

New light on link between snoring and cognitive deficits in children

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About two-thirds of children with sleep-disordered breathing (SDB)—snoring or obstructive sleep apnea (OSA)— have some degree of cognitive deficit, but the severity of the cognitive deficit has been notoriously difficult to correlate to the severity of the SDB, suggesting that other important issues may be at play, or that the right factors were simply not being measured.

A new study that will be published in the first issue for November of the American Thoracic Society's *American Journal of Respiratory and Critical Care Medicine* opens the door to understanding the complex relationship between sleep, breathing and brain function in a whole new way.

"A history of snoring is a predictor for cognitive deficit in children with SDB," said principle investigator Raouf Amin, M.D., professor of pediatrics and the director of the Division of Pulmonary Medicine at Cincinnati Children's Hospital Medical Center. "However, the frequency of apnea events during sleep does not predict cognitive deficit and does not correlate with the degree of cognitive deficit. Such a paradox raised the question of whether there are some variables that we do not traditionally measure in the sleep laboratory that might modify the effect of SDB on cognition."

Dr. Amin and colleagues measured a new parameter to determine whether it could explain the variability in cognitive dysfunction better than the severity of SDB: the degree to which the brain's blood remains

oxygenated during sleep. Using a technology called near infrared spectroscopy, which is able to penetrate the skull with high-powered light beams to assess oxygen saturation, they measured the "regional cerebral oxygen concentration" (SrO₂) in children 7 to 13 years old with SDB to varying degrees. They also measured blood pressure (BP) during sleep.

As expected, they found that children with snoring had lower regional cerebral oxygen concentration than healthy children. But, paradoxically, they found that children with sleep apnea, which is usually considered a more severe degree of sleep-disordered breathing, have higher regional cerebral oxygen concentration than children with just snoring.

"During normal sleep, when breathing appears to be stable, there seems to be higher oxygen in the brain among children with sleep apnea compared even to normal children," said Dr. Amin, who attributes the unexpected finding to the sleep apnea raises blood pressure. "Children with sleep apnea have higher BP compared to children with snoring. This may explain why paradoxically we find higher oxygen levels in children with OSA."

This study opens the door to a new area of study, said David Gozal, M.D., professor of pediatrics and director of the Kosair Children's Hospital Research Institute at the University of Louisville, who wrote the accompanying editorial in the journal. "It shows us that what is happening in children with OSA and that neurocognitive deficits are not just in the brain matter but involve the cardiovascular system as well."

More than anything, the study opens up avenues of inquiry for investigating the perplexing link between SDB and cognitive deficits in children. Understanding the source of that association will be key in future efforts to treat or prevent it.

"By taking into account the role of blood pressure in regulating the amount of oxygen concentration in the brain, we might have a better understanding of the relationship between sleep-disordered breathing and cognitive deficit," concluded Dr. Amin.

Source: American Thoracic Society

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