ameliorate health risk related to short sleep duration among insomniacs is a question largely unanswered but a potentially promising area for future studies.

References
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