Children with insomnia may have impaired heart rate variability

March 2 2010

Children with insomnia and shorter sleep duration had impaired modulation of heart rhythm during sleep, Pennsylvania researchers reported at the American Heart Association's 50th Annual Conference on Cardiovascular Disease Epidemiology and Prevention.

In a study of young children, researchers showed that insomnia symptoms were consistently associated with impaired heart variability measures. They also found a significant but less consistent pattern with shortened sleep duration and decreased heart rate variability.

Heart rate variability is the beat-to-beat variations of heart rate. In a healthy person, beat-to-beat intervals change slightly in response to automatic functions like breathing.

The study included 612 elementary school children in the first to fifth grades. The children were average age 9, and 25 percent were non-white and 49 percent were boys. All were generally in good health. Their parents completed the Pediatric Behavior Scale, including two questions that focused on symptoms of insomnia.

Researchers examined the children overnight in a sleep laboratory with polysomnography (PSG), a standardized method for measuring sleep disorders. The researchers measured sleep duration, trouble falling asleep, the number of wake-ups and problems going back to sleep if awakened. They also measured cardiac autonomic modulation (CAM), the balance of the sympathetic and the parasympathetic control of the

heart rate rhythm.

A balance is needed between the sympathetic modulation that "excites" the heart and the parasympathetic modulation that "calms" the heart, said Mr. Fan He, the lead-author of the study and a graduate student at Penn State University College of Medicine in Hershey, Pa. "The balance between the sympathetic and the parasympathetic provides a favorable profile for the heart."

The study showed:

- Children with reported insomnia had impaired CAM with a shift towards more sympathetic or excitable activation of the heart rhythm. There was a 3 percent to 5 percent reduction in the parasympathetic modulation of heart rhythm in children with insomnia.

- Children with longer sleep duration had a slower heart rate indicative of a balance of heart rhythm, with a shift towards more parasympathetic modulation. The heart rate of children who slept eight hours was two beats per minute slower than that of kids who slept only seven hours.

- Insomnia and short sleep duration, even in young children, resulted in a physiological activation of the sympathetic modulation.

"Kids who sleep a longer duration have a healthier heart regulation profile compared to kids who sleep shorter durations," said Duanping Liao, M.D., Ph.D., co-author of the study and professor of epidemiology at Penn State University College of Medicine in Hershey, Pa. "Their hearts are more excitable if they have insomnia. If the heart is too

excited, that means it is beating too fast and usually that isn't good. These data indicate that among young children with insomnia symptoms reported by their parents, there already is an impairment of cardiovascular autonomic regulation, long before they reach the traditional high-risk period for cardiovascular disease."

Parents should encourage their children to have healthy bedtime habits that encourage sleep, Liao said. "Watching television before going to bed and waking up to return text messages are examples of activities that could have a harmful affect on healthy sleep patterns in children."

Liao called for further studies in children to determine the impact of sleep deprivation and stress and the possible long-term risk of cardiovascular disease and obesity. "Previous studies have shown a strong association of heart rhythm regulation and heart risk in adults. It's quite possible that this kind of stress can have a long-term impact even at a young age."

The study was funded by the National Heart, Lung, and Blood Institute.

Provided by American Heart Association

Citation: Children with insomnia may have impaired heart rate variability (2010, March 2) retrieved 24 April 2024 from https://medicalxpress.com/news/2010-03-children-insomnia-impaired-heart-variability.html

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