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A Mouth Guard as Effective as CPAP for Sleep Apnea?

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STORY AT-A-GLANCE

- Continuous positive airway pressure (CPAP) often leaves the user feeling claustrophobic and may cause dry membranes in the mouth and eyes. Many are finding that mandibular advancement devices (MADs) are as effective with fewer side effects
- When the airway closes during sleep apnea it triggers a pause in breathing that may resume with a loud gasp. A MAD pushes the lower jaw forward, moving the tongue base away from the airway and reducing the potential for obstruction
- Adequate sleep helps maintain metabolic and biological homeostasis, supports the removal of toxic waste products from the brain and promotes memory formation. By contrast, sleep apnea increases the risk of high blood pressure, diabetes, obesity, Alzheimer's disease and infection
- Sleep apnea and other sleep disorders also increase the risk of osteoporosis, pain perception, impaired sexual function, mental health dysfunction, premature aging and slowed reaction time

Doctors who practice sleep medicine are finding that mandibular advancement devices (MADs) or moveable mouth guards, are an effective alternative to CPAP machines for sleep apnea.[1] Sleep apnea is a medical condition during which you intermittently stop breathing while you're asleep.

The most common type of sleep apnea is obstructive sleep apnea, which often presents as snoring. Nearly 50% of the population snores.[2] However, sleep apnea is more than

just snoring. The throat muscles may intermittently relax during sleep, obstructing the airway and lowering the oxygen level in the blood.

As the brain registers that oxygen levels have declined, the person awakens briefly. Breathing may resume with a loud gasp or body jerk, yet the person does not remember waking during the night.[3] A person may have mild, moderate or severe sleep apnea. Those with a severe condition can wake up more than 30 times every hour.

There are specific physical and clinical features that are common in individuals who have obstructive sleep apnea. For example, people with nasal obstruction, enlarged tonsils or a small jaw with an overbite are at higher risk of experiencing sleep apnea. Individuals who are overweight or obese also have an increased risk as the added weight can obstruct the upper airway.

Dr. Colleen Lance is a physician at Cleveland Clinic Sleep Disorders Center. She says "The higher your body mass index is, the less likely the dental appliance is going to work. Any extra weight is going to close that airway even more."[4]

Mouth Guard May Improve Your Sleep Apnea

Lance says that CPAP remains the gold standard for treating sleep apnea.[5] CPAP stands for continuous positive airway pressure. Continuous air pressure is produced by a small device that sends the air through a mask, which can cover a person's mouth, nose or mouth and nose.[6]

The air pressure keeps the airway open, so it does not collapse during sleep. This helps prevent the drop in oxygen level during the night and improves sleep quality. The most common side effect of using CPAP is a feeling of claustrophobia when wearing the mask.

Other individuals may experience nasal congestion, dry mucous membranes in the mouth and eyes or sores where the mask applies pressure over the face during the night. Although CPAP is an effective strategy to reduce apnea, the discomfort and

claustrophobia have prompted many people to turn to MADs and mouth guards to address the issue.[7]

MADs are custom fit by dentists in collaboration with sleep doctors. The device has two pieces that fit over your top and bottom teeth. They are connected on both sides by a mechanism that's used to slowly push the lower jaw forward. By changing the position of the lower jaw, it moves the tongue base away from the airway and reduces the potential for obstruction.

The dentist does a physical examination and X-rays to calculate how many millimeters forward your lower jaw must be moved to keep the airway open. The adjustments are made very slowly so it doesn't change your bite or create jaw pain. The difference between the over-the-counter models and those that are custom-molded is the fit.

One of the reasons people want to use a mouth guard instead of CPAP is that the CPAP can cause discomfort. Also, there's always the likelihood they might pull the machine off during the night. If the mouth guard does not fit well, you can have the same issue of discomfort and not wearing it through the night. Lance reports that the oral devices are usually prescribed for people who have mild to moderate challenges with sleep apnea.[8]

One 2017 review of the literature[9] found that CPAP and MADs produced similar results. In 2,342 patients the researchers found that CPAP improved the mental component score by 1.7 compared to the 2.4-point improvement in patients using MADs. There was a 1.7-point improvement in the physical component score in patients using CPAP as compared to the 1.5-point improvement in those using MADs.

In another study,[10] researchers looked at the side effects of using a mandibular advancement splint to address sleep apnea. They found patients reported excessive salivation, temporomandibular joint pain, myofascial discomfort, bite changes and dry mouth. A third paper published in 2019[11] found that though the devices can reduce the severity of the condition, approximately 1 in 3 showed little improvement.

The researchers suggest that selecting the appropriate candidate may help reduce the number who do not find relief. Researchers[12] have also sought to compare three

different oral appliances that may be used to help reduce sleep apnea. They found the MAD was the best option for effective treatment as "the tongue retaining device and the soft palate lift could not achieve satisfactory results."[13]

Sleep Is Essential

Common symptoms that are associated with obstructive sleep apnea include excessive daytime sleepiness, frequent loud snoring, decreased ability to concentrate and pay attention, dry mouth or headaches when waking and sexual dysfunction.[14]

To understand how sleep affects health, it's important to understand what we know about why we sleep. For many ambitious individuals, sleep may seem like an annoyance without a clear purpose. However, far from being a waste of time, scientists have discovered that sleeping impacts nearly every area of your physical and mental health.

Matthew Walker, Ph.D., is a professor of neuroscience and psychology at the University of California-Berkeley, founder and director of the Center for Human Sleep Science and author of the book "Why We Sleep: The New Science of Sleep And Dreams." He covers many of the benefits of sleep in his book, some of which include:[15]

- **Maintaining metabolic homeostasis in your brain —** Wakefulness is associated with mitochondrial stress and without sufficient sleep, neuron degeneration sets in, which can lead to dementia.[16] In one animal study,[17] mice lost 25% of the neurons located in their locus coeruleus,[18] a nucleus in the brainstem associated with arousal, wakefulness and certain cognitive processes.

- **Maintaining biological homeostasis —** Your body contains an array of body clocks that regulate everything from metabolism to psychological functioning. The Nobel Prize in physiology or medicine in 2017[19] was awarded for the discovery of these body clocks.

  All these clocks, while having slightly different rhythms, are synchronized to the master clock in your brain. When these clocks become desynchronized, a wide array of health problems can ensue.

- **Removal of toxic waste from your brain through the glymphatic system —** This system ramps up its activity during deep sleep, thereby allowing your brain to clear out toxins,[20] including harmful proteins linked to brain disorders such as Alzheimer's.

  By pumping cerebral spinal fluid through your brain's tissues that shrink during the night to allow greater flow,[21] the glymphatic system flushes the waste from your brain, back into your body's circulatory system. From there, the waste eventually reaches your liver, where it can be eliminated.[22,23]

- **Memory formation and improving daytime performance —** During sleep, your brain pulls together and extracts meaning from the day's events. Dreams also play an important role. Tests reveal dreaming about performing an activity improves physical performance.[24] In the dream state, your brain is processing information at multiple levels. Your whole brain is engaged.

Sleep Apnea Linked to Heart Disease and More

Diet and exercise may come quickly to mind when you think of methods to boost your heart health. Yet, a third crucial component is sleep. Research has connected a lack of sleep with subclinical atherosclerosis,[25] which is a progressive inflammatory disease that manifests as coronary heart disease.

The link between sleep and heart health has also been associated with the number of hours you get per night.[26] People who sleep less than seven hours or greater than nine hours have an increased risk of heart disease, regardless of other factors that influence heart health like age, weight, smoking and exercise.

Women with sleep apnea tend to have a higher level of troponin T, which is a protein marker for heart damage.[27] They are also more likely to have an enlarged heart, which is another risk factor for heart disease. A lack of sleep can increase your risk for several more health problems, including:

- **Blood pressure —** When you sleep, your blood pressure naturally goes down, a phenomenon known as "nocturnal dipping."[28] Lack of sleep dampens this natural dipping, which may increase your risk of death from heart disease by at least 20%.

  Lack of sleep is also known to increase nighttime blood pressure,[29] and high blood pressure at night is an even better predictor of heart disease risk than daytime blood pressure.

- **Type 2 diabetes —** Too little sleep, poor sleep quality and sleep disorders such as insomnia and sleep apnea have all been associated with diabetes risk, via multiple mechanisms. Researchers wrote in Current Diabetes Reports:[30]

  > *"Sleep is important for regulating many physiologic functions that relate to metabolism.*
  >
  > *Because of this, there is substantial evidence to suggest that sleep habits and sleep disorders are related to diabetes risk. In specific, insufficient sleep duration and/or sleep restriction in the laboratory, poor sleep quality, and sleep disorders such as insomnia and sleep apnea have all been associated with diabetes risk."*

- **Obesity —** Research links not enough sleep with an increased risk of metabolic diseases, including obesity. One study[31] found shorter sleep is associated with obesity and larger waist circumference. People who are overweight or obese are at an increased risk of heart disease.

- **Alzheimer's disease —** In a similar vein, research published in the journal Neurobiology of Aging suggests people with chronic sleep problems develop Alzheimer's disease sooner than those who sleep well.[32]

- **Infection —** Research[33] has shown that sleep deprivation has the same effect on your immune system as physical stress. Getting adequate amounts of sleep has the potential to improve your body's immune cell's ability to attach to their target and destroy it.[34]

Study leader, Stoyan Dimitrov, a researcher from the University of Tubingen, Germany, advises that if you want your immune system to fight off pathogens, it's important to avoid chronic stress and get adequate sleep each night.[35]

Sleep Disorders Disrupt More of Your Health and Productivity

Considering how important sleep is to your health, it's easy to see how it affects a wide variety of health conditions. Lack of sleep also makes you more susceptible to infections and other health problems that include, but are not limited to:

Increased risk of osteoporosis.[36]	Increased risk of pain and pain-related conditions such as fibromyalgia.[37]
Increased susceptibility to stomach ulcers.[38]	Impaired sexual function.[39]
Increased risk of depression, anxiety, post-traumatic stress disorder and suicide.[40,41]	Premature aging by interfering with growth hormone production, normally released by your pituitary gland during deep sleep.[42]
Increased risk of dying from any cause.[43]	Impaired memory and reduced ability to learn new things.[44]
Reduced productivity.[45]	Reduced athletic performance.[46]
Slowed reaction time, increasing your risk of accidents on the road and at work.[47]	Impaired regulation of emotions and emotional perception.[48]

Optimizing Sleep Is Beneficial for Your Health

There's simply no doubt that sleep needs to be a priority if you intend to live a long and healthy life. Anyone struggling with chronic disease — which is at least half of the American adult population[49] — would be wise to take sleep seriously, as it can have a significant impact, not only contributing to the problem but also counteracting any other healthy lifestyle strategies you're using to address it.

In conjunction with addressing challenges from sleep apnea, seek to get around eight hours of sleep every night. Anything below seven hours really starts to impact your health. For many, this means forgoing night-owl tendencies and getting to bed at a reasonable time. If you need to be up at 6 a.m., you must have a lights-out deadline of 9.30 or 10 p.m., depending on how quickly you tend to fall asleep.

Be sure you're sleeping in complete darkness, as light (even that from a night light or alarm clock) can disrupt your internal clock and your production of melatonin and serotonin, and therefore interfere with your sleep.

At night, as the sun sets, darkness should signal to your body that it's time to sleep. Keep the temperature cool in your bedroom, between 60 and 68 degrees Fahrenheit, and eliminate electromagnetic fields (EMFs). Ideally, shut down the electricity to your bedroom by pulling your circuit breaker before bed and turning off your Wi-Fi at night.

This is just a starting point. Other ways to improve your sleep include adopting a neutral sleeping position, going to bed earlier and considering a separate bedroom if your partner is interfering with your sleep. In the morning, bright, blue light-rich sunlight signals to your body that it's time to wake up and shuts off your melatonin production.

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