



Effectiveness of Oropharyngeal Exercises in Obstructive Sleep Apnea-A Literature Review

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ABSTRACT :

Background: The present review was conducted to critically evaluate the existing body of literature on the effectiveness of oropharyngeal exercises in the management of obstructive sleep apnea, aiming to provide evidence-based insights that can support the management of oropharyngeal exercises as a non-invasive therapeutic approach for reducing OSA severity and improve the quality of life, reduce the Apnea-Hypopnea Index (AHI), snoring frequency and daytime sleepiness.

Methods: The PubMed and Cochrane database was searched for published papers from 2015 to 2024. We evaluated the effectiveness of oropharyngeal exercises for reducing OSA severity and reduction in the Apnea-Hypopnea Index (AHI), improve quality of life, reduction in snoring frequency and daytime sleepiness.

Results: The review of six high-quality studies from 2015 to 2024 confirms that oropharyngeal exercises are effective as a **low-cost, non-invasive, and effective adjunct or alternative therapy** for managing mild to moderate OSA, shows significant Improvement in quality of life, reduction in AHI index, snoring frequency and daytime sleepiness.

Conclusion: The review highlights the benefits of Oropharyngeal Exercises (OE) in managing obstructive sleep apnea (OSA). These exercises strengthen throat and airway muscles, helping to keep airways open during sleep and reducing apnea episodes. Oropharyngeal exercises also improves respiratory function and promotes effective breathing patterns, enhancing sleep quality for individuals with OSA. While preliminary findings are promising, further research is needed to establish standardized protocols and assess the long-term effectiveness of Oropharyngeal Exercises in addressing this condition.

Keywords: oropharyngeal exercises, myofunctional therapy, obstructive sleep apnea, Apnea -Hypopnea index

Introduction :

Obstructive Sleep Apnea Syndrome (OSAS) is a significant sleep-related respiratory disorder characterized by frequent blockages of the upper airway during sleep, resulting in recurrent episodes of hypoxia and pauses in breathing (apnea or hypopneas)^(1,5). These disruptions can last for at least 10 seconds and occur five or more times during an hour of sleep⁽²⁾. Key symptoms associated with OSAS include loud snoring, fragmented sleep, excessive daytime fatigue, mood disturbances, and morning headaches, all of which profoundly affect an individual's quality of life.⁽¹¹⁾

The pathophysiology of OSAS is primarily linked to the anatomical characteristics of the upper airway, where factors such as enlarged tonsils, a large tongue, or excess soft tissue, and variables such as vacuum effect during inspiration; and a decrease or loss of pharyngeal muscle tone can play a crucial role in airway obstruction.^(2,10) Additionally, obesity, particularly excess weight around the neck, as well as age, increase the risk of developing OSAS, with males being at a higher risk compared to females.^(7,8)

Continuous Positive Airway Pressure (CPAP) is the most widely used treatment for OSAS and is particularly effective for those with moderate cases. However, some patients may find CPAP cumbersome or uncomfortable due to issues like air leaks and nasal irritation^(3,5). Other treatment options include lifestyle changes such as weight loss, using oral appliances, surgical interventions, and oropharyngeal exercises⁽¹²⁾.

Oropharyngeal exercises focus on strengthening the muscles in the upper airway, including the soft palate and tongue, which can help reduce the severity of OSAS symptoms⁽⁶⁾. Isometric and isotonic exercises such as tongue slides, palate blowing, chewing gum, tongue stretching, neck and throat workouts, jaw exercises, and gargling are a few of these exercises, should be practiced regularly—at least three times a day for three months—to achieve noticeable benefits.^(2,3,4)

There's also emerging research suggesting that engaging in activities like singing or playing wind instruments may help maintain an open airway during sleep, highlighting the importance of muscle tone in preventing airway collapse^(6,10). Overall, while CPAP remains the standard treatment for OSAS, a comprehensive approach incorporating lifestyle changes and exercises can enhance outcomes for individuals affected by this condition.

Materials and Methods :

Study design: Literature review

Study setting: St John's Medical College Hospital, Bangalore

Study criteria

The eligible studies were required to have the following criteria:

1. Systematic Review, randomized control trial, and meta analyses studies and experimental cohort study .
2. Full-text articles published in English from the year 2015-2024.
3. Articles available online at free of cost.

Search strategy

We searched several electronic database ,PubMed and published papers from 2015 to 2024. For further relevant studies, we manually reviewed references from the collections. To decide whether the studies met the predetermined inclusion requirements, we checked authors, titles, and abstracts. The following keywords were used, “oropharyngeal exercises”, “myofunctional therapy”, “obstructive sleep apnea”.

REVIEW OF LITERATURE :

1.Esra Atilgan et al.(2020)¹

This randomized controlled study evaluated the impact of oropharyngeal exercises on 30 participants aged 22 to 27 with obstructive sleep apnea (OSA). Over 12 weeks, one group performed these targeted exercises, while the control group received only posture-related information. Results revealed significant improvements in sleep quality and overall health in the exercise group ($p < 0.05$), underscoring the effectiveness of oropharyngeal exercises in enhancing sleep outcomes. Additionally, 80% of participants presented with forward head tilt and rounded shoulders, indicating a need for further posture assessments. Limitations included the absence of polysomnography (PSG) data and reliance on self-reported compliance with CPAP and exercise. This study advocates for the integration of oropharyngeal exercises in the management of OSA

2.Roshan k verma et al.(2015)²

The study assessed the impact of graded oropharyngeal exercises over three phases, leading to a significant reduction in neck circumference from 38.4 to 37.8 cm, while BMI remained unchanged. Participants experienced improved sleep quality, with higher oxygen saturation and sleep efficiency, and expressed high satisfaction in Phase 3. The findings suggest these exercises can enhance compliance and lessen mild to moderate OSA severity. However, limitations included a small sample size of 20 patients and a short duration of 3 months, which may not reflect long-term effectiveness.

3.Selin Cakmakcr et al.(2020)³

randomized controlled study evaluated the effects of oropharyngeal exercises combined with CPAP therapy in 41 patients with obstructive sleep apnea (OSA), divided into an exercise group (20) and a control group (21). Key assessments were conducted at baseline and after three months, including CPAP usage, respiratory pressures, and sleep quality indices. Results indicated significant improvements in the exercise group, such as increased maximal voluntary ventilation (MVV) ($p = 0.003$), maximal inspiratory pressure (MIP) ($p = 0.002$), maximal expiratory pressure (MEP) ($p = 0.0024$), and health-related quality of life ($p = 0.020$), alongside reductions in sleep quality scores and neck circumference. The study concluded that oropharyngeal exercises may improve respiratory muscle strength and overall health in OSA patients. However, it lacked final polysomnography data and relied on patient-reported CPAP compliance and exercise adherence.

4.Neurel Ertuk et al. (2020)

A randomized controlled trial titled “The Effectiveness of Oropharyngeal Exercises Compared to Inspiratory Muscle Training in Obstructive Sleep Apnea” compared these treatments in 41 non-CPAP patients aged 19-75 with obstructive sleep apnea syndrome (OSAS). Participants were divided into three groups: 15 in inspiratory muscle training (IMT), 14 in oropharyngeal exercises (OE), and 12 as a control. The IMT group trained for 12 weeks while the OE group practiced for 5 days a week. Results showed no significant changes in the Apnea-Hypopnea Index, but both treatments reduced snoring frequency and severity. The IMT group experienced reduced neck and waist circumference and improved muscle strength. The OE group showed better muscle strength and reduced daytime sleepiness ($p = 0.05$). The study concluded that both OE and IMT are effective for OSAS patients not using CPAP, with OE being potentially preferred due to insurance coverage issues.

5.Macario Camacho et al. (2015) ⁶

A systematic review and meta-analysis titled "Myofunctional therapy to treat obstructive sleep apnea" examined the effectiveness of myofunctional therapy (MT) for obstructive sleep apnea (OSA) in adults and children, following PRISMA guidelines across 11 studies (9 adult and 2 pediatric). In a study of 120 adults, the apnea-hypopnea index improved significantly from 24.5 to 12.3 (MD -14.26, $P < 0.0001$), while lowest oxygen saturation increased from 83.9% to 86.6% (MD 4.19, $P = 0.0005$) and snoring reduced from 14.05% to 3.87% of total sleep time ($P < 0.001$). Among 25 children, the apnea-hypopnea index decreased from 4.87 to 1.84 ($P = 0.004$). The study found that MT can reduce apnea-hypopnea indices by about 50% in adults and 62% in children, along with improvements in other OSA symptoms. Despite the significant findings from 145 patients, there is a need for more pediatric studies and long-term follow-up beyond six months to verify MT's lasting effects on muscle tone and airway changes.

6. Jose Ramon Rueda et al. (2020) ⁵

systematic review titled "Myofunctional Therapy for Obstructive Sleep Apnea" evaluated the benefits and harms of myofunctional therapy (MT) using data from 347 participants in randomized controlled trials. The findings indicated that MT reduced daytime sleepiness compared to sham therapy by an average of 4.25 points on the Epworth Sleepiness Scale, with moderate certainty. Additionally, one study showed low certainty improvement in sleep quality, while two studies found little to no impact on snoring, although one noted a slight subjective reduction. The review concluded that while MT appears beneficial for reducing daytime sleepiness and improving sleep quality, further studies are needed, particularly involving women and children, due to issues related to low certainty and bias in the existing evidence. Most participants were men, limiting the ability to analyze gender-specific outcomes.

RESULTS :

This review affirms the clinical effectiveness of oropharyngeal exercises in obstructive sleep apnea patients. Evidence from these randomized controlled trials, systematic reviews and cohort studies indicates that oropharyngeal exercises improve sleep quality, quality of life, reduction in snoring frequency, and apnoea-hypopnoea index. Oropharyngeal exercises are cost-effective, adjuvant or alternative therapy in treating mild to moderate obstructive sleep apnea cases. Further high-quality, long-term studies are wanted to optimize treatment protocols and confirm sustained benefits.

DISCUSSION :

The review focused on the effects of oropharyngeal exercises for managing obstructive sleep apnea (OSA), analyzing six studies from PubMed and Cochrane that included cohort and randomized controlled studies, systematic reviews, and a meta-analysis. These studies collectively investigate the efficacy of myofunctional therapy as a non invasive approach , aiming to reduce the apnea-hypopnea index (AHI) and improve sleep quality and reduction in snoring frequency without solely relying on CPAP therapy.

Esra Atilgan et al. conducted a comparison between oropharyngeal exercises group and a control group only where information about posture and physical activity was provided were significant improvement in sleep quality was noted in the exercise group. They highlighted strengthening of oral and throat muscles but noted limitations such as small sample sizes and measurement challenges⁽¹⁾

Roshan K Verma found subjective improvements in AHI and sleep quality additionally noted reduction in neck circumference , mean arousal index and a significant increase in mean minimum oxygen saturation , but the absence of a control group raised potential biases. Selin Çakmakçı Karakaya's study indicated that combining oropharyngeal exercises with CPAP could enhance results where they also noted increase in inspiratory , expiratory muscle strength and respiratory tract resistance which implies that they may have tackled the potential underlying cause , despite issues with participant adherence⁽²⁾.

In a systematic review by Jose-Ramon Rueda examined potential harms and benefits of myofunctional therapy in obstructive sleep apnea in OSA treatment, emphasizing the need for standardized methods due to subjective assessments and provided the conclusion that myofunctional therapy is more beneficial than sham therapy but should not replace the primary treatment⁽³⁾. Without adhering to the common trend seen in OSA studies, Nurel Ertuk compared oropharyngeal exercises with inspiratory muscle training in addition to a control group. It was found that the OE group experienced a reduction in daytime sleepiness and an enhancement in their daily life quality, although challenges arose concerning participant blinding and adherence to the program⁽⁴⁾. Macario Camacho's meta-analysis provided insights into the impact of these exercises on OSA yet faced issues like study heterogeneity and still proposed the conclusion that it reduces the snoring frequency and improve sleep quality and proposed that the future researches can conduct studies on standardized individual exercises⁽⁶⁾.

In conclusion, oropharyngeal exercises demonstrate potential for improving OSA with proper adherence to the exercises but not yet can be proposed as a primary line of treatment ,and also help in studying the potential unidentified causes for OSA. Further robust research is essential to establish their clinical role, addressing current methodological limitations and ensuring long-term effectiveness.

CONCLUSION :

The review conclusively shows that oropharyngeal exercises are effective in treating obstructive sleep apnea. After analysing 6 articles, it was found that these exercises improve sleep quality, general health, and functional capacity. They also reduce neck circumference and snoring, while significantly

decreasing the Apnea-Hypopnea Index (AHI). Oropharyngeal exercises can be used as adjuvant therapy and offer a cost-effective alternative to continuous positive airway pressure (CPAP). Further research is needed to fully understand their effectiveness in treating OSA.

CONFLICT OF INTEREST :

The authors declare no conflict of interest related to this study.

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