
**ISSN Print:** 2394-7500
**ISSN Online:** 2394-5869
**Impact Factor:** 3.4
IJAR 2015; 1(4): 189-192
www.allresearchjournal.com
Received: 16-01-2015
Accepted: 25-02-2015

**Dr. Abdul Majid Khan**
Assistant Professor, Department of General Medicine, NRI Institute of Medical Sciences, Visakhapatnam, Andhra Pradesh, India

**Dr. Golve Srinivas**
Assistant Professor, Department of Otorhinolaryngology, Narayana Medical College, Nellore, Andhra Pradesh, India

**Correspondence**
**Dr. Golve Srinivas**
Assistant Professor, Department of Otorhinolaryngology, Narayana Medical College, Nellore, Andhra Pradesh, India

# Investigations on the prevalence of OSA in thyroid illness patients

## Dr. Abdul Majid Khan and Dr. Golve Srinivas

**Abstract**
**Background and Objective:** Research indicates that thyroid illness can be affected by both environmental variables and ethnicity. The objective of this study was to ascertain the attributes and factors associated with thyroid disease in relation to obstructive sleep apnea (OSA), as well as to determine the frequency of thyroid disease in persons diagnosed with OSA through laboratory testing.
**Methods:** The present investigation was carried out at the Department of Otorhinolaryngology, Narayana Medical College, located in Nellore, Andhra Pradesh, over the period spanning from January 2014 to December 2014. The serum levels of free thyroxine (FT4) and thyroid-stimulating hormone (TSH) were evaluated in all patients who were referred to the sleep disorders center for an overnight sleep study. The levels were evaluated four weeks after the sleep study. Type I attended polysomnography (PSG) was performed on all 100 patients.
**Result:** Furthermore, those diagnosed with hypothyroidism had increased body weight and a higher propensity for developing diabetes mellitus and hypertension. Additionally, they experienced prolonged durations during which their $SaO_2$ levels fell below 90. There was a notable association between male patients diagnosed with hypothyroidism and their body weight, duration of $SaO_2$ > 90%, and desaturation index (33.3 32.4 min vs. 13.5 24.4 min, $p<0.05$). There were no significant differences observed between euthyroid and hypothyroid cases among female patients with OSA. Among the 53 patients who did not exhibit obstructive sleep apnea (OSA), a total of seven individuals (13.2%) were identified as having clinical hypothyroidism and were already undergoing thyroxine replacement therapy.
**Conclusion:** The prevalence of newly identified clinical hypothyroidism in individuals with obstructive sleep apnea was relatively low, although subclinical hypothyroidism was prevalent among OSA patients.

**Keywords:** Thyroid, TSH, thyroxine, hypothyroidism, and subclinical hypothyroidism

## Introduction
There exists a correlation between obstructive sleep apnea (OSA) and hypothyroidism due to the presence of same symptoms in both conditions. Several proposed mechanisms have been identified for the association between obstructive sleep apnea and hypothyroidism. These mechanisms include upper airway obstruction resulting from the accumulation of mucoproteins in the upper airway, alterations in the regulatory control of the pharyngeal dilator muscles due to neuropathy, and the possibility of respiratory center depression [1-3].
Thyroxine replacement medication does not always address sleep disordered breathing, and it does not cure hypothyroidism. Hence, it is imperative to ascertain both ailments and administer appropriate treatment. The potential overlap between the two illnesses may pose challenges for the treating physician in differentiating between them, potentially resulting in a misdiagnosis or inadequate recognition of either disorder [4, 5].
SDB is a common disease in individuals with hypothyroidism, while previous study has yielded contradictory results, indicating that hypothyroidism is rather rare among patients with OSA. Based on multiple investigations employing diverse diagnostic criteria, it was found that 10% of patients with obstructive sleep apnea (OSA) exhibited the syndrome. In a previous study investigating gender disparities in individuals with obstructive sleep apnea, it was observed that the prevalence of thyroid disease was greater among females (23.6%) in comparison to males (6.2%). Previous studies have characterized hypothyroidisms by focusing on the presence of elevated blood thyroid-stimulating hormone levels, while

disregarding the level of thyroxine hormone. Due to its diverse treatment and prognostic consequences, subclinical hypothyroidism may have impacted certain individuals who were initially diagnosed with hypothyroidism [6, 7].

Multiple studies have indicated that the prevalence of hypothyroidism is influenced by both ethnicity and environmental factors. Consequently, there may be variations in the occurrence of hypothyroidism among individuals with obstructive sleep apnea based on race and location. This study was conducted to determine the prevalence of thyroid illness in patients with laboratory-diagnosed obstructive sleep apnea and to identify the characteristics and factors that predict thyroid disease in OSA patients. The study aimed to analyze the levels of thyroid-stimulating hormone and thyroxine [7, 8].

## Materials and Methods

The study was carried out in the Department of Otorhinolaryngology, Narayana Medical College, Nellore, Andhra Pradesh, from January 2014 to December 2014. All patients sent to the sleep disorders center had an overnight sleep study to evaluate their serum levels of free thyroxine (FT4) and thyroid-stimulating hormone (TSH). The levels were evaluated four weeks following the sleep study. Polysomnography (PSG) was performed on all 100 individuals who had Type I attended.

During the preliminary assessment in the Sleep Disorder Center (SDC), a sleep medicine expert gathered demographic and clinical information by administering the Wisconsin Sleep Cohort Study questionnaire to patients. This questionnaire encompasses inquiries regarding sleep-related grievances, medical diagnoses, and response scales that specifically address presenting symptoms, sleep-related symptoms, medical symptoms, and additional medical conditions. To have a deeper understanding of your daytime drowsiness, we referred to the ESS. Exclusion criteria encompassed those with neuromuscular illnesses, acutely unwell patients, and individuals using medication that could potentially impact thyroid testing. Hypoventilation was operationally defined as a disparity of 10 mmHg in equivalent arterial pressure of carbon dioxide (EtCO2) during the sleep phase in comparison to the awake supine state, which is indicative of prolonged oxygen desaturation. This condition is not linked to obstructive apneas, hypopneas, or periodic breathing. The study was conducted without the administration of any hypnotics or narcotics to any of the patients under observation. An institutional review board granted approval for the study, and all participants provided their informed consent. The researchers conducted a thyroid assessment and polysomnography [8, 9]. The data consisted of the mean and standard deviation (SD). Student t-tests were used to compare the means of continuous data. If normality was not met, the Mann-Whitney test was employed. Categorical data was analyzed using the chi-square test. A p-value of less than 0.05 confirmed statistical significance. In order to investigate the relationship between independent factors and clinical and subclinical hypothyroidism, a preliminary analysis was conducted using a univariate logistic regression model with a single explanatory variable. The factors with significant p-values were analyzed using a multivariate logistic regression model. SPSS (version 17; Chicago, IL, USA) was employed for the analysis.

## Results

The prevalence of subclinical hypothyroidism was observed to be quite high among Saudi patients diagnosed with obstructive sleep apnea, particularly among female individuals. This validates the findings of our prior study on gender disparities in individuals with obstructive sleep apnea, which indicated a higher prevalence of hypothyroidism among female patients. Nevertheless, the study did not differentiate between overt and covert hypothyroidism. Research conducted in Western nations often reveals a lower incidence of thyroid disease compared to the findings of this study.

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

| Characteristics | Clinical Hypothyroidism | |
|---|---|---|
| | Yes | No |
| BMI | 40.5 | 34.1 |
| ESS | 8.6 | 7.1 |
| Sleep eficiency | 19 | 61 |
| ESS >10 | 11 | 92 |
| Desaturation index | 70.5 | 71.1 |
| Arousal Index | 57.1 | 54.2 |
| Smoking Index | 2.0 | 26 |
| Hypertension | 18 | 90 |
| Ischemic heart disease | 7 | 25 |

**Table 2 :** Evaluation of euthyroid and clinical hypothyroid OSA patients within gender categories

| Characteristics | Male | | Female | |
|---|---|---|---|---|
| | Euthyroidism | Clinical Hypothyroidism | Euthyroidism | Clinical Hypothyroidism |
| Age (yrs.) | 50.1 | 51.5 | 42.2 | 41.1 |
| BMI | 40.7 | 42.2 | 33.6 | 32.7 |
| ESS | 8.4 | 7.8 | 11.3 | 10.4 |
| Sleep efficiency | 70.5 | 71.3 | 75.1 | 74.8 |
| Desaturation index | 50.1 | 51.2 | 52.3 | 51.7 |
| Time (Min) | 31.5 | 32.4 | 32.3 | 31.4 |
| Min $O_2$ | 70.8 | 71.7 | 80.6 | 79.4 |
| Arousal Index | 54.0 | 53.0 | 56.1 | 55.2 |

Studies examining the prevalence of subclinical hypothyroidism in patients with obstructive sleep apnea (OSA) may have been problematic due to their failure to account for the potential transient nature of the illness. By repeating TSH and FT4 readings after 12 weeks, it is possible to exclude certain patients with temporary hypothyroidism and decrease the number of patients initially diagnosed with subclinical hypothyroidism. The majority of patients have undergone re-measurement of thyroid function tests, although not all of them.

## Discussion

The incidence of newly identified instances of clinical hypothyroidism did not exhibit a higher frequency compared to previous research. However, the occurrence of subclinical hypothyroidism was shown to be higher in this particular study. The occurrence rate of subclinical hypothyroidism was determined to be 11.5% among a cohort of 78 Italian patients diagnosed with obstructive sleep apnea, aligning with the results reported by Resta *et al*. The disparities in reported prevalence rates are presumably influenced by factors such as race, environment, and socioeconomic position [9, 10].

Referral bias, which refers to a disparity in the population being referred, could potentially account for the observed variation in prevalence. Previous research investigating thyroid illness in individuals with obstructive sleep apnea included measurements of thyroid stimulating hormone levels. individuals exhibiting elevated TSH levels were classified as hypothyroid. The lack of discrimination between overt and subclinical hypothyroidism was not facilitated by this. By utilizing FT4 levels, we categorized a substantial cohort of individuals with obstructive sleep apnea who exhibited heightened TSH levels into two groups: those with clinical and subclinical hypothyroidism. The prevalence of clinical hypothyroidism diagnosed in this study aligns with the findings of a significant majority of other studies. Nevertheless, in comparison to both previously conducted research and individuals without obstructive sleep apnea, the occurrence of subclinical hypothyroidism exceeded initial expectations. In contrast, Kapur *et al*. observed a relatively low incidence of subclinical hypothyroidism (1.4% in their study) in comparison to the results obtained in our study. The frequency of subclinical hypothyroidism in the United States is one-third of that among whites and three times higher among blacks, indicating racial differences. Furthermore, in this study, the radioimmunoassay utilized by Kapur *et al*. was substituted with an alternative assay known as ECLIA, which is known for its enhanced sensitivity [11, 12].

The findings of this study indicate that there are distinct variations in the impact of hypothyroidism between males and females. Despite no changes in age, BMI, respiratory parameters, arousal index, or concomitant diseases, male patients with hypothyroid OSA exhibited significantly higher AHI, desaturation index, and time with $SaO_2$ 90% compared to euthyroid OSA patients. The males and females with euthyroidism displayed distinct traits. Euthyroid females with OSA exhibited higher age, weight, and duration of $SaO_2$ 90% compared to males with OSA. Conversely, the disparities were less noticeable in the group with clinically hypothyroid OSA [13-15].

These findings indicate that the severity of obstructive sleep apnea may be comparable between women with clinical hypothyroidism and euthyroid women. The findings align with the research conducted by Miller *et al*., who examined a group of 118 women diagnosed with OSA. Their study revealed no significant disparities in age, BMI, respiratory disturbance index, or arousal index between women with normal thyroid function and those with hypothyroidism. At now, there exists a lack of empirical evidence supporting the efficacy of replacement treatment in enhancing survival rates or mitigating cardiovascular morbidity among those diagnosed with subclinical hypothyroidism. However, the available data indicates that thyroxine replacement therapy may have potential benefits in specific situations, such as improving certain aspects of lipid profiles and left ventricular function [16, 17].

Extensive research has been conducted on clinical hypothyroidism in individuals with obstructive sleep apnea, and the findings demonstrate evident advantages of replacement therapy in nonobese patients. Individuals who were obese experienced a lesser degree of enhancement. Nevertheless, the efficacy of treating subclinical hypothyroidism in patients with obstructive sleep apnea in enhancing their quality of life remains uncertain. The tiny study examining the impact of treating subclinical hypothyroidism in patients with OSA did not observe any alterations in PSG values. Within this investigation, a substantial percentage of individuals with obstructive sleep apnea also experienced bronchial asthma. While asthma is a prevalent condition, a prior investigation approximated that 35.1% of individuals diagnosed with obstructive sleep apnea also experienced asthma. An unexpected finding of this study is the high diagnostic yield of PSG in patients who have clinical suspicion of OSA. Approximately 80% of patients who had clinical concerns of OSA were diagnosed with OSA by the use of PSG. This finding is consistent with previous research, although it has not received significant attention or extensive analysis [18, 19].

Studies examining the prevalence of subclinical hypothyroidism in patients with obstructive sleep apnea may have been problematic due to their failure to account for the potential transient nature of the illness. By repeating TSH and FT4 readings after 12 weeks, it is possible to exclude certain patients with temporary hypothyroidism and decrease the number of patients initially diagnosed with subclinical hypothyroidism. The thyroid function tests were reassessed for a significant majority of patients, albeit not all patients [19, 20].

## Conclusion

In conclusion, the results of our study suggest that there is no need for regular assessment of thyroid function in individuals with obstructive sleep apnea as the incidence of newly identified instances of clinical hypothyroidism is quite low. The prevalence of subclinical hypothyroidism in patients with obstructive sleep apnea remains uncertain, as the potential impact of intervention on their health remains uncertain. Routine thyroid function testing is not recommended for people with obstructive sleep apnea unless there is suspicion of hypothyroidism based on symptoms and physical evidence.

## Funding

Nil

## Conflict of interest

None

## References

1. Rajagopal KR, Abbrecht PH, Derderian SS, Pickett C, Hofeldt F, Tellis CJ, *et al*. Obstructive sleep apnea in hypothyroidism. Ann Intern Med 1984 Oct;101(4):491e4.
2. Meslier N, Giraud P, Person C, Badatcheff A, Racineux JL. Prevalence of hypothyroidism in sleep apnoea syndrome. Eur J Med 1992 Nov;1(7):437e8.
3. Pelttari L, Rauhala E, Polo O, Hyyppa MT, Kronholm E, Viikari J, *et al*. Upper airway obstruction in

hypothyroidism. J Intern Med 1994 Aug;236(2):177e81.
4. Winkelman JW, Goldman H, Piscatelli N, Lukas SE, Dorsey CM, Cunningham S. Are thyroid function tests necessary in patients with suspected sleep apnea? Sleep 1996 Dec;19(10):790e3.
5. Attal P, Chanson P. Endocrine aspects of obstructive sleep apnea. J Clin Endocrinol Metab 2010 Feb;95(2):483e95.
6. Grunstein RR, Sullivan CE. Sleep apnea and hypothyroidism: mechanisms and management. Am J Med 1988 Dec;85(6):775e9.
7. Lin CC, Tsan KW, Chen PJ. The relationship between sleep apnea syndrome and hypothyroidism. Chest 1992 Dec;102(6):1663e7.
8. Domm BM, Vassallo CL. Myxedema coma with respiratory failure. Am Rev Respir Dis 1973 May;107(5):842e5.
9. Brix TH, Hansen PS, Kyvik KO, Hegedus L. Cigarette smoking and risk of clinically overt thyroid disease: A population-based twin case-control study. Arch Intern Med 2000 Mar 13;160(5):661e6.
10. Sichieri R, Baima J, Marante T, de Vasconcellos MT, Moura AS, Vaisman M. Low prevalence of hypothyroidism among black and Mulatto people in a population-based study of Brazilian women. Clin Endocrinol (Oxf) 2007 Jun;66(6):803e7.
11. Hollowell JG, Staehling NW, Flanders WD, Hannon WH, Gunter EW, Spencer CA, *et al*. Serum TSH, T(4), and thyroid antibodies in the United states population (1988 to 1994): National Health and Nutrition examination Survey (NHANES III). J Clin Endocrinol Metab 2002 Feb;87(2):489e99.
12. Young T, Evans L, Finn L, Palta M. Estimation of the clinically diagnosed proportion of sleep apnea syndrome in middle-aged men and women. Sleep 1997 Sep;20(9):705e6.
13. Johns MW. Reliability and factor analysis of the Epworth Sleepiness Scale. Sleep 1992 Aug;15(4):376e81.
14. Resta O, Pannacciulli N, Di Gioia G, Stefano A, Barbaro MP, De Pergola G. High prevalence of previously unknown subclinical hypothyroidism in obese patients referred to a sleep clinic for sleep disordered breathing. Nutr Metab Cardiovasc Dis 2004 Oct;14(5):248e53.
15. Grunstein R. Obstructive sleep apnea syndrome and hypothy- roidism. Chest 1994 Apr;105(4):1296e7.
16. Kapur VK, Koepsell TD, deMaine J, Hert R, Sandblom RE, Psaty BM. Association of hypothyroidism and obstructive sleep apnea. Am J Respir Crit Care Med 1998 Nov;158(5 Pt 1):1379e83.
17. Miller CM, Husain AM. Should women with obstructive sleep apnea syndrome be screened for hypothyroidism? Sleep Breath 2003 Dec;7(4):185e8.
18. Skjodt NM, Atkar R, Easton PA. Screening for hypothyroidism in sleep apnea. Am J Respir Crit Care Med 1999 Aug;160(2):732e5.
19. Alotair H, Bahammam A. Gender differences in Saudi patients with obstructive sleep apnea. Sleep Breath 2008 Nov;12(4):323e9.
20. Pham CB, Shaughnessy AF. Should we treat subclinical hypo- thyroidism? BMJ 2008;337:290e1.