Less Sleep May Mean Higher Blood Pressure

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HOUSTON, June 8 -- Shorter sleep duration predicted higher blood pressure, adverse changes in blood pressure, and an increased risk of hypertension over a five-year period, data from an ongoing cohort study showed.

Sleep duration also played a role in diastolic blood pressure differences between African-Americans and whites, Kristen L. Knutson, Ph.D., of the University of Chicago, and colleagues reported in the June 8 issue of *Archives of Internal Medicine*.

Adjustment for multiple covariates, including snoring, attenuated but did not eliminate the effects of sleep duration on blood pressure.

"Because of the major adverse health consequences of high blood pressure, the identification of a new and potentially modifiable risk factor has clinical implications," the authors concluded. "Intervention studies are needed to determine whether optimizing sleep duration and quality can reduce the risk of increased blood pressure."

Epidemiologic studies have shown an association between self-reported short sleep duration and higher blood pressure. Other studies have shown increased blood pressure after partial or total sleep deprivation, suggesting that sleep loss might lead to increased sympathetic nervous activity and higher blood pressure, the authors said.

Action Points

- Explain to patients that shorter sleep duration and poorer sleep maintenance were associated with higher blood pressure.
- Note that the study did not evaluate the impact of efforts to improve sleep on blood pressure.

Most prior studies relied on self-reported sleep duration and quality, which has only a moderate correlation with objective measures of sleep, they continued.

So the goal of their study was to determine whether objectively measured sleep duration and quality predicted five-year incidence of hypertension and changes in systolic and diastolic blood pressure.

The study involved a subset of 670 participants in an ongoing investigation into factors associated with development of coronary disease. All of the participants had clinical examinations in 2000 and 2001, the 15th year of the larger ongoing study. They also responded to questions related to sleep duration and quality.

In 2003 and 2005 the subgroup completed a sleep-related survey and underwent monitoring by wrist actigraphy. During 2005 and 2006 participants had another clinical examination and provided demographic and sleep information.

After excluding patients with incomplete data and those taking antihypertensive medication, the investigators analyzed data on 535 participants.

The analysis showed that 43% of participants averaged fewer than six hours of sleep each night and only 1% averaged eight or more hours. Over five years, average systolic blood pressure increased and diastolic pressure decreased.

Over the five years of follow-up, shorter sleep duration and poorer sleep maintenance were significantly associated with changes in systolic and diastolic blood pressure ($P<0.05$ for cross-sectional and longitudinal analyses).

Logistic regression models of hypertension showed that short sleep duration significantly increased the odds of hypertension (OR 1.37, 95% CI 1.05 to 1.78).

For each one-hour reduction in sleep duration, the likelihood of hypertension increased 37%, the authors reported.

Sleep maintenance was not associated with the risk of hypertension.

In a fully adjusted model, shorter sleep duration remained a significant predictor of the five-year change in diastolic blood pressure ($P=0.03$).

The association between sleep duration and hypertension declined only slightly (OR 1.30, 95% CI 0.96 to 1.75).

Associations between sleep maintenance and blood pressure were attenuated but remained statistically significant ($P<0.05$).

In a fully adjusted analysis of sex-race differences in five-year blood pressure changes, sleep duration remained a significant mediator of diastolic differences between African-Americans and whites ($P=0.02$) but not systolic.

A major limitation of the study as reported by the authors was the use of wrist actigraphy rather than polysomnography to monitor sleep. This did not allow assessment of sleep-disordered breathing, a known risk factor for hypertension.

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The authors reported no competing interests.

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Knutson KL, et al "Association between sleep and blood pressure in midlife. The CARDIA sleep study" *Arch Intern Med* 2009; 169(11): 1055-61.

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