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New Insights of Obstructive Sleep Apnea and its Association with Different Disorders in Human Body

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Commentary

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COMMENTARY

Obstructive sleep apnea is a syndrome of breathing in sleep in which breathing repeatedly stops due to obstruction of upper airway i.e. upper throat muscles and tissues. Patients suffering from OSA are mostly unaware of uneven breathing. A pause in breathing is called an apnea. The pause can last up to seconds or minutes. During an apnea carbon dioxide accumulates in the blood. A person may not be aware to the whole process during sleep but in consequences he suffers from sleepiness, fatigue and restlessness and many more symptoms. These symptoms and consequences may not seem to be a matter of concern but recent studies suggest that OSA is associated with several disorders which can be fatal.

The presence of OSA can be estimated in the patients as quality of life in patient certainly decreases. It can cause morbidity and mortality in a person's daily life as it is associated with wide range of medical conditions e.g., Hypertension, diabetes, metabolic syndromes, obesity, cardiovascular diseases, depression, fatigue, sleepiness and many more [1].

It is very common when a patient is diagnosed with both OSA and Metabolic disorder. Some studies suggest that the OSA is an indication of the metabolic syndrome. The presence of both the syndromes at an instance has been named as "Syndrome Z". From a case study it is found that about 60% patients were diagnosed with metabolic syndrome having OSA. Furthermore OSA also has a boosting effect to atherosclerosis in patients suffering from metabolic syndrome [2].

Obstructive sleep apnea is common among people diagnosed with hypertension, heart disease and suffering from obesity [3]. OSA also increases the risk for the above diseases. OSA is generally seen in middle aged and elderly persons [4]. Also, it is observed that irrespective of the age group it found in people suffering from obesity. Studies suggest that 70% of people had OSA who were diagnosed with Hypertension [5]. Many risk factors for stroke like: atrial fibrillation, diabetes and hypertension are associated with OSA and untreated OSA can take out worse outcomes [6]. Case studies of 34 patients after 4 months of a stroke shows that they were observed and diagnosed with sleep Disordered Breathing after that. However, the study lac evidences and good representation of data [7].

In some cases OSA can occur due to genetic disorders irrespective of age and sex. From a case study of a 14-year old girl suffering from Rett syndrome [8], it is found that along with a number of body bizarre disorders she was suffering from OSA also [9].

OSA could be at a risk for atherosclerosis as chronic intermittent hypoxia (CIH) can trigger atherosclerosis in a patient suffering from hyperlipidemia [10]. CIH significantly increased atherosclerotic lesion sizes, mRNA levels of COX-1 and thromboxane synthase. In OSA patient, activation of the COX pathway in relation to CIH along with increased atherosclerotic lesions [11] shows early atherosclerosis

markers. The whole mechanisms involved in the cancer development progression from hypoxia [12]. Hypoxia-inducible factor (HIF)-1 triggers the transcription of genes playing a basic role in genetic modification, with the formation of cancer-related stem cells [13].

OSA is also associated with myocardial injury. Cardiac Troponin I, levels can confirm the degree or severity of myocardial injury. So, the extent of Cardiac Troponin I, can directly be relate to severe OSA and can predict the extent of myocardial injury [14]. But the study do not shows the exact relation and association between the levels of Cardiac Troponin I [15] and OSA. So the procedure can be helpful but cannot say that it is a precise method to diagnose.

During a research relating hematological parameters and OSA it was found that red cell distribution width (RDW) may be a marker to find out the severity of OSA which can be an inexpensive tool for polysomnography evaluation of OSA [16,17]. Representation of results and evidences suggests that it can be an efficient method to diagnose levels of OSA.

As a diagnostic tool Physical parameters like: Body Mass Index (BMI), Neck Circumference (NC), and Waist Circumference (WC) can be helpful tool to diagnose and to check the severity of OSA. This is not a precise method but in most Asian countries where the resources are limited for polysomnography [18], can be an effective diagnostic tool. During a research in Thailand 66 patients were enrolled and checked for Physical parameters and levels of OSA. The results represented that The BMI of more than 25 kg/m2 had the maximum sensitivity (93.8%) for severe OSA, whereas Waist Circumference more than 101.8 cm had the maximum specificity (92%). NC was not associated with severity of OSA [17]. But this study was remarkable to diagnose levels of OSA in limited resource areas. Some regular day symptoms like Excessive daytime sleepiness, poor sleep quality and loud snoring are common symptoms of OSA [19]. But these symptoms along with nocturia, arousal index, and lowest oxygen saturation also vary with mostly differentiated OSA across different age groups of patients with OSA [18].

A study by Toraldo DM et al. [22] also shows that there may be a relation between genotypic frequencies of genes like F5-coagulation factor V and F2-coagulation factor II and severity of OSA. A number of patients were tested with control patients which suggests genotypic heterogeneity [20] in OSA patients, PAI-1 5G/5G polymorphism with PAH possibly in relation with severity of the disease. The study suggests the possible relation as well as could not prove the direct relation.

As far as the concern of treatment of OSA, since the invention of Continuous Positive Airway Pressure (CPAP) it has been the standard treatment. In addition to CPAP or in mild OSA positional therapies to prevent other disorders like supine and jaw advancement devices and specially designed dental appliances [21] has been in use. It is cost effective and certainly improved quality of life in OSA patients [22]. As a withdrawal it is concluded [23] that CPAP may add up to the unpleasant dream content and an increase in REM sleep. Also, CPAP treated OSA along with surgery may lead the patient to become hypoxic [24].

Oral appliance therapy can be effective as much as CPAP in ling term use with minimal dental effects, condition as properly titrated [25]. In most of cases patients suffer from supine related OSA. As prevention there is an anti-supine t-shirt which showed remarkable results in preventing supine related OSA as it inhibits the patient to sleep in supine position [26]. But it may led to unpleasant and uncomfortable sleep to the patient in early days of use, later on as the patient become used to the treatment it could be very helpful.

In addition to OAD, Mandibular advancement devices (MADs) are leading in comparison to CPAP and anti-supine shirt. It can cure mild to moderate OSA especially snoring. Also, it need not to consult some sleep specialist as general dentist could perform the treatment [27]. However, certain mild side effects are there also in this treatment. A study suggested that a new oral appliance [28] in the treatment is BestMAD i.e. a Mandibular advancement devices with minimal or negligible side effects. It is a comfortable and effective device which is proven to be improving polysomnographic parameters [29]. This devise works as tongue base advancement and with the activation of the genioglossus muscles. It reduces the resistance in upper airway and expand the size of lumen which prevents apneas and snoring [30]. So in contrast, till now BestMAD is proven to be cost effective, reliable, and efficient appliance for the treatment of OSA.

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