

## Obstructive Sleep Apnea – A Review Article

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### ABSTRACT

Obstructive sleep apnea (OSA) is very common in society, and the majority of cases are undiagnosed and untreated. Patients who suffer from OSA experience not only long-term negative consequences but also a degradation of their quality of life with time. For treatment, the proper diagnosis and knowledge of OSA are necessary. This review discusses the types, pathophysiology, diagnosis, and treatment options for obstructive sleep apnea.

### INTRODUCTION

In obstructed sleep apnea (OSA) there is regular pause of breathing during sleep. It happens when the upper airway becomes blocked while sleeping because of the insufficient motor tone of dilator muscles or tongue.<sup>1</sup>

People often get confused between OSA and snoring. OSA is characterized by repeated episodes of total (apnea) or partial (hypopnea) stoppage of breathing during the course of the night as a result of the collapse of the upper airway while, primary snoring is

caused by a constriction in the UA that causes tissue vibrations without stopping breathing.<sup>2</sup>

It doesn't take place immediately; it takes time to manifest. You progressively become more aware of your losses as the symptoms worsen over time. Nearly all of the body's systems, including the neurological, hormonal, and immune systems, get influenced by it. OSA is not simply a condition of middle age; it becomes worse with age and weight gain. In 2009, it was estimated that 2–4% of kids had OSA, and 10% of kids snored often.<sup>3-6</sup>

Sleep apnea is of 3 types

1. **Central sleep apnea** - occurs because your brain doesn't send proper signals to the muscles that control your breathing.
2. **Obstructive sleep apnea** - it occurs when something blocks part or all of your upper airway while you sleep. It can be your surrounding muscles or any anatomical obstruction in your upper airway.

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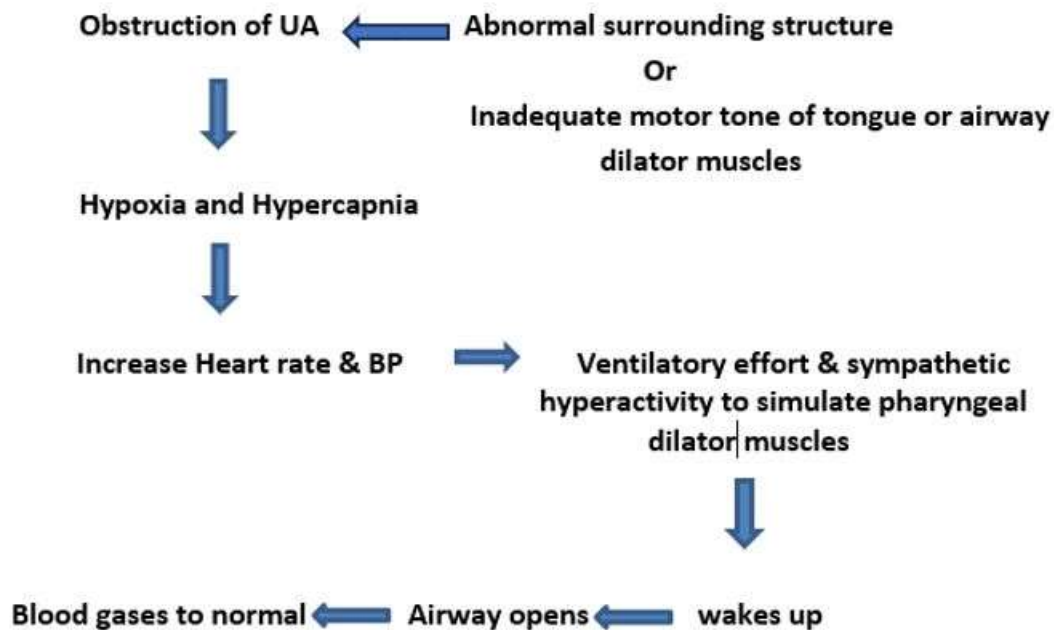
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3. **Mixed** - it contains characteristics of both central and obstructive sleep apnea

### PATHOPHYSIOLOGY OF OSA



- As a result of all this sleep cycle becomes fragmented or quality of sleep gets poor

### CONSEQUENCES OF OBSTRUCTIVE SLEEP APNEA

1. **Cardiovascular System<sup>7</sup>**: Previous studies concluded that untreated Obstructive sleep apnea leads to increased risk of hypertension, coronary artery disease, and stroke.
2. **Central Nervous System<sup>8</sup>**: Numerous studies have revealed that individuals with untreated instances of Obstructive sleep apnea frequently experience difficulty concentrating, frustration, and discomfort as a result of their combination of excessive daytime sleepiness and disrupted night time sleep.
3. **Endocrine System<sup>9</sup>**: Diabetes mellitus and insulin resistance can be caused by sleep-related disorders.
4. **Excessive sleepiness during day time<sup>10</sup>**: It leads to changes in behavior and personality, depression, psychosis, accidents at work and in during driving, cognitive decline, and deficit in learning ability.
5. **Periodontitis<sup>11</sup>**: Previous research evaluate the relationship between varying degrees of OSA severity and periodontitis. The results of these indicated that moderate or severe OSA mostly causes periodontitis due to its beneficial effect on periodontal health.

## **OBSTRUCTIVE SLEEP APNEA SYMPTOMS**

1. Loud snoring along with Apnea events
2. Nocturnal choking
3. Excessive daytime sleepiness
4. Weakness and headaches in the morning inability to focus, memory problems, insomnia, and even anxiety and sadness

## **DIAGNOSIS**

1. Symptoms are identified through extra oral and intra oral examination and sleep questionnaire.
2. Patient is referred to sleep doctor for home sleep test
3. If results of home sleep test are positive, then patient is advised for polysomnography (PSG)
4. If the results of PSG are positive patient is treated accordingly

## **EXTRA ORAL EXAMINATION**

### **1. Head posture<sup>12</sup>**

A kyphosis/hyperextended neck can create breathing issues, that can be observed from the moment as a patient walk into the room.

### **2. Skeletal retrognathia<sup>12</sup>**

The extraluminal tissue tensions near the upper part of the airway were raised by the retrognathic mandible, which had an impact on airway passage.

### **3. Nasal anatomy<sup>12</sup>**

One should be looking for a nasal septum that is small, collapsible, or deviated since these conditions might impair upper airway function and therefore limit airflow by obstructing or narrowing it.

### **4. Neck size<sup>13</sup>**

According to past studies, a neck circumference of more than 16 inches for females and 17 inches for males is one of the indicators of OSA.

The neck circumference can be measured by wrapping a measuring tape round the

base of your Adam's apple, which is where the shoulders and neck meet.

### **5. BMI<sup>14</sup>**

The body mass index (BMI), which is represented in kilograms per square meter and is derived from height in meters and mass in kilograms, is defined as the body mass divided by the square of the body height.

$BMI = \text{WEIGHT (Kg)}/\text{height}^2 \text{ (metres)}$

Patients with increased BMI have higher chances of having OSA.

## **INTRA ORAL EXAMINATION**

### **1. Enlarged tonsils/adenoids<sup>15</sup>**

In most cases, swollen tonsils and adenoids are the cause of this kind of obstruction. These glands are situated in the throat's back and sides. They may grow too large or an infection may cause them to swell. During sleep, they could potentially momentarily obstruct the airway. The possible seriousness of the effect of the palatine tonsils on the respiratory system is indicated by the tonsillar grading scale.

### **2. Tongue size & position<sup>16</sup>**

Enlarge tongue size or Variability in tongue mobility can impact the morphology of the maxillofacial region, mostly manifesting as a transversely deficient high-arched palate

### **3. GERD<sup>17</sup>**

Increased risk of OSA development is more common in GERD patients, particularly those with NERD who also have symptoms at night. OSA and GERD are related to one another and reinforce one another.

## RADIOLOGICAL EXAMINATION

1. Lateral cephalogram
2. CBCT
3. CT

In comparison to lateral cephalogram, CT & CBCT provide us with more precise methods for superimposing volumes and assessing the results of treatment. They also enable us to measure the relative breadth of the jaws more precisely and assist in locating obstructions.

## POLYSOMNOGRAPHY

During Polysomnography, the patient is attached to several hundred leads, which record various physiological parameters such as blood pressure, muscular activity, clenching, and brain activity (EMG). After that, sleep physician assesses the findings. The respiratory disturbance index (RDI) or apnea-hypopnea index (AHI), in conjunction with oxygen desaturation values, are used to report Polysomnography data.

It is known as apnea when a patient ceases to breathe for ten seconds or longer. Hypopnea is when the patient breathes shallowly, causing a partial blockage and a 3-4% reduction in blood oxygen. The total number of apneas and hypopneas per hour is known as the AHI. Increased breathing effort lasting 10 seconds or more, followed by awakening from sleep that does not meet the criteria for either apnea or hypopnea, is the character of respiratory event arousal rate (RERAs). The RDI is the total number of hypopneas, apneas, and RERAs per hour.<sup>12</sup>

IN ADULTS		
AHI or RDI	less than 5	normal
	5-15	mild OSA
	16- 30	moderate
	greater than 30	severe
IN CHILDREN		
AHI or RDI	greater than 1	abnormal

**Table 1.** Range of AHI or RDI for OSA in adults and children

## TREATMENT

### 1. Behavioral Treatments

- a. Limit alcohol consumption.
- c. Give up smoking.
- c. After midday, stay away from stimulants like coffee.
- d. Try to avoid using blue-light displays for at least two hours just before bed.
- e. Lose weight.

### 2. CPAP

After confirmed diagnosis of OSA initial course of therapy for an adult is CPAP. In an adult with a confirmed OSA diagnosis, CPAP is the standard first treatment. A CPAP machine consists of a mask that is secured to the wearer's head and neck with straps, and it is equipped with a fan that propels air into the lungs through the upper airway. When worn appropriately, CPAP has been demonstrated to be up to 95% effective in correcting AHI.<sup>18</sup>

#### Disadvantages

- a. Due to trouble keeping a seal, problems like headaches, dehydration, claustrophobia, skin irritation occurs.<sup>19</sup>
- b. Long-term usage has also been shown to alter cellular immunological components, raising the risk of sinus and upper respiratory infections.<sup>20</sup>

- c. The mask's backward pressure may restrict the maxilla's and mandible's development.<sup>21</sup>
- d. It doesn't fix the underlying anatomy.

### 3. Oral Appliances

Oral appliances are more convenient to use than CPAP equipment, compliance is frequently higher. They work by moving the tongue forward and out of the pharyngeal airway through the lower jaw and works best when the obstruction is in the pharyngeal airway.<sup>22</sup>

#### Limitation

1. Functions best when there is a blockage in the pharynx.
2. The likelihood of the patient experiencing jaw discomfort, tooth movement, or stiffness in the muscles increases with the forward positioning of the mandible.

### 4. Surgical treatment

- a. Genioglossus advancement  
This method involves moving a rectangular portion of the chin bone—where the genioglossus muscle attaches—forward, rotating it 90 degrees, and then reattaching it to push the tongue forward. It extends the airway during sleep by pushing the genioglossus complex forward, which creates tension at the base of the tongue and stabilizes the hypopharyngeal airway.<sup>23</sup>
- b. Uvulopalatopharyngoplasty (UPPP)  
It is the most common surgical procedure for OSA which was introduced by Fujita et al. In UPPP, the tonsillectomy (if not previously done), the anterior and posterior tonsillar pillars are trimmed and reoriented and the uvula and posterior palate are removed.<sup>24</sup>

- c. Tracheotomy  
In patients with OSA, tracheostomies dramatically reduce mortality, drowsiness, the apnea index, and the oxygen desaturation index.<sup>25</sup> This technique is almost 100% successful, but only used as a final option.
- d. Somnoplasty  
It works by shrinking tissue in the upper airway, including the uvula, soft palate or base of the tongue using radiofrequency energy. This enlarges the throat and nose space, allowing for unobstructed breathing. It can be used for treating OSA but efficacy still under observation.<sup>26</sup>

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