Medical Xpress

Study explains link to increased cardiovascular risks for people with obstructive sleep apnea

July 26 2023

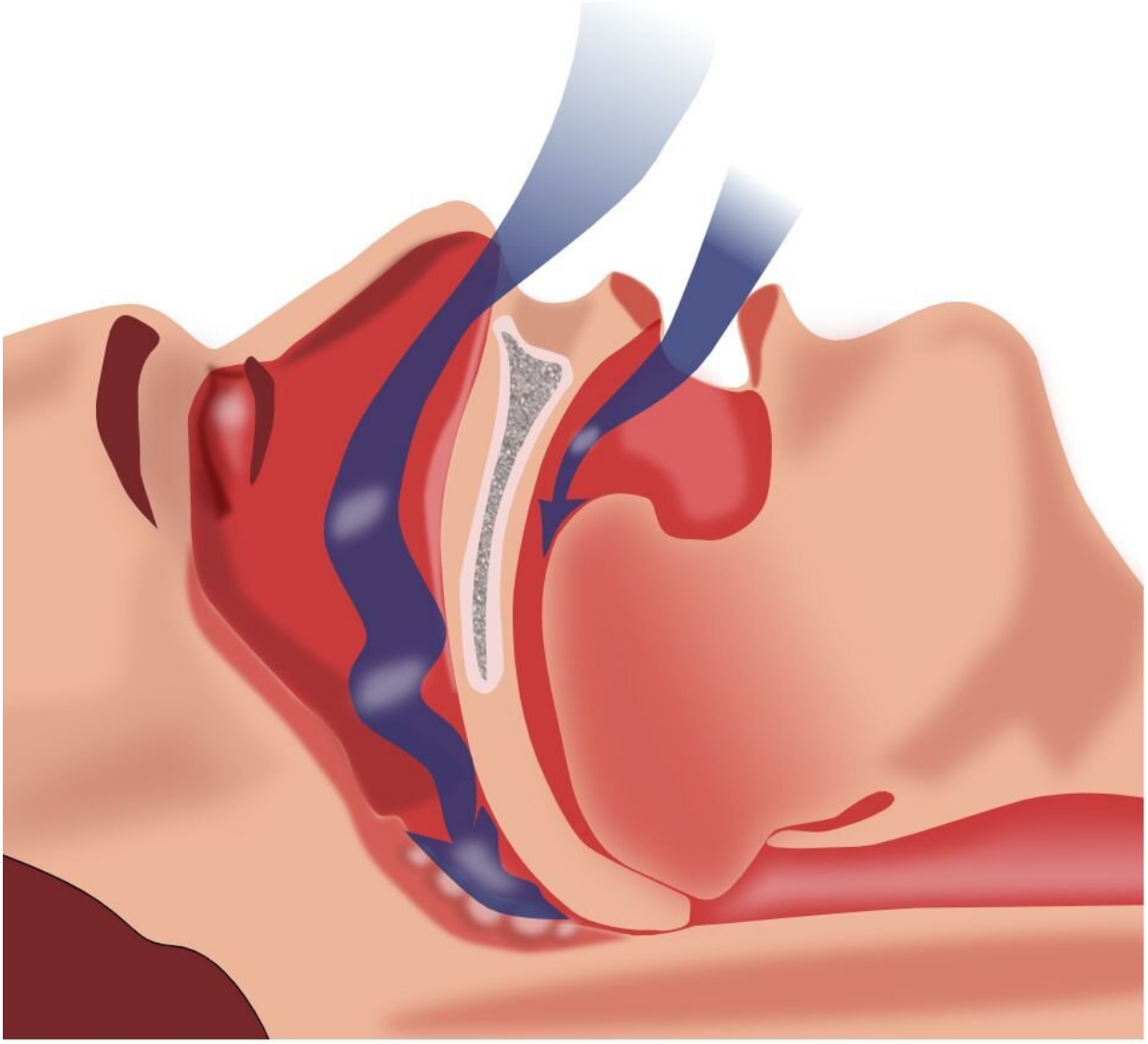

Illustration of obstruction of ventilation. Credit: Habib M'henni / public domain

Researchers have found that people with obstructive sleep apnea have an increased cardiovascular risk due to reduced blood oxygen levels, largely explained by interrupted breathing. Obstructive sleep apnea has long been associated with increased risk of cardiovascular issues, including heart attack, stroke, and death, but the findings from this study, published in the *American Journal of Respiratory and Critical Care Medicine*, show the mechanism mostly responsible for the link.

"These findings will help better characterize high-risk versions of obstructive sleep apnea," said Ali Azarbarzin, Ph.D., a study author and director of the Sleep Apnea Health Outcomes Research Group at Brigham and Women's Hospital and Harvard Medical School, Boston. "We think that including a higher-risk version of obstructive sleep apnea in a randomized clinical trial would hopefully show that treating sleep apnea could help prevent future cardiovascular outcomes."

Researchers reviewed data from more than 4,500 middle-aged and older adults who participated in the Osteoporotic Fractures in Men Study (MrOS) and the Multi-Ethnic Study of Atherosclerosis (MESA), and sought to identify features of obstructive sleep apnea that could explain why some people were more likely than others to develop cardiovascular disease or related death.

Physiological features of obstructive sleep apnea assessed included hypoxic burden, which is a reduction in blood oxygen levels during sleep; ventilatory burden, which are interruptions in breathing due to airway obstruction; and nighttime arousals, which are when a person suddenly wakes up from sleep due to interrupted breathing and that can cause their blood pressure or heart rate to rise.

While sleep apnea severity is defined as how many times the airways become blocked during an hour of sleep, this study sought to better characterize underlying mechanisms of obstructive sleep apnea and identify those that strongly predict increased cardiovascular risks.

Through MrOS, 2,627 men, with an average age of 76, were followed for about nine to 12 years. MESA included data from 1,973 men and women, with an average age of 67, who were followed for about seven years. During this time, participants completed medical check-ins and sleep assessments and shared information about their health. Approximately 110 participants in MESA and 382 in MrOS experienced a primary cardiovascular event.

For every measure of observed reduction in blood oxygen levels, or hypoxic burden, a person in MESA had a 45% increased associated risk for having a primary cardiovascular event. In MrOS, the observed increased risk was 13%. Airway obstruction, measured by a full or partial closing of the airways, accounted for 38% of observed risks in MESA and for 12% in MrOS.

Similar findings for predicting premature death based on hypoxic and ventilatory burden were also observed. Sudden awakenings weren't associated with cardiovascular outcomes in MESA, but were linked with cardiovascular-related deaths in MrOS. Additionally, the researchers found that a high hypoxic burden was mostly due to severe obstruction of the airway and not other factors, such as abdominal obesity or reduced lung function.

"That's something that makes this metric specific to sleep apnea," said Gonzalo Labarca, M.D., a study author and an instructor in medicine at Brigham and Women's Hospital and Harvard Medical School. "The connections are less explained by obesity or another factor."

The authors noted the findings have the potential to change how sleep apnea is assessed but need to be validated through future studies.

"Understanding these mechanisms could change the way that sleep apnea clinical trials are designed and what is measured in clinical practice," said Marishka K. Brown, Ph.D., director of the National Center for Sleep Disorders Research at the National Heart, Lung, and Blood Institute (NHLBI), part of NIH.

Previous studies have estimated that nearly up to 425 million adults worldwide, and about 54 million in the United States have obstructive sleep apnea and are therefore at higher risk of cardiovascular disease, the leading cause of death in the world.

More information: Gonzalo Labarca et al, Sleep Apnea Physiological Burdens and Cardiovascular Morbidity and Mortality, *American Journal of Respiratory and Critical Care Medicine* (2023). DOI: 10.1164/rccm.202209-1808OC

Provided by NIH/National Heart, Lung and Blood Institute