



Obstructive Sleep Apnea- Physiotherapists Perspective

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Abstract

The Obstructive Sleep Apnea (OSA) is recognized as a major illness in recent times affecting millions of people worldwide. The role of physiotherapy in obstructive sleep apnea is still unearthed due to lack of research studies. The Obstructive Sleep Apnea is marked by recurrent events of obstruction of the upper airway during sleep involving respiratory effort related arousals, limitation, reduction(hypopnea) or complete airflow cessation(apnea) while respiratory movements continues. The consequences of Obstructive sleep apnea are plenty and if untreated leads to excessive day time sleepiness, cognitive dysfunction, sickness absenteeism in work places and impaired quality of life. Continuous Positive Airway Pressure therapy given to OSA patient based on the Polysomnography reports. This article has been written primarily to unearth the role of physiotherapy in OSA.

Keywords: Obstructive Sleep Apnea; Polysomnography; CPAP; Physiotherapy

Background

Obstructive sleep apnea (OSA) is being considered as a significant cause of morbidity and mortality in recent times around the world. It is a clinical sleep disorder characterized by recurrent episodes of partial or complete collapse of the upper airway during sleep [1]. The fall of airflow leads to derangements in gaseous exchange and frequent arousals from sleep. The clinical consequences of obstructive sleep apnea are abundant and may cause systemic hypertension, development of cardiovascular disease, abnormal levels of glucose. It may cause day time sleepiness, impaired cognition and deterioration quality of life [2]. The onset of symptoms is insidious and patients are unacquainted of the related symptoms. The manifestations are better described as loud snoring; breathing pauses during sleep, disturbed sleep quality and excessive day time sleepiness. Early screening for the

symptoms and proper therapy can improve the neurobehavioral consequences and have fruitful effects on cardiovascular system [3]. The role of physiotherapy in obstructive sleep apnea is still inconclusive that it is indicated or not. In this article, prevalence, clinical importance of obstructive sleep apnea is considered and emphasis on role of physiotherapy is discussed.

Prevalence

Epidemiological studies have reported the recent increase of obstructive sleep apnea cases worldwide. Naresh M Punjabi 2008 in his article quoted the prevalence estimates for the obstructive sleep apnea in countries such as the United States, Australia, Spain, China, Korea and India [3]. There is a paucity of published data about prevalence of obstructive sleep apnea in India. Zarir F Udwadia. , et al. 2004 in their study stated that the higher

prevalence of obstructive sleep apnea syndrome was alarming and might have impact on major public health implications in a developing country [4]. The economic burden of obstructive sleep apnea is more increasing in developing countries like India [5-9].

Patho-physiology

Many theories have been proposed to elaborate the patho-physiology of obstructive sleep apnea syndrome. The pharyngeal airway is reduced in size and shape alteration in OSA patients and also increased airway resistance to airflow even during supine wakefulness. The upper airway is a muscular and complaint structure prone to inspiratory collapse because of intra-thoracic negative pressure generated during inspiration. Tonic and phasic neural activation of pharyngeal dilator muscles are crucial in maintaining patency of upper airway. During sleep on the other hand neural activation of dilator muscles is attenuated, thus predisposing to collapse of airways.

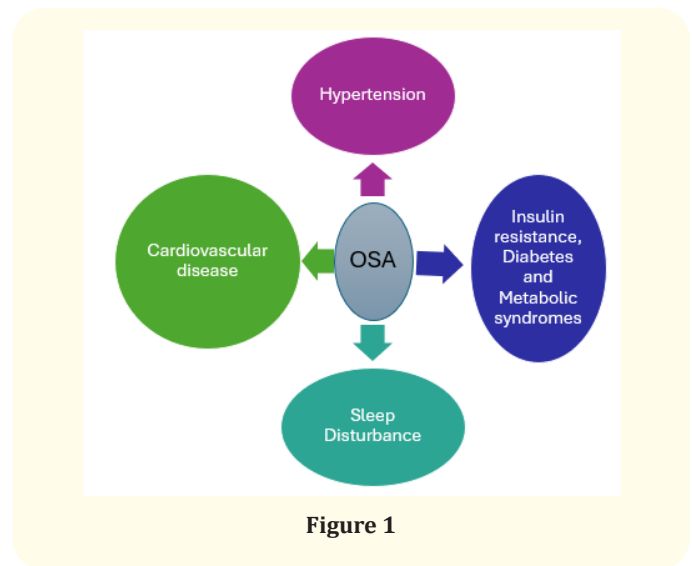
There are many structural factors associated with the development of OSA which includes deposition of fat in the neck, with decreased diameter of the lumen. According to Poiseuille law, increased resistance due to decreased lumen diameter causes greater inspiratory negative pressure generation to maintain flow of the air. This can lead to vicious cycle resulting in collapse of the airway during sleep and causes apnea. Humoral factors that influence central breathing control also be important in understanding the occurrence of OSA. Leptin which is the protein product of the adipose ob gene is increased in obesity and also in OSA.

Clinical importance

The implication of OSA in clinical scenario is numerous. OSA predisposes to major morbidity such as hypertension, insulin resistance diabetes mellitus, neurodegeneration, carcinoma etc.

Sleep disturbance

Obstructive sleep apnea causes sleep disturbance such as excessive day time sleepiness, fatigue are the troublesome complications of OSA. This may lead to sickness absenteeism, work place accidents and road traffic accidents. Sleepiness and falling



asleep while driving due to OSA are major causes of road traffic accidents. Howard M E et al 2004 found that majority of the road traffic accidents in Australia was due to sleep disturbance caused by OSA [10]. In a review by Garbarino S., et al. 2016 10 articles were analyzed for OSA and occupational disease. Most of the articles proved that OSA has adverse effects on work accidents [11].

Hypertension

Many research studies have stated a high prevalence of hypertension among OSA patients independent of other major risk factors [12]. The association between OSA and hypertension may be attributed due to an enhanced sympathetic tone.

Cardiovascular disease

The evidence for association between OSA and cardiovascular disease comes from epidemiological studies, clinical cohorts of sleep apnea patients and from randomized treatment trials of OSA treatment efficacy as reviewed by PACK AND GISLASON in 2009 [13].

OSA was found to augment the risk for stroke and all-cause mortality independent of other cardiovascular- or cerebrovascular risk factors.

Insulin resistance, diabetes and the metabolic syndrome

There are both cross sectional clinical and population studies that have reported an association between the presence of OSA and glucose intolerance, insulin resistance and diabetes [14].

Assessment of OSA

Subjective assessment

The subjective assessment includes use of sleep questionnaires such as Epworth Sleepiness Scale. In Epworth sleepiness scale (ESS) the patient's tendency to sleep during situations ranging from lying to rest and to sitting and to conversing is rated. The likelihood of falling sleep ranges from 0-3 with 3 representing the highest likelihood of falling asleep. The total score ranges from 0-24 with a score of more than 10 suggestive of daytime sleepiness [15].

Modified berlin questionnaire

The questionnaire reports the incidence of frequency of snoring, daytime sleepiness, obesity and hypertension risk. Risk stratification done based on Modified Berlin Questionnaire is a useful predictor for the presence of both mild and moderate OSA [16].

Prediction models

This is useful to prioritize patients for Polysomnography studies (PSG) and avoids pointless PSG studies in patients with low probability of having the disorders. Gender, relative reported snoring index, body mass index (BMI) and choking index have been found to be independent predictors of OSA in Indian patients [17].

Investigations

Polysomnography

Overnight supervised laboratory based polysomnographic study or split night study is needed to make a diagnosis of OSA. PSG study provides data on AHI, RDI, various sleep stages, arousals and lowest oxygen saturation and is manually measured by a sleep study technician on the next day [18].

Continuous positive airway titration

CPAP involves titration of appropriate pressure for obliteration of snoring and apneic and hyponeicevents. It is done on the second day or on the second half of the same night in the split-night study [19].

Physical therapy management

There is little research available for physical therapy interventions for OSA. It goes undiagnosed providing prospects for physical therapists to detect, educate and refer patients who present with signs and symptoms of OSA [20].

Physical therapists can educate their regular patients on OSA about signs and symptoms, risk factors, associated morbidities, how to get tested and risks of undiagnosed OSA.

Various physical therapy interventions

Aerobic exercises

Studies suggest the effectiveness of exercise in reducing the severity of sleep apnea in OSA patients. Aerobic exercises for 30 minutes for 3-5 days a week. Examples of aerobic exercises such as supervision of 150 min/week of aerobic exercises (treadmill, elliptical trainer or recumbent bicycle performed at 60% of HRR (heart rate reserve) for 12 weeks is ideal [21].

Tongue Exercises [22]

- **Tongue brushing:** Using toothbrush, the patient should brush the top and sides of the tongue, while tongue is sitting on the floor of mouth and it should be repeated 5 times each. The patient should complete the exercises three times daily.
- **Tongue slide:** The patient should look straight head and the patient tongue should be positioned against the back of top front teeth. The patient should be asked to slide the tongue backward. The patient should repeat the exercises for 10 times.

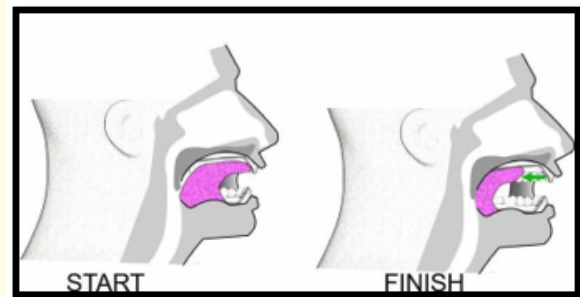


Figure 2: Image Courtesy <https://www.sleepsolutionsnw.com/exercises-improve-osa/>.

- **Tongue forces:** The patient should force the back of the tongue downward until the whole tongue is resting on the floor of the mouth. The patient should keep the tip of the tongue touching the back of the lower teeth and he/she hold for 4 seconds and it should be repeated 5 times.

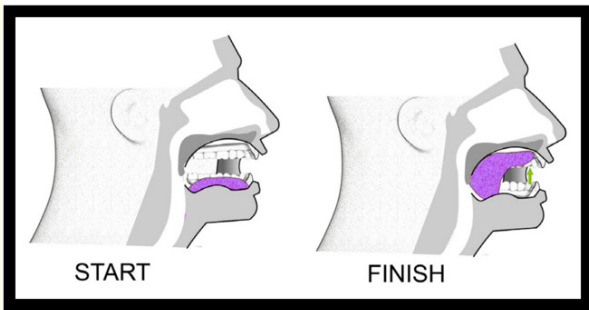


Figure 3: Image Courtesy <https://www.pinterest.com/pin/524387950362777641/>.

- Tongue Press:** The patient should push the tongue against hard palate (the top and front of the mouth). The patient should do this exercises for 5 seconds. Then patient should do slide the tongue backward to the back of the mouth and the initial third of the tongue should be against the hard palate and not the tip. The patient should keep the jaw open throughout the exercise and it should be repeated for 4 times a day.

This exercise strengthens the genioglossus muscle and also to strengthen the hyoid muscles. This exercise also makes the hyoid bone in the correct position.

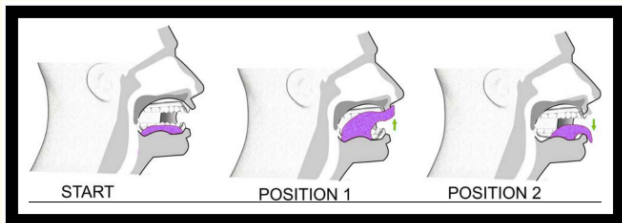


Figure 4: Image Courtesy <https://www.sleepsolutionsnw.com/exercises-improve-osa/>.

Positional therapy

Many years positional therapy strategies are employed to prevent patients lying on their back such as an alarm system, a back pack with a ball, a pillow with straps, and tennis ball technique. Evidence shows that there is short term benefit with tennis ball technique and it effectively reduces the patients lying on their back [23].

Conclusion

In recent times the incidence of OSA is alarming and the risk for cardiovascular and other morbidities are increasing due to OSA. Hence Physiotherapist an important member of health care delivery system should know the basics of OSA and its incidence, pathophysiology and complications. Few physiotherapy interventions mentioned in this paper are beneficial to prevent the complications of OSA and it will improve the quality of life in patients with OSA.

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