



## SLEEP APNEA: A GUIDE TO DEFINITION AND SUGGESTIONS

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### ABSTRACT

A condition known as Obstructive Sleep Apnea (OSA) is characterized by poor sleep quality, excessive daytime drowsiness, and impaired cognitive performance. As a result, it has long been regarded as a severe public health concern with possible social effects, such as higher morbidity and mortality, as well as cognitive deficiencies that affect job productivity. Recently, there has been a significant rise in the number of people identified with and cured with OSA. A worldwide condition with increased prevalence and comorbidities, particularly with metabolic syndrome, is OSA. Diabetes mellitus type 2 (T2DM), hypercholesterolemia, and hypertension are significant contributors to sleep apnea. To control OSA, CPAP treatment may be used. As worldwide awareness grows, health care systems provide prevention, diagnosis, and treatment. To reduce obesity, people need to be aware of exercising and changing their lifestyle habits (eating habits, smoking, drinking). Obesity and sleep apnea will be dramatically decreased if these lifestyle changes are widely adopted. To enhance quality of life, the public must be aware of weight reduction via diet and exercise. They may also lower the risk of other comorbidities such as cardiovascular disease, atherosclerosis, and depression associated with obesity. Finally, health care prices will fall.

## 1. Introduction

Obesity prevalence is growing worldwide, with the prevalence of obesity in Asian nations reaching around 30 percent [1]. It has been shown that obesity and OSA are correlated linearly. The upper respiratory tract becomes narrowed due to fat deposits in the upper respiratory tract; there is a reduction in muscular activity in this area, which results in hypoxic and apneic episodes, which eventually lead to sleep apnea. These hypoxia/apnea events reduce the amount of oxygen accessible in the body's tissues and blood vessels. The reduced oxygenation results in tissue hypoxia, the most important contributing factor to atherosclerosis, the most crucial risk factor for Cardiovascular Diseases (CVD) [2].

Four-year longitudinal research [3] of obese and overweight American individuals showed that weight change is inversely proportional to sleep-disordered breathing (SDB). Those who gained the most weight had a more severe apnea-hypopnea index than those who lost the most weight (AHI). A sedentary lifestyle, cigarette use, and excessive alcohol use were all shown to enhance OSA incidence in a cohort of Australian males. Other risk factors were being overweight or obese, having a high BMI, and having a sedentary lifestyle. Several disorders, including T2DM, hyperlipidemia, hypertension, heart failure, CVD, and depression, are closely associated with OSA [3].

### 1.1. Obesity and Sleep

Obesity can be defined as a BMI is greater than or equal to 30, while a BMI > 25.0 implies the individual is overweight. Compared to males, found to have lower rates of becoming overweight or obese. The key contributing causes to obesity are the environment, eating habits, and physical inactivity. Psychosocial factors and genetics may play an important part in obesity [4].

Persons who are overweight (with a BMI of much more than thirty) and have lower sleep length have twice as many personal sleep issues as nonpeople. Being fat or overweight is connected with a lower quantity of sleep than nonpeople. Obesity is connected with poor sleep and quality so weight reduction may relieve sleep issues. Consequently, reducing excess weight had a favorable influence on sleep length and quality in adults.

Weight gain is a gradual process fueled by insufficient sleep, a sedentary lifestyle, excessive calorie intake, and genetic predisposition. Short-sleepers and obese individuals are more susceptible to developing severe depression. Men who are

obese had shorter sleep duration (less than eight hours) and worked longer hours (more than 9 hours). Obesity is connected with shorter sleep duration (less than eight hours) and longer working hours. Hormonal imbalances may occur as a result of inadequate sleep and nutritional consumption. One such imbalance is a reduction in melatonin, which results in changes in the circadian metabolism rhythm, which increases the risk of weight gain and the development of the metabolic syndrome. Changes in the body's metabolic rate affect the effects of leptin and insulin. Individuals who are overweight or obese develop resistance to these hormones. These hormones reduce the demand for eating while increasing the rate at which energy is burned. When The stomach produces ghrelin, it increases hunger and is influenced by sleep disruptions. It has also been shown that chronic short sleepers had higher ghrelin levels and lower leptin levels than the general population. Because of the increased food intake that occurs due to these changed levels in short sleepers, they are predisposed to obesity. Predisposing factors for obesity, such as insufficient sleep and an excessive caloric intake, are also significant risk factors for diabetes and the other elements of insulin resistance. More severe implications of OSA exist than merely being sleepy; in OSA patients, extreme daily drowsiness, anxiety, and poor focus owing to a lack of sleep may result in traffic accidents [5].

### *1.2. The Syndrome of Obstructive Sleep Apnea (OSA)*

Patients with obstructive sleep apnea syndrome (OSAS) suffer from repeated apnea and hypopnea episodes due to a total or partial collapse of the upper airway during their sleep. Because of the buildup of fatty tissues in the upper respiratory muscles of obese individuals, the upper respiratory muscles become narrowed. A significant rise in intrathoracic pressure occurs due to the restriction in breathing caused by the constriction of the upper airway, resulting in apnea and hypoxia. In individuals with OSAS, there is enhanced sympathetic activity due to apnea/hypoxia events [6]. Apneic episodes may cause oxygen saturation to decline from 95 percent to 80 percent, depending on the amount of time the patient was awake during the apneic episode. OSA is a known independent risk factor for cardiovascular and cerebrovascular disorders and other health problems. Because of the hypoxia associated with OSAS, oxidative stress accumulates reactive oxygen species, promoting endothelial dysfunction and ultimately culminating in atherosclerosis. Increased levels of the inflammatory markers C-reactive protein (CRP), tumor necrosis factor (TNF), and interleukin-6 (IL-6) were seen in individuals with OSA, and these levels were statistically significant when the AHI was 15 or higher [7].

Leptin is a hormone that has a role in regulating food intake and energy metabolism. Patients with OSAS have higher than average amounts of the hormone leptin. The amount of the hormone leptin is inversely associated to the degree of OSAS. In another study, researchers discovered that individuals with obesity and OSA had higher amounts of the hormone leptin, with leptin being directly related to the severity of the condition [8]. When comparing OSA patients to controls, serum leptin levels are fifty percent higher in the OSA group.

### *1.3. OSA is Characterized by its Epidemiology, Prevalence, and Gender Disparities.*

In the general population, males are 3 to 7 percent more likely than women to have OSA, while women are 2 to 5 percent more likely. Obesity-related mortality rates are exceptionally high in persons who are overweight. The contrary is also true: those who suffer from OSA are at risk of becoming overweight. Patients who do not get enough sleep at night and are sleepy during the day are more likely to gain weight. In obese persons who have bariatric surgery, sleep apnea affects 77 percent of those who undergo the procedure. For obese persons who are candidates for gastric surgery, polysomnographic (PSG) testing is highly suggested [9].

Women's rates of OSA differ depending on whether or not they are postmenopausal. It is estimated that 0.6 percent of premenopausal women suffer from OSA, a relatively low prevalence. The prevalence of postmenopausal women on hormone replacement therapy (HRT) is 0.5 percent; however, the prevalence of postmenopausal women who do not take HRT is 2.7 percent. OSA prevalence in postmenopausal women who do not use hormone replacement therapy is similar to that in males. According to the National Sleep Foundation, women, apart from postmenopausal women, have a greater incidence of OSA than males. Despite the higher frequency of sleep apnea in males, women are more likely to have comorbidities such as morning headaches, insomnia, mood disorders, and anxiety [9].

### *1.4. Differentiation Based on Ethnicity*

The majority of research conducted on the relationship between ethnicity and OSA has been conducted between Blacks and Whites. White Europeans were approximately twice as likely as South Asians to develop OSA in a cross-sectional examination of OSA incidence in T2DM patients than white Europeans in longitudinal research (thirty percent vs. fifty percent ). Furthermore, South Asians had a lesser severity of the illness than Europeans, which was a positive finding. An ethnically diverse cohort was researched as part of the Sleep Heart Health Study to understand better the symptoms of SDB and how they differ by race and ethnicity. Snoring was shown to be more prevalent among Hispanic men and women and Black women compared to other races. OSA risk is higher in African-Americans than in whites, and it manifests itself

at a younger age. OSA was more prevalent and more severe in Far East Asian males than in white men in research that compared the two groups. Far East Asian men had a lower BMI than white men. The authors speculated that the elevated incidence of OSA in Far East Asian males might be due to variations in their cranial structure. The paper is organized as follows: In Section 2, Implications for treatment are discussed in detail. Section 3 provides several points related to the discussion. Section 4 draws the Conclusion for further future works.

## **2. Implications for Treatment**

### *2.1 The Importance of Weight Reduction, Physical Exercise, and Nutrition Management*

Obesity and a lack of physical exercise are also connected with moderate - to - severe OSA. Exercise may help you lose weight, lower your blood pressure, and combat depression, anxiety, and exhaustion. Eating disorders like bulimia may also contribute to obesity; thus, it is essential to treat these psychological and emotional concerns to solve obesity and its comorbidities as early as possible in infancy or at the earliest possible age of diagnosis. To combat grown-up obesity, families' childhood development prevention and treatment is essential in bringing this global problem under control. Unfortunately, there is very little high-quality research in this field, which is unfortunate [10].

### *2.2 CPAP*

Continuous positive airway pressure (CPAP) is the most often used therapy for OSA (CPAP). This treatment uses a machine to give consistent airflow to a patient's airway using nasal, facial, or oral equipment, which keeps the patient's airway open. At the same time, they sleep, maintaining airway patency. Treatment with continuous positive airway pressure (CPAP) dramatically reduces OSAS complaints and improves functional ability in both men and women. Female sleep patterns and OSAS clinical presentations vary from those of males during pregnancy and menopause [10], owing to physiological changes that occur during these periods.

### *2.3 Implications for Public Health*

Patient participation in preventing obesity and its significant implications is encouraged by legislators, healthcare providers, marketing, and the food industry. The importance of early childhood development treatments mediated through parents' and friends' education cannot be overstated in preventing obesity and its repercussions. Preparing nutritious meals, boosting physical activity, and fostering healthy lifestyle changes from an early age are all recommended. Early childhood education on what defines a healthy lifestyle and the adoption of that lifestyle are very significant factors. Parents may encourage their children to be more physically active by including them in household duties or encouraging them to engage in activities other than video games. The need to use healthier cooking techniques, like baking or grilling, rather than frying meals should also be stressed. It is also vital to stay away from items that contain high fructose corn syrup, such as juice or soda. Ironically, obesity continues to be a problem in Australia despite a national nutrition program that has decreased the intake of sugary beverages. According to the American Heart Association, local community initiatives may help draw attention to and urge individuals to avoid sweet beverages and other sugar-laden beverages and foods. Even though this avoidance and knowledge may be damaging to soda companies and other sugar-producing goods throughout the globe, it will help us manage this rapidly developing global issue more effectively and associated comorbidities. Encouraging healthy lifestyle choices across the whole family will result in a healthier future society [11].

## **3. Discussion**

The incidence of OSA is rising worldwide due to the increasing prevalence of obesity in civilization. Obesity-related sleep apnea (OSA) is characterized by fat accumulation in the respiratory tract that causes breathing problems during sleep. Obesity and sleep apnea are highly linked. Obese individuals must be evaluated for sleep apnea and the diseases connected with it. Overweight and OSA patients are both at increased risk of developing metabolic syndrome. Dietary management in obese persons may alleviate sleep issues and the sadness, anxiety, and insomnia linked with them. Stress and depression management and the management of disrupted sleep management should be addressed in young people. Bearing in view that emotional difficulties should also be taken into consideration. Encouraging a person to engage in healthy group conversations and treatments actively and encouraging them to join in these groups may help them improve their psychological, mental, and social health. Health care providers, particularly primary care doctors, may significantly contribute to the resolution of this expanding public health issue.

OSA is a growing and pervasive condition that is mainly related to obesity. The gold standard of treatment is continuous positive airway pressure (CPAP) therapy and ensuring that the patients adhere to the therapy. Surgical techniques are advised if the situation does not improve within a reasonable period. Surgical weight reduction techniques for obese patients are strongly encouraged by non-surgical teams and groups and medical professionals. It should not be a barrier to undertake bariatric surgical treatments, particularly in the older population, because these procedures are safe.

#### 4. Conclusion

The influence of obesity on OSA is clearly shown in this study. A significant positive link between overweight and OSA was found in several groups from various cultural backgrounds. There is a significant public health concern here, and multi-layered responses are required. Our emphasis is on reducing the intake of junk food and fast food while boosting the intake of fruit and vegetables to deal with this growing and mostly avoidable health problem. Besides quitting smoking, other key behaviors include water rather than juice, soda, or alcohol and exercising regularly. Additionally, physical activity is required in conjunction with dietary modifications. Surgery is an option for treating obesity and its related complications if pharmacological and lifestyle modification regimens are unsuccessful. Surgical techniques that might significantly decrease obesity and its associated comorbidities, hence lowering death rates, are being developed and implemented. Obesity and its related comorbidities should be taken seriously if the goal is to enhance public health overall. This problem is not just the duty of the person and the healthcare professional; it should also be handled correctly by government authorities to enhance people's health and create a more healthy society as a result.

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