

Original article:

Effectiveness Of Oropharyngeal Exercises In Patients with Moderate Obstructive Sleep Apnoea Syndrome

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Abstract

Introduction: Sleep apnea is an entity characterized by repetitive upper airway obstruction resulting in nocturnal hypoxia and sleep fragmentation daytime hypersomnolence Excessive day time sleepiness is a cardinal symptom of Obstructive sleep apnea syndrome (OSAS).

Methods: The patients with age group of 20-65 years with recently diagnosed with moderate OSAS having history of habitual snoring were included. Outcome measures-Daytime sleepiness of all the patients was evaluated with Epworth questionnaire. Intensity and frequency of snoring of the patient suffering from OSAS is evaluated from Bed partner assessment Chart 20 subjects having moderate OSAS were included in the study. All the subjects were instructed to perform oropharyngeal exercise for 30 minutes/day,5 days a week for 4 weeks.

Observations and Results : At the end of study we found that day time sleepiness is reduced after 4 weeks of exercise sessions from 69.16% to 55.83%and intensity and frequency of snoring (BPAC scores) is reduced from 68% to 45%.We conclude that Oropharyngeal exercises is a new and simple technique to improve ESS, and decreases the intensity and frequency of snoring (BPAC scores)

key words : Obstructive sleep apnea syndrome, Snoring, Oropharyngeal exercises

Introduction

Sleep apnea is an entity characterized by repetitive upper airway obstruction resulting in nocturnal hypoxia and sleep fragmentation daytime hypersomnolence, and increased cardiovascular risk.^{1,2}

It is estimated that 2%-4% of the middle-aged population has sleep apnea with a predilection in men relative to women.³The etiology of OSAS is not sharply known to physicians. They studied neuromuscular abnormalities of upper airway in addition to abnormal anatomical factors (e.g., tongue volume, tonsils enlargement, soft palate length,

position of mandible andmaxilla) which all contribute in the pathogenesis of OSAS ^{4,5}In OSAS, during sleep the muscles tone is lost and upper airway becomes obstructed. This upper airway patency is maintained by genioglossus contraction and a lung volume expansion .This obstruction is probably due to passive collapse of the pharyngeal wall. The muscle activity required to hold the pharynx open is reduced during sleep resulting in hypoxemia and severe hypercapnea. This increases the drive to respiratory muscles including pharynx which is

finally pulled open with a load snoring and the sufferer may awake partially or completely⁶.

The complications of untreated OSAS are increase in risk of premature death, myocardial infarction, arrhythmias, stroke, motor vehicle accidents, metabolic syndromes and neurocognitive dysfunction. Excessive day time sleepiness is a cardinal symptom of OSAS⁷.

It is well established that the most effective treatment for OSAS is continuous positive airway pressure (CPAP)⁸.

CPAP virtually eliminates OSAS in conjunction with elimination of snoring, reduction of daytime sleepiness, and improvement in subjective sleep quality^{8,9}. The improvement is especially true for patients with severe OSAS, in whom the apnea-hypopnea index (AHI) is greater than 30 events/hour. However, for moderately affected patients (AHI between 15 and 29.9 events/h), CPAP therapy may not be suitable for a significant proportion of patients. Alternative treatments for moderate OSAS include mandibular advancement, weight loss, and surgery; these treatments have variable results¹⁰. A recent study showed that upper airway muscle training while awake with the use of didgeridoo playing significantly ameliorated OSAS severity and associated symptoms¹¹

One of the recent cited treatment for OSAS is Oropharyngeal exercises. General concept is to strengthen and train certain muscles related to soft palate, face, mouth, throat and neck region of the body to make the airway easier to access during night while sleeping and preventing its collapse. Oropharyngeal exercises have been previously shown to be effective in small and non-controlled studies¹². Guimarães KC et al. in 2009 suggested that

Oropharyngeal exercises significantly reduce OSAS severity and symptoms and represent a promising treatment for moderate OSAS.

Day time sleepiness can be subjectively quantified using Epworth sleepiness scale which asks the patient to estimate the likelihood of dozing in various situations.

There are fewer studies to evaluate the effectiveness of oropharyngeal exercises on day time sleepiness in patients with OSAS. There is less awareness about the use of this therapy among the medical professionals, so not widely used. In present study the effectiveness of oropharyngeal exercises in patients with moderate OSAS is to be evaluated.

Aim and objective : The aim of the study is to evaluate the effectiveness of oropharyngeal exercises in moderate OSAS patients. Our objectives are to evaluate the effectiveness of oropharyngeal exercises on daytime sleepiness using Epworth sleepiness scale and intensity and frequency of snoring using bed partner assessment chart in moderate OSAS patients

Methods

Patients – The patients with age group of 20-65 years with recently diagnosed with moderate OSAS having history of habitual snoring were included. We excluded patients with one or more of the following condition, having facial malformation, enlarge tonsil, BMI > 40 kg/m², regular use of hypnotic medicines, hypothyroidism, neuromuscular diseases. All the patients gave a written and verbal consent. The study was approved by institutional ethical review board.

Outcome measures– Daytime sleepiness of all the patients was evaluated with Epworth questionnaire. This questionnaire evaluate the propensity to sleep from no.(0) to intense(3) in eight different situations. Total score greater than 10 is considered excessive

daytime sleepiness The scale is simple to use and reliable in effectiveness.

Intensity and frequency of snoring of the patient suffering from OSAS is evaluated from Bed partner assessment Chart. It is 10 point scale on which the bed partner grades the patients. Higher the score more is the intensity and frequency of snoring.

Study Group

20 subjects having moderate OSAS were included in the study. These patients were assessed for Epworth sleepiness scale and bed partner assessment chart as reported by the bed partner. All the subjects were instructed to perform oropharyngeal exercise for 30 minutes/day, 5 days a week for 4 weeks. The oropharyngeal exercises included:

Soft palate Pronounce an oral vowel intermittently (isotonic exercise) and continuously (isometric exercise).

Tongue. (1) Brushing the superior and lateral surfaces of the tongue while the tongue is positioned in the floor of the mouth (2) placing the tip of the tongue against the front of the palate and sliding the tongue backward (3) forced tongue sucking upward against the palate, pressing the entire tongue against the palate (4) forcing the back of the tongue against the floor of the mouth while keeping the tip of the tongue in contact with the inferior incisors.

Facial muscles. The exercises of the facial musculature use facial mimicking to recruit the orbicularis oris, buccinator, major zygomaticus, minor zygomaticus, levator labii superioris, levator anguli oris, lateral pterygoid, and medial pterygoid muscles.

Stomatognathics functions. 1. Breathing and Speech: (1) Forced nasal inspiration and oral expiration in conjunction with phonation of open vowels, while sitting; (2) Balloon inflation with prolonged nasal inspiration and then forced blowing, repeated five times without taking the balloon out of the mouth. 2. Swallowing and Chewing: Alternate bilateral chewing and deglutition, using the tongue in the palate, closed teeth, without perioral contraction, whenever feeding. The supervised exercise consisted of alternate bread mastication.

Statistical analysis

All Data were statistically analyzed using SPSS version 8.

Normally distributed data was presented as mean \pm SD. Baseline characteristics of patients with OSAS and differences between baseline and follow-up between groups were compared by using Wilcoxon signed rank test with $P < 0.05$ was considered to be statistically significant.

Observations & Results

After fulfilling inclusion criteria, from 35 OSAS patients, 15 patients were excluded due to low adherence. 20 patients (both male & female) included in final analysis with mean age of 42.05 ± 12.3 years. They had excessive day time sleepiness (mean Epworth scores 16.6 ± 1.14). They had average BPAC scores of 6.8 ± 1.62 (Table 1). Patients treated with oropharyngeal exercises (moderate OSA). The primary outcome (daytime sleepiness as measured by ESS) improved significantly by 13.33% ($p < 0.0001$) and BPAC scores were reduced by 23% ($p < 0.0001$) (table 2)

Table 1 Demographic characteristic of participants, and baseline values of outcomes.	
variables	Values
age	42.05±12.3
sex	12/8
BMI	28.62± 1.86
ESS	16.6±1.14
BPAC	6.8±1.62

TABLE 2 Epworth score and BPAC score at baseline and after oropharyngeal exercises			
Variable	Baseline	After treatment	P value
Epworth scores	16.6±1.14	13.4±2.48	P<0.0001
BPAC scores	6.8±1.62	4.5±1.76	P<0.0001

Discussion

Pathogenesis of OSA is multifactorial both anatomical and physiological factors affecting it ⁴. Pharyngeal patency during breathing mainly achieved by synchronized action of upper airway and thoracic respiratory muscles together. The tendency for pharyngeal lumen to collapse during inspiration by effect of thoracic negativity is opposed by upper airway muscles contraction (dilators and pharyngeal lumen regulators)¹³. The goal of OSAS treatment is to restore optimal breathing during night improve symptoms and decreasing complications^{7,14}. Myofunctional therapy includes functional exercises (respiratory, suction, swallowing and chewing), aim is to improve tonus and mobility of oral and cervical structures^{7,15}

At the end of study we found that day time sleepiness is reduced after 4 weeks of exercise sessions from 69.16% to 55.83% and intensity and frequency of snoring (BPAC scores) is reduced from 68% to 45%

This results was in accordance with the study of KatiaC, Guimaraes, who concluded that group oropharyngeal exercises significantly reduce OSAS severity and symptom⁷

The exercises were developed based on this integrated concept of overlapping functions of the upper airways as well as on the clinical observation of patients with OSAS. Patients with OSAS typically had elongated and floppy soft palate and uvula, enlarged tongue, and inferior displacement of the hyoid bone ¹⁶⁻¹⁸. The exercises targeting soft palate elevation use speech exercises that recruit several upper airway muscles. In addition to the recruitment of the tensor and levator veli palatine, these exercises also recruit muscle fibers of the palatopharyngeal and palatoglossus muscle. Based on the evidence that tongue posture appears to have a substantial effect on upper airway structures ^{19,20}, specific exercises were developed targeting tongue repositioning. The facial muscles are also recruited during chewing and were

also trained with the intention of training muscles that promote mandibular elevation, avoiding mouth opening. We speculate that this treatment modality may affect the propensity to upper airway edema and collapsibility²¹.

The limitation of our study is the small number of study population. Specific sleeping postures were not considered in our study. Standardized procedure like

polysomnographic studies in sleep laboratory were not used to measure OSA

Conclusion-We conclude that Oropharyngeal exercises is a new and simple technique to improve ESS, and decreases the intensity and frequency of snoring (BPAC scores)

Conflict of interest

There is no conflict interest.

Source of support: Nil

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