Simple analysis of breathing sounds while awake can detect obstructive sleep apnea

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The analysis of breathing sounds while awake may be a fast, simple and accurate screening tool for obstructive sleep apnea, suggests a research abstract that will be presented Monday, June 13, in Minneapolis, Minn., at SLEEP 2011, the 25th Anniversary Meeting of the Associated Professional Sleep Societies LLC (APSS).

Results show that several sound features of breathing were statistically significant between participants with obstructive sleep apnea and healthy controls. In an analysis that combined the two most significant sound features, the presence or absence of OSA was predicted with more than 84-percent accuracy. Sound analysis also allowed for the stratification of OSA severity.

According to the authors, people with OSA tend to have a narrower and more collapsible pharynx with more negative pharyngeal pressure, which creates greater resistance when breathing through the nose. Breathing sounds are directly related to pharyngeal pressure, making sound analysis a viable diagnostic option for OSA.

"Despite being able to breathe at the same high flow rate, the pharyngeal pressure in people with OSA during wakefulness is usually more negative than that in the non-OSA group," said principal investigator and lead author Zahra Moussavi, PhD, professor and Canada Research Chair on Biomedical Engineering at the University of Manitoba in Winnipeg, Canada.

Moussavi and co-investigator Aman Montazeri studied 35 patients with varying severity levels of OSA and 17 age-matched controls. The presence or absence of OSA was validated by full-night polysomnography.

The subjects were instructed to breathe through their nose at their normal breathing level for at least five breaths and then breathe at their maximum flow level for another five breaths. Then the process was repeated as they breathed through their mouth with a nose clip in place. The breathing sounds were picked up by a microphone placed over the neck, and the recordings were repeated in two body positions: sitting upright and lying on the back. Data were digitized and then analyzed using spectral and waveform fractal dimension techniques.

Moussavi added that detecting OSA through sound analysis could become an attractive alternative to the more costly and labor-intensive method of performing overnight polysomnography.

"If we can predict the likelihood of apnea and its severity with the same accuracy as in our pilot study, it will have a significant impact on health-care costs as it can reduce the need for full-night sleep assessment significantly," she said.

The study was supported by the National Sciences and Engineering Research Council of Canada and TRLabs Winnipeg, where Moussavi is an adjunct scientist.

According to the American Academy of Sleep Medicine, OSA is a sleep-related breathing disorder that involves a decrease or complete halt in airflow despite an ongoing effort to breathe. It occurs when the muscles relax during sleep, causing soft tissue in the back of the throat to collapse and block the upper airway. This leads to partial reductions (hypopneas) and complete pauses (apneas) in breathing that can produce abrupt

reductions in blood oxygen saturation and reduce blood flow to the brain. Most people with OSA snore loudly and frequently, and they often experience excessive daytime sleepiness.

The treatment of choice for OSA is CPAP therapy, which provides a steady stream of air through a mask that is worn during sleep. This airflow keeps the airway open to prevent pauses in breathing and restore normal oxygen levels. Help for OSA is available at more than 2,200 AASM-accredited sleep disorders centers across the U.S.

Provided by American Academy of Sleep Medicine