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This *Sunstar E-Brief* examines the risks mouth breathing poses to oral and systemic health, as well as its association with the misdiagnosis of attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD).

Facial development is an area that can be impacted by mouth breathing. One study of North American children between the ages of 6 and 12 found that mouth breathers had longer faces than those who were not mouth breathers.² This difference manifested as narrower maxillae and retrognathic jaws. The results of this research demonstrate that without proper treatment, mouth breathing can negatively affect normal facial and dental development, and lead to oral health problems, such as malocclusion.³

Another study examined the long-term effects of mouth breathing on the vertical position of posterior teeth. In this investigation, subjects chewed gum while their nostrils were blocked with nose clips. Researchers then collected chewing data electronically. The degree and duration of vertical force on posterior teeth as a result of chewing activity were evaluated, along with other measures, such as variation in chewing cycle. The findings indicated that mouth breathing reduced the number of chewing cycles, as well as the level of mastication activity. These changes resulted in a decreased exertion of vertical force on the posterior teeth as subjects chewed. The research team concluded that mouth breathing may adversely affect the vertical position of the posterior teeth, and contribute to the development of open bite.⁴

REDUCED OXYGEN TRANSPORT

While many oral health professionals may be familiar with the risk mouth breathing poses to dental structures, they may be less aware of the deleterious effects it can have on systemic health. It is here that the oral cavity's connection to the upper respiratory tract comes into play, notes Tung Nguyen, DMD, MS, an assistant professor of orthodontics at the University of North Carolina at Chapel Hill School of Dentistry.

"Mouth breathing is a multifactorial problem, but it is mainly attributed to swelling of the oral and nasal tissues that leads to decreased airflow through the nasal cavity," Nguyen explains. "As a consequence, these patients have to rely on breathing through their mouths to get adequate oxygen levels."

Mouth breathing moves oxygen less efficiently than nasal respiration, and individuals who breathe primarily through their mouths exhibit lower concentrations of oxygen in the blood than those who have optimal nasal respiration. Studies have established an association between cardiac failure and high blood pressure with low concentrations of oxygen in the bloodstream.⁵⁻⁸

Another disadvantage is that mouth breathing moves respiration away from the paranasal sinuses, which produce nitric oxide molecules.⁹ Nitric oxide is a vasodilator that increases oxygen transport throughout the body, and when acquired through nasal respiration, it can increase oxygen exchange efficiency and raise blood oxygen levels by 18%.¹⁰ The lungs have a greater ability to absorb oxygen when nitric oxide is produced via nasal respiration,¹¹ but mouth breathing reduces those benefits.

TRIGGER FOR BEHAVIORAL ISSUES

Mouth breathing can also be associated with behavioral problems and sleep disorders in children. For example, enlarged adenoids or tonsils can cause mouth breathing and act as obstructions that trigger sleep apnea. This

condition can negatively impact children, potentially manifesting in issues involving attention, behavioral inhibition and socio-emotional behavior.¹²

While ADHD is the most commonly diagnosed behavioral disorder among pediatric patients, research indicates that many children are actually being misdiagnosed, when in reality they suffer from sleep disorders.¹³ Unfortunately, the neurological effects of sleep-disordered breathing may not be reversible. These phenomena underscore the critical need for prompt, accurate diagnoses, which can yield highly successful results, according to Melanie Simmer-Beck, RDH, PhD, an associate professor in the division of dental hygiene at the University of Missouri-Kansas City, School of Dentistry.

Simmer-Beck notes that while working in clinical practice, she had cases in which mouth breathing and sleep apnea were found in teenagers who were also diagnosed with ADD/ADHD. "These kids had their tonsils and adenoids removed, and after the procedure was completed, their school performance improved tremendously," she says.

VITAL SIGNS

These cases point to the importance of clinicians' roles in educating patients about the potential correlation between mouth breathing, sleep disorders and overall health and quality of life. Nguyen notes that sleep disorders, such as sleep apnea, should always be given proper attention, and recommends patients arrange for an examination if they observe these symptoms:

- An increase in snoring
- Awakening multiple times during the night
- Constant fatigue and inability to focus during the day
- Falling asleep frequently in the daytime and while driving

Mouth breathing can be a red flag that signals the need to investigate and correctly diagnose the source of symptoms. A multidisciplinary team of oral health professionals, physicians and other specialists can best manage the diagnosis and treatment of mouth breathing with solutions that range from removing swollen adenoids and tonsils to therapeutic oral appliances.³ The observational skill of dental clinicians can be key in identifying potential signs of mouth breathing, and can help initiate a vital first step toward correct diagnosis and effective treatment.

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