

Key Points

1. Several reports have indicated that sleep apnea is common among Chiari patients
2. This study looked at 46 patients of all ages with Chiari I and II
3. Found that 73% of adults suffered from sleep apnea
4. Also found that 60% of children had apnea as well
5. Apnea tended to be mild in the children but was more severe among older adults
6. Exact mechanism not known, but Chiari affects brainstem and cranial nerves which are critical for breathing during sleep
7. Snoring, especially in children, can be an indication of apnea

Definitions

apnea - temporary stop in breathing

central sleep apnea - sleep apnea due to a delay in the nerve signal from the brain to breathe

cranial nerves - 12 pairs of nerves that start in the brain itself versus the spinal cord

hypopnea - slow or shallow breathing

obstructive sleep apnea - sleep apnea due to an obstruction in the throat

polysomnography - studying physical measures - such as breathing - during sleep in a controlled environment

sleep apnea - disruption of breathing during sleep which lasts longer than 10 seconds

sleep apnea index - a measure of how many apnea episodes occur during an hour of sleep

sleep apnea syndrome (SAS) - name given when sleep apnea index is unusually high

cerebellar tonsils - portion of the

Majority Of Chiari Patients Suffer From Sleep Apnea

May 31, 2007 -- Sleep apnea is a disorder where a person actually stops breathing for an extended period of time during sleep and must wake up to breathe again. An adult is considered to have sleep apnea disorder when he or she suffers more than 5 such incidents per hour during the night, but severe cases can result in hundreds of such incidents each night.

There are two main types of sleep apnea, obstructive and central. Obstructive apnea is when breathing is disrupted by something blocking the throat - usually a narrowing of the windpipe. Central apnea is when there is a delay in the nerve signals from the brain which control breathing. Of the two, central apnea is considered to be more serious, and people with central apnea often are found to suffer from both central and obstructive episodes during the night.

The effects of prolonged apnea can be severe, especially in children. For adults, daytime sleepiness can result in reduced productivity at work and lack of energy. In children, chronic apnea can cause behavioral problems, interfere with normal growth and recent research has indicated that it can even affect brain development.

The diagnostic criteria for sleep apnea are fairly well established and sleep centers to test for apnea are becoming more common, especially in the US. Testing, which is referred to as polysomnography, involves spending the night at a special lab where different biological functions, such as breathing and brain activity, can be monitored during sleep. In this way, apnea episodes can be identified, counted and classified.

In recent years, there have been several publications linking Chiari to an unusually high rate of sleep apnea and now a study from France indicates that the majority of Chiari patients, both young and old alike, suffer from clinically defined sleep apnea. Published on-line in the Journal of Neurology, Neurosurgery and Psychiatry (Dauvilliers et al.), the study looked at 46 Chiari patients at two centers in France.

The patient group was comprised of 26 adults and 20 children. All patients had definitive, symptomatic Chiari (40 Chiari I/20 Chiari II) as verified by MRI and underwent a battery of tests, including physical and neurological exams, imaging studies, polysomnography and examination of the throat and larynx.

The researchers used well accepted definitions of apnea episodes and defined sleep apnea syndrome as an apnea index (average episodes per hour of sleep) greater than five for the adults and greater than one for the children. Using this definition, they found that nearly three out of four (73%) of the Chiari adults suffered from sleep apnea and 60% of the children did as well (see Table 1).

These numbers are extremely high considering the frequency of sleep apnea among children in the general population is thought to be less than 3% and less than 15% among adults. However, it is important to note that for the majority of patients, the sleep apnea was considered mild. The average apnea index for the children was 2.6 which is just above the cut-off for clinical apnea. Similarly, in adults younger than 30, the average apnea index was barely above 5 which was the cut-off used in the study. However, in older adults the average apnea index jumped to 26.4, and a significant percent of the cases were considered severe.

Although obstructive apnea was more common, as has been seen in other research, there was an unusually high percent of central apnea episodes as well indicating problems with nerve signaling during sleep.

The precise mechanism by which Chiari is linked to sleep apnea is not known, however there are a number of possibilities. First, the Chiari malformation itself may compress the brainstem, which is where the breathing center is located. Second, Chiari is also known to compress and interfere with the function of the cranial nerves which are also important for breathing at night. Finally, Chiari is also known to cause problems in the throat area, such as swallowing, hoarsely voice, etc. It may be that in some cases of Chiari, the muscles of the lower throat become weakened, and this weakness leads to an obstruction of the airway during sleep. In fact, the researchers in this study found that vocal cord paralysis was a strong predictor of apnea, which supports the weak muscle theory.

The evidence is now abundant that apnea is common with Chiari and patients should be cognizant of this fact. While decompression surgery has been shown to improve apnea, it is not 100% effective, especially with central sleep apnea, and additional treatments may need to be considered. Parents of Chiari children in particular should consider monitoring their children's sleep occasionally to see if there is excessive snoring or periodic arousals and discuss these issues with their doctors.

Frequency of Sleep Apnea Syndrome In Chiari Patients vs General Population

cerebellum located at the bottom, so named because of their shape

cerebellum - part of the brain located at the bottom of the skull, near the opening to the spinal area; important for muscle control, movement, and balance

cerebrospinal fluid (CSF) - clear liquid in the brain and spinal cord, acts as a shock absorber

Chiari malformation I - condition where the cerebellar tonsils are displaced out of the skull area into the spinal area, causing compression of brain tissue and disruption of CSF flow

Source

Dauvilliers Y, Stal V, Abril B, Coubes P, Bobin S, Touchon J, Escourrou P, Parker F, Bourgin P. [Chiari malformation and sleep related breathing disorders.](#) J Neurol Neurosurg Psychiatry. 2007 Mar 30

	Chiari	General Population
Adults	73%	4%-15%
Children	60%	1%-3%

Notes: General population frequencies were cited in this study but are derived from other publications

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