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Original Research Article

Prevalence of hypothyroidism among patients with obstructive sleep apnea: A study in a tertiary care center

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ABSTRACT

Background: Obstructive sleep apnea is a common disorder wherein there are recurrent episodes of sleep disordered breathing resulting in disrupted sleep and other sequelae. The symptoms of hypothyroidism are very similar to OSA, a number of studies have been performed to analyze their association with conflicting results.

Materials and Methods: A questionnaire based on the Wisconsin Sleep Apnea questionnaire for quality of sleep, sleep pattern, symptoms during sleep, snoring were asked to 118 patients included in the study. The day time sleep patterns were assessed by the Epworth Sleepiness scale. Polysomnography testing, Saturated oxygen levels, sleep efficiency and arousal index were also done for all the patients. Blood was collected for the detection of thyroid hormones.

Results: There were 82 (69.5%) males and 36 (30.5%) females on the present study out of 118 patients. The mean age of the patients under study was 53.91 ± 4.69 years, the weight was 89.48 ± 12.83 kgs and the BMI was 34.86 ± 6.11. Amongst the patients with OSA and hypothyroid, the apnea hypoapnea index was 66.22 ± 18.31 episodes per hour, and Epworth sleepiness scale was 15.18 ± 5.26 while in patients with OSA and without hypothyroid, it was 24.17 ± 6.29 and 8.25 ± 5.82 respectively.

Conclusions: Our study shows a significant association between OSA and hypothyroidism among patients, thus having a considerable implications in managing the thyroid condition of the patients.

1. Introduction

Obstructive sleep apnea is a common disorder wherein there are recurrent episodes of sleep disordered breathing resulting in disrupted sleep and other sequelae.[1–3] These episodes maybe due to total or partial pharyngeal collapse as well as in temporary obstruction of the airways during sleep thus resulting in hypoxemia and hypocapnia. These symptoms are restored during the arousal of the individual as the pharynx is opened restoring the airflow, but in turn it disturbs the quality of sleep. Many times, this results in excessive sleep during the day, the condition called as obstructive sleep apnea syndrome (OSAS).[1] Other symptoms associated with the fragmented sleep are apathy, somnolence and lethargy.

OSA is very often accompanied by lowered blood saturation levels. This is due to the pauses in the breath which may last for 20-40 seconds. The patient is normally unaware of these pauses, but it is noticed by the people around him. OSA is characterized by snoring, gasping and choking.[4–8] Some of the risk factors for OSA are age, obesity, a familial history and the circumference of the neck. OSA is also said to occur more in males in comparison to the female population. In case of the females, menopause is said to be the main cause.[9–11]

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Since the symptoms of hypothyroidism are very similar to OSA, a number of studies have been performed to analyze their association with conflicting results. The mechanisms associated for OSA have been proposed to be an increased mucopolysccharide and protein deposition in the upper respiratory system with an alteration in the regulatory control of the dilator muscles of the pharynx due to neuropathy and a depression of the respiratory centers.[12,13]

According to National Health and Nutrition Examination Survey (NHANES) done in the USA, the prevalence of hypothyroidism was estimated to be around 3.7%, while sleep apnea was around 3%. Using different criteria, the prevalence of hypothyroidism among the patients with OSA has been reported to be around 1-10%.[14,15]

Since OSA is a risk factor for many diseases such as cardiovascular diseases, depression, obesity, diabetes, hypertension, the diagnosis of this condition is very important for an effective treatment.[16,17] It has also been reported that in patients with hypothyroidism, the frequency of OSA is increased.[18] This study was therefore conducted to study the association between OSA and hypothyroidism.

2. Materials and Methods

The present study was conducted by the Department of Pulmonary Medicine at Kamineni Academy of Medical Sciences and Research Centre during the period of two years between December 2019 to March 2021 on 118 patients who were diagnosed with having obstructive sleep apnea. This study was conducted after obtaining clearance for the Institutional Ethical Committee and informed consent from the concerned patients or their family members. In case of minors, the consent was obtained from the parents or the legal guardians. All the patients were subjected to a thorough clinical examinations by the clinician during the initial screening procedure. A questionnaire based on the Wisconsin Sleep Apnea questionnaire was prepared and questions regarding the quality of sleep, sleep pattern, symptoms during sleep, snoring were asked to the patients. The day time sleep patterns were assessed by the Epworth Sleepiness scale.

Polysomnography testing was done for all the patients. For electronic data, the scoring system was done manually as per the established criteria. The sleep apnea in patient was diagnosed as per the definition of International Classification of Sleep Disorders and classification was as per the American Academy of Sleep Medicine (AASM) criteria (Table 1).

Table 1: Classification of OSA as per American Academy of Sleep Medicine (AASM)

Apnea – Hypopnea Index	Criteria of OSA
1-14/h	Mild
15-29 /h	Moderate
≥ 30/h	Severe

Saturated oxygen levels, sleep efficiency and arousal index were also done for all the patients and noted.

Blood was collected from the medial cubital vein within 2 weeks of the sleep apnea test for serum thyroxine (T4) and thyroid stimulating hormone (TSH). The hypothyroidism was divided as following[19] (Table 2)

Table 2: Classification of hypothyroidism

TSH and T4 level	Classification
TSH >5.0 μIU/mL &T4 <10.3 pmol/L	Clinical hypothyroidism
TSH > 5.0 μIU/mL & T4 normal range	Subclinical hypothyroidism

3. Results

There were 82 (69.5%) males and 36 (30.5%) females on the present study out of 118 patients (Figure 1).

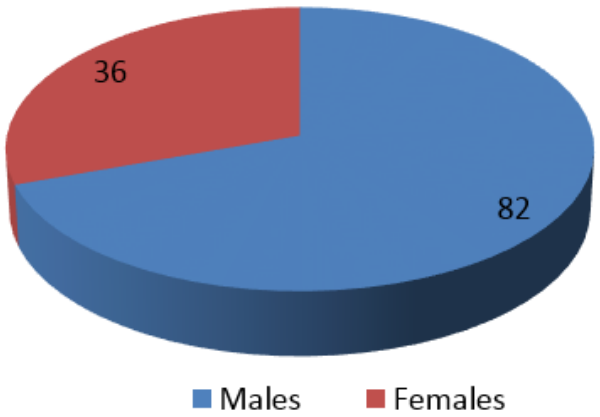

Fig. 1: Gender classification of patients

The mean age of the patients under study was 53.91 ± 4.69 years, the weight was 89.48 ± 12.83 kgs and the BMI was 34.86 ± 6.11. Most of the patients in the study were either overweight or obese (Table 3).

Table 3: Demographic detail of the patients

Details	Mean ± SD
Age (in years)	53.91 ± 4.69
Weight (in Kg)	89.48 ± 12.83
BMI (in kg/m^2)	34.86 ± 6.11

103 (87.3%) of the patients had a history of snoring. Most of the times, this was noticed by the patients attenders. Apnea was observed in 101 (85.6%) of the patients, 78 (66.1%) had somnolence during the day and out of the 118 patients, 22 (18.6%) had hypothyroid (Table 4).

Amongst the patients with OSA and hypothyroid, the apnea hypoapnea index was 66.22 ± 18.31 episodes per

Table 4: Clinical Features of patients

Details	Number (%)
History of snoring	103 (87.3%)
Apnea	101 (85.6%)
Somnolence during day	78 (66.1%)
Hypothyroidism	22 (18.6%)

hour, while in patients with OSA and without hypothyroid, it was 24.17 ± 6.29. The Epworth Sleepiness scale was 15.18 ± 5.26 in OSA patients with Hypothyroid and 8.25 ± 5.82 in patients without hypothyroid. The sleep efficiency was 68.49 ± 16.39 and 76.19 ± 13.03 % in OSA patients with hypothyroid and without hypothyroid respectively. Arousal index in the patients was 67.96 ± 21.84 in OSA patients with hypothyroid and 57.66 ± 18.73 in patients without hypothyroid (Table 5).

Table 5: Comparison of clinical symptoms in OSA patients with and without hypothyroid

Features	OSA with hypothyroid	OSA without Hypothyroid
Apnea Hypoapnea Index	66.22 ± 18.31	24.17 ± 6.29
Epworth Sleepiness scale	15.18 ± 5.26	8.25 ± 5.82
Sleep efficiency	68.49 ± 16.39	76.19 ± 13.03
Desaturation Index	44.71 ± 11. 56	30.15 ± 7.21
Time of SaO2 < 90% (min)	34.88 ± 16.44	26.33 ± 13.81
Arousal Index	67.96 ± 21.84	57.66 ± 18.73

The most common risk factors among the patients was hypertension as seen in 71(60.2%) of the patients and diabetes was seen in 49(41.5%). 55(46.6%) of the patients had a history of smoking, some with more than 5 packs a day, while depression was observed in 37(31.4%) of the patients. Few patients (31 (26.3%)) had asthma and 24(20.3%) had a history of coronary heart disease (Table 6).

Table 6: Risk factors

Risk factors	Number	Percentage
Diabetes mellitus	49	41.5%
Hypertension	71	60.2%
Depression	37	31.4%
Smoking	55	46.6%
Asthma	31	26.3%
Coronary arterial Disease	24	20.3%

4. Discussion

Thyroid disorders and obstructive sleep apnea are two disorders commonly found in adult population. OSA is said to be more associated with obesity among men in whom the disorder is noted to be twice more common than in women[1]. Moreover, OSA is also associated with metabolic disorders such as obesity, acromegaly apart from hypothyroidism. It is also suggested that OSA is one of the risk factors for cardiovascular disease.

In the present study, 69.5% of the patient with OSA were males and 30.5% were females. In another study by Young et al, 9% of women and 24% men showed sleep disordered breathing, with day time somnolence.[1]

The mean age was 53.91 ± 4.69 years with a mean BMI of 34.86 ± 6.11kg/m^2. In a study by BaHannan et al., the mean age of the patients in their study was 48.7 ± 14.1 years[20] with a BMI of 37.7±9.6 kg/m^2, corroborating our study. The prevalence of apnea n obese patients is probably due to the deposits of fat in the pharynx lateral wall reducing the caliber of UAs.[21] Obesity was one of the main factors for sleep apnea. In a study by Kapur et al., Women aged below 50 years were found to be more prone to OSA.[22]

83.7% of the patients in the present study had a history of snoring, while apnea was observed in 85.6% of the patients. 66.1% of the patients showed somnolence during the day. Hypothyroidism was seen in 18.6% of the patients. In a study by BaHammam et al., the prevalence of hypothyroidism was 11.5%[20] and was more prevalent in the female group. In several studies, an increase in the development of OSA is observed in patients with hypothyroidism.[23,24] 11% of hypothyroidism was diagnosed in OSA patients in another wtudy by Popovivi et al.,.[25]

Amongst the patients with OSA and hypothyroid, the apnea hypoapnea index was 66.22 ± 18.31 episodes per hour, while in patients with OSA and without hypothyroid, it was 24.17 ± 6.29. In a similar study by Rajgopal et al., a range of 17 -176 episodes per hour were seen among the patients.[26] They also observed obese patients to have considerably more episodes of apnea compared to the non-obese patients.[21] In a similar study by BaHammam et al., the AHI was 55.2±37/hr in OSA group of patients.[9]

The ESS scale was 15.18 ± 5.26 in patients with hypothyroid and 8.25 ± 5.82 in without hypothyroid. There was not much difference between the two groups in the arousal index. The time of SaO2 < 90% /min. Similar were the cases in studies by BaHammam et al., and Miller et al.,[9,27]

In studies by Skjodt et al, the patients who were treated with thyroxine were found to have improved response to sleep apnea.[28] Similar results were observed in other studies by Millman et al and Orr et al while Skatrud et al., and Grunstein et al., found no difference in sleep apnea after treatment with thyroxine.[13,29–31]

5. Conclusions

Our study shows a significant association between OSA and hypothyroidism among patients, thus having a considerable implications in managing the thyroid condition of the patients. Thus, we recommend routine thyroid estimation in patients with OSA, so that if detected, it can be treated at the earliest.

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None.

7. Conflict of interests

The authors declare that there are no conflicts of interest in this paper

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None

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