A Link Between Sleep and ADHD


JON KRAUSE

COULD ADHD be a problem caused by a disruption in circadian rhythms?

It's an area of research that some experts say holds promise for developing new treatments for attention-deficit hyperactivity disorder.

Many adults and children diagnosed with ADHD report sleep problems. Some have difficulty falling asleep or staying asleep, and some develop sleep apnea.

Sandra Kooij, an associate professor of psychiatry at VU University Medical Centre in Amsterdam, says ADHD and sleep may be more intertwined than previously thought. She proposed a theory at a conference in September that ADHD may be caused by a lack of regular circadian sleep.

Her research has found that 78% of adults diagnosed with ADHD have a delayed-sleep phase or circadian rhythm, which means they are night owls and don't get sleepy or tired enough to fall asleep until 2 or 3 a.m. In the normal adult population about 20 to 25% have such a chronotype, or sleep-wake rhythm, she says.

"Everyone who treats people with ADHD recognizes the day and night difficulties," she says.

The researchers measured the sleep hormone melatonin in the saliva of 40 subjects and found that its production began 105 minutes later in the ADHD group: at 11:15 p.m., compared with 9:30 p.m. in a control group. They also found that the adults in the control group fell asleep on average two hours after melatonin production began, compared with three hours later for the ADHD group.

The hyperactivity that manifests itself during the day for those with ADHD may be a coping mechanism for exhaustion, Dr. Kooij says.

In another 24-person study, Dr. Kooij and colleagues found that core body temperature and moving patterns associated with sleep were also delayed in people with ADHD, compared with a control group. The body's core temperature drops during sleep, and movement slows.

Her patients will try going to sleep early to compensate for lack of sleep, then return to their usual rhythm of going to bed late, which results in a disrupted rhythm. "My hypothesis is that because ADHD and circadian sleep delay overlap in around 80% of patients, they might both be an expression of a circadian-rhythm disorder," she says.

ADHD patients have low levels of dopamine, a neurotransmitter in the brain whose levels start increasing in the morning. Many ADHD medications boost dopamine levels.

Dr. Kooij notes that ADHD patients also tend to suffer from seasonal affective disorder (SAD) more often than others, meaning they get more depressed in the winter when days are shorter. And they experience more fatigue and weight gain.

Researchers are now studying whether ADHD patients with a delayed sleep phase can be treated with light therapy, which is often used to treat SAD. In such treatments, patients are exposed to bright light for 30 minutes in the morning when they wake up to reset their body's internal clock.

"Even if it's not curing ADHD but only diminishing its severity, it will be very, very helpful," Dr. Kooij says.

Robert Levitan, a professor of psychiatry at the University of Toronto, says he was doing a genetic study on SAD when he noticed large numbers of people with SAD also had ADHD.

> 'It's probably the ADHD pathology that leads to a sleep problem,' one researcher says.

He subsequently sampled a group of adults with ADHD and found a very high number reported having SAD. "ADHD is thought to be a disorder of understimulation of the brain, so you treat it with stimulant medication," he says. "Similarly, we use light therapy to stimulate the brain in SAD."

He has used the same light treatments used to treat SAD patients—30 minutes of ultraviolet-filtered light exposure in the morning—on those who also have ADHD. He found that they subsequently performed better on neuropsychology tests. They completed more of their tasks accurately and more quickly.

Other groups have replicated the findings. More researchers are showing interest in using light for ADHD treatment, he says.

Dr. Levitan wouldn't go so far as to say that ADHD is a sleep disorder. But he does believe there's a consistent pattern in a large number of ADHD patients related to sleep.

"It's probably the ADHD pathology that leads to a sleep problem," he says.

Andrew Coogan, a behavioral neuroscientist and head of the psychology department at Maynooth University in Ireland, has researched ADHD and sleep. He examined levels of cortisol, a stress hormone with ebbs and flows over a 24-hour period in the body controlled by the master circadian clock in our brains. Cortisol levels generally peak on awakening. Dr. Coogan found it peaks about 30 to 40 minutes later in adults with ADHD, suggesting a delay in the internal body clocks of those patients.

Dr. Coogan says that genes aside, adults with ADHD may also be affected by medications they are taking, which can impact sleep.

The interplay between ADHD and sleep in children is trickier, because their sleep patterns and circadian rhythms change as they grow. "In adults, sleep is a little bit more set," Dr. Coogan says.