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The study of association of hypothyroidism and sleep disordered breathing in symptomatic adult Patients

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Abstract
Aim: was to evaluate the prevalence of symptoms of sleep apnoea and related breathing disorders in patients suffering from hypothyroidism on the basis of Epworth sleepiness scale.
Material and method: The present hospital based cross sectional study was conducted among 90 patients reporting to the department of respiratory medicine and department of general medicine at Chattarpati Shivaji Hospital of Subharti Medical College, Meerut. Clinical history, BMI, blood pressure (recorded after at least 5 minutes of rest in both arms sitting/supine position) was recorded. Blood samples of 5 ml drawn after 12 hours (overnight fasting) for the measurement of thyroid profile and fasting plasma glucose. OSA is defined as apnoea-hypopnoea index (AHI) > 5 that is more than five episodes per hour of cessation of breathing for at least 10 seconds.
Results: Mean fT3 (pmol/L), fT4 (pmol/L) and TSH (mIU/mL) was found to be 1.94, 4.20 and 42.27 respectively. AHI score >5 was reported among 47 subjects. 51.06% of the subjects were having severe apnoea while moderate and mild sleep apnoea was found among 23.40% and 25.53% of the subjects respectively.
Conclusion: The results of the present study concluded that patients with hypothyroidism should be assessed and evaluated for OSAS as it helps in an appropriate treatment with CPAP or thyroid supplements or both. Routine screening for thyroid disorders may prevent misdiagnosis and allows physicians to find primary condition and start hormone replacement therapy, inhibiting the progression of the primary disorder.

Keywords: OSA, Sleep Apnoea, Epworth sleepiness scale

Introduction
Obstructive sleep apnoea (OSA) is a condition in which there is collapse of the upper airway during sleep, as a result of which there is a decrease or complete cessation of airflow [1]. Obstructive sleep apnea is the most common type which is caused by obstruction in the upper airway. OSA has been shown to be associated with these risk factors including hypertension, insulin resistance and dyslipidaemia [1]. Thyroid diseases are, arguably, among the commonest endocrine disorders worldwide.
Hypothyroidism is characterized by a broad clinical spectrum ranging from an overt state of myxedema, end-organ effects and multisystem failure to an asymptomatic or subclinical condition with normal levels of thyroxine and tri-iodothyronine and mildly elevated levels of serum thyrotropin. Hypothyroidism has been associated with obstructive sleep apnea (OSA), as some symptoms for both illnesses overlap. The proposed mechanisms for the relationship between OSA and hypothyroidism include the deposition of mucoproteins in the upper airway causing upper airway obstruction, disturbances of the regulatory control of pharyngeal dilator muscles due to neuropathy, and the possibility of respiratory center depression [2].
The overlap between the two disorders may create a problem for the treating physician in differentiating both disorders and may result in a misdiagnosis or under-recognition of one of the disorders. Therefore, it is essential to consider both diseases to discuss the relationship between hypothyroidism and sleep disordered breathing[3]. Hence the present study is planned to evaluate the prevalence of symptoms of sleep apnoea and related breathing disorders in patients suffering from hypothyroidism on the basis of Epworth sleepiness scale.

Material and methods: All patients enrolled in study were analyzed on the basis of Epworth sleepiness scale. Patients with ESS >10 were subjected to polysomnography.
- **Study duration**: 18 months
- **Type of study**: Cross sectional study
- **Study centre**: Department of Respiratory and General Medicine, Chattrapati Shivaji Subharti Hospital
- **Sample size**: 90

Inclusion Criteria
- Patient is a known case of hypothyroidism
- Patients with free T3 levels <4pmol/L or free T4 levels <9pmol/L or TSH levels >5uIU/ml.
- Patients who were in stable condition

Exclusion Criteria
- Critically ill patients
- Patients with end stage organ disease and malignancy
- Pregnant woman
- Patients with neuromuscular diseases, acutely ill patients, patients on drugs that may affect the thyroid function were excluded from the study.

Patient Data Recording

- Clinical history
- BMI (wt in kg/ht in m^2)
- Blood pressure (recorded after at least 5 minutes of rest in both arms sitting/supine position).
- Blood samples of 5 ml drawn after 12 hours overnight fasting for the measurement of thyroid profile and fasting plasma glucose.

Diagnosis of hypothyroidism

- Diagnosis of hypothyroidism was based the symptoms and the results of blood tests that measure the level of TSH and on the level of the thyroid hormone thyroxine.
- In addition, TSH tests are used to help diagnose a condition called subclinical hypothyroidism, which usually causes no outward signs or symptoms. In this condition, you have normal blood levels of triiodothyronine and thyroxine, but higher than normal levels of TSH.

Diagnosis of OSA

- OSA is defined as apnoea-hypopnoea index (AHI) > 5 that is more than five episodes per hour of cessation of breathing for at least 10 seconds.
- Apneas were defined by an 80% or greater reduction in the airflow signal with persistent respiratory effort lasting 10 seconds or longer.
- Hypopneas were defined as a 30% or greater reduction in the airflow signal with persistent respiratory effort lasting at least 10 seconds associated with a desaturation of 4% or greater.

Results

The present hospital based cross sectional study was conducted among 90 patients reporting to the department of respiratory medicine and department of general medicine at Chattarpati Shivaji Hospital of Subharti Medical College, Meerut, Uttar Pradesh between October 2017 to March 2019 (18 months). Male and female comprised of 55.6% and 44.4% of the subjects respectively (table 1).

In the present study, mean age of the study subject was 51.51±12.28 years. 1.11%, 18.89%,28.89%, 28.89% and 22.22% of the subjects belonged to 21-30, 31-40, 41-50, 51-60 and >60 year age group respectively (table 2).

Mean fT3 (pmol/L), fT4 (pmol/L) and TSH (mIU/mL) was found to be 1.94, 4.20 and 42.27 respectively as shown in table 3.

AHI score >5 was reported among 47 subjects. 51.06% of the subjects were having severe apnoea while moderate and mild sleep apnoea was found among 23.40% and 25.53% of the subjects respectively. Mean AHI score among the study subjects was 59.43±30.71 (table 4).

Discussion

OSAS and hypothyroidism are two prevalent health problems of adult population. Obstructive sleep apnea-hypopnea syndrome (OSAHS) is a chronic condition, characterized by recurrent pauses in breathing during sleep. In consequence, they lead to sleep fragmentation and intermittent hypoxemia. Decreased quality of sleep leads to excessive day time sleepiness, cognitive dysfunction and impaired work performance. OSAHS contributes to systemic hypertension, cardiovascular diseases and abnormalities in glucose metabolism.

The reported prevalence of OSAHS in adult population ranges from 4 to 7% in men, and from 2 to5% in women; with some subgroups of the population bearing higher risk. It is a serious health problem considering high prevalence and its deleterious consequences, e.g. traffic accidents or all causes related morbidity and mortality.

Polysomnography is an acknowledged gold standard in OSAHS diagnostics available on the prevalence of OSAS in subjects suffering from hypothyroidism. Hence the present study was conducted to evaluate the prevalence of symptoms of sleep apnoea and related breathing disorders in patients suffering from hypothyroidism on the basis of Epworth sleepiness scale.

Summary and conclusion

- Male and female comprised of 55.6% and 44.4% of the subjects respectively.
- More than 2/3rd of the subjects belonged to >41 year of age.
- Previous illness, hypertension, diabetes mellitus, TB and smoking was reported among 37.78%, 40%, 40%, 18.89% and 37.78% of the subjects respectively.
- 98.9% of the subjects were overweight/obese in the present study.
- AHI score >5 was reported among 47 subjects. 51.06% of the subjects were having severe apnoea while moderate and mild sleep apnoea was found among 23.40% and 25.53% of the subjects respectively.
- The prevalence of OSAS was found to be approximately 52% in patients with hypothyroidism.
- Thus all patients with hypothyroidism should be assessed and evaluated for OSAS as it helps in an appropriate treatment with CPAP or thyroid supplements or both.
- Routine screening for thyroid disorders may prevent misdiagnosis and allows physicians to find primary condition and start hormone replacement therapy, inhibiting the progression of the primary disorder.
- In a few cases treatment of hypothyroidism as a primary condition resulted in significant improvement of coexisting OSAHS. As the present study is one of its kinds, therefore to confirm the presence of OSAS in hypothyroidism subjects, further such studies should be conducted among the large sample size with longitudinal study design. This conclusion might be of value, regardless the existence of a causal association or just a concurrence of OSAHS and hypothyroidism.

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