

# Review: Evidence relating sleep apnea to adverse health outcomes is inconclusive

Wright J, Johns R, Watt I, Melville A, Sheldon T. **Health effects of obstructive sleep apnoea and the effectiveness of continuous positive airways pressure: a systematic review of the research evidence.** *BMJ*. 1997 Mar 22;314:851-60.

## Objective

To determine whether an association exists between obstructive sleep apnea and morbidity and mortality, and to assess the effectiveness of continuous positive airway pressure (CPAP).

## Data sources

Searches were done in MEDLINE (1966 to 1996), EMBASE (1974 to 1996), and Cumulated Index to Nursing and Allied Health (1982 to 1995); reviews were sought; references from identified studies were retrieved; and experts were contacted.

## Study selection

Studies were selected if they addressed the association between sleep apnea and mortality, hypertension, pulmonary hypertension, cardiovascular disease, or road traffic accidents in adults. Studies were excluded if they were case reports, had no clinical outcomes, investigated only acute or physiologic changes during sleep, or the study par-

## Commentary

The systematic review by Wright and colleagues emphasizes the lack of sound evidence about mortality and vascular morbidity in association with obstructive sleep apnea. Most of the available studies have not controlled adequately for such confounding factors as age, weight, or alcohol consumption. Similar problems apply to some of the studies showing an association with road traffic accidents.

For hypersomnolence, the associated risk factors are again a problem but a clear association is found between daytime sleepiness and obstructive sleep apnea. In some countries, the presence of sleep apnea and daytime sleepiness may lead to suspension of a driver's license until adequate treatment has improved the hypersomnolence. Some disagreement exists about the most important nighttime factor: apnea, any respiratory dis-

turbance, or electroencephalogram (EEG) disturbances.

## Data extraction

2 independent assessors classified the studies as prospective cohort, retrospective cohort, case-control, or cross-sectional. The assessors further graded the studies based on the adequacy of case ascertainment, adjustment for confounders, and the validity of the measurement of disease possibly caused by sleep apnea.

## Main results

54 studies were identified. Of the 6 studies that examined the association between sleep apnea and mortality, 2 prospective studies found no association; 1 showed an association only in women ( $P = 0.015$ ), and another showed the apnea index to be a predictor of death (odds ratio 1.01, 95% CI 1.00 to 1.02) but with less effect than age, body mass index, and hypertension. 18 studies of hypertension had weak designs (cross-sectional), and most did not adjust for confounding variables, such as smoking and alcohol use. The results were inconclusive. 14 studies that examined arrhythmia, heart disease, and left ventricular hypertrophy gave inconclusive results; the pro-

turbance, or electroencephalogram (EEG) disturbances.

Nasal CPAP is well established as the most effective treatment in preventing the respiratory and EEG disturbances present at night in obstructive sleep apnea. The review makes it clear that abnormalities of daytime performance, which are improved by effective nasal CPAP, are found in studies of obstructive sleep apnea. In practice, this is the main reason for its use. Use of CPAP at night is a considerable imposition that is unlikely to be tolerated as prevention of a future problem unless patients obtain some early benefit.

Use of this method solely to prevent later cardiovascular or cerebrovascular problems is not justified based on the current evidence and would not be achievable in practice. Future research should concentrate on the

spective studies found no association between sleep apnea and arrhythmia. 6 cross-sectional studies showed an association between sleep apnea and pulmonary hypertension, but preexisting obstructive airway disease, smoking, and obesity were not excluded as confounders. 1 case-control study indicated an association between sleep apnea and stroke. 6 cross-sectional studies examining road traffic accidents lacked adjustment for confounders. 1 randomized cross-over study with 32 patients showed improvement in multiple sleep latency time ( $P = 0.03$ ), vigilance ( $P = 0.01$ ), and Nottingham health profile part 2 scores ( $P = 0.002$ ) with CPAP. 5 nonrandomized controlled trials showed improvement in the treated patients.

## Conclusions

The evidence for a causal association between sleep apnea and adverse health outcomes is weak. Continuous positive airway pressure may be effective in reducing daytime sleepiness.

*Source of funding: Yorkshire Collaborating Centre for Health Services Research.*

*For article reprint: Dr. J. Wright, Bradford Royal Infirmary, Bradford, West Yorkshire BD9 6RJ, England, UK. FAX 44-1274-364-409.*

Abstract and Commentary also published in *ACP Journal Club*. 1997;127:45.

natural history of obstructive sleep apnea and the effects of treatment on any identified morbidity or mortality.

Daytime somnolence has numerous causes, but obstructive sleep apnea is one of the most common (1). If obstructive sleep apnea is present, then such problems as obesity, smoking, alcohol consumption, sleeping position, and nasal resistance should be addressed first. If daytime symptoms remain marked, then nasal CPAP is still the appropriate treatment.

*P.J. Rees, MD  
Guy's Hospital  
London, England, UK*

## Reference

1. Young T, Palta M, Dempsey J, et al. The occurrence of sleep-disordered breathing among middle-aged adults. *N Engl J Med*. 1993;328:1230-5.