

OSA: A Study

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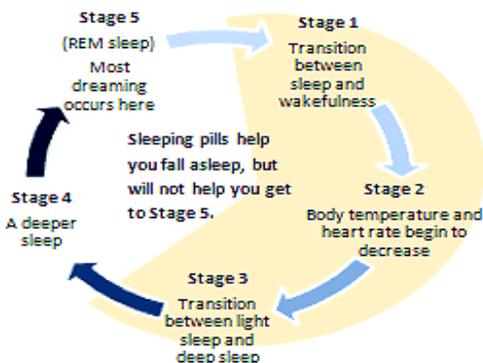
Abstract: This publication is a literature survey on OSA Obstructive Sleep Apnea, carried out with help from reputed physicians. The inputs from Polysomnography Centre are also considered in this study. The major points included in this study are the basic information about OSA, its symptoms, the diagnosis and treatment options available. Obstructive Sleep Apnea (OSA) is the most common type of sleep apnea and is caused by complete or partial obstructions of the upper airway. It is characterized by repetitive episodes of shallow or paused breathing during sleep, despite the effort to breathe, and is usually associated with a reduction in blood oxygen saturation.

Index Terms: OSA, POLYSOMNOGRAPHY, CPAP, REM, AHI

I. INTRODUCTION

Obstructive Sleep Apnea (OSA) is the most common type of sleep apnea and is caused by complete or partial obstructions of the upper airway. It is characterized by repetitive episodes of shallow or paused breathing during sleep, despite the effort to breathe, and is usually associated with a reduction in blood oxygen saturation. These episodes of decreased breathing are called Apneas. Polysomnography is method for diagnosing OSA. In Polysomnography measures respiration, blood saturation (SPO₂) and chest's expansion and compression. As in central apnea, pauses are followed by a relative decrease in blood oxygen and an increase in the blood carbon dioxide. Continuous Positive Airway Pressure (CPAP) therapy on the structural and functional characteristics of the right heart in patients with Obstructive Sleep Apnea (OSA). CPAP treatment would improve right ventricular (RV) function in patients with OSA. When CPAP is used, the titration is performed according to usual manual standardized procedure, which includes CPAP monitoring.

II. SLEEP CYCLE



This is the standard sleep cycle being observed in the normal human being. Study of sleep cycle plays a vital role in diagnosing sleep disorders in humans. These disorders are commonly related to the respiration during sleep. OSA is specially observed in the REM Stage of sleep cycle.

III. OBSTRUCTIVE SLEEP APNEA

Obstructive Sleep Apnea (OSA) is the most common type of sleep apnea and is caused by complete or partial obstructions of the upper airway. It is characterized by repetitive episodes of shallow or paused breathing during sleep, despite the effort to breathe, and is usually associated with a reduction in blood oxygen saturation. These episodes of decreased breathing are called Apneas.

Many people having OSA are rarely aware of difficulty breathing, even upon awakening. It is often recognized as a problem by others who observe that particular persons sleep and its effects on the body. OSA is accompanied with Snoring. Obstructive sleep apnea syndrome or obstructive sleep apnea-hypopnea syndrome are the general terms of OSA.

IV. CENTRAL APNEA

Central sleep apnea is a disorder in which your breathing repeatedly stops and starts during sleep. Central sleep apnea occurs because your brain doesn't send proper signals to the muscles that control your breathing. This condition is different from obstructive sleep apnea, in which you can't breathe normally because of upper airway obstruction. Central sleep apnea is less common than obstructive sleep apnea. Central sleep apnea may occur as a result of other conditions, such as heart failure and stroke. Sleeping at a high altitude also may cause central sleep apnea. Treatments for central sleep apnea may involve treating existing conditions, using a device to assist breathing or using supplemental oxygen

V. SYMPTOMS

Symptoms may be present for years or even decades without identification, during which time the individual may become conditioned to the daytime sleepiness and fatigue associated with significant levels of sleep disturbance. Individuals who generally sleep alone are often unaware of the condition, without a regular bed-partner to notice and make them aware of their symptoms

- Daytime sleepiness or fatigue
- Dry mouth or sore throat when you wake up
- Headaches in the morning
- Trouble concentrating, forgetfulness, depression, or irritability
- Night sweats
- Restlessness during sleep
- Problems with sex
- Snoring
- Waking up suddenly and feeling like you're gasping or choking
- Trouble getting up in the mornings

VI. DIAGNOSIS OF OSA

Polysomnography is the Diagnosis theory used for the detection of OSA with this Diagnosis the Polysomnography machine can also measure the following measurements

1. Measure ECG and EEG.
2. Measure Respiratory Saturation.
3. Measure Respiration.
4. Measure Chest movement.
5. Measure Eye movement
6. Leg movement & Chin movement.

VII. POLYSOMNOGRAPHY



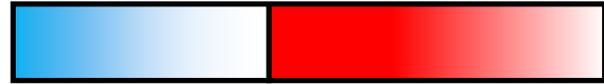
ALICE PDx (Phillips Respiratory)

Polysomnography in diagnosing OSA characterizes the pauses in breathing. As in central apnea, pauses are followed by a relative decrease in blood oxygen and an increase in the blood carbon dioxide. Whereas in central sleep apnea the body's motions of breathing stop, in OSA the chest not only continues to make the movements of inhalation, but the movements typically become even more pronounced. Monitors for airflow at the nose and mouth demonstrate that efforts to breathe are not only present but that they are often exaggerated. The chest muscles and diaphragm contract and the entire body may thrash and struggle An "event" can be either an apnea, characterized by complete cessation of airflow for at least 10 seconds, or a hypopnea in which airflow decreases by 50 percent for 10 seconds or decreases by 30 percent if there is an associated decrease in the oxygen saturation or an arousal from sleep. To grade the severity of sleep apnea, the number of events per hour is reported as the apnea hypopnea index (AHI). An AHI of less than 5 is considered normal. An AHI of 5-15 is mild; 15-30 is moderate

and more than 30 events per hour characterize severe sleep apnea.

Primary snoring

OSA



UARS Mild Moderate Severe
AHI = 5 15 30

AHI	RATINGS
< 5	Normal
5 - 15	Mild
15 -30	Moderate
>30	Severe

Respiratory Summary									
By Event Classification	Central			Mixed			Obstructive		
	Cou nt	Mean	Max	Cou nt	Mea n	Max	Cou nt	Mean	Max
Apneas, NREM	25	19.0	42.0	12	20.9	70.5	46	18.8	56.5
Apneas, REM	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Apneas, Total	25	19.0	42.0	12	20.9	70.5	46	18.8	56.5
<i>*Hypopneas scored based on 0% or greater desaturation.</i>									
Hypopneas, N	157	20.1	59.5				0	0.0	0.0
							RERAs, NREM		
Hypopneas, R	0	0.0	0.0				0	0.0	0.0
							RERAs, REM		
Hypopneas, Ti	157	20.1	59.5				0	0.0	0.0
							RERAs, Total		

General report of Polysomnography

VIII. TREATMENT

The Treatment offered to the patients for OSA is .Either upper airway **Surgery** or **CPAP**. When CPAP is recommended, titration is performed in sleep laboratory, according to usual manual standardized procedure, which includes CPAP monitoring. Compliance with CPAP is estimated based on the time counter on the device and on clinical effectiveness.

IX. CPAP

Continuous positive airway pressure (CPAP) is a form of positive airway pressure ventilator, which applies mild air pressure on a continuous basis to keep the airways continuously open in people who are able to breathe

spontaneously on their own. It is an alternative to Positive End Expiratory Pressure (PEEP). Both modalities stent the lungs' alveoli open and thus recruit more of the lung's surface area for ventilation. But while PEEP refers to devices that impose positive pressure only at the end of the exhalation, CPAP devices apply continuous positive airway pressure throughout the breathing cycle. Thus, the ventilator itself does not cycle during CPAP, no additional pressure above the level of CPAP is provided, and patients must initiate all of their breaths

X. ADVANTAGES OF TREATMENT

1. *Reduces Snoring*

By keeping your airway open as you sleep, CPAP reduces or eliminates the sound of your snoring. While you may not notice, your bed partner will benefit from a quieter sleep environment.

2. *Increases Daytime Alertness*

Sleepiness and daytime fatigue are common symptoms of sleep apnea. CPAP can restore your normal sleep pattern and increase your total sleep time by eliminating breathing pauses in your sleep. This will help you wake up feeling more refreshed and boost your energy throughout the day

3. *Increases Concentration*

Untreated, severe sleep apnea can damage your brain tissue. As a result you may have trouble concentrating. You also may suffer from memory loss. Using CPAP may improve your ability to think, concentrate and make decisions. This also can improve your productivity and decrease your chance of making a costly mistake at work.

4. *Insures Emotional Stability*

Untreated sleep apnea increases your risk of depression. CPAP can help improve your mood, reduce your risk of depression and improve your overall quality of life.

5. *Decreases Diabetes*

Using CPAP to treat your sleep apnea can improve insulin sensitivity. Sleep apnea is related to glucose intolerance and insulin resistance, both factors in type 2 diabetes. Untreated sleep apnea increases your risk of getting type 2 diabetes.

XI. CONCLUSION

Obstructive sleep apnea is a health hazard and usually affects middle-aged, overweight adults. It causes not only snoring but also repeated obstruction to breathing while the person is sleeping. This leads to a drop in oxygen saturation within the blood which can damage organs such as the heart and the brain.

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