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Journal homepage: [www.ijohd.org](http://www.ijohd.org)**Review Article****Diagnosis of obstructive sleep apnea****Shipra Bisht<sup>1,\*</sup>, Tanvika<sup>1</sup>, Rini Banerjee<sup>1</sup>, P Narayana Prasad<sup>1</sup>**<sup>1</sup>Dept. of Orthodontics & Dentofacial Orthopedics, Seema Dental College & Hospital, Rishikesh, Uttarakhand, India**ARTICLE INFO***Article history:*

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**ABSTRACT**

Obstructive sleep apnea, a disorder in which people stop or restrict their breathing while sleeping, is becoming more common. This leads to restless, disrupted sleep, which can cause headaches in the morning and exhaustion in the afternoon. Obstructive sleep apnea affects people of all ages, however it is more common among persons over the age of 60. As a result, the correct diagnosis is essential for effective treatment. This review discusses a variety of diagnostic processes, including screening questionnaires, sleep tests, and other diagnostic approaches, in order to demonstrate how correct diagnosis might aid in the development of a more effective treatment plan.

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For reprints contact: [reprint@ipinnovative.com](mailto:reprint@ipinnovative.com)**1. Introduction**

Burwell et al. published the first medical description of "Obstructive Sleep Apnea (OSA)" in 1956, describing "Pickwickian syndrome" as a link between increased obesity levels and alveolar hypoventilation. However, there are rumours that it was explored by Charles Dickens in "The Posthumous Papers of the Pickwick Club" in the early nineteenth century (1837).<sup>1</sup>

"Obstructive sleep apnea is a condition marked by recurrent bouts of upper airway obstruction during sleep, resulting in reduced (hypopnoea) or absent (apnoea) airflow at the nose/mouth". Apneas are frequently associated with loud snoring and lack of oxygen, and are typically ended by brief arousals, resulting in severe sleep fragmentation and lower amounts of "slow wave sleep" (SWS) and "rapid eye movement" (REM) sleep.<sup>2</sup>

"Physiological assessment of the Upper airway" was presented at the American Thoracic Society's Annual Meeting in May 1989, and "Imaging of the Upper Airway" was presented at the association of professional sleep

Societies' Annual Meeting in June 1990.<sup>3</sup>**2. Diagnosis using a Medical Approach***2.1. Chief complain*

The most prevalent complaint among patients is loud snoring, which is followed by a morning headache and tiredness.

To establish patient trust and rapport, a comprehensive diagnostic of the patient should be performed prior to the onset of snoring. This will be critical in the beginning of patient-centered treatment.

*2.2. Screening tool*

Easy-to-use questionnaires, including the STOP BANG, Berlin questionnaire, and Epworth Sleep Scale (ESS), have been designed as low-cost screening tools for identifying OSA.<sup>4</sup>

Score of 0 to 2 have a low chance of developing moderate to severe OSA, but those with a score of 5 to 8 have a significant risk.<sup>4</sup>

\* Corresponding author.

E-mail address: [shiprabisht94@gmail.com](mailto:shiprabisht94@gmail.com) (S. Bisht).

Yes	No	<b>Snoring?</b>
<input type="radio"/>	<input type="radio"/>	Do you snore loudly (loud enough to be heard through closed doors or your bed partner elbows you for snoring at night)?
Yes	No	<b>Tired?</b>
<input type="radio"/>	<input type="radio"/>	Do you often feel tired, fatigued, or sleepy during the daytime (such as falling asleep during driving)?
Yes	No	<b>Observed?</b>
<input type="radio"/>	<input type="radio"/>	Has anyone observed you stop breathing or choking/gasping during your sleep?
Yes	No	<b>Pressure?</b>
<input type="radio"/>	<input type="radio"/>	Do you have or are being treated for high blood pressure?
Yes	No	<b>Body mass index more than 35 kg/m<sup>2</sup>?</b>
<input type="radio"/>	<input type="radio"/>	
Yes	No	<b>Age older than 50 years?</b>
<input type="radio"/>	<input type="radio"/>	
Yes	No	<b>Neck size large? (measured around Adam's apple)</b>
<input type="radio"/>	<input type="radio"/>	For male, is your shirt collar 17 inches or larger?
<input type="radio"/>	<input type="radio"/>	For female, is your shirt collar 16 inches or larger?
Yes	No	<b>Sex = male?</b>
<input type="radio"/>	<input type="radio"/>	

Fig. 1: Stop bang

**THE EPWORTH SLEEPINESS SCALE**

Name: \_\_\_\_\_  
 Today's date: \_\_\_\_\_ Your age (years): \_\_\_\_\_  
 Your sex (male = M; female = F): \_\_\_\_\_

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your usual way of life in recent times. Even if you have not done some of these things recently try to work out how they would have affected you. Use the following scale to choose the *most appropriate number* for each situation:

0 = would *never* doze  
 1 = *slight* chance of dozing  
 2 = *moderate* change of dozing  
 3 = *high* chance of dozing

Situation	Chance of dozing
Sitting and reading	_____
Watching TV	_____
Sitting, inactive in a public place (e.g. a theater or a meeting)	_____
As a passenger in a car for an hour without a break	_____
Lying down to rest in the afternoon when circumstances permit	_____
Sitting and talking to someone	_____
Sitting quietly after a lunch without alcohol	_____
In a car, while stopped for a few minutes in the traffic	_____

**Thank you for your cooperation**

Fig. 2: Epworth score

Figure 2 shows short, self-administered questionnaire that has been found to evaluate the subject's general degree of daytime drowsiness. This is a unique opportunity. a brief, self-administered questionnaire that has been found to offer a measure of the subject's general level of intelligence drowsiness during the day.<sup>5</sup>

### 3. Physical Examination

#### 3.1. Obesity

Obesity of the upper body is frequent in OSAS, Patients with OSAS are also more prone to have a chubby neck. The presence of a neck boundary is a strong predictor of sleep apnea, with circumferences of < 37 cm and larger than 48 cm indicating low and high risk, respectively.<sup>6</sup>

#### 3.2. Anatomic factor

Anatomic component that lead to upper airway constriction incorporate tonsillar hypertrophy, micrognathia, retrognathia, macroglossia, and inferior placement of the hyoid. A general constriction of the oropharyngeal airway, with or without an increase in soft tissue deposition, is a typical physical finding in people with OSAS.<sup>2</sup>

#### 3.3. Hypertension

It has been demonstrated in numerous research that a link exist between sleep apnea and hypertension. Example : "drug-resistant hypertension", the OSAS seems to be extremely high.<sup>7</sup>

### 4. Oral Examination

Patients with OSA, particularly non-obese people with continuous OSA, should have their upper airways thoroughly evaluated.

Mallampati oropharynx scoring is a noninvasive approach for determining the difficulty of doing an intubation when the tongue obstructs the airway.

#### 4.1. "Airway classification in mallampati (I-IV Scale)"<sup>8</sup>

Class I: Soft palate and complete uvula is seen.

Class II : Soft palate and a piece of the uvula are visible.

Class III: noticeable soft palate (may include base of uvula)

Class IV: no apparent soft palate

### 5. Studies on Sleeping

#### 5.1. Polysomnography

The gold standard for diagnosing OSA is polysomnography (PSG). Electro-oculogram, EEG, submental and bilateral leg electromyograms, and EC recordings are also included.<sup>9</sup>

Sleep studies are of four different types, based on the amount of physiologic variables recorded:<sup>10</sup>

Level I : Standard PSG includes EOG, EEG (frontal, central, and occipital derivations), ECG, chin EMG, airflow record, respiratory exertion, oxygen saturation, and limb EMG.

Level II: Comprehensive portable PSG examinations are similar to level I. A heart rate monitor is utilised instead of an ECG.

Level III: An assessment of cardiorespiratory incorporates ventilation (at least 2 channels of respiratory movement and airflow), heart rate, and oxygen saturation is known as modified portable sleep apnea testing. In this situation, ventilation is measured using at least two channels of respiratory movement or airflow.

Level IV: Continuous bioparameter recordings are employed in oxygen studies.

“According to the Rechtschaffen and Kales sleep grading criteria, sleep phases were assessed in 30-second epochs. Apneas and hypopneas number was calculated for each epoch, an apnea was defined as a loss of airflow lasting shorter than 10 seconds.”<sup>11</sup>

## 5.2. Home sleep test with portable monitoring device

With a portable monitoring device, you can conduct a sleep test at home.

According to a 2017 guideline from the “American Academy of Sleep” Medicine, HST is only authorized for uncomplicated patients with signs and indication of moderate to severe OSA.<sup>12</sup>

Patients who suffer from nighttime anxiety may benefit from PSG. The HSTs that are routinely used in clinical practise only assess respiratory airflow, oxygen saturation, and respiratory effort. Some HSTs have a sensor that detects body position as well as an actigraph, which can be used to determine when the patient is awake or asleep.

## 6. Various Methodologies

### 6.1. Müller’s maneuver

The MM, which was first reported by Borowiecki and Sassin for preoperative OSA testing, involves the patient pushing against a blocked airway while fiberoptic endoscopic imaging of the upper airway is performed. It’s easy to set up, little obtrusive, and low-cost.

After achieving topical nasal anaesthetic with 4% lidocaine and 0.5% ephedrine spray, the test is performed with the patient in a sitting position. A nasopharyngoscope is placed through the anaesthetic nasal cavity into the lower oropharynx.

During a maximum inspiratory effort with the lips and nose closed (“reverse Valsalva”). The base of the tongue and the lateral pharyngeal walls are checked for collapse. Collapse of the soft palate is evaluated once more during

a maximum inspiratory effort against a closed mouth and sealed nose when the nasopharyngoscope is pulled out to a point just cephalad to Passavant’s ridge.<sup>13</sup>

### 6.2. Cephalometries

In patients with OSA, to assess the skeletal and, soft tissue architecture, which includes the VA’s limits. The most common method has been to employ cephalometric roentgenograms.<sup>3</sup>

Riley et al. observed that OSA patients had mandibular insufficiency (retrognathia), soft palate elongation, PAS, and a hyoid bone positioned inferiorly relative to the mandibular plane.<sup>14</sup>

One of the most significant drawbacks of cephalometric imaging is that it is a two-dimensional static imaging technique.

### 6.3. Upper airway computerised tomographic assessment

In 1983, the first studies using CT to assess UA in OSA patients were published. Fast-CT scanning can be used to assess the UA both during sleep and during waking. Conventional CT scanners can acquire each axial image in 2-5 seconds. The radiation exposure is 5 rads.

Fast-CT, on the other hand, takes only 50 milliseconds for two axial images or 224 milliseconds to scan eight levels of the UA. The radiation dose is lowered by an order of magnitude due to the shorter scan period. Fast-CT can clearly define the area where the UA collapses.<sup>3</sup>

### 6.4. Magnetic resonance imaging

The degree of pharyngeal airway constriction, volumetric evaluation of soft tissue abnormalities, and craniofacial deformities may all be assessed using MRI.

MRI can give good anatomical information in a noninvasive manner without ionising radiation, and it can image directly in many planes.<sup>15</sup>

### 6.5. During sleep, forced oscillatory measures of airway patency

It determine pharyngeal resistance by measuring reflected random noise in the 4 to 32 Hz frequency range, and it’s been touted as a viable tool for measuring upper airway resistance during sleep.<sup>16</sup> More research is needed to see if this technique is a workable and simple to use diagnostic tool for OSAS.

## 7. Conclusion

OSA syndrome, or OSA with daytime impairment, is believed to affect one out of every 20 persons, is often undiagnosed and untreated, and leads to behavioural

and cardiovascular morbidity. There have been several approaches to tackling this issue, including thorough screening and diagnosis of the condition, followed by treatment options.

Because the therapy for sleep apnea differs depending on the severity of the condition, adequate diagnostic procedures are essential to prevent morbidity in individual with mild to severe OSA.

## 8. Source of Funding

None.

## 9. Conflict of Interest

The authors declare no conflict of interest.

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## Author biography

**Shipra Bisht**, Post Graduate Student

**Tanvika**, Post Graduate Student

**Rini Banerjee**, Post Graduate Student

**P Narayana Prasad**, Senior Professor and Head

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