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A study on the frequency of OSA in patients with thyroid conditions

Dr. G Sripavana Krishna Murthy[1], Dr. Naveen Kumar Dannana[2*]

1. Associate Professor, Department of Otorhinolaryngology, Sardar Rajas Medical College and Hospital, Bhawanipatna, Orissa, India
2. Assistant Professor, Department of Otorhinolaryngology, Sardar Rajas Medical College and Hospital, Bhawanipatna, Orissa, India

Background and Objective: Studies have shown that environmental factors and ethnicity can have an impact on thyroid illness. The goal of this research was to identify the characteristics and risk factors of thyroid disease in relation to obstructive sleep apnea (OSA) and to ascertain the prevalence of thyroid disease in individuals who were diagnosed with OSA based on laboratory testing.
Methods: Between November 2011 and October 2012, the study was conducted at the Department of Otorhinolaryngology at Department of Otorhinolaryngology, Sardar Rajas Medical College and Hospital, Bhawanipatna, Orissa, India Upon referral to the sleep disorders clinic, all patients had their serum levels of thyroid-stimulating hormone (TSH) and free thyroxine (FT4) assessed for an overnight sleep study. Four weeks after the sleep study, the levels were assessed. Each of the 120 patients had type I attended polysomnography (PSG) done.
Result: In addition, people with hypothyroidism were heavier overall and more likely to acquire hypertension and diabetes mellitus. They also went through extended periods of time where their SaO_2 levels were lower than 90. A significant correlation was seen between the body weight, duration of SaO_2 > 90%, and desaturation index (33.3 32.4 min vs. 13.5 24.4 min, p<0.05) in male patients diagnosed with hypothyroidism. Among female OSA patients, no discernible differences were found between euthyroid and hypothyroid cases. Of the fifty-three patients without obstructive sleep apnea (OSA), seven (13.2%) were found to have clinical hypothyroidism and were already receiving thyroxine replacement medication.
Conclusion: While subclinical hypothyroidism was common in OSA patients, the frequency of newly diagnosed clinical hypothyroidism in people with obstructive sleep apnea was comparatively low.

Keyword: Thyroid, TSH, thyroxine, hypothyroidism, and subclinical hypothyroidism

Introduction: Because the symptoms of hypothyroidism and obstructive sleep apnea (OSA) are similar, there is a connection between the two disorders. There are a number of hypothesized explanations for the connection between hypothyroidism and obstructive sleep apnea. These processes include changes in the regulatory control of the pharyngeal dilator muscles due to neuropathy, the accumulation of mucoproteins in the upper airway, and the potential for respiratory center depression [1-3].
Medication to replace thyroid function does not necessarily resolve breathing disorders during sleep, nor does it treat hypothyroidism.

Therefore, it is critical to diagnose both conditions and provide the necessary care. The treating physician may find it difficult to distinguish between the two illnesses due to their possible overlap, which could lead to an incorrect diagnosis or insufficient recognition of one of the disorders [4, 5].

Hypothyroidism is a prevalent cause of SDB in people, although results from earlier research contradict each other and suggest that hypothyroidism is rather uncommon in patients with OSA. According to several studies using various diagnostic standards, 10% of patients with obstructive sleep apnea (OSA) also had the condition. In a prior research study examining gender differences in people with obstructive sleep apnea, it was shown that women were more likely than men to have thyroid disease (23.6%). Prior research has classified hypothyroidisms based solely on the existence of increased blood levels of thyroid-stimulating hormone, ignoring thyroxine hormone levels. Some people who were first diagnosed with hypothyroidism may have been affected by subclinical hypothyroidism because of its varied treatment options and prognostic implications [6, 7].

Numerous studies have shown that environmental factors and ethnicity have an impact on the occurrence of hypothyroidism. As a result, differences in the prevalence of hypothyroidism among obstructive sleep apnea sufferers according to race and geography may exist. The purpose of this study was to ascertain the prevalence of thyroid disease in individuals with obstructive sleep apnea (OSA) detected through laboratory testing, as well as the traits and variables that are predictive of thyroid disease in OSA patients. The purpose of the study was to examine the thyroxine and thyroid-stimulating hormone levels [7, 8].

Material and Methods

The study was conducted from November 2011 and October 2012 at the Department of Otorhinolaryngology, Sardar Rajas Medical College and Hospital, Bhawanipatna, Orissa, India. An overnight sleep study was performed on every patient referred to the sleep disorders center in order to measure the levels of thyroid-stimulating hormone (TSH) and free thyroxine (FT4) in their serum. Four weeks after the sleep study, the levels were assessed. Every one of the 120 patients who had Type I attended had polysomnography (PSG).

A sleep medicine specialist used the Wisconsin Sleep Cohort Study questionnaire to collect clinical and demographic data from patients during the initial evaluation at the Sleep Disorder Center (SDC). This survey includes questions about complaints related to sleep, medical diagnoses, and response scales that particularly address symptoms that are present, symptoms linked to sleep, symptoms related to medical issues, and other medical disorders. We used the ESS to have a better picture of your afternoon sleepiness. The exclusion criteria included patients with neuromuscular diseases, patients who were critically ill, and people who were taking medications that would affect thyroid tests. Operationally, hypoventilation was defined as a difference in equivalent arterial pressure of carbon dioxide ($EtCO_2$) between the awake supine state and the sleep phase of 10 mmHg, indicating sustained oxygen desaturation. Periodic breathing, hypopneas, and obstructive apneas are unrelated to this disorder. None of the patients who were being observed in the study received any hypnotics or drugs during its execution. The study was approved by an institutional review board, and informed consent was given by each participant. Polysomnography and a thyroid evaluation were performed by the researchers [8, 9]. The mean and standard deviation (SD) comprised the data. The means of continuous data were compared using student t-tests. The Mann-Whitney test was used if the normalcy condition was not met. The chi-square test was utilized to assess categorical data. Statistical significance was proven by a p-value of less than 0.05. A univariate logistic regression model with a single explanatory variable was used for a preliminary analysis to look into the link between independent factors and clinical and subclinical hypothyroidism. A multivariate logistic regression model was used to assess the components with significant p-values. For the

analysis, SPSS (version 17; Chicago, IL, USA) was used.

Result

Research conducted in Western countries typically indicates a lower incidence of thyroid disease compared to the findings of this study. It was found that among Saudi patients diagnosed with obstructive sleep apnea, the prevalence of subclinical hypothyroidism was relatively high, especially among female individuals. This supports the findings of our previous study on gender disparities in individuals with obstructive sleep apnea, which indicated a higher prevalence of hypothyroidism among female patients. However, the study did not distinguish between overt and covert hypothyroidism.

Table 1: Statistics on PSGs and demographics of OSA patients with and without clinical hyperthyroidism

Characteristics	Clinical Hypothyroidism	
	Yes	No
BMI	42.8	35.9
ESS	8.9	8.5
Sleep efficiency	20	65
ESS >10	15	98
Desaturation index	72.6	73.6
Arousal Index	59.6	56.8
Smoking Index	2.6	28
Hypertension	20	96
Ischemic heart disease	8	28

Table 2: Assessment of clinically hypothyroid and euthyroid OSA patients according to gender

Characteristics	Male		Female	
	Euthyroidism	Clinical Hypothyroidism	Euthyroidism	Clinical Hypothyroidism
Age (yrs.)	52.6	52.9	43.9	43.9
BMI	42.6	43.8	36.7	33.7
ESS	8.9	7.9	12.9	12.8
Sleep efficiency	72.9	72.7	76.7	77.9
Desaturation index	51.5	52.9	53.4	53.8
Time (Min)	33.6	33.9	33.4	33.9
Min O_2	72.9	72.9	81.7	76.8
Arousal Index	58.9	54.6	57.9	57.8

Research investigating the frequency of subclinical hypothyroidism in individuals suffering from obstructive sleep apnea (OSA) could have been problematic because it did not take into consideration the possibility that the condition was temporary. It is possible to rule out certain patients with transient hypothyroidism and reduce the number of patients initially identified with subclinical hypothyroidism by repeating TSH and FT4 tests after 12 weeks. While not all patients have had their thyroid function levels remeasured, the majority of individuals have.

Discussion

New cases of clinical hypothyroidism were not more common than those found in previous research. However, it was discovered that subclinical hypothyroidism was more prevalent in this particular study. The incidence of subclinical hypothyroidism was found to be 11.5% in a group of 78 Italian patients with obstructive sleep apnea, which is in line with the results reported by Resta *et al*. The variations in reported prevalence rates are probably influenced by factors such as race, environment, and socioeconomic position [9, 10].

Referral bias, defined as a variation in the population being referred, could account for the observed disparity in prevalence. In past research, thyroid illness in patients with obstructive sleep apnea was examined using measurements of thyroid stimulating hormone levels. Individuals classified as hypothyroid had TSH levels that were greater than normal. The capacity to differentiate between overt and

subclinical hypothyroidism was not enhanced by this. We were able to distinguish between patients with clinical and subclinical hypothyroidism within a large group of patients with obstructive sleep apnea and increased TSH levels using FT4 values. The results of most other research agree with the frequency of clinical hypothyroidism found in this investigation. However, the prevalence of subclinical hypothyroidism was higher than expected when compared to both previous research and individuals without obstructive sleep apnea. Kapur *et al*. reported a relatively low incidence of subclinical hypothyroidism (1.4% in their sample), in contrast to the results of our investigation. In the US, the frequency of subclinical hypothyroidism is three times greater in Black individuals and one-third in White people, indicating racial differences. Additionally, the radioimmunoassay employed by Kapur *et al*. was replaced in this work with another assay known as ECLIA, which is well-known for its higher sensitivity [11, 12]. The investigation's findings demonstrate that men and women experience hypothyroidism's effects in quite different ways. In comparison to individuals with euthyroid OSA, males with hypothyroid OSA had significantly higher AHI, desaturation index, and time with SaO_2 90%; however, concomitant illnesses, age, BMI, respiratory parameters, and arousal index remained unchanged. The males and females of the euthyroid species displayed distinct traits. Females with euthyroidism had greater age, weight, and duration of SaO2 90% compared to males with OSA. However, in the group of patients with clinically hypothyroid OSA, the changes were less pronounced [13-15].

These findings imply that the degree of obstructive sleep apnea in women with clinical hypothyroidism and euthyroid women may be comparable. These results are consistent with those of Miller *et al*.'s study, which looked at 118 women who had been diagnosed with OSA. Their investigation found no statistically significant differences between women with normal thyroid function and those with hypothyroidism in terms of age, BMI, respiratory disturbance index, or arousal index. As of right now, there is insufficient empirical data to support the effectiveness of replacement therapy in improving survival rates or reducing cardiovascular morbidity in patients with subclinical hypothyroidism. The information that is now available, however, suggests that thyroxine replacement therapy might be advantageous in particular circumstances, such as enhancing particular lipid profile characteristics and left ventricular performance [16, 17].

Many studies have been carried out on clinical hypothyroidism in patients with obstructive sleep apnea, and the results clearly show the benefits of replacement medication in patients who are not fat. Those who were obese showed less improvement. However, it is still unclear if treating subclinical hypothyroidism in obstructive sleep apnea patients can improve their quality of life. PSG readings were not altered in the small trial investigating the effects of treating subclinical hypothyroidism in patients with OSA. In this study, a significant proportion of patients with obstructive sleep apnea also had bronchial asthma. Even though asthma is a common ailment, an earlier study estimated that 35.1% of people with obstructive sleep apnea also had asthma. The high diagnostic yield of PSG in patients with clinical suspicion of OSA is an unexpected finding of our study. PSG was used to identify OSA in almost 80% of individuals who had clinical concerns about the condition. Despite not receiving much attention or in-depth examination, this finding is in line with earlier research [18, 19].

Research on the frequency of subclinical hypothyroidism in obstructive sleep apnea patients may have been flawed since it did not take into consideration the possibility that the condition was temporary. Repeating TSH and FT4 tests after 12 weeks can help rule out some patients with temporary hypothyroidism and decrease the number of patients initially diagnosed with subclinical hypothyroidism. While not all patients had their thyroid function tests assessed, a significant portion of patients did [19, 20].

Conclusion

Our study's findings, taken together with the low incidence of newly discovered cases of clinical hypothyroidism, imply that routine thyroid function testing is not necessary for people with obstructive sleep apnea. Because it is unclear how intervention may affect these patients' health, it is also unclear how common subclinical hypothyroidism is in obstructive sleep apnea patients. Unless there is a suspicion of hypothyroidism based on symptoms and physical evidence, routine thyroid function testing is not advised for individuals with obstructive sleep apnea.

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Conflict of interest

None

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