

OBSTRUCTIVE SLEEP APNEA- A GROWING PROBLEM

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ABSTRACT

Sleep is one of the basic human need, which gives freshness and positivity to any mind. OSA is the one where the sleep pattern is disturbed with the episodes of breathing difficulty. It is most commonly seen in obese people and causes adverse health. Prevention plays a highly important role in OSA, where identifying high risk population and screening them helps to identify the condition earlier in time before it could worsen. A nurse helps in identifying risk people and providing education about home care management. This caring also involves teaching about complications of OSA and its treatment modalities. This review article addresses the challenges, gaps in sleep apnoea, and improves knowledge about practical aspects of caring the client. Ultimately, it is found to be useful for healthcare professionals how to approach the risk people and for implementing the preventive strategies.

Key words: Sleep apnea, Obesity, Hypertension, difficult breathing, snoring.

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INTRODUCTION

Sleep : Minimum : 6 hours



Maximum : 8 hours

Sleep is the natural process and it is considered to be one of the basic needs of human life. Though it is a natural process, many people suffer with insomnia and other sleep related issues. The sleep process is characterized by temporary loss of consciousness, low sensory activity, less body tone etc.. Sleep is the most important factor in maintenance of good health and prevention of many diseases. Adequate quality & quantity of sleep helps to maintain physical, mental health of a human being. Plays a vital role in good health and well-being [1 & 2].

Advantages :

- ✓ Sleep improves memory
- ✓ Sleep extends life span

- ✓ Sleep boosts creativity
- ✓ Sleep strengthens immune system
- ✓ Sleep reduces risk for depression
- ✓ Sleep improves physical performance
- ✓ Sleep sharpens attention
- ✓ Sleep reduces stress
- ✓ Sleep helps body to heal itself
- ✓ Sleep helps to lose weight
- ✓ Sleep makes you more alert

Sleep apnoea is a potentially serious sleep disorder in which suffocated breathing occurs frequently and repeatedly.

Types of Sleep Apnea :

❖ **Obstructive sleep apnoea** : It is the commonest form where there is an obstruction which occurs when the throat muscles relax.

❖ **Central Sleep Apnoea**, which occurs when your brain doesn't send proper signals to the muscles that control breathing.



❖ **Complex Sleep Apnoea's Syndrome**, It is a mixed Sleep Apnea also known as treatment-emergent central sleep apnoea, which occurs when there is combined obstructive and central apnoea's [3].



Obstructive sleep apnea is a serious sleep disorder, characterized by breathing difficulty repeatedly. Obstructive sleep apnea syndrome is a common but often unrecognized disorder caused by pharyngeal collapse during sleep and characterized by frequent awakenings, disturbed sleep and consequent excessive daytime sleepiness. Many studies have shown that hypertension, metabolic syndrome, diabetes, heart failure, coronary artery disease, arrhythmias, stroke, pulmonary hypertension, neurocognitive and mood disorders were correlated with Obstructive sleep apnea [4 & 5].

Epidemiology :

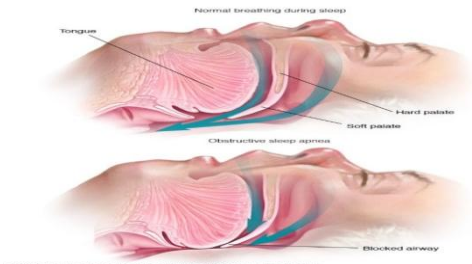
Obstructive Sleep Apnea can affect various age groups. The prevalence of adult OSA in the United States has been reported being 4 % in men and 2 % women between the ages of 30 and 60 years. Among middle-aged adults, 93 % of women and 82 % of men with OSA have not been clinically diagnosed [2&6]

Stages :

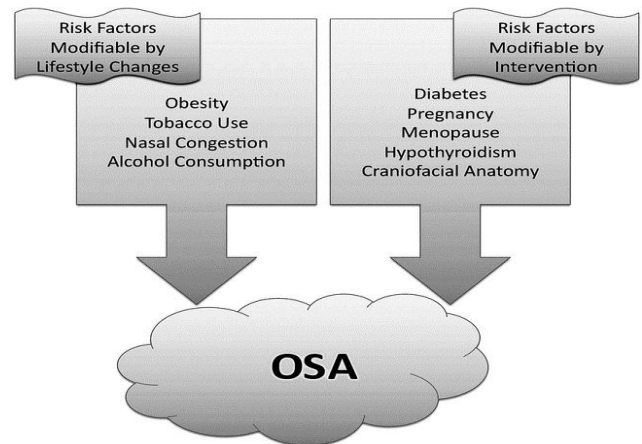
Mild OSA : The client experiences 5-14 episodes of breathing difficulty in an hour.

Moderate OSA : The client experiences 15-30 episodes of suffocated breathing in an hour.

Severe OSA : The client experiences 30 or more obstructed in breathing in an hour [7].



Risk Factors :



Causes:

Weight : Overweight or obese are obviously with short neck circumference and this could cause sleep apnoea	Frequent alcohol use : Alcohol relaxes the muscles in the body.
Age : Aging causes muscles to lose tone, and becomes weaker. Natural Causes : Narrower throat, enlarged tongue, family history of OSA.	The Menopause (in women) : In women some changes in hormone levels especially after their menopause may likely cause throat muscle relaxation more than usual.
Being male : It has been the unknown fact that OSA is seen commonly in men, some theories explain about alcohol and smoking.	Nasal congestion : OSA occurs more often, in people with nasal congestion, such as deviated septum, nasal polyps.
Enlarged tonsils or adenoids : leading cause of OSA in children but also affects adults who never had a tonsillectomy when they were younger.	Smoking : It acts as irritant to lungs, throat, and oesophagus causes inflammation and fluid retention in the upper airways that can impede airflow. [8 & 9]

Pathogenesis :

Several factors are implicated in the development of OSA. The main factor among those was the muscle weakness, there was a reduced elasticity of pharyngeal dilator muscles causes situations of genio glossal muscle dysfunction, as this could lead to less or inhibited co-ordination of inspiratory effort and respiratory effort. Pae *et al.* found tongue shape in patients with OSAS to be



different from that of normal subjects in the supine position. OSA is more closely related to Obesity and the severity is influenced by neck perimeter than body mass index [10].

Clinical Presentation :

- Adult sleep- disordered breathing : Excessive sleepiness or insomnia with frequent episodes of obstructed breathing during sleep and associated features of loud snoring, morning headaches and dry mouth on awakening.
- Daytime sleepiness is the most complaint, it can occur following meals, while sitting, watching television, attending a meeting, driving etc..
- Patients may notice difficulty with attention, concentration, memory, judgment and impaired performance of tasks.
- Neurocognitive impairment
- Heart burn
- Nocturia
- Erectile dysfunction
- Night sweats
- Approximately 50 % of patients report generalized, dull, morning and nocturnal headaches. Nocturnal symptoms in OSA are more specific than daytime symptoms. Loud snoring with brief gasps alternating with episodes of silent lasting from 20 to 30 seconds.
- Changes in mood
- Nocturnal restlessness
- Vivid, strange or threatening dreams
- GERD
- Chocking sounds, snorts, vocalizations or brief awakenings, diaphoresis in the neck and upper chest area, restlessness are commonly seen [11].

Diagnosis :

- Thorough history collection
- Physical examination – High BMI, Neck circumference > 40 cm, Nasal turbinate hypertrophy, Septal deviation, High, and hard narrow plate, Elongated and a low-lying uvula, Crowding of oropharynx with enlarged tonsils and adenoids, Prominent tonsillar pillars, Microglossia.
- Polysomnography – a). Full-night polysomnography is routinely indicated for patients suspected OSA. In adults, it demonstrates greater than five obstructive apnoea's per hour of sleep, lasting at least 10 seconds and associated with one or more of the following :
 1. Frequent arousals from the sleep
 2. Brady tachycardia
 3. Arterial oxygen desaturationb). Split-night polysomnography - the first half of the night is spent in diagnostic recording, with the second half of the night used for CPAP titration.
- Overnight pulse oximetry used as screening test to identify sleep apnoeas.

- Multiple Sleep latency test (MSLT) is another test that is used to evaluate excessive daytime sleepiness.
- 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 : In adults, OSA is confirmed if one of the following two conditions exists :

- a) There are 15 or more episodes of apnea, hypopnea. More than 75 % of the episodes of apnea and hypopnea must be obstructive.
- b) There are > 5 obstructive apneas, obstructive hypopnes or respiratory effort related arousals per hour of sleep [12].

MEDICAL MANAGEMENT : Treatment of symptomatic OSA syndromes is influenced by the severity of sleep apnoea's, relative efficacy of treatment options, the presence of co morbid conditions, patient and physical preference.

For mild forms of OSA _ Non surgical options include

- Weight loss
- Avoidance of sleep deprivation, alcohol, nicotine, and sedatives
- Positional therapy (avoidance of supine position)
- Treatment of comorbid conditions such as hypothyroidism.
- Continuous Positive Airway Pressure : It can be used for all categories of OSA and represents first line therapy for moderate to severe OSA. Effective CPAP therapy reduces nocturnal respiratory disturbances and improves nocturnal oxygenation, sleep architecture, daytime sleepiness, neurocognitive performance etc.



- Bilevel positive airway pressure allows independent adjustment of inspiratory and expiratory pressures. It is indicated for patients who cannot tolerate CPAP because of persistent massive nasal mask air leak or discomfort exhaling against positive pressure or have concomitant nocturnal breathing disorders such as restrictive thoracic disorders, COPD or nocturnal hypoventilation.



Auto titrating positive airway pressure (Auto-CPAP) devices detect snoring, apneas and hypopneas, flow limitation and changes in airway resistance or impedance which are then interpreted by central processing unit based on specific diagnostic algorithms to determine the resultant voltage from the auto titrating positive airway pressure blower in response to these signals.



➤ **Oral Appliances:**

For patients with mild or moderate OSA who decline or fail to adhere to positive airway pressure therapy, an oral appliance is a reasonable alternative to positive airway pressure. This is based upon the recognition that while positive airway pressure is more effective than an oral appliance at normalizing respiratory events and oxyhemoglobin desaturation episodes during sleep, most patients prefer an oral appliance, adherence is an essential aspect of successful treatment.



➤ **Mandibular advancement devices (MADs)**

The aim of the MAD is to improve the patient's sleep quality as well as that of the relatives or roommates, by reducing or eliminating snoring and respiratory pauses during sleep. Mandibular advancement devices carry out an anterior and inferior movement of the jaw, generating anatomical variations in the UA that enable an increase in the pharyngeal area. This movement stabilizes and fixes the jaw and the hyoid bone, preventing the postero rotation of these structures during the decubitus, preventing blockage of the airway. Although its main effect appears in the velopharyngeal area, it has repercussions for all the pharyngeal segments. Initially it causes rigid and swelling of the space between pharyngeal pillars. The soft palate is displaced ventrally, and this increases the caliber of the lateral walls of the velopharyngeal area which are factors that drastically reduce snoring.



➤ **Tongue retaining mouthpieces**

Tongue Retaining Device for Snoring (TRD) is being the revolutionary, and the best solution for patients suffering with snoring. It works by holding tongue in place during sleeping, as it prevents the movements of tongue into his/ her throat. It also holds the jaw in place simply by a gentle suction that holds your tongue in place [13].



SURGICAL MANAGEMENT:

A Surgical therapy of OSA is directed toward site-specific obstruction in the upper airway. Three parts were involved in the process of obstruction in OSA. 1. The nose, 2. The palate (oropharynx), 3. The base of the tongue (hypopharynx). Fujita classified the sites of obstruction as follows ; Fujita type 1 – palate with normal base of the tongue ; Fujita type II – Palate and base of the tongue obstruction ; Fujita type III - Base of the tongue obstruction with a normal palate.

Surgical technique involve either extirpation of soft tissue, secondary soft tissue repositioning through primary skeletal mobilization, or bypass of the pharyngeal airway. Procedures resulting in extirpation of soft tissue include UPPP, modified UPPP – extended uvulopalatal flap, uvulo palato pharyngo glossoplasty, laser midline glossectomy and lingualplasty.

❖ UPPP – commonly used technique enlarges the retropalatal airway through tonsillectomy (if present), trimming and reorientation of posterior and anterior



tonsillar pillars and excision of the uvula and the posterior portion of the palate.

❖ Primary skeletal mobilization include transpalatal advancement pharyngoplasty, mandibular advancement, maxillomandibular advancement, genitoglossal advancement and hyoid myotomy and suspension.

❖ Tracheostomy may be used to bypass the pharyngeal airway in OSA patients with morbid obesity, sever facial skeletal deformity with excessive day time somnolence, hypoxemia, cardiac arrhythmias.

❖ Nasal reconstruction is performed for patients with significant obstruction of the nasal airway.

❖ Weight control and bariatric surgery : Weight loss is a main goal in the management OSA and al patients should be encouraged to control their weight. In patients with severe obesity bariatric surgery, including gastric bypass and bandage, is a modality of weight reduction when conservative treatments have failed.

❖ Emerging therapeutic options : The stimulation of upper airway muscles has been considered over the years as a potential approach to prevent an obstructive apnoea's. Electrical stimulation of hypoglossal nerve, activating the genio glossus muscle, increase upper airway patency. The stimulator device is implanted under the chest skin with an electrode placed on the hypoglossal nerve and is activated during sleep time.

❖ Other emerging treatment options include nasal expiratory PAP (nEPAP) has recently gained attention. The nEPAP is a disposable adhesive device placed over each nostril to increase the airflow resistance during the exhalation with a consequent improvement in the upper airway patency.

❖ Oral negative pressure is another novel treatment modality alternative to positive pressure. The most studies negative pressure system consists of an oral interface, a vacuum pump, and a connection tube. The application of a negative pressure by the vacuum pump produces a displacement of the tongue and the soft palate in a more anterior position, thus stabilising the upper airway, this device is well tolerated and significantly reduces the number of nocturnal apnoea's [13].

NURSING MANAGEMENT :

❖ **Assessment :**

- Hospital nurses have a unique opportunity to observe patients sleeping, particularly at night, though clues may be discernible during the day. Ask about sleep history like unusual sounds/snoring or waking from the sleep to be explored from the patient data. Hence the nurse can counsel the patient to undergo needed assessments based on that planning for interventions through life style changes.

- Vigilant monitoring of the patient for OSA effects.
- Asking appropriate questions
- Helping with symptom management.

❖ **Nursing Action :**

- Prepare the patient and partner for C PAP treatment through education.
- Explaining and demonstrating – how to apply at home
- A nurse's understanding of the condition, its diagnosis and treatment may help patients to manage the condition.

- The nurse role in the use of the CPAP device will differ from that in its use in acute respiratory settings, more emphasis must be given to managing the device at home.

- This would include an explanation and demonstration of how the device works and how to prevent potential problems such as chafing from the mask or nasal cannula, particularly around the nose and ears or conjunctival oedema. Dehydration or nausea can also occur.

- Checking for the functioning of CPAP equipment.

❖ **Patient education :**

- Increase communicating to patient.
- Explaining about possible physical side effects of CPAP like nasal congestion, runny nose, sneezing, sinusitis and nose bleeds.
- Concern for the psychological and socio economic side effects.
- Cognitive behaviour therapy may be useful for the patients who experience claustrophobia and anxiety.

- Explain about frequent health visits.

- Advising on lifestyle choices.

- Hygiene : encourage about more oral hygiene as some oral devices causes oral cavity infections.

❖ **Nursing Diagnosis :**

- Ineffective breathing pattern related to impaired regulation as possibly evidenced by an apnoea during a sleep.

- Impaired gas exchange related to ventilation – perfusion imbalances as possibly evidenced by the hypoxia, hypercapnia.

- Compromised family coping related to situational crisis as possibly evidenced by the spouse expresses concern and fear about apnoea episodes.

- Anxiety related to acute breathing difficulties and fear of suffocation.

- Activity intolerance related to inadequate oxygenation and dyspnoea.

- Risk for complications like respiratory distress related to frequent episodes of apnea [14].

COMPLICATIONS :

➤ **Hypertension :** OSA is an independent risk factor for hypertension, and hypertension is a frequent comorbid condition with sleep apnoea.

➤ **Cardiovascular disease :** OSA is associated with heart failure. It has also been implicated in the pathogenesis of pulmonary hypertension, nocturnal cardiac ischemia, nocturnal arrhythmias and atherosclerosis. OSA patients demonstrate transient fluctuations in pulmonary artery pressure and pulmonary wedge pressure coincident with an apnoea which lead to



pulmonary artery pressure. Various studies demonstrated that OSA can precipitate nocturnal angina, MI etc..

- **Cerebrovascular Disease** : OSA patients have a higher intima-media thickness values in OSA compared with habitual snorers. It is one of the risk factors for development of CVA.
- **Obesity-metabolic syndrome** : Obesity is the most common metabolic abnormality seen with sleep apnoea and is predominantly central in pattern.
- **Others** : As sleeplessness causes Irritability, drowsiness, altered attention, poor academics, stress, Headache, Motor vehicle accidents etc..
- Irregular heart beats
- Insulin resistance & Diabetes
- Depression
- Weight gain
- Worsening of ADHD
- Adult asthma
- Acid reflux
- Pulmonary hypertension
- Depressed quality of life
- Childhood growth interruption
- Fetal growth retardation.
- Malignancy : Sleep disordered breathing generates a molecular environment which is certainly markedly pro-atherogenic., but could also potentially promote the development of cancer. OSA causes tissue hypoxia, systemic inflammation, oxidative stress and immune dysregulation, all these factors lead to oncogenesis. New
- Disruption of patients 'bed partners' sleep quality [15, 16 & 17].

PREVENTION

- Educational and behavioural Interventions : Intensive life style interventions are effective in the management of OSA, resulting in significant weight loss, and a reduction in sleep apnoea severity.
- Losing weight : Weight loss has been accompanied by improvement in characteristics related not only to obesity but to OSA as well, suggesting that weight loss might be a cornerstone of the treatment of both conditions. The studies done previously shown that there an association

REFERENCES

1. Clement: Text book of nursing foundation : 2nd edition : Jaypee brothers publishers pvt., Ltd. : 320-321.
2. Brunner & Suddarth's text book of medical surgical nursing : Wolters Kluwer publications : 2016 :13th edition, volume 1: 553-554.
3. Jennifer Hines. Alaska sleep education centre: Alaska sleep clinic : The 3 types of sleep apnoea Explained :Obstructive, Central & Mixed.
4. Christian Guilleminault, Vivien C. Abad. (2004) Obstructive sleep apnoea syndromes, *The Med Clin N Am*, 611-630.
5. Massimo R. Mannarino, Francesco Di Filippo, Matteo Pirro. (2012) Obstructive sleep apnoea syndrome : *European Journal of Internal Medicine*, 23(7), 586-593.
6. Kevin K Motamedi BS, Andrew C. Mc Clary ScB and Ronald G. Amedee MD. (2009) Obstructive Sleep Apnoea : A Growing problem. *The Ochsner Journal*, 9(3), 149-153.
7. Christian Guilleminault, Vivien C. Abad. (2004) Obstructive sleep apnoea syndromes: *The Med Clin N Am*, 611-630.
8. John F. Garvey, Martino F. Pengo, Panagis Drakatos and Brain D. Kent. (2015) Epidemiological aspects of obstructive sleep apnoea. *Journal of Thoracic Disease*, 7 (5), 920-929.

between OSA and obesity. Obesity interacts with sleep, Weight reduction helps in reducing the severity of OSA (Romero-Corral *et al.*, 2010) [18].

- Avoid alcohol : High alcohol intakes also contribute to dietary energy intake, and hence in some cases a high body mass index, which is itself a risk factor for OSA, alcohol consumption may cause or exacerbate OSA (E Simou *et al.*, 2018) [19].
- Quit smoking: Cigarette smoking may increase the severity of OSA through alterations in sleep architecture, upper airway neuromuscular function, arousal mechanisms, and upper airway inflammation. Smoking cessation, and coexisting unhealthy lifestyles (eg, weight gain, alcohol intake) may be effective in improving the quality and duration of life of these patients (V Krishnan, 2014) [20].
- Avoid use of sleeping pills and tranquilisers and hypnotics.
- Controlling hypertension
- Keep blood sugar levels in normal
- Eating healthy foods
- Exercising frequently
- Frequent health check ups
- Sleeping positions like obese people may benefit from sleeping in an upright position [21].

CONCLUSION

OSA is a prevalent disease entity that has become a common problem over the past few decades. OSA is recognized as a common clinical problem. It also causes lot of complications like stroke, hypertension, vascular dementia, atrial fibrillation. The present article provides information about the importance of sleep, pathology of OSA, signs and symptoms and management of the condition, also discussed surgical advancements. Special attention goes to nursing management where nurses can identify risk people and advise about preventive strategies as part of their education programmes. The social, economic and personal impacts are significant and contributes to improvement in treatment modalities of OSA.



9. Terry Young, Paul E. Peppard and Daniel J. Gottlieb. (2002) Epidemiology of Obstructive sleep apnoea : A Population health perspective. *American Journal of Respiratory and critical care medicine*, 165, 9.
10. Eva Azagra-Calero, Eudardo Espinar-Escalona, Jose M.Barrera-Mora, Jose M. Llamas-Carreras and Enrique Solano-Reina. (2012) Obstructive sleep apnoea syndrome (OSAS). Review of the literature. *Medicina Oral Patologia Oral cirugia Bucal*, 17(6), e925-e929.
11. Robert C. Stansbury and Patrick J. Strollo. (2015) clinical manifestations of sleep apnes. *Journal of Thoracic Disease*, 7 (9), e298-e310.
12. Moein Foroughi, Hossein Razavi, Majid Malekmohammad, Parisa Adimi Naghan and Hamidreza Jamaati. (2016) Diagnosis of Obstructive Sleep Apnea Syndrome in Adults. A Brief review of existing data for practice in Iran. *Tanaffos*, 15 (2), 70-74.
13. Meir H Kryger, MD, FRCPC, Atul Malhotra MD. (2018) Management of obstructive sleep apnoea in adults.
14. Lucia Spicuzza, Danielea Caruso and Giuseppe Di Maria. (2015) Obstructive sleep apnoea syndrome and its management. *Therapeutic chronic disease*, 6(5), 273-285.
15. Alison Malcolm RN. (2005) The nurse role in managing and treating sleep disorders. *Neurology*, 101, 23- 34.
16. Hading SM. (2000) Complications and consequences of obstructive sleep apnea : *Curr opin pulm med*, 6 (6), 485-489.
17. John F. Garvey, Martino F. Pengo, Panagis Drakatos and Brain D. Kent. (2015) Epidemiological aspects of obstructive sleep apnoea. *Journal of Thoracic Disease*, 7 (5), 920-929.
18. Sharon A. Chung, Hongbo Yuan, ph D, Frances Chung. (2008) A systematic review of obstructive sleep Apnea and its implications for anaesthesiologists. *Ambulatory Anesthesiology*, 107, 5.
19. Abel Romero-Corral, Sean M. Caples, Francisco Lopez-Jimenez and Virend K. Somers. (2010) Interactions between Obesity and Obstructive Sleep Apnea. *Chest*, 137 (3), 711-719.
20. Evangelia Simou, John Britton and Jo Leonaardi-Bee. (2018) Alcohol and he risk of sleep apnoea : a systematic review and meta-analysis. *Sleep Med*, 42, 38-46.
21. Krishnan V, Sherrie Dixon Williams and J. Daryl Thornton. (2014) Where there is smoke there is sleep apnoea. *Chest*, 146 (6), 1673-1680.
22. Ralph Downey. What are the prevention measures for obstructive sleep apnoea (OSA), 2018.

