Original Research Article

# Diagnostic evaluation of patients with obstructive sleep apnoea: Our experience

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## Abstract

**Background:** Sleep related disorders like insomnia, narcolepsy, restless leg syndrome, and sleep apneoa, lead to reduced quality of life and productivity as well as increased use of health care services. Obstructive sleep apnoea (OSA) is increasingly being recognized as an important health issue in adults. **Aim:** The aim of this study was to evaluate the high risk patients of obstructive sleep apnoea with full night polysomnography. **Materials and Methods:** This prospective study was conducted by the department of Otorhinolaryngology and pulmonology, Shri Mata Vaishno Devi Narayana Superspeciality Hospital, Katra, Jammu during which a total of fourty patients were considered on the basis of clinical suspicion of obstructive sleep disordered breathing. All the patients were thoroughly evaluated and diagnosed by using gold standard diagnostic tool of full night polysomnography. **Results:** In our study males were more common than females. Most of our patients were in the age group of 41-55years. Snoring, excessive day time sleepiness and disturbed sleep were the most common symptoms. Mean BMI was 33.25± 2.36 Kg/m2. The mean neck circumference was 35.2 ± 3.6 cm. Mean preoperative Epworth Sleepiness Scale was 14.0 ± 2.86. The Polysomnography AHI mean Score/hour had value of 50.25 ± 8.36**Conclusion:** This study suggests that the external neck circumference and the degree of obesity determined through BMI measurement may be important predictors of sleep apneoa in adult. Also a strong statistically significant correlation was seen between the severity of OSAS on AHI scale and neck circumference, BMI and ESS.
**Key Word:** sleep apnoea.

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## INTRODUCTION

Sleep is an essential aspect of health and wellbeing of life and occupies approximately one-third of the human life span. It is described as a behavioral state, with characteristic immobile posture and diminished but readily reversible sensitivity to external stimuli. Most theorists agree that sleep has value as a recuperative and adaptive function in the lives of humans[1]. Therefore, Sleep related disorders including, but not limited to, insomnia, narcolepsy, restless leg syndrome, and sleep apneoa, lead to reduced quality of life and productivity as well as increased use of health care services. It is estimated that 50 to 70 million individuals in United States are affected by sleep problems.[2,3,4]Snoring is estimated to occur in 3% to 12% of children and up to 59% of adults[5,6]. An individual may oscillate within a spectrum of sleep disordered breathing from intermittent simple snoring, to chronic heavy snoring, to upper airway resistance syndrome (UARS), to mild OSA, to moderate OSA to severe OSA or to obesity hypoventilation syndrome. Guilleminault *et al*. coined the terms "Sleep Apneoa Syndrome" and "Obstructive Sleep Apneoa Syndrome" in 1976[2,4]. It is characterised by repetitive episodes of complete or partial upper airway obstruction that occur during sleep, usually associated with a reduction in blood oxygen saturation (hypoxemia) and unconscious (EEG) arousals[3]A careful sleep history plays a critical part in the evaluation of patients with OSA. During a routine health maintenance evaluation, screening for OSA can be performed by inquiring about

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snoring, daytime sleepiness, and looking for obesity, hypertension, or craniofacial deformity. Presence of obesity (body mass index [BMI; weight in kilograms divided by height in meters squared], congestive heart failure, atrial fibrillation, treatment of refractory hypertension, type 2 diabetes, nocturnal dysrhythmias, stroke, pulmonary hypertension, high-risk driving populations, or preparation for bariatric surgery indicates patients at high risk for OSA.[7-12]The gold standard diagnostic test for OSA is the overnight in-laboratory polysomnography. It involves multi-channel continuous polygraphic recording from surface leads for electroencephalography, electrooculography, electromyography, electrocardiography, nasal pressure transducer (supplemented by thermistor) for nasal airflow, thoracic and abdominal impedance belts for respiratory effort, pulse oximetry, tracheal microphone for snoring, and sensors for leg and sleep position. These recordings will identify different types of apnoeas and hyponoeas during sleep. We conducted this study with aim to evaluate the high risk patients of obstructive sleep apnoea with full night polysomnography.

## MATERIALS AND METHODS

This observational study was conducted by the department of pulmonary medicine and department of Otorhinolaryngology, Head and Neck Surgery, Shri Mata Vaishno Devi Narayana Superspeciality Hospital, Jammu.

The study included patients with history suggestive of sleep disorder and high risk of OSA. A total of forty patients from June 2017 to October 2018 were considered on the basis of clinical suspicion of obstructive sleep disordered breathing. All the patients were thoroughly evaluated and diagnosed by using gold standard diagnostic tool of full night polysomnography. Detailed assessment of all the patients included detailed history of patient in which, history taken from patient or spouse of the patient about snoring severity, excessive day time sleep, witnessed apneoa episodes during night, and associated comorbid conditions like hypertention, cardiovascular ailment, diabetes etc. General examination of the all the patients specifically included neck circumference and body mass index of the patient. Otorhinolaryngological and Head and Neck examination of patient included detailed examination of neck, face, nose. Assessment of mandible and maxilla and detailed examination of oral cavity, oropharynx for tonsil size and palatal and tongue position of the patient. All these patients underwent routine haematological, biochemical, and other relevant investigations like ECG and chest radiograph for any associated comorbid condition. The sleep study (full night polysomnograhy) of all the patient was done and all the data was recorded and later statistically analysed.

## RESULTS

Most of the patients were in the age group of 41-55 years with mean age group of 44.15±8.17 years. Males constituted 55 percent of the study group and they had mean age of 42.5±8.67years and females constituted rest 45 percent with mean age of 46.17±7.25years(table 1).

**Table 1:** Age and Gender Distribution of studied group (n=40)

| Age (years) | Male | | Female | |
|---|---|---|---|---|
| | n | % | N | % |
| ≤ 30 | 2 | 9.09% | 0 | 0.0 |
| 31 to 40 | 6 | 27.27% | 3 | 16.67% |
| 41 to 50 | 10 | 45.45% | 9 | 50% |
| 51 to 60 | 4 | 18.18% | 6 | 33.33% |
| mean ± SD | 42.5±8.67years | | 46.17±7.25years | |

Snoring was the commonest presenting symptom followed by disturbed sleep at night and excessive day time sleepiness. Patients also complained about morning headaches, forgetfulness and dry mouth (table 2).

**Table 2:** Distribution of Presenting Symptoms

| Symptoms | No of patients | PERCENTAGE |
|---|---|---|
| Snoring | 38 | 95 |
| EDS | 34 | 85 |
| Disturbed sleep | 36 | 90 |
| Morning headache | 21 | 52.5 |
| Forgetfulness | 18 | 45 |
| Dry mouth | 25 | 62.5 |

On physical analysis the studied patients had mean neck size of 35.2 ± 3.6 cm. Mean BMI of the patients was 33.25± 2.36 Kg/$m^2$. The Epsworths sleepiness scale scores had mean value of 14.0 ± 2.86 and the mean value of polysomnography Apnoea/Hypopnea index per hour was 50.25 ± 8.36 in the studied patients(table 3).

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**Figure 3:** Physical analysis of studied group

| Parameters | Mean ±sd |
|---|---|
| NECK SIZE IN CM | 35.2 ± 3.6 cm |
| BMI (Wt/Ht m2) | 33.25± 2.36 |
| ESS | 14.0 ± 2.86 |
| PSG AHI Score/Hr | 50.25 ± 8.36 |

In our study, patients were thoroughly examined and classified on basis of several physical parameters. Most of the patients had Modified Mallampati grade II AND III followed by grade IV(table 4) and tonsillar hypertrophy was also common among patients with around 95% patients having hypertrophy(table 5).

**Table 4:** Classification of Studied group On modified mallampati score

| Grade | Number | Percentage |
|---|---|---|
| I | 0 | 0 |
| II | 12 | 30 |
| III | 18 | 45 |
| IV | 10 | 25 |
| TOTAL | 40 | 100 |

**Table 5:** Classification of patients on basis of tonsil grade

| Grade | Number | Percentage |
|---|---|---|
| 0 | 2 | 5 |
| I | 11 | 27.5 |
| II | 13 | 32.5 |
| III | 10 | 25 |
| IV | 4 | 10 |
| TOTAL | 40 | 100 |

In this study videoendoscopy with Muller's maneuver was done to all the fourty patients and site of obstruction was seen when patient was awake. (Table 6)

**Table 6:** site of obstruction seen by video endoscopy with muller'smaneuver

| Site of Obstruction | Number of patients | Percentage |
|---|---|---|
| Hypopharyngeal | 6 | 15 |
| Retropalatal | 15 | 37.5 |
| Hypopharyngeal + Retropalatal | 4 | 10 |
| Hypopharyngeal +Retrolingual | 10 | 25 |
| Retropalatal +Retrolingual | 3 | 7.5 |
| Retropalatal + nasal | 1 | 2.5 |
| Retropalatal +Retrolingual +Nasal | 1 | 2.5 |
| TOTAL | 40 | 100 |

Around 52.5% patients had single site of obstruction as seen on videoendoscopy with muller maneuver. Rest of the patients mainly had two sites of obstruction, while one patient was having three sites of obstruction. (**Table 7)**

**Table 7:** Distribution of patients on basis of site of obstruction

| Site of Obstruction | NUMBER | PERCENTAGE |
|---|---|---|
| SINGLE | 21 | 52.5 |
| MULTIPLE | 19 | 47.5 |
| TOTAL | 40 | 100 |

Among the comorbidities seen in these patients, around 72.5% patients had hypertension, 30% had hypothyroidism and around 17.5% had diabetes mellitus. Two patients also were undergoing treatment for depressive disorder. (**Table 8)** The Epsworths Sleepiness Scale in these patients had abnormal value in 72.5% patients and in borderline range in 22.5%. (**Table 9)**

**Table 8:** Associated comorbid conditions

| Comorbid condition | Number of patients | Percentage |
|---|---|---|
| Hypertension | 29 | 72.5 |
| Diabetes | 7 | 17.5 |
| hypothyroidism | 12 | 30 |
| Depressive disorder | 2 | 5 |

**Table 9:** Comparative analysis on basis of Epworths Sleepiness Scale

| Ess | Number | Percentage |
|---|---|---|
| 0-10 | 2 | 5 |
| 10-12 | 9 | 22.5 |
| 12-24 | 29 | 72.5 |

## DISCUSSION

OSA is the most common sleep disorder. Characterized by recurrent episodes of upper airway obstruction during sleep, it results in significantly reduced airflow (hypopnea) or complete cessation of breathing (apnea) for intervals lasting ≥ 10 seconds.[4,5] The total number of apneas or hypopneas per hour of sleepthe apnea-hypopnea index (AHI)is one domain that can be used to classify the severity of OSA. Symptoms suggestive of OSA include witnessed or reported apneas, snoring, gasping/choking at night, excessive daytime sleepiness not explained by other factors, severity of sleepiness (as determined by the Epworth Sleepiness Scale), Non Refreshing sleep, sleep fragmentation/maintenance insomnia, nocturia, morning headaches, decreased concentration, memory loss, decreased libido, and irritability.In addition to symptomatology, there are several risk factors associated with OSA that should be considered. The most important are male gender, increasing age (40 to 70), obesity, large neck circumference, and craniofacial and upper airway abnormalities.[13] In our study with the aim to evaluate the patients with obstructive sleep apnoea we performed all these investigations. In our study we had a forty patients and majority were within the age group of 40-50 years. Mean age of patients was 44.15±8.17 years. Males constituted 55percent of the study group and they had mean age of 42.5±8.67years and females constituted rest 45 percent with mean age of 46.17±7.25years. Our findings are consistent with the findings of study by Akram Khan, Kannan Ramar, Supriya[11] who had conducted a study to assess the role of uvulopalatopharyngoplasty in treatment of OSAS and had included 51 men (81%) and 12 women (19%) of mean age group 42.1±13.9 years in their study. In the study by Lawrence J. Epstein *et al.*[12] increased prevalence of OSA in male population was seen.The most common complaints of all the patients in our study group were snoring and excessive daytime sleepiness. Snoring was seen in with 95%, disturbed sleep seen in 90% and EDS seen in 85%of the cases. The other less common presenting symptoms like morning headache forgetfulness and dry mouth was seen in 52.5%, 45% and 62.5% respectively. In a study by Christian Guilleminault, Vivien C. Abad, in 2004[3]approximately 50% of patients reported generalized, dull, morning or nocturnal headaches. Nocturnal symptoms in OSA are more specific than daytime symptoms. Seventy-five percent of spouses reported apneic episodes terminated by gasps, choking sounds, snorts, vocalizations, or brief awakenings. Other nocturnal symptoms seen were nocturia (28%); esophageal reflux; dryness of the mouth (74%); and drooling (36%).In another study by P C Deegan and WT Mc Nicholas[13] the presenting symptoms in patients were snoring in 75%, sleeping supine with disturbed sleep in 70% and excessive daytime sleep in 80% of the patients. Similar findings were reported by Alfred Dreher, Christine Klemens, Robert Werner, Fiona Baker, Gabriele Barthlen[14], in their study. They reported that all patients complained ofsnoring; 72% reported nocturnal breathing pauses; and 61%complained of EDS.In our study videoendoscopy with Mueller's maneuver was done to all the patients and site of obstruction was seen when patient was awake. In 37.5% of patients only retropalatal obstruction was seen and in 15% only hypopharyngeal. Rest of the patients had multilevel obstruction with 25% having hypopharyngeal and retrolingual and 10% with hypopharyngeal and retropalatal. 7.5% of the patients had retropalatal and retrolingual and retropaltal, retrolingual and nasal in 2.5% and retropalatal, nasal in 2.5% of patients. In study by UmitTuncel, Hasan Met, Murat Enoz[15], most of the patients [104(47.1%) of 221] had obstruction at the soft palate level, 33 (14.9%) had hypopharyngeal obstruction and 84 (38%) had obstruction at both levels. According to the most recent classification of obstruction types; 138 patients (62.4%) had unilevel and 83 patients (37.6%) had multilevel obstruction. On examination, majority of the patients had grade III MMS (45%). Grade II and grade IV constitute 30% and 25% respectively. There was no single patient of grade I MMS. Our findings are consistent with the findings of Thomas J. Nuckton, David V. Glidden, Warren S. Browner[16], who also found grade III MMS in highest number of patients(47%). MMS grade I was seen in 9%, grade II in 36% and grade IV in 7%. In another study by Michael Friedman, Hasan Tanyeri, Manuel La Rosa[17], grade III was seen in 47%, followed by Grade II(26.7%) and Grade IV(16.2%).In our study group patients were thoroughly examined and classified on basis of tonsil size on oropharyngeal examination, it was seen that 32.5% patients had Grade II, 27.5% and 25 % patients had Grade I and Grade III tonsilar enlargement respectively. Grade 0 was seen in 5 % and Grade IV in 10% of patients. In study by Michel BurihanCahali, Carolina Ferraz de Paula Soares, Gilberto[18]oropharyngeal examination of the tonsils revealed that 39.2% of the

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subjects had grade I, 43.1% had grade II, 16.2% had grade III and 1.5% had grade IV tonsils. Our findigs are not consistent with findings in the study by Michael Friedman, Hasan Tanyeri, Manuel La Rosa[17], the distribution of tonsil size to patients was, grade 0: 40 (23.25%) patients; grade I: 74 (43.0%) patients, grade II: 35(20.3%) patients; grade III: 16(9.3%) patients; and grade IV 7(4.0%).In our study group of 40 patients the mean neck circumference had mean value of 35.2 ± 3.6 cm, the mean BMI of all the patients was 33.25± 2.36 $kg/m^2$. Epworth Sleepiness Scale had mean ESS to be 14.0 ± 2.86 and AHI score of all the patients ranges from 22/h-81/h with mean to be 50.25 ± 8.36. In study by Richard P. Millman[19]mean body mass index 32.5±0.9$kg/m^2$. The preoperative baseline AHI was 44.8±4.3. Michael Friedmann *et al*.[17], conducted a study in 1999 on 172 patients. In their study BMI ranged from 18.6 to 58, with a mean of 32.34±23.7. These clinical parameters recorded in our study are in conformity with the above quoted references. Sleep apneoa is a common but mostly underestimated disorder, which negatively affects multiple organ systems, OSA syndromes afflict various age groups. Obstructive sleep apnoea is a complex multifactorial condition produced by a combination of anatomical and physiological factors. Polysomnography and other diagnostic parameters help in prompt identification of suspected cases.

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