Prevalence of hypothyroidism in obstructive sleep apnea

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ABSTRACT

Background: Patients with OSA usually present with complaints of excessive daytime sleepiness, un-refreshing sleep, fatigue or insomnia. Earlier studies have suggested an influence on hypothyroidism whose incidence differed in different geographical areas and between races. This study was conducted to identify the prevalence of hypothyroidism in obstructive sleep apnea in our area.

Methods: Polysomnography was conducted on all patients referred for sleep apnea test after performing the regular clinical and physical examination. Blood tests were done to diagnose hypothyroidism. AHI and the Epworth Sleepiness scale was done for assessment for daytime sleep patterns. BMI was calculated for all patients.

Results: There was a predominance of males with OSA than females, though the incidence of hypothyroid was greater in females. 36 patients were found to be hypothyroid of which, 27 were previously detected cases and on medication. Only 9 patients (2.4%) were newly diagnosed cases. Male patients with hypothyroid were heavier in weight than the females or men without hypothyroid, had higher ESS, AHI and desaturation Index and low sleep efficiency and arousal index

Conclusions: There were more males than females having sleep apnea although the hypothyroidism was more common in females than in males. The prevalence of hypothyroidism was not significant than the normal population. Therefore, the detection of TSH in sleep apnea cases should be considered only if there are other risk factors and indications like obesity, persistent sleepiness despite therapy.

Keywords: Obstructive sleep apnea, Hypothyroidism, Prevalence, AHI

INTRODUCTION

Sleep apnea is a sleep disorder, which is characterized by shallow or infrequent breathing during sleep. Obstructive sleep apnea is the most common type which is caused by obstruction in the upper airway. It is usually associated with reduction in blood saturation. These pauses in breath may last for 20-40 seconds. The patient is normally unaware of the problem, even on waking, and this is witnessed by the people around him. OSA is normally accompanied by snoring or other sequelae. The spectrum of diseases involvement can range from mild dyspnea to more severe and life threatening respiratory failure.

These symptoms of OSA, i.e. daytime somnolence, lethargy and apathy are also seen in patients with hypothyroidism, thereby questioning a possibility of an association between these two disorders.

The mechanism of the relationship between the two diseases could be due to the deposition of mucoproteins in the upper airway causing obstruction in the airway and disturbances of the regulatory control of pharyngeal...
dilator muscles due to neuropathy and the possibility of airway depression. Even though thyroxine is given as a replacement therapy, it does not resolve the sleep disordered breathing and treating sleep apnea does not cure hypothyroidism. Therefore, the treatment of both the disorders independent of each other is essential.\textsuperscript{6,8,10}

Patients with OSA usually present with complaints of excessive daytime sleepiness, un-refreshing sleep, fatigue or insomnia. These patients may wake up at night with breathe holding, gasping, or choking.\textsuperscript{11,12} The man risk factors are obesity, older age, family history, increasing neck circumference and male gender.\textsuperscript{13,14} In women, menopause is the main risk factor.\textsuperscript{15}

As the symptoms are similar, it is difficult to differentiate between the two diseases, often leading to misdiagnosis or under-recognition. A prevalence of 1-10% hypothyroidism among the patients with OSA has been reported in various studies using different criteria.

Several studies have suggested that environmental factors and ethnicity have a great influence on the prevalence of OSA as well as hypothyroidism.\textsuperscript{16-18} As the prevalence of hypothyroidism in OSA may vary in different geographical regions, we have conducted this study to identify the prevalence of hypothyroidism in Obstructive sleep apnea patients in our area.

METHODS

This study was conducted in the department of Department of TB and Chest and Medicine at Fathima Institute of Medical Sciences, Andhra Pradesh, India. 372 patients who were referred for an overnight sleep study were included onto the study. All the patients were subjected to the regular clinical examinations and demographic details like age, weight, height, sex, etc. were noted during the initial screening by the sleep specialist. Mean values with standard deviation were calculated. The patients were asked questions about their sleep pattern, symptoms and snoring with reference to the Wisconsin Sleep apnea questionnaire. The Epworth Sleepiness scale also was done for assessment for daytime sleep patterns.

Patients with neuromuscular diseases, acutely ill patients, patients on drugs that may affect the thyroid function were excluded from the study. None of the patients included were on narcotics or other hypnotic drugs.

Blood was collected to determine serum thyroid stimulating hormone levels and thyroxine levels, within 2 weeks of the sleep apnea test. Based on the levels, the patients were divided into clinical hypothyroidism (if the TSH level was >5.0 μIU/mL and the FT4 level was <10.3 pmol/L), subclinical hypothyroidism if the TSH concentration was > 5.0 μIU/mL and the serum FT4 level was within the normal range.\textsuperscript{19}

All the patients underwent polysomnography testing. The scoring of the electronic data was performed manually in accordance to the established criteria. OSA was defined according to the International Classification of Sleep Disorders. OSA was further classified as per American Academy of Sleep Medicine (AASM) criteria into mild OSA if the Apnea – Hypopnea Index (AHI) was 1-14/h, moderate if the index was 15-29/h and severe if it was ≥ 30/h. Below 5 was considered normal. SaO2 levels, sleep efficiency, arousal Index were also identified.

Statistical analysis

The Fisher’s Exact Probability test was used for assessment of statistical significance.

RESULTS

Table 1: General Characteristics of the patients with OSA.

<table>
<thead>
<tr>
<th>Males</th>
<th>268 (72%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age</td>
<td>51.38 ± 3.56</td>
</tr>
<tr>
<td>Mean weight</td>
<td>98.3kg ± 13.29</td>
</tr>
<tr>
<td>BMI</td>
<td>38.1 ± 8.64</td>
</tr>
<tr>
<td>History of snoring</td>
<td>361 (97%)</td>
</tr>
<tr>
<td>Witnessed apnea</td>
<td>336 (93.1)</td>
</tr>
<tr>
<td>Day time somnolence</td>
<td>257 (69.1%)</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>36 (9.6%)</td>
</tr>
<tr>
<td>Previously confirmed</td>
<td>27 (7.3%)</td>
</tr>
</tbody>
</table>

![Figure 1: Risk factors in patients with OSA.](image)

Out of the 372 patients, 268 (72%) were males and the rest females. The mean age for all the patients was 51.38 ± 3.56; weight was 98.3kg ± 13.29. BMI 38.1 ± 8.64. All patients except 11 had a history of snoring. Of them, 93% had relatives who witnessed the apneas. Day time somnolence was observed in 69% of the cases. 36 of the 372 patients had hypothyroidism. Of them, 27 were previously confirmed cases and on thyroxine treatment and 9 of them were diagnosed during the present study. Of these 9, 4 had subclinical hypothyroidism and 5 were clinical hypothyroid cases (Table 1).
We compared the male and female hypothyroid patients in OSA. Male patients with hypothyroid were heavier in weight than the females or men without hypothyroid, had more BMI though the females with hypothyroid were not far behind. The desaturation index was highest in males with hypothyroid rather than any other group. There was no significant difference in the time of SaO2 <90% among all the patients (Table 2).

Hypertension seemed to be a more prominent feature in the patients with OSA followed by diabetes, asthma and depression (Figure 1).

### Table 2: Gender comparison between normal and hypothyroid cases in OSA patients.

<table>
<thead>
<tr>
<th>Characters</th>
<th>Males OSAs patients without hypothyroid (value ± SD)</th>
<th>Males Hypothyroid OSAs patients (value ± SD)</th>
<th>Females OSAs patients without hypothyroid (value ± SD)</th>
<th>Females Hypothyroid OSAs patients (value ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>49.23 ± 4.2*</td>
<td>58.78 ± 3.76</td>
<td>50.14 ± 7.5</td>
<td>53.87 ± 4.38</td>
</tr>
<tr>
<td>BMI</td>
<td>36.9 ± 4.2*</td>
<td>44.23 ± 3.23</td>
<td>39.2 ± 3.6</td>
<td>42.32 ± 3.45</td>
</tr>
<tr>
<td>ESS</td>
<td>9.9 ± 4</td>
<td>11.8 ± 8.2</td>
<td>7.9 ± 3.7</td>
<td>9.8 ± 3.4</td>
</tr>
<tr>
<td>AHI</td>
<td>56.8 ± 45.1</td>
<td>73.3 ± 24.9</td>
<td>55.2 ± 29.6</td>
<td>62.7 ± 14.7</td>
</tr>
<tr>
<td>Sleep efficiency</td>
<td>79.5 ± 12.6*</td>
<td>67.7 ± 21.6</td>
<td>73.9 ± 6.9</td>
<td>76.6 ± 12.4</td>
</tr>
<tr>
<td>Desaturation Index</td>
<td>30.9 ± 12.5*</td>
<td>48.4 ± 32.3</td>
<td>29.1 ± 9.3</td>
<td>40.7 ± 10.5</td>
</tr>
<tr>
<td>Time of SaO2&lt;90% (min)</td>
<td>18.5 ± 16.4*</td>
<td>32.8 ± 31.6</td>
<td>33.2 ± 33.1</td>
<td>36.9 ± 32.5</td>
</tr>
<tr>
<td>Arousal Index</td>
<td>56.2 ± 32.6</td>
<td>53.6 ± 36.8</td>
<td>57.3 ± 21.7</td>
<td>73.5 ± 34.2</td>
</tr>
</tbody>
</table>

The prevalence of previously diagnosed hypothyroidism was observed in 7.3% cases in our study. This was higher than the prevalence reported in the studies by Lin et al and Messler et al.6,7

We could not follow up these patients to identify the effect of thyroxine treatment on sleep apnea but in other studies, it was observed in a study by Skjodt that patients responded to thyroxine replacement therapy alone as sole treatment for their sleep apnea.27 The same was observed by other investigators who observed positive response of OSA patients to thyroxine therapy.21,25 In contrast, other studies observed that there was no response to thyroxine in OSA.6,25

We studied the difference between the two genders among the OSA patients with and without hypothyroidism. There was higher prevalence of hypothyroid in females with OSA compared to males although OSA was highly prevalent in males than females. This was in agreement with another study by Alotair et al who also reported a higher prevalence of hypothyroidism in females rather than males with sleep apnea.22,24 This could be due to environmental factor, races and other quality of life.

In the present study, we found that there was not much difference in age and weight in the females with or without hypothyroid although there was a slight increase in the BMI in females with hypothyroid although it was not significant. In males there was a marked increase in weight as well as BMI among the hypothyroid patients compared to non hypothyroid patients. The risk factors were similar in all the four groups, though the desaturation levels, AHI scores, and SaO2<90% were higher in males with hypothyroid with OSA. These results were in accordance to a similar study by Bahammam and Miller et al.

Our study had many limitations. Association of hypothyroidism and OSA was not ascertained as the number of hypothyroid cases among the study population was too low. Moreover, the recently diagnosed hypothyroidism cases were very less compared to the previously diagnosed ones. The severity of the hypothyroidism in the treated and untreated could not be measured except to identify the history of the medication. The duration of the thyroxine use in the diagnosed cases were also not very many so as to identify if the medication has a positive effect on the sleep apnea. We therefore recommend the continuation of this study for a longer period on patients with recently diagnosed

### DISCUSSION

In our study hypothyroid was discovered during routine testing in 36 (9%) patients in people being tested for sleep apnea, 27 of whom were diagnosed earlier. This was reported by other studies.6,7 The prevalence of previously undiagnosed hypothyroidism obtained in these studies (0.7 to 3.1%) was similar to our result. The prevalence of hypothyroid was higher in another study conducted by Popovici et al who reported a prevalence of 11%.21
hypothyroidism in OSA patients and the outcome of long term use of thyroxine on sleep apnea.

CONCLUSIONS

The overall prevalence of hypothyroidism in OSA patients in our area was 9.6%, while the previously diagnosed patients among these was 7.3%. Only around 2% of the cases were diagnosed during this study. There were more males than females having sleep apnea although the hypothyroidism was more common in females than in males. The prevalence of hypothyroidism was not significant than the normal population. Therefore, the detection of TSH in sleep apnea cases should be considered only if there are other risk factors and indications like obesity, persistent sleepiness despite therapy. Long term studies are warranted to identify the relevance of thyroxin therapy on OSA.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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