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Original Research Article

FREQUENCY OF OBSTRUCTIVE SLEEP APNEA (OSA) IN PATIENTS WITH HYPOTHYROIDISM

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Name of Author:
Dr. M Umer Mumtaz[1], Dr. Huma Batool[2], Dr. Mirza Muhammad Ayub Baig[3], Dr. Zanobia Nasim[4], Dr. Hafiz Muhammad Abdullah Asad[5], Ahmad Atif[6]

Affiliation: *[1]Post Graduate Resident, Pulmonology, Jinnah Hospital Lahore, Punjab, Pakistan*
[2]Associate Professor, Pulmonology, Jinnah Hospital Lahore, Punjab, Pakistan
[3]Professor, Pulmonology, Jinnah Hospital Lahore, Punjab, Pakistan
[4]Assistant Professor, Pulmonology, AIMC/Jinnah Hospital Lahore, Punjab, Pakistan
[5]Post Graduate Resident, AIMC/Jinnah Hospital Lahore, Punjab, Pakistan
[6]Postgraduate Resident, Pulmonology, Jinnah Hospital Lahore, Punjab, Pakistan

Corresponding Author:
Dr. M Umer Mumtaz

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Abstract: ***Objective:*** To determine the frequency of obstructive sleep apnea among patients with hypothyroidism. ***Study Design:*** Cross-sectional study. ***Place and Duration of Study:*** Department of Pulmonology, AIMC/Jinnah Hospital, Lahore, from 15 May 2025 to 15 October 2025. ***Methodology:*** A total of 132 patients diagnosed with hypothyroidism were included using a non-probability consecutive sampling technique. Patients aged 25–65 years of either gender were enrolled. Patients with alternative pulmonary pathology, normal thyroid function tests, or hyperthyroidism were excluded. Baseline characteristics including age, gender, body mass index, duration of hypothyroidism, TSH, fT4, and fT3 were recorded. ***Results:*** The mean age was 45.8 ± 10.7 years, and 89 (67.4%) patients were female. The mean BMI was 29.4 ± 4.8 kg/m², and the mean duration of hypothyroidism was 4.2 ± 2.8 years. A STOP-BANG score of ≥5 was observed in 28 (21.2%) patients. Obstructive sleep apnea was diagnosed in 18 (13.6%) patients. Among these, mild OSA was found in 8 (44.4%), moderate OSA in 6 (33.3%), and severe OSA in 4 (22.2%). ***Conclusion:*** Obstructive sleep apnea was present in 13.6% of patients with hypothyroidism. Older age, male gender, obesity, and longer duration of hypothyroidism were significantly associated with OSA.

Keywords: Hypothyroidism; obstructive sleep apnea; STOP-BANG; polysomnography; apnea-hypopnea index

INTRODUCTION

In the case of obstructive sleep apnea (OSA) the airways close either partially or completely, reducing the level of oxygen in the blood or causing the person to wake up, thus making it difficult to get a good night sleep as well as other symptoms such as loud snoring, apnea during sleep and excessive daytime sleepiness [1]. Obstructive sleep apnea (OSA) can negatively affect a person's risk of developing heart disease and mental illness, quality of life, and safe driving [2]. The

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prevalence of obstructive sleep apnea is estimated to be 28.7-43.8% among the population, and 37% in Asia, with there being millions who suffer from it. This has been associated with a myriad of other morbidities including hypertension, coronary artery disease, depression, insulin-resistant diabetes, and accidents during sleep, as a result of poor sleep quality [4]. The STOP-BANG score has received thorough research and has been proven to be a reliable tool for determining the problems associated with OSA. The STOP-BANG score is associated with an increased risk of cardiopulmonary complications by 4-fold in a meta-analysis [5]. A multitude of conditions may lead to obstructive sleep apnea, such as acromegaly, metabolic syndrome, chronic alcohol abuse, sedative use, advanced age, male sex, obesity, adenoid and tonsillar hypertrophy, mandibular hypoplasia, micrognathia and diabetes [6,7]. Other than these factors, another important etiology of obstructive sleep apnea is hypo-functioning of thyroid gland. In one study, it was reported that 18.6% of hypothyroidism patients had obstructive sleep apnea (OSA) [8]. This rate of obstructive sleep apnea (OSA) in hypothyroid patients was 12.3% in another study [9]. A similar study was carried out, and it was reported that only 9.47% of the patients in the study who were diagnosed with hypothyroidism had obstructive sleep apnea (OSA) which is significantly less than the above-mentioned study [10]. A few studies have shown that thyroid hormone replacement could improve sleep-related symptoms, but the link between hypothyroidism and OSA is not fully understood [11]. In addition, symptoms like fatigue, daytime somnolence, weight gain, and cognitive impairment are often shared by the two disorders and may be underdiagnosed in hypothyroid patients. [12] Owing to these highly variable results it is imperative to further conduct study with the aim of determining frequency of obstructive sleep apnea (OSA) in patients with hypothyroidism.

OBJECTIVES

To determine frequency of obstructive sleep apnea (OSA) in patients with hypothyroidism.

MATERIALS AND METHODS

This cross-sectional study was conducted at Department of Pulmonology, AIMC/ Jinnah Hospital, Lahore from 15 May 2025 to 15 October 2025. Non-probability consecutive sampling was used to collect the data. The sample size was calculated using the WHO sample size calculator by taking an expected frequency of obstructive sleep apnea (OSA) among hypothyroid patients as 9.47% [10], with a 95% confidence level and 5% margin of error. The calculated sample size was 132 patients.

Inclusion Criteria

- Patients aged 25–65 years.
- Both male and female patients.
- Patients diagnosed with hypothyroidism according to the operational definition.

Exclusion Criteria

- Patients with alternative pulmonary pathologies causing abnormal pulmonary function, including chronic obstructive pulmonary disease, asbestosis, hypersensitivity pneumonitis, or other interstitial lung diseases, confirmed through clinical evaluation and previous medical records.
- Patients with normal thyroid function tests [TSH 0.35–5.0 mIU/L, fT4 0.7–1.53 ng/dL, and fT3 260–480 pg/mL].
- Patients with hyperthyroidism [TSH <0.35 mIU/L, fT4 >1.53 ng/dL, and fT3 >480 pg/mL].

Data Collection Procedure

Following approval from CPSP and IERC, patients presenting to the Department of Pulmonology, AIMC/Jinnah Hospital, Lahore who were eligible were enrolled after getting informed written consent. A structured proforma was used to record baseline characteristics (age, gender, BMI, thyroid function tests and duration of hypothyroidism). All patients received the STOP-BANG questionnaire. All patients with a STOP-BANG score ≥5 had overnight polysomnography to confirm OSA, as per the operational definition. Polysomnography was used to diagnose and classify OSA severity by the apnea-hypopnea index (AHI). The anonymity and confidentiality of the patients were observed throughout the study. No personal identifiers, such as patient names and registration numbers, were recorded.

Data Analysis

The data were entered and analysed with SPSS version 20. The quantitative variables such as age, BMI, STOP-BANG score, apnea-hypopnea index, TSH, fT4, fT3 and duration of hypothyroidism were reported as mean ± SD. Categorical variables such as gender, and presence or absence of OSA were expressed as frequencies and percentages. To control for effect modifiers, the frequency of OSA was stratified by age, gender, BMI and duration of hypothyroidism. The post-stratification chi-square test was used. The level of $p \leq 0.05$ was considered statistically significant.

RESULTS

Data were collected from 132 patients, mean age was 45.8 ± 10.7 years, with an age range of 25–65 years. Females constituted the majority of the study population, accounting for 89 (67.4%) patients, while 43 (32.6%) were males. The mean BMI was 29.4 ± 4.8 kg/m², and the mean duration of hypothyroidism was 4.2 ± 2.8 years. The mean

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serum TSH level was 8.9 ± 4.6 mIU/L, while the mean fT4 and fT3 levels were 0.82 ± 0.21 ng/dL and 301.5 ± 52.8 pg/mL, respectively.

Table 1. Baseline demographic and clinical characteristics of patients with hypothyroidism (n=132)

Variable	Frequency (%) / Mean ± SD
Age, years	45.8 ± 10.7
Age range, years	25–65
Male	43 (32.6%)
Female	89 (67.4%)
BMI, kg/m²	29.4 ± 4.8
Duration of hypothyroidism, years	4.2 ± 2.8
TSH, mIU/L	8.9 ± 4.6
fT4, ng/dL	0.82 ± 0.21
fT3, pg/mL	301.5 ± 52.8
STOP-BANG score	3.9 ± 1.7
STOP-BANG score ≥5	28 (21.2%)
STOP-BANG score <5	104 (78.8%)

Obstructive sleep apnea was diagnosed in 18 (13.6%) of the 132 hypothyroid patients, whereas 114 (86.4%) did not have OSA. Among patients with OSA, the mean apnea-hypopnea index was 18.7 ± 9.4 events per hour. Mild OSA was the most common severity category, affecting 8 (44.4%) patients, followed by moderate OSA in 6 (33.3%) and severe OSA in 4 (22.2%) patients.

Table 2. Frequency and severity of obstructive sleep apnea among hypothyroid patients (n=132)

Variable	Frequency (%) / Mean ± SD
OSA present	18 (13.6%)
OSA absent	114 (86.4%)
AHI among OSA patients, events/hour	18.7 ± 9.4
Mild OSA	8 (44.4%)
Moderate OSA	6 (33.3%)
Severe OSA	4 (22.2%)

Patients older than 45 years had a higher prevalence of OSA than those aged 45 years or younger (19.4% vs. 7.7%, p=0.041). OSA was more common among males compared with females (20.9% vs. 10.1%, p=0.048). Similarly, patients with BMI ≥30 kg/m² had a significantly higher prevalence of OSA than those with BMI <30 kg/m² (24.0% vs. 7.3%, p=0.011). Patients with hypothyroidism duration greater than five years also had a higher frequency of OSA compared with those having hypothyroidism for five years or less (28.1% vs. 9.0%, p=0.036).

Table 3. Stratification of OSA frequency according to age, gender, BMI, and duration of hypothyroidism (n=132)

Variable	Category	OSA Present n (%)	OSA Absent n (%)	p-value
Age group	≤45 years	5 (7.7%)	60 (92.3%)	0.041
	>45 years	13 (19.4%)	54 (80.6%)	
Gender	Male	9 (20.9%)	34 (79.1%)	0.048
	Female	9 (10.1%)	80 (89.9%)	
BMI group	<30 kg/m²	6 (7.3%)	76 (92.7%)	0.011
	≥30 kg/m²	12 (24.0%)	38 (76.0%)	
Duration of hypothyroidism	≤5 years	9 (9.0%)	91 (91.0%)	0.036
	>5 years	9 (28.1%)	23 (71.9%)	

Chi-square test was applied. A p-value of ≤0.05 was considered statistically significant.

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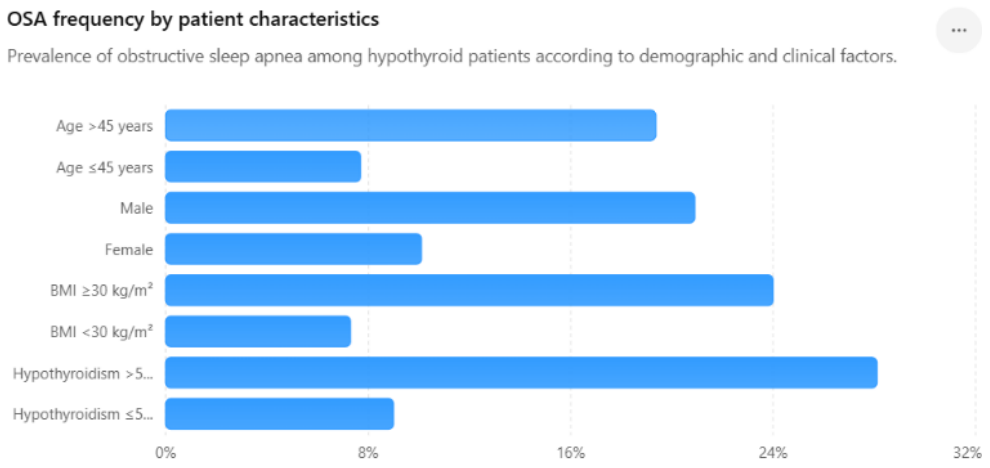

Figure 1. Frequency of obstructive sleep apnea among patients with hypothyroidism

DISCUSSION

This is a cross-sectional study where obstructive sleep apnea (OSA) was found in 18 (13.6%) out of 132 patients with hypothyroidism. In the group of patients with a diagnosis of OSA, 8/23 (44.4%) patients had mild OSA, 6/23 (33.3%) moderate OSA, and 4/23 (22.2%) severe OSA. Increasing age, male gender, obesity, and longer duration of hypothyroidism were significantly associated with a higher frequency of OSA. The mean age of the study population was 45.8 ± 10.7 years and 67.4% of the subjects were females. The gender predominance is consistent with the epidemiology of hypothyroidism, which is more common in women, due to the higher prevalence of autoimmune thyroid disorders. But, even with the smaller number of males, OSA was significantly higher in males than females (20.9% vs 10.1%, p=0.048). The same results have also been observed in previous studies, which found that males are also an independent risk factor for OSA due to different upper airway structures, fat distribution and hormonal differences affecting respiration [13].

The overall prevalence of OSA found in this study is consistent with other studies that assessed sleep-disordered breathing in patients with hypothyroidism. Previous studies have found a prevalence from 9% to 25%, taking polysomnography selectively in high-risk subjects identified by screening questionnaires. However, research using universal polysomnography has found much higher rates, up to 80% [14]. These differences may be explained by differences in study population, definition of hypothyroidism, diagnostic criteria, and screening for OSA. There are several pathophysiological mechanisms that may account for the relationship between hypothyroidism and OSA. Thyroid hormone deficiency is also associated with upper airway narrowing by deposition of mucopolysaccharides in the tongue and pharyngeal tissues which results in macroglossia and soft tissue edema [15]. Also, hypothyroidism leads to upper airway dilator muscle myopathy, decreased ventilatory drive and decreased sensitivity to hypoxia and hypercapnia. Common symptoms of hypothyroidism are weight gain and obesity, which worsens sleep apnea by making the upper airway more collapsible [16].

This study showed that there was a significant correlation between obesity and OSA. The odds of having OSA were significantly greater in patients with BMI ≥30 kg/m2 than in patients with BMI <30 kg/m2 (24.0% vs. 7.3%, p=0.011). Obesity is a known risk factor for OSA as the excess adipose tissue in the neck and pharyngeal structures make the airway more resistant and prone to collapse during sleep. BMI is one of the most consistent predictors of the severity of OSA demonstrated in previous studies. Another important finding of the present study was the association between the duration of hypothyroidism and OSA [17]. The frequency of OSA was significantly higher in patients with hypothyroidism for more than 5 years compared with patients with a shorter duration of the disease (28.1% vs. 9.0%, p=0.036). Inadequate or untreated hypothyroidism for long periods of time can lead to progressive infiltration of soft tissue, persistent metabolic dysfunction, and a slow deterioration of the role of the upper airway muscles, which can contribute to sleep-disordered breathing. The findings of this study have important clinical implications [18]. Several symptoms are common for both hypothyroidism and OSA including fatigue, excessive daytime sleepiness, poor concentration and weight gain, and this can contribute to under-recognizing OSA in this population [19]. If OSA may be present in hypothyroid patients, early diagnosis and treatment can have a positive impact on quality of life and lessen the risk of cardiovascular side effects as well as insulin resistance and neurocognitive impairment [20]. There

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are a few limitations with this study. The cross-sectional design does not allow for the determination of cause and effect between hypothyroidism and OSA. Polysomnography was only performed in patients that had a STOP-BANG score of ≥5, which could have underestimated the actual prevalence of OSA. Moreover, the study was performed in one tertiary care centre on non-probability consecutive sampling, which might restrict the generalization of the results. Other factors that could have confounded the analysis, such as information on thyroid replacement therapy adherence, degree of thyroid dysfunction, neck circumference, etc. was not investigated. However, this study offers local insight into the prevalence of OSA in patients with hypothyroidism in Pakistan, despite the limitations mentioned above. Hypothyroid patients should be screened routinely for OSA with the use of simple screening tools like the STOP-BANG questionnaire, especially older males, obese people, and those with a longer duration of hypothyroidism.

CONCLUSION

Based on the results, it is concluded that OSA is a relatively common comorbidity in patients with hypothyroidism; 13.6% of the studied population had OSA. There was a significant association between longer duration of hypothyroidism, male gender, obesity, and increased frequency of OSA.The association with longer duration of hypothyroidism, male gender and obesity with increased frequency of OSA was significant. Mild OSA was the most common severity classification. Due to the clinical overlaps between hypothyroidism and OSA, regular screening, with the use of validated brief questionnaires (STOP-BANG), may aid early detection of high-risk patients. Early diagnosis and treatment of hypothyroidism patients could benefit the quality of life and decrease the long-term cardiovascular complications associated with OSA.

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