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THE ROLE OF NASAL BREATHING IN SLEEP OPTIMIZATION: A CLINICAL ANALYSIS OF THE EFFICACY AND RISKS OF THE MOUTH TAPING METHOD

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ABSTRACT

Background. Nasal breathing is obligatory for maintaining airway patency, humidifying and delivering Nitric Oxide (NO). In contrast, mouth breathing increases airway resistance and leads to significant nocturnal dehydration and sleep fragmentation. Nocturnal Mouth Taping (NMT) has gained popularity as a tool to enforce the nasal route.
Aim. To explore the physiological advantages of nasal respiration, and to study the clinical effect and safety for mouth taping approach.
Materials and Methods. A narrative review of 20 peer-reviewed sources (2003–2025) was conducted using databases such as PubMed, Scopus, and Google Scholar, focusing on respiratory physiology and clinical outcomes of nocturnal mouth taping.
Results. In mild OSA (Obstructive Sleep Apnea) patients NMT reduces significantly Apnea/Hypopnea Index (from 8.3 to 4.7 events/h) and snoring (by 47%). However, it is ineffective for moderate-to-severe OSA, where "mouth puffing" indicates persistent airway collapse despite mechanical lip closure.
Conclusions. The existing evidence is inadequate for clinical use of NMT. The practice is explicitly discouraged for the general population, especially those with moderate-to-severe OSA or nasal obstructions, due to life-threatening risks of asphyxiation and aspiration. NMT cannot replace medical treatment and potentially dangerous delay of appropriate surgery may occur for underlying anatomical pathologies.

KEYWORDS

Nasal Breathing, Mouth Taping, Sleep Apnea, Airway Resistance, Nitric Oxide

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1. Introduction

1.1. Definitions of Physiological Breathing and Mouth Breathing: Nasal breathing is the exclusive or prevailing use of the nose for respiration, which serves as the primary and most efficient gateway for the respiratory system. Georgalas (2011) concluded that the nose contributes more than 50% of overall resistance of the upper airway, serving as a key modulator of pressure and airflow. In contrast, mouth breathing is typically a compensatory mechanism triggered by nasal obstruction or an entrenched behavioral habit. A transition to mouth breathing during sleep is coincident with a significant increase in airway instability. Koutsourelakis et al. (2006) revealed that oral breathing segments are related to increased apnea severity, also in non-anatomically stenosed nasal patients, suggesting that the route itself influences the collapse-propensity of the throat.

1.2. Mouth Taping as a Therapy Device: During the night with mouth taping (NMT) individuals mechanically close their lips by a hypoallergenic, porous adhesive and are obliged to breathe only through the nose. Lately, this method has gained popularity on social media, where it is often presented as a panacea for issues ranging from low energy to poor dental health. However, Fangmeyer et al. (2025) and Rhee et al. (2025) point out that the public excitement about these potential benefits has predated clinical evidence to support them. They suggest that NMT is a subject specific adjunct to sleep medicine rather than an independent technology for treatment of OSA.

1.3. Objective of the Study: The present review aims to summarize the physiological advantages of nasal breathing during sleep and objectively analyze the treatment efficacy and safety of mouth taping. Analysis relates to the parameters of respiration (AHI, ODI), biochemistry of respiration gas, and particular risks for people possessing unclarified diagnoses of nasopharynx pathology.

2. Material and Methods

A narrative review of the literature was conducted using databases such as PubMed, Scopus, and Google Scholar, focusing on peer-reviewed articles published between 2003 and 2025. The selection was restricted to studies addressing upper airway mechanics, respiratory physiology, and clinical outcomes of sleep-disordered breathing. A total of 20 sources were analyzed to evaluate the physiological impact, efficacy, and safety profile of nocturnal mouth taping in various patient populations.

3. Physiology of Nasal Breathing and Sleep Quality

3.1. Filtration, Humidification, and Thermoregulation: As the first anatomical filter and main inrushing airway under physiological conditions, the nose has important physiological functions. These functions reduce and warm the air before it enters the lungs. Constituting itself over 50% of the complete upper airway resistance, the nose is a key regulator of airflow. This conditioning and resistance are important for respiratory stability, as artificial or disease-induced nasal obstruction, bypassing these functions, is closely related to a higher number of micro-arousals and marked sleep fragmentation (Georgalas 2011).

3.2. The Role of Nitric Oxide (NO): One of the unique benefits of breathing through the nose is that it delivers Nitric Oxide (NO), a molecule housed primarily in the paranasal sinuses. Spector et al. (2023) view NO as an "aerocrine messenger" carried to the lungs by inspired air, while Kawasumi et al. (2021) highlight the pivotal role of this complex for maintaining homeostasis in the human airway. Research by Bandara et al. (2021) shows for NO and Carbon Monoxide (CO) that the concentrations of these gases in paranasal sinus air are higher than those in lower airways. NO is a powerful vasodilator, optimizing the ventilation-perfusion (V/Q) ratio in the alveoli, which in turn facilitates systemic oxygen uptake. In addition, NO upregulates ciliary beat frequency which helps promote effective mucociliary clearance and remains an important initial defense against inhaled pathogens.

3.3. Autonomic Activation and Respiratory Control: Nasal breathing is conducive to optimal respiratory mechanics and autonomic tone. Zaliene et al. (2025) reported that breathing methods combined with nocturnal mouth taping resulted in a statistically significant increase of high-frequency (HF) component of heart rate variability (HRV). This change suggests increased parasympathetic nervous system activity. Such physiological modifications are related to lowered perceived stress and increased respiratory reserve, thus promoting general psychophysiological recovery and potentially enhanced sleep.

4. Pathophysiology of Mouth Breathing During Sleep

4.1. Airway Instability and the Starling Resistor Model: Mouth-breathing during sleep is biomechanical disadvantageous. As Georgalas (2011) points out, the Starling Resistor Model explains why: when opening a mouth, the mandible and tongue are displaced posteriorly (downward and backward), significantly narrowing the oropharyngeal space. Fitzpatrick et al. (2003) confirmed this result in a crossover randomized study, after upper airway resistance rose from 5.2 $cmH_2O/L/s$ during nasal breathing to 12.4 $cmH_2O/L/s$ ($p < 0.001$) during oral breathing in NREM sleep. This massive increase in resistance directly leads to the vibration of soft tissues (snoring) and total airway collapse (apnea).

4.2. Xerostomia and Nighttime Water Loss: Mouth breathing, which occurs during 96.7% of sleep time in patients with obstructive sleep apnea (OSA) compared to only 26.7% in healthy individuals, bypasses the nasal humidification system and leads to significant xerostomia and systemic dehydration. As Su et al. (2023) report, dry mouth afflicts between 22.4% and 40.7% of OSA sufferers, with symptoms worsening linearly alongside the severity of the disorder. Such a change in the route of respiration causes a much greater estimated volume loss in plasma (5.5% as opposed to 3.7% for controls) and nocturnal hemoconcentration characterized by an average rise in hematocrit (1.35%) and hemoglobin level (0.50 g/dL) while one-fourth of obstructive sleep apnea sufferers shed fluids amounting to 8.7% - it is a degree of dehydration comparable with that seen in marathon runners. It is a critical risk factor for nighttime ischemic heart attacks and certain other dire consequences.

4.3. Sleep Architecture and BMI: Koutsourelakis et al. (2006) found that patients with obstructive sleep apnea (OSA) spend a significantly higher percentage of their sleep epochs breathing orally or oro-nasally compared to simple snorers. This shift in breathing route is driven primarily by the severity of the Apnoea/Hypopnoea Index (AHI) and is exacerbated by sleep fragmentation and nocturnal hypoxemia, which creates a vicious cycle of ventilatory instability. Additionally, a higher Body Mass Index (BMI) serves as an independent predictor of oro-nasal breathing, likely because adipose tissue deposition under the jaw makes it easier to keep the mouth open while sleeping.

5. Analysis of Mouth Taping Efficacy

5.1. Impact on AHI: The Apnea/Hypopnea Index (AHI) is a fundamental clinical metric defined as the sum of apnea events (AI) and hypopnea events (HI) recorded per hour of sleep. An apnea event is characterized by a 90% reduction in airflow for at least 10 seconds, while hypopnea involves a 30% to 90% reduction accompanied by oxygen desaturation. In clinical practice, the AHI is utilized to diagnose the presence of Obstructive Sleep Apnea (OSA), categorize its severity, and objectively evaluate the efficacy of various therapeutic interventions. The primary clinical evidence for mouth taping's effectiveness comes from Lee et al. (2022). In a study focused on patients with mild OSA, the application of mouth tape resulted in a median AHI reduction from 8.3 to 4.7 events/h. This is a clinically significant improvement ($p = 0.0002$), suggesting that for certain individuals, enforcing the nasal route can effectively "downstage" or resolve mild apnea by bringing the index into the normal range.

5.2. Reduction in Snoring and Subjective Recovery: In the same study by Lee et al. (2022), the median snoring index (SI) decreased from 303.8 to 121.1 events per hour, representing a significant reduction of 47%. To reset the natural breathing pattern McKeown et al. (2021) emphasize that mouth taping is an effective component of breathing re-education, as well as assisting user feel overcome symptoms linked with "low arousal threshold" phenotype for sleep apnea. Despite this, the authors explicitly emphasize that while mouth taping is effective, it is not a sufficient method when used in isolation. However, for a therapeutic intervention to succeed completely it must consider all three dimensions of functional breathing– biochemical, biomechanical and resonant frequency rather than just targeting a single aspect of the disease.

5.3. Use in Specific Populations and Combined Therapies: While direct studies on elite athletes in these files are limited, the trial by Zaliene et al. (2025) conducted in a community fitness setting reveals that improving respiratory efficiency and autonomic balance may increase functional capacity and be helpful for rehabilitation purposes. Fangmeyer et al. (2025) report of the value of mouth taping to prevent "mouth leaks" in patients using bilevel ventilation or oronasal CPAP (Continuous Positive Airway Pressure) for sleep apnoea, potentially enhancing both the clinical efficacy and patient compliance with these modalities.

6. Risk Analysis and Safety Profile

6.1. Anatomical Contraindications: Nasal Obstruction: The greatest danger with mouth taping is when it is used in persons who are anatomically unable to breathe through their nose. Alghamdi et al. (2022) and Lepley et al. (2023) warn the medical professionals that Nasal Septal Deviation (NSD) is one of the most frequent obstructive respiratory problems. In patients with NSD or nasal polyps – often found in Chronic Rhinosinusitis (Keating et al., 2023; Laidlaw et al., 2021), taping the mouth blocks the only usable airway. This can result in sudden oxygen desaturation and sensation of suffocation.

6.2. The "Mouth Puffing" Phenomenon: Pioneering investigation of Jau et al. (2022, 2023) reported the “mouth puffing” phenomenon. Using Mouth Puffing Detectors (MPD), they found that patients with more severe airway collapse attempt to blow air out through their lips even when taped. This is good practical evidence that mouth taping alone would be inadequate in moderate-to-severe OSA in which the airway collapse occurs whatever the route of breathing. In these, mouth taping is futile and could interfere with timely medical intervention.

6.3. Clinical Risks: The systematic review by Rhee et al. (2025) warns that mouth taping carries a serious risk of asphyxiation, particularly for individuals with nasal obstruction. There is also a significant danger regarding the aspiration of stomach contents if a patient regurgitates while the mouth is occluded. For those with moderate to severe obstructive sleep apnea (OSA), the practice is explicitly discouraged as it may impose more danger than benefit. Moreover, as a paradoxical consequence, forced mouth closure may reduce inspiratory airflow in some patients and is not effective for patients with certain anatomical defects such as collapse of the palatal muscular structures. Further, "mouth puffing," noted in taped patients has been associated with increasing apnea/hypopnea index and greater oxygen desaturation. The authors eventually determine that current evidence is minimal and does not support mouth taping as a sound clinical intervention for the general population.

7. Patient Qualification

Before any consideration be given to nocturnal mouth taping (NMT), we need a professional appraisal of nasal patency and to rule out serious respiratory disorders. Varghese et al. (2022) identify the Oxygen Desaturation Index (ODI) is a useful and inexpensive technique for screening severe OSA patients. An ODI value > 20 enables high-sensitive recognition of subjects who should be submitted to full polysomnographic testing before conservative management. In children, Ahn (2010) states that nasal obstruction caused by factors such as tonsillar hypertrophy cause permanent craniofacial dysmorphisms. Such alterations including reduction of the maxillary arch, necessitate early medical or surgical intervention to re-establish appropriate airway development. Thus, the mechanical imposition of breathing through the nose is not a substitute for causative treatment where there is a physical anatomical obstruction.

8. Discussion

The analysis demonstrates that nasal breathing is important in the maintenance of respiratory freedom due to opening and control of airway, filtering and conditioning of respiratory gases, especially by means of nitric oxide involvement as gas exchangers advisor. While the nose is a high resistance regulator, it turns out oral breathing makes this regulation still higher, according to the Starling resistor model, with its viewed tissue collapse and so systemic dehydration threatening cardiovascular health. Though mouth taping during sleep is a trend growing in popularity on social media, the practice has only been found to be effective for mild obstructive sleep apnea and snoring. In the presence of high-grade airway collapse, it is reminded that some patients exhibit “mouth puffing” suggesting that this technique may be inadequate. Thus, NMT cannot be considered as a therapy in isolation but rather should be an integral part of a global respiratory re-education program also considering biochemical and biomechanical aspects.

9. Conclusions

Nocturnal mouth taping is effective in the treatment of snoring and mild apnea; however, it may only be performed once a professional has assessed the patient's nasal patency, and severe breathing related problems ruled out using an objective measure such as the ODI. This technique is not a replacement for causal therapy in individuals presenting with physical anatomical derangements, and when used in patients with nasal obstruction can result in serious consequences if performed incorrectly including asphyxiation and gastric aspiration. The reinforcement of nasal breathing with a device cannot be considered as an alternative for ENT treatment (tonsillar hypertrophy) in the pediatric population. In conclusion, existing evidence does not favour NMT as a routine clinical application to the general population, and for individuals with moderate-to-severe OSA in particular, the technique is either ineffective or may be unsafe.

Disclosure

Authors do not report any disclosures.

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Conceptualization: Klaudia Brzoza, Filip Matusiak
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Formal analysis: Klaudia Brzoza, Filip Matusiak
Writing- rough preparation: Klaudia Brzoza
Writing- review and editing: Klaudia Brzoza, Filip Matusiak
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