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## Research Article

# Study of obstructive sleep apnea in respiratory disorders

**D. H. Bhise**[1], R. R. Hegde[*2], J. M. Phadtare[3] and N.N Ramraje[4]

[1]*Assistant Professor, Department of Pulmonary Medicine,GMC Akola, India*
[2]*Assistant Professor, Department of Pulmonary Medicine, Grant Government Medical College, Mumbai, India*
[3]*Professor and Head of Unit, Department of Pulmonary Medicine,Grant Government Medical College,Mumbai-8, India*
[4]*Professor and Head of Department, Department of Pulmonary Medicine, Grant Government Medical College, Mumbai, India*

### *Correspondence Info:

Department of Pulmonary Medicine,
Grant Governmrnt Medical College, Mumbai-400008,
Maharashtra state, India
E-mail: rohit_hegde1984@yahoo.co.in

### Abstract

100 patients having respiratory complaints were selected randomly from OPD and were screened for by symptomatology, history, clinical examination, Chest X ray & spirometry and were analyzed for various respiratory diseases. The youngest subject was 30 yrs old and the oldest 75 years. In the study, 75% were males and 25% were females. Polysomnography was performed in these subjects. Patients were distributed as regards the severity of Obstructive Sleep Apnea (OSA).OSA was detected in 45, of these 45% had mild, 35% moderate and 20% had severe OSA. A linear relationship was found between Body Mass Index (BMI) and severity of OSA as also between neck circumference and severity of OSA. No correlation was detected between Diabetes Mellitus and OSA. Whereas, there was a significant impact of systemic hypertension on OSA.

**Keywords:** Polysomnography,Obstructive sleep apnea, Respiratory Diseases

## 1. Introduction

Approximately 45 years ago, two reports published within few years of each other revolutionized our thinking about sleep and wakefulness. Normal pattern of human sleep was first discovered by Davies, Harvey and Hobart in 1937-39.[1] Prior to this, sleep was considered a passive state- an intermediate state between wakefulness and death. Today we know that sleep is an active and complex state. Herman Hans Berger recorded different electrical activities in the human brain during awake and sleep state in 1928. In 1949, Moruzzi and Magoun reasoned on the basis of electrical stimulation of the brain stem that its central core, the reticular formation contained element essential for arousal and consequently wakefulness.Asterinsky and Kleitman reported periods during sleep in which EEG resembled that of wakefulness. They also observed rapid eye movements during this stage that give this stage its name. Research of sleep has led to the staging of sleep and sleep related disorders- of which Obstructive Sleep Apnea has generated maximum interest. Though Obstructive Sleep Apnea has been mentioned in literature since the time of Charles Dickens in his description of fat boy joe in The Posthumous papers of Pickwickian Club: it is only in the past 3 decades that this entity has been clinically defined. Sleep Disordered breathing is a common condition that is characterized by repetitive episodes of partial or complete upper airway obstruction during sleep.Sleep Related Breathing Disorder (SRBD) is common in vast majority of the population and is under-reported,under-diagnosed and under-treated. Population based epidemiological studies have uncovered a high prevalence of undiagnosed OSA and have consistently found that even mild obstructive sleep apnea is associated with significant morbidity. The term overlap syndrome was coined in 1985 by David Flenley[2] - to describe patient having both Chronic Obstructive Pulmonary Disease and Obstructive Sleep Apnea. Co-existence of COPD and OSA is associated with a definite increase in morbidity and decrease in survival. There is an independent association of OSA with hypertension, stroke and cardiovascular disease[3].

## 2. Materials And Methods

Amongst patients attending our OPD, 100 patients who were diagnosed as chronic obstructive pulmonary disease, bronchial asthma, interstitial lung disease and post infective fibrosis were selected and they underwent investigations like chest X-ray, pulmonary function test and polysomnography. Obstructive Sleep apnea was defined as Apnea hypopnea index (AHI) of more than 5/hour. The severity of OSA was graded as mild (AHI 5-14/ hour), moderate (AHI 15-29/hour) and severe (AHI >or = 30/hour).The selected patients were studied for different variables in relation to the presence and severity of OSA. These patients were also evaluated on the basis of their morphological characteristics like Body mass Index (BMI) and neck circumference to see for any possible association with the disease. Co-morbid conditions like diabetes mellitus and hypertension were taken into consideration. These patients also underwent echocardiography to see for the presence of pulmonary hypertension. Any addiction like tobacco consumption in any form and alcohol intake were given due consideration. Thyroid functions were also taken into consideration. All these variables were analyzed using SPS v13.0 software (Chicago, Illinois, Inc)

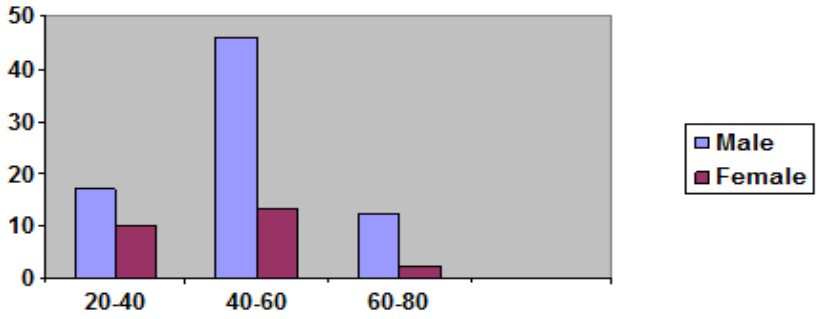
## 3. Results

### 3.1 Distribution

#### 3.1.1. Age And Gender wise

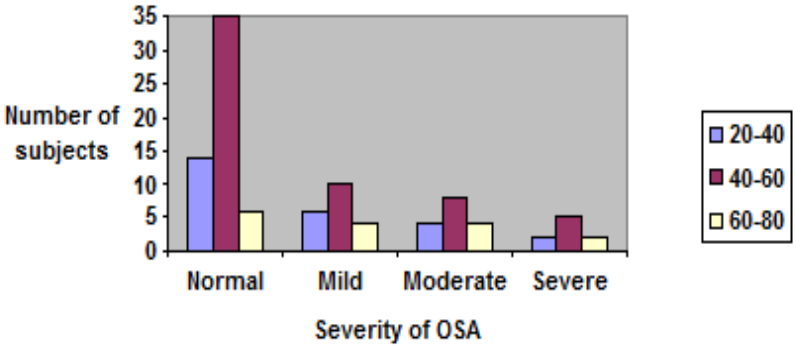
Of the 100 patients, 75 were male and 25 were females.

| Age | Male | Female | Total |
|---|---|---|---|
| 20-40 | 17 | 10 | 27 |
| 40-60 | 46 | 13 | 59 |
| 60-80 | 12 | 2 | 14 |
| Total | 75 | 25 | 100 |



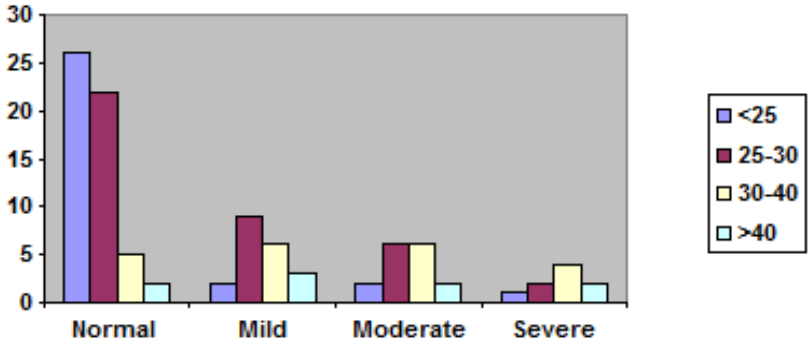

#### 3.1.2. Age and severity wise

| Age | Normal | Mild | Moderate | Severe | Total |
|---|---|---|---|---|---|
| 20-40 | 14 | 6 | 4 | 2 | 26 |
| 40-60 | 35 | 10 | 8 | 5 | 58 |
| 60-80 | 6 | 4 | 4 | 2 | 16 |
| Total | 55 | 20 | 16 | 9 | 100 |




**3.1.3. BMI and severity wise**

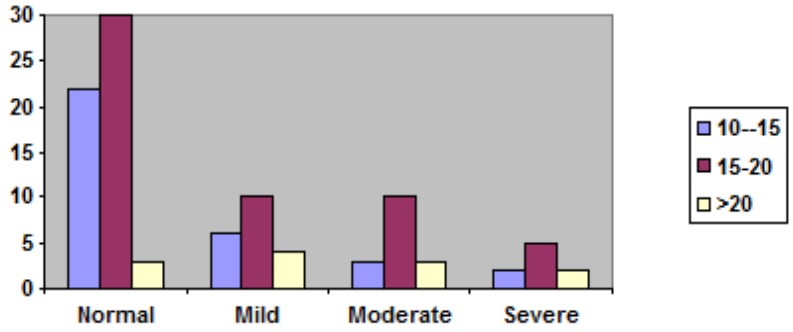
| BMI | Normal | Mild | Moderate | Severe | Total |
|---|---|---|---|---|---|
| <25 | 26 | 2 | 2 | 1 | 31 |
| 25-30 | 22 | 9 | 6 | 2 | 39 |
| 30-40 | 5 | 6 | 6 | 4 | 21 |
| >40 | 2 | 3 | 2 | 2 | 9 |
| Total | 55 | 20 | 16 | 9 | 100 |




As the BMI increases, severity of OSA increases.

**3.1.4. Neck Circumference and Severity wise**

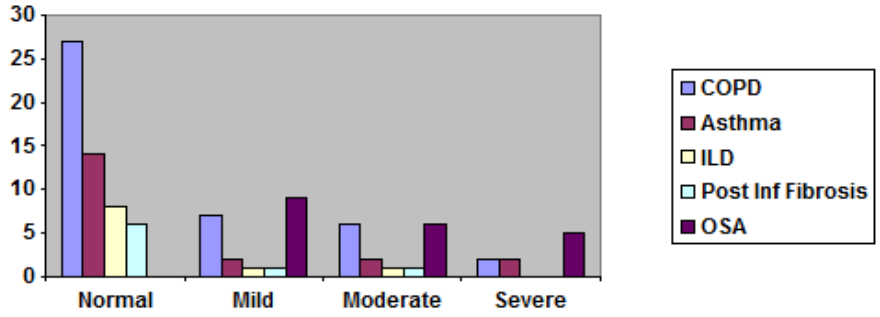
| Neck Circumference | Normal | Mild | Moderate | Severe | Total |
|---|---|---|---|---|---|
| 10-15 | 22 | 6 | 3 | 2 | 33 |
| 15-20 | 30 | 10 | 10 | 5 | 55 |
| >20 | 3 | 4 | 3 | 2 | 12 |
| Total | 55 | 20 | 16 | 9 | 100 |




As the neck circumference increases, severity of OSA increases.

**3.1.5. Respiratory Disease and Severity wise**

| Diseases | Normal | Mild | Moderate | Severe | Total |
|---|---|---|---|---|---|
| COPD | 27 | 7 | 6 | 2 | 42 |
| Asthma | 14 | 2 | 2 | 2 | 20 |
| ILD | 8 | 1 | 1 | 0 | 10 |
| Post infective Fibrosis | 6 | 1 | 1 | 0 | 8 |
| OSA | 0 | 9 | 6 | 5 | 20 |
| Total | 55 | 20 | 16 | 9 | 100 |

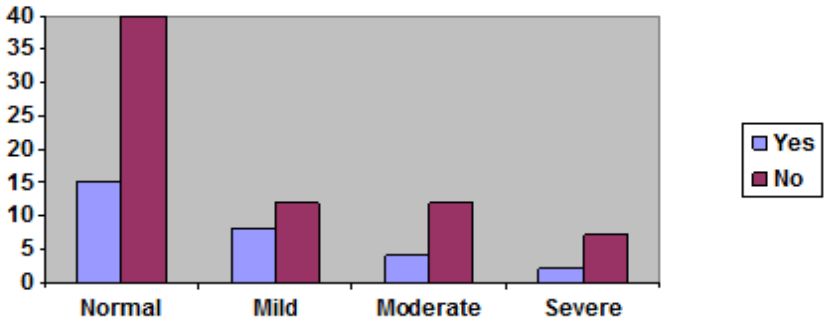



55% of the total subjects had no sleep disordered breathing.

Irrespective of the type of disorder, 80% had mild to moderate OSA

**3.2 Diabetes mellitus and OSA**

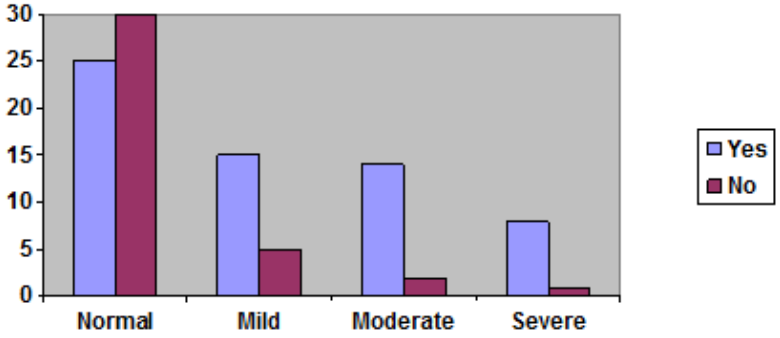
| Diabetes Mellitus | Normal | Mild | Moderate | Severe | Total |
|---|---|---|---|---|---|
| Yes | 15 | 8 | 4 | 2 | 29 |
| No | 40 | 12 | 12 | 7 | 71 |
| Total | 55 | 20 | 16 | 9 | 100 |




No correlation was detected between Diabetes Mellitus and OSA.

**3.3 Systemic Hypertension and OSA**

| Systemic Hypertension | Normal | Mild | Moderate | Severe | Total |
|---|---|---|---|---|---|
| Yes | 25 | 15 | 14 | 8 | 62 |
| No | 30 | 5 | 2 | 1 | 38 |
| Total | 55 | 20 | 16 | 9 | 100 |




A significant impact of systemic hypertension on OSA was found. Subjects with higher blood pressure had higher AHI.

## 4. Discussion

100 patients were included in the study. They were evaluated for sleep disordered breathing; of these 42 were COPD, 20 Bronchial Asthma,20 Obstructive sleep Apnea, 8 Interstitial Lung Disease and 6 were post infective fibrosis. This study provides data on the occurrence of OSA in respiratory diseases and its association with variety of potential factors such as Body Mass Index, Neck Circumference and systemic hypertension. A conventional measure of Apnea Hypopnea Index(AHI) was used to define the presence of OSA. Various investigators have taken different levels of AHI cut off points of 5,14 and 29 events per hour to indicate mild, moderate and severe levels of OSA. These recommendations were acknowledged to be an expert consensus statement based on a paucity of objective data and intended to stimulate further research to identify optimal approach to quantify sleep related breathing disorders. Out of 100 subjects included in the study, 75 were males and 25 were females. Of the 75 males 35 had OSA while out of 25 females 10 had OSA. We found no sexual predilection conforming to other studies.[4-8] Patients selected were between 20 to 80 years of age with higher incidence in the fifth to seventh decades. In our study, 31% had BMI less than 25, 39% had BMI between 25-30, 21%

between 30-40 and 9% had BMI more than 40. We used the correlation co-efficient test to establish a significant positive correlation between BMI and severity of OSA i.e as the BMI increases, the AHI increases. Guilleminault *et al* in their study found a clear relationship between excess body weight expressed as BMI and severity of OSA which corroborates with our study[9]. Similarly we used correlation co-efficient test to establish a linear correlation between neck circumference and severity of OSA. Anthropometric evaluation in the form of neck circumference was also found to be a good predictor of OSA. RJ Davies *et al*[10] and Pineda *et al*[11] showed that neck circumference corrected for height is more useful as a predictor of obstructive sleep apnea than general obesity. Our study observed that there is significant correlation between systemic hypertension and AHI. Subjects with higher blood pressure had higher AHI. Worsnop CJ *et al*[12] found a similar result in their study, with a linear relationship existing between OSA and systemic hypertension. Similar results were also obtained by Thomopoulos *et al*[13] and Marin *et al*[14].

## 5. Conclusions

- Sleep Disordered breathing is more prevalent in COPD afflicted than in the general population.
- A linear relationship was found between Body Mass Index (BMI) and severity of OSA as also between neck circumference and severity of OSA..
- No correlation was detected between Diabetes Mellitus and OSA.
- A significant impact of systemic hypertension on OSA was found.

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