

Association of Sleep-Disordered Breathing, Sleep Apnea, and Hypertension in a Large Community-Based Study

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Context Sleep-disordered breathing (SDB) and sleep apnea have been linked to hypertension in previous studies, but most of these studies used surrogate information to define SDB (eg, snoring) and were based on small clinic populations, or both.

Objective To assess the association between SDB and hypertension in a large cohort of middle-aged and older persons.

Design and Setting Cross-sectional analyses of participants in the Sleep Heart Health Study, a community-based multicenter study conducted between November 1995 and January 1998.

Participants A total of 6132 subjects recruited from ongoing population-based studies (aged ≥ 40 years; 52.8% female).

Main Outcome Measures Apnea-hypopnea index (AHI, the average number of apneas plus hypopneas per hour of sleep, with *apnea* defined as a cessation of airflow and *hypopnea* defined as a $\geq 30\%$ reduction in airflow or thoracoabdominal excursion both of which are accompanied by a $\geq 4\%$ drop in oxyhemoglobin saturation), obtained by unattended home polysomnography. Other measures include arousal index; percentage of sleep time below 90% oxygen saturation; history of snoring; and presence of hypertension, defined as resting blood pressure of at least 140/90 mm Hg or use of antihypertensive medication.

Results Mean systolic and diastolic blood pressure and prevalence of hypertension increased significantly with increasing SDB measures, although some of this association was explained by body mass index (BMI). After adjusting for demographics and anthropometric variables (including BMI, neck circumference, and waist-to-hip ratio), as well as for alcohol intake and smoking, the odds ratio for hypertension, comparing the highest category of AHI (≥ 30 per hour) with the lowest category (<1.5 per hour), was 1.37 (95% confidence interval [CI], 1.03-1.83; P for trend=.005). The corresponding estimate comparing the highest and lowest categories of percentage of sleep time below 90% oxygen saturation ($\geq 12\%$ vs $<0.05\%$) was 1.46 (95% CI, 1.12-1.88; P for trend $<.001$). In stratified analyses, associations of hypertension with either measure of SDB were seen in both sexes, older and younger ages, all ethnic groups, and among normal-weight and overweight individuals. Weaker and nonsignificant associations were observed for the arousal index or self-reported history of habitual snoring.

Conclusion Our findings from the largest cross-sectional study to date indicate that SDB is associated with systemic hypertension in middle-aged and older individuals of different sexes and ethnic backgrounds.