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CPAP May Reduce Resting Heart Rate in Prediabetic Patients

ATS 2018, San Diego, CA – Patients with prediabetes who also have [obstructive sleep apnea](#) (OSA) may improve their resting heart rate, an important measure of cardiovascular health, by using [continuous positive airway pressure](#) (CPAP) to treat their OSA, according to a randomized, controlled trial presented at the ATS 2018 International Conference.

People with prediabetes have blood sugar levels higher than normal but below Type 2 diabetes levels. People with OSA experience times during sleep when air is obstructed from flowing normally into the lungs. CPAP is considered the “gold standard” treatment for OSA.

According to Sushmita Pamidi, MD, lead study author and a sleep physician-scientist at McGill University, previous studies have found that OSA is associated with increased sympathetic activity, which activates our “fight or flight” response. This response, in turn, raises our heart rate.

“Both prediabetes and higher resting heart rates have been linked to cardiovascular disease,” she said. “We wanted to see if CPAP would lower resting heart rates both during the day and at night in this group of patients with abnormal glucose metabolism.”

Of 39 participants in this study, twice as many were randomly assigned to CPAP as an oral placebo for 14 days. All-night adherence to CPAP was assured by monitoring all participants in a sleep lab throughout the two weeks. Resting heart rates were measured 24 hours a day for the two weeks using a portable monitoring device.

The study found that those using CPAP had significantly lower resting heart rates throughout the day and night than those in the placebo arm of the study. The differences between the two groups were more pronounced during the second week of the trial.

“The effect of CPAP on resting heart rate is comparable to using beta blockers,” said Esra Tasali, MD, senior study author and director of the Sleep Research Center at the University of Chicago. Commonly prescribed for heart problems, beta blockers block stress hormones, such as adrenaline that raise heart rates.

“OSA is exceedingly common among individuals with abnormal glucose tolerance,” Dr. Tasali added, noting recent estimates indicate that 80 percent of those with OSA in the general U.S. population are undiagnosed. “Our study is a first step in demonstrating that optimal treatment of sleep apnea reduces cardiovascular risk in those with prediabetes.”

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Abstract 13808

All-Night CPAP Treatment Reduces 24-Hour Resting Heart Rate in Prediabetes: A Randomized Placebo- Controlled Study

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Introduction/Rationale: Patients with prediabetes are at substantially greater risk for cardiovascular disease. Higher resting heart rate has been linked to increased cardiovascular mortality. Obstructive sleep apnea (OSA) is an important mediator of adverse cardiometabolic outcomes. We have previously reported (Pamidi et al. AJRCCM 2015) that in a randomized placebo-controlled study involving prediabetics, continuous positive airway pressure (CPAP) treatment of OSA during the entire night improves glucose metabolism and reduces plasma norepinephrine levels (a marker of sympathetic activity). In the same cohort, we have now examined how all-night CPAP treatment affects resting heart rate during 14 consecutive days and nights.

Methods: Adults with prediabetes and OSA (apnea-hypopnea index [AHI] >5) were randomized to either 2 weeks of in-laboratory CPAP or oral placebo tablet. Sleep was recorded by polysomnography and all-night CPAP use was ensured by continuous supervision. Participants were allowed to leave the laboratory during the daytime and engage in their routine activities. Physical activity and heart rate were monitored for 24-hours at baseline (i.e. prior to any CPAP or placebo use) and during 14 consecutive treatment days using an ambulatory device (Actiwave Cardio, CamNtech) consisting of tri-axial accelerometer and one-lead ECG. All data processing (e.g. motion, posture, ECG artifact and R-wave detection, sleep state classification) and data analyses were performed using PRANA software (PhiTools, France). In order to control for the effects of physical activity on heart rate, we have analyzed daytime data from rest periods only. Nighttime data (bedtimes 11:00pm to 7:00am) included only the sleep period excluding all wake epochs. Mixed-effects linear modelling was used to determine the impact of CPAP (vs. placebo) over 14 consecutive treatment days on activity and resting heart rate, while adjusting for baseline values and gender.

Results: A total of 39 subjects were randomized to either CPAP (n=26) or placebo tablet (n=13). Daytime activity counts at rest were not significantly different between groups (p=0.77). Mean daytime resting heart rate profiles were significantly lower in CPAP vs. placebo groups (p=0.04), with the largest differences during the second week of treatment (Figure). Similar effects of CPAP were also observed during nighttime (p=0.002).

Conclusion: All-night CPAP treatment markedly reduced 24-hour (daytime and nighttime) resting heart rate in individuals with OSA and prediabetes, a population that is at increased risk for cardiovascular morbidity. The magnitude of these reductions in resting heart rate is comparable to that of beta-blockers, and thus may have significant clinical cardiovascular benefit.

