Review Article

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TANAFFOS

Diagnosis of Obstructive Sleep Apnea Syndrome in Adults: A Brief Review of Existing Data for Practice in Iran

Moein Foroughi [1], Hossein Razavi [2], Majid Malekmohammad [3], Parisa Adimi Naghan [1], Hamidreza Jamaati [4]

[1] Chronic Respiratory Diseases Research Center, Department of Pulmonary and Sleep Medicine, National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, Iran, [2] Medical Director, Saint Helena Hospital ICU & Department of Respiratory Care, Napa, CA, USA, [3] Tracheal Diseases Research Center, NRITLD, Shahid Beheshti University of Medical Sciences, Tehran, Iran, [4] Tobacco Prevention and Control Research Center, NRITLD, Shahid Beheshti University of Medical Sciences,Tehran, Iran

Correspondence to: Adimi P
Address: Department of Pulmonary and Sleep Medicine, NRITLD, Tehran, Iran.
Email address: prs_adimi@yahoo.com

Obstructive sleep apnea (OSA) is a common disorder associated with major comorbidities. It is estimated that 5-35% of the adult population in Iran are at high risk for OSA. This review article is designed to assist sleep medicine specialists as well as general practitioners in Iran to screen for OSA. It summarizes empirical data for diagnosing OSA including history taking, physical examination, diagnostic testing, and diagnostic criteria with regards to existing sleep medicine centers and availability of diagnostic tests in Iran.

Key words: Obstructive Sleep Apnea Syndrome, Sleep-Disordered Breathing, Clinical Guideline

INTRODUCTION

Obstructive sleep apnea (OSA) is the most common form of sleep-disordered breathing. It is due to periodic partial or complete collapse of the upper airways during sleep (1). It is estimated that 2-26% of the general population worldwide are suffering from this disorder (2). It is estimated that 5-35% of the Iranian adults are at increased risk for OSA (3, 4). Symptoms of OSA include snoring, excessive daytime somnolence, and impaired function (5). It is associated with major comorbidities including metabolic dysfunction and increased risk of cardiovascular diseases. Obstructive sleep apnea is prevalent among certain groups of patients with peculiar physical features. Table 1 summarizes conditions that significantly increase the risk of OSA. Patients suffering from these comorbidities should be further evaluated for OSA.

History taking

Symptoms of OSA have a gradual onset and are present for years in most of patients. Excessive daytime somnolence is the main symptom of OSA. It is defined as the tendency to fall asleep despite an individual's effort to stay awake, and may be described by patients as fatigue or low energy. These patients become somnolent in passive situations or during monotonous activities such as watching television, reading books, or during a long drive. If the aforementioned problem occurs despite getting

adequate amount of sleep during the preceding night the patient may have a problem with quality of his/her sleep. Excessive daytime somnolence could be measured quantitatively by Epworth Sleepiness Scale (ESS) questionnaire (Table 2).

Table1. conditions that could be further evaluated for OSA(7)

Obesity (BMI>35)	Pulmonary arterial hypertension
Congestive heart failure	High-risk driving population
Atrial Fibrillation	Preoperative for bariatric surgery
Refractory HTN	Hypothyroidism*
Type 2 diabetes	Opioids use*
Nocturnal dysrhythmia	
Stroke	

Table 2. Epworth Sleepiness Scale Questionnaire.

The patient should choose one of the 0-3 numbers as described below in the recent two weeks. Scores greater than 10 out of 24 are regarded as presence of daytime sleepiness

0 = would *never* doze or sleep.

1 = *slight* chance of dozing or sleeping

2 = *moderate* chance of dozing or sleeping

3 = *high* chance of dozing or sleeping

Sitting and reading

Watching TV

Sitting inactive in a public place

Being a passenger in a motor vehicle for an hour or more

Lying down in the afternoon

Sitting and talking to someone

Sitting quietly after lunch (no alcohol)

Stopped for a few minutes in traffic

Snoring is another major symptom of OSA. The patient's partner or family members often report snoring, gasping for air while asleep, or witnessed apnea. However at times patients may awaken themselves with any of those symptoms. The mechanism for arousal could vary from the noise to vibration or respiratory drive as the result of hypercapnia that is caused by prolonged apnea. Male sex, age over 50, hypertension, and metabolic diseases are the other risk factors for OSA. Some other features that should be noticed through history & physical are shown in Table 3.

Table 3. Clinical features of OSA*(Up To Date)*

Excessive daytime sleepiness	Obesity
Non-restorative sleep	Neck circumference equal to or larger than 17 inches
Witnessed apneas	Systemic hypertension
Awakening with choking	Hypercapnia
Nocturnal restlessness	Cardiovascular disease
Insomnia with frequent awakenings	Cerebrovascular disease
Lack of concentration	Cardiac dysrhythmias
Cognitive deficits	Narrow or "crowded" airway
Changes in mood	Pulmonary hypertension
Morning headaches	Cor pulmonale
Vivid, strange, or threatening dreams	Polycythemia
Gastro-esophageal reflux	Floppy eyelid syndrome

Physical examination

Physical examination may indicate an increased risk for OSA and should include the respiratory, cardiovascular and nervous system (6). Obesity and signs of upper airway narrowing are the most prominent physical exam findings in patients with OSA (7). Body mass index above 30 kg/m^2 is a risk factor for OSA. Asretrognathia, micrognathia, lateral peritonsillar narrowing, macroglossia, tonsillar hypertrophy, an elongated or enlarged uvula, a high arched or narrow palate, nasal septal deviation, and nasal polyps increase the risk of OSA (7). Modified Mallampati score of 3 or 4 is also considered a risk factor for OSA. Large neck circumference (above 17 inches in men, or 16 inches in women), elevated blood pressure, and signs of pulmonary arterial hypertension or cor pulmonale are other important findings in physical exam.

There are standardized questionnaires that could be used in primary care visits for screening patients with possible OSA. We recommend STOP-BANG questionnaire because of its feasibility and high sensitivity for detecting OSA (8). It has 8 questions (Table 4) and a score of ≥ 3 is considered high risk for OSA.

Table 4. STOP-BANG questionnaire (1)

1. Snoring: Do you snore loudly (louder than talking or loud enough to be heard through closed doors)? Yes No
2. Tired: Do you often feel tired, fatigued, or sleepy during daytime? Yes No
3. Observed: Has anyone observed you stop breathing during your sleep? Yes No
4. Blood pressure: Do you have or are you being treated for high blood pressure? Yes No
5. BMI: BMI more than 35 kg/m2? Yes No
6. Age: Age over 50 years old? Yes No
7. Neck circumference: Neck circumference greater than 40 cm? Yes No
8. Gender: Male gender? Yes No

*Neck circumference was measured by the staff

Diagnostic Testing

All patients with a history of snoring and excessive daytime somnolence, as well as individuals who have high-risk jobs (pilots, truck or bus drivers, and machine operators at plants or factories) and experience excessive daytime somnolence should undergo diagnostic testing for OSA. Lack of excessive daytime sleepiness does not rule out the possibility of clinically significant sleep-disordered breathing or OSA. The clinician should search for clinical features that are listed in Table 2. Having ≥ 2 of those symptoms indicate the need for further assessment or a sleep study.

There are four levels of sleep testing, which are shown in Table 5. Levels 1 and 3 are routinely used to diagnose OSA, while level 4 should not be performed to diagnose OSA.

Table 5. Evaluations used in sleep test (9)

Level 1	In-laboratory, technologist attended polysomnography
Level 2	Full (unattended) polysomnography
Level 3	Portable monitoring with three or more channels, including pulse oximetry and heart rate
Level 4	Portable monitoring with only one or two channels including pulse oximetry

Polysomnography

Overnight polysomnography is the gold-standard diagnostic test for OSA. Patients who are diagnosed with OSA and choose continuous positive airway pressure (CPAP) therapy are then brought back for follow up study, during which the pressure of CPAP device is titrated. Alternatively those two studies can be done in selected patients over one night, followed by a "split-night protocol". The two parts of the split night study complement each other; diagnosis of OSA is made during the first part, followed by titration of CPAP during the second half of the study. If there are more than 20 respiratory events per hour in the first half of the study in a patient with a high pre-test probability (having two or more clinical features), or ≥ 40 respiratory events in a patient with a pretest low-probability, splitting the study is recommended. Starting CPAP titration during the same night sleep study is time- and cost effective while expediting delivery of treatment to the patients. It should be noted that the first half of the split night sleep study has to have at least 2 hours of recorded sleep data.

A negative polysomnogram does not exclude diagnosis of OSA particularly in high-risk patients. In such patients repeating the polysomnogram should be considered (10-12)

Portable monitoring

There are a variety of devices that are used for in-home, portable monitoring of cardiorespiratory parameters. An effective portable monitor requires at least three channels to asses airflow, thoraco-abdominal movements, and blood oxygenation (13). In general the sensitivity and specificity of these devices seem to be high in populations at high risk for OSA (Table 3), assuming there are no other comorbid medical or sleep disorders. Clinical practice guidelines from the American Academy of Sleep Medicine (AASM) indicate that portable monitoring may be used as an alternative to polysomnography to diagnose OSA in patients with a high pre-test probability of moderate to severe OSA (14) . Portable monitoring should not be used if another sleep disorder is suspected or the patient has comorbid medical conditions that predispose to non-OSA sleep related breathing disorders. These comorbid conditions include, but are not limited to, moderate to severe pulmonary diseases, neuromuscular diseases, congestive heart failure, movement disorders, parasomnias, sleep seizures, etc.

Other sleep procedures

Multiple sleep latency test (MSLT) is another test that is used to evaluate excessive daytime sleepiness and is not routinely indicated for evaluation and diagnosis of OSA or in assessment of response to therapy following treatment with CPAP.

Actigraphy is a useful tool for assessment of periodic limb movements. This helps to determine the rest-activity pattern during the test period but it does not have a role in diagnosis of OSA.

Diagnostic criteria

The diagnosis of OSA is based upon the presence or absence of related symptoms, as well as the frequency of respiratory events during sleep (i.e., apneas, hypopneas, and respiratory effort related arousals) as measured by polysomnography or portable monitoring (Figure 1). In adults, OSA is confirmed if either of the following two conditions exists:

1. There are 15 or more episodes of apnea, hypopnea, or respiratory effort related arousals per hour of sleep (i.e., an apnea hypopnea index or respiratory disturbance index ≥ 15 events per hour) in an asymptomatic patient (15). More than 75% of the episodes of apnea and hypopnea must be obstructive (16).

2. There are ≥ 5 obstructive apneas, obstructive hypopneas, or respiratory effort related arousals per hour of sleep (i.e., an apnea hypopnea index or respiratory disturbance index ≥ 5 events per hour) in a patient with symptoms or signs of disturbed sleep (15). More than 75% of the apneas and hypopneas must be obstructive (16).

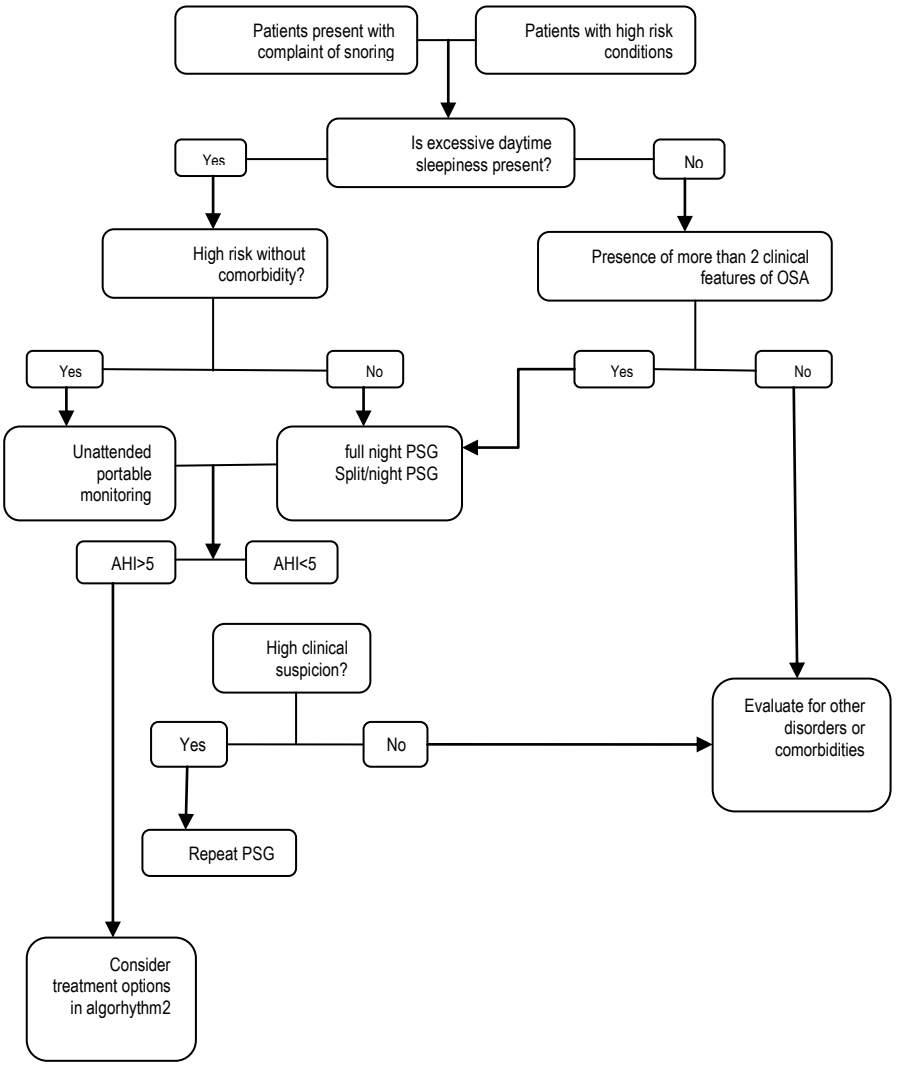

Figure1. Diagnosis of obstructive sleep apnea algorithm

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