Effect of nocturnal nasal continuous positive airway pressure on blood pressure in obstructive sleep apnea
Bazzano L A, Khan Z, Reynolds K, He J

CRD summary
The authors concluded that continuous positive airway pressure reduces blood-pressure in patients with obstructive sleep apnoea. Although the evidence appears to support the authors’ conclusions, the quality of the studies was not reported and it is therefore difficult to comment on the strength of the evidence underpinning these conclusions.

Authors’ objectives
To evaluate the effects of continuous positive airway pressure (CPAP) on blood-pressure (BP) in patients with obstructive sleep apnoea (OSA).

Searching
MEDLINE (1980 to July 2006), the Cochrane Database of Systematic Reviews, conference abstracts, and the reference lists of published studies and reviews were searched. Search terms for MEDLINE were reported.

Study selection
Parallel-group and crossover randomised controlled trials (RCTs) that compared the effects on BP of CPAP with a non-active control treatment (medical or no treatment or sham CPAP) in patients with OSA were eligible for inclusion. Interventions had to last for at least 2 weeks. OSA had to be diagnosed by polysomnography.

The duration of the included CPAP interventions ranged from 2 to 24 weeks. The review assessed systolic and diastolic BP and mean arterial pressure (MAP). Most of the studies used ambulatory BP monitoring; the other studies used a manually inflated cuff. The mean age of the patients was 51 years, the majority were men (86%), the mean body mass index was 31 kg/m2 and the average apnoea-hypopnoea index was 36 events per hour. Two of the 16 studies only included hypertensive patients, while some of the other studies excluded hypertensive patients. The control treatments included sham or sub-therapeutic CPAP, pill and usual care.

Two reviewers independently selected the studies and resolved any disagreements on inclusion in a conference with a third reviewer.

Assessment of study quality
Two reviewers independently extracted the following validity-related items during the data extraction process: sample size, study design, blinding, type of control and use of intention-to-treat analysis. Any discrepancies were resolved through discussion.

Data extraction
For each study, the mean change in BP was extracted for each treatment group (or phase) and the mean differences in systolic BP, diastolic BP and MAP were calculated. Two reviewers independently extracted the data onto a standardised form. Any discrepancies were resolved through discussion. Authors were contacted if required.

Methods of synthesis
Pooled mean net changes in BP were calculated with studies weighted by the reciprocal of the variance. Fixed-effect and random-effects models were used; the results for random-effect models (DerSimonian and Laird) were reported. Publication bias was assessed using a funnel plot and tested using the rank correlation test of Begg and the regression asymmetry test of Egger. Statistical heterogeneity was assessed. Pre-specified subgroup analyses were used to examine the influence on the mean net change in BP of study design, severity of OSA, CPAP intervention duration, baseline BMI, baseline BP, sample size and time of day at which BP was measured. Sensitivity analysis was undertaken by excluding each study in turn and by excluding possible outliers.
Results of the review
Sixteen RCTs (n=818) were included: 9 parallel-group and 7 crossover RCTs.

CPAP was associated with a clinically significant reduction in the mean net change in systolic BP (-2.46 mmHg, 95% confidence interval, CI: -4.30, -0.62), diastolic BP (-1.83 mmHg, 95% CI: -3.05, -0.61) and MAP (-2.22 mmHg, 95% CI: -4.38, -0.05) compared with control. No statistically significant heterogeneity was detected for any of the analyses.

There was no significant difference between daytime and night-time BP measurements.

The results of other analyses were also reported.

There was no evidence of publication bias from either the funnel plot or statistical tests.

Authors' conclusions
CPAP reduces BP in patients with OSA and may help prevent hypertension.

CRD commentary
The review question was stated clearly. Several relevant sources were searched and no evidence of publication bias was found. However, it was not clear if attempts were made to minimise publication and language bias. Appropriate methods were used to minimise reviewer error and bias during the review process. Only RCTs were included and validity-related criteria were apparently extracted, but the results were not reported and this makes it difficult to judge the reliability of the results. Appropriate methods were used for the meta-analyses, heterogeneity was assessed, and various predefined subgroup analyses were conducted. The evidence appears to support the authors' conclusions, but the lack of reporting of study quality makes it difficult to comment on the strength of the evidence underpinning these conclusions.

Implications of the review for practice and research
Practice: The authors stated that CPAP should be considered as a possible part of the prevention and treatment of hypertension in patients with OSA.

Research: The authors stated that the effects on BP of weight loss, avoidance of alcohol before bedtime, and sleeping in the lateral position should be assessed in patients with OSA.

Funding
Building Interdisciplinary Research Careers in Women’s Health Scholarship (grant number K12-HD43451) co-funded by the Office of Research on Women’s Health and the Office of Dietary Supplements of the National Institutes of Health; Center for Research Resources of the National Institutes of Health, grant number P20-RR17659.

Bibliographic details

PubMedID
17548722

DOI
10.1161/HYPERTENSIONAHA.106.085175

Original Paper URL
http://hyper.ahajournals.org/

Indexing Status
Subject indexing assigned by NLM
MeSH
Adult; Aged; Blood Gas Analysis; Blood Pressure Monitoring, Ambulatory; Confidence Intervals; Continuous Positive Airway Pressure /methods; Female; Humans; Hypertension /complications /diagnosis; Male; Middle Aged; Polysomnography; Probability; Prognosis; Randomized Controlled Trials as Topic; Risk Assessment; Severity of Illness Index; Sleep Apnea Syndromes /complications /diagnosis /therapy; Treatment Outcome

AccessionNumber
12007002843

Date bibliographic record published
09/08/2008

Date abstract record published
30/09/2008

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.