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A Study on Prevalence of Co-Morbidities among Hypothyroidism Patients in Various Hospitals- Palakkad.

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ABSTRACT

Background: Many disorders may respond to hypothyroidism like depression, reactive hypoglycemia, menstrual disorders, infertility, premenstrual dysphoric syndrome, fibrocystic breast disease, PCOD, certain dermatological conditions, asthma, hypertension, and certain cardiovascular diseases. **Aim & Objective:** In this study, we evaluated the prevalence of hypothyroidism and associated co-morbid conditions among the study population. **Methodology:** The study was a prospective observational study and was conducted over a period of six months in various hospitals, Palakkad. **Results and Discussion:** Out of 175 patients, 161 of them were females (92%) and 14 of them were males (8%). In age wise distribution, the highest number of patients (24.57%) in above 59 years of age range followed by 40% in 18 to 28 years range. Out of the 175 patients, 82 (46.85%) were suffering from subclinical hypothyroidism followed by 66 (37.71%) suffering from overt hypothyroidism. In co-morbid wise distribution, 62 (35.42%) patients have Diabetes followed by 50 (28.57%) patients with Hyperlipidemia. 41 (23.42%) patients have hypertension and also about 27 (15.42%) patients have PCOD. In this 40.24% subclinical hypothyroid and 30.30% overt hypothyroid patients were suffering from diabetes. **Conclusion:** Hypothyroidism was reported more in the female population and in age group above 59 years. Diabetes, Hyperlipidemia, Hypertension, PCOD, Migraine, Anemia and Depression were associated co-morbid diseases. Subclinical hypothyroid patients are more commonly suffering due to these co-morbid diseases than overt hypothyroid patients. It is clear that screening tests for this co-morbid conditions should carry out in hypothyroid patients for early diagnosis and treatment because their prevalence is much higher.

INTRODUCTION

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 triiodothyronine and mildly elevated levels of serum thyrotropin. The prevalence of hypothyroidism in the developed world is about 4-5%. The prevalence of subclinical hypothyroidism in the developed world is about 4-15%.[1] Hypothyroidism, specifically, is the most common of thyroid disorders in India, affecting one in ten adults. The prevalence of hypothyroidism in India is 11%, compared with only 2% in the UK and 4·6% in the USA.[2]

Many disorders may respond to hypothyroidism like depression, reactive hypoglycemia, ENT disorders, menstrual disorders, infertility, premenstrual dysphoric syndrome, fibrocystic breast disease, polycystic ovary syndrome, certain dermatological conditions, asthma, hypertension, and certain cardiovascular diseases.[3] In type 2 diabetes mellitus (T2DM) the presence of the sub-clinical forms of hyperthyroidism should be ruled out since it may be associated with higher cardiovascular risk. Hypothyroidism may also be associated with asthma and it is recognized as a secondary cause of hypertension.[4] The "American Thyroid Association" guidelines for T2DM patients require frequent testing for thyroid dysfunction. They recommend testing from 35 years of age, and every 5 years thereafter in adults.

Recent findings have evidenced the intricate bond between subclinical hypothyroidism and diabetes mellitus that deceptively contribute to the major complications such as retinopathy and neuropathy. Cardiovascular events and micro or macro-angiopathies are the counter reflection of resurgence of heavily disturbed lipid metabolism due to thyroid dyscrasias.[5] To conclude, there is a high prevalence of thyroid disorders in patients with T2DM which was further found to be more in females, elderly patients, patients with uncontrolled diabetes, i.e., HbA1C values ≥ 7 or patients on insulin, and patients with BMI > 30.[6] In this study, we evaluated the prevalence of hypothyroidism and associated co-morbid conditions among the study population.

MATERIALS AND METHOD

The study was a prospective observational study and was conducted over a period of six months (December 2016 to May 2017). **Study Criteria:** Inclusion Criteria: All patients diagnosed with hypothyroidism and other co-morbid diseases were included in this study. Exclusion Criteria:

Patients having pituitary disorder, Patients with age below 18 years, Patients who unwilling to participate in this study. Measurements: Demographic details, medical history, laboratory values, vital signs, and physical examination and co-morbid conditions were recorded for each participant.

RESULTS AND DISCUSSION

A total of 175 patients were enrolled in the study. Out of 175 patients, 161 of them were females (92%) and 14 of them were males (8%). Females were also more likely to be detected with hypothyroidism than males[1]. In age wise distribution, the highest number of patients (24.57%) fell in above 59 years of age range followed by 40% in 18 to 28 years range. 40% of patients were in the overweight range followed by the 60% in the normal BMI range. 37% followed by obese range. The causal relationship between BMI and variations in thyroid function could be explained by the process of thermogenesis. Thyroid hormones increase thermogenesis through an increase in cellular activity to produce ATP. Variations of normal thyroid function area companied by differences in BMI perhaps due to the changes in the resting energy consumption. The high incidence of the pathological disorders in thyroid function combined with the strong influence of various environmental factors can increase weight with an unknown biological mechanism and lead to obesity[7]. Data obtained from family history shows 144 patients are without family history (82.28%) followed by 22 patients are with family history (13.71%). This can be shown in Table 1.

Table: 1 Socio-Demographic Characteristic of the Study Population.

Variables	Frequency	Percentage
Sex wise(n=175)		
Female	161	92%
Male	14	8%
Age wise(n=175)		
18-28	40	22.85%
29-38	36	20.57%
39-48	28	16%
49-58	28	16%
Above 59	43	24.57%
BMI(n=175)		
<18.5	8	4.5%
18.6-24.9	60	34.28%
25-29.9	70	40%
>30	37	21.14%
Based on family history(n=175)		
With family history	24	13.71%
Without family history	144	82.28%

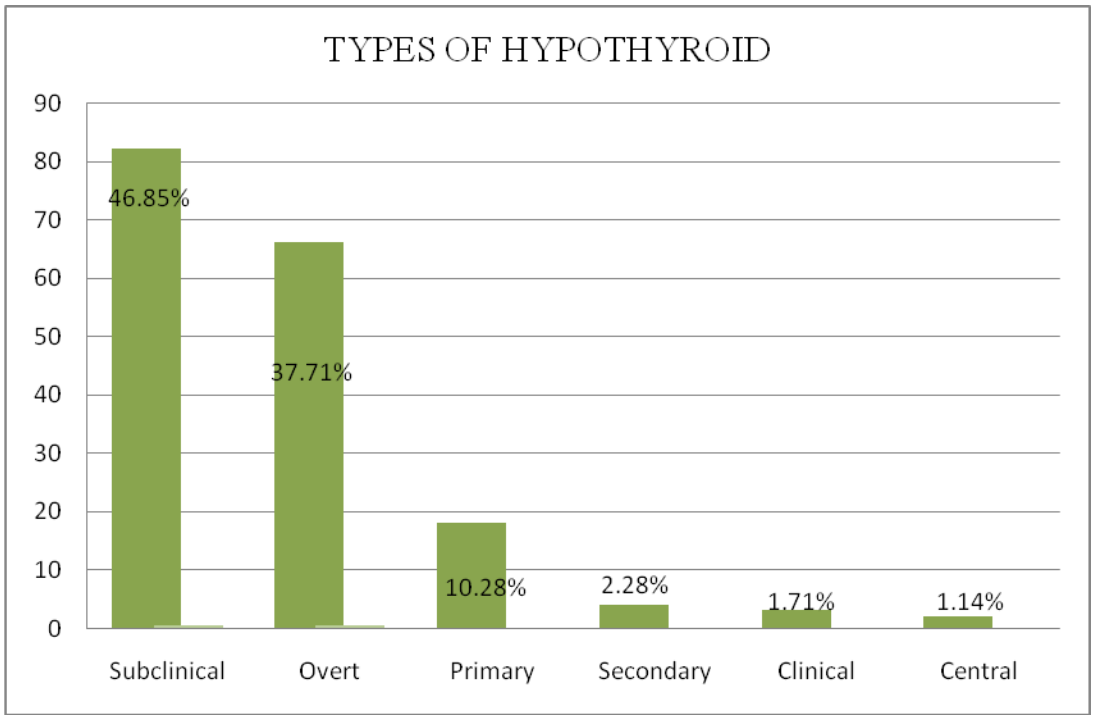

Figure: 1. Types of Hypothyroid Among Study Population

Out of the 175 patients, 82 (46.85%) were suffering from subclinical hypothyroidism followed by 66 (37.71%) suffering from overt hypothyroidism. About 18 (10.28%) suffering from primary hypothyroidism followed by 4 (2.28%) with secondary hypothyroidism followed by 3 (1.71%) with clinical and 2 (1.14%) with central hypothyroidism. Subclinical hypothyroidism is defined as a combination of high TSH with normal FT4 levels. Overt hypothyroidism is defined as a combination of high TSH with low T_3 and T_4.[8] Subclinical hypothyroidism is more common in regions with high iodine intake. Subclinical hypothyroidism is a risk factor for dyslipidemia and coronary artery disease.[9]

Table: 2 Co-morbid wise distributions among the study population.

S. No	Co-morbidities	Number of patients	Percentage of patients
1	Diabetes Mellitus	62	35.42%
2	Hyperlipidemia	50	28.7%
3	Hypertension	41	23.41%
4	PCOD	27	15.42%
5	Migraine	17	9.41%
6	Anemic	13	7.42%
7	Depression	15	8.575
8	Myocardial infarction	8	4.5%
9	Asthma	3	1.71%
10	Others	4	2.28%

In co-morbid wise distribution, 62 (35.42%) patients have Diabetes followed by 50 (28.57%) patients with Hyperlipidemia. 41 (23.42%) patients have hypertension and also about 27 (15.42%) patients have PCOD. About 17 (9.71%) patients have migraine and 13 (7.42%) patients have anemia. 15 (8.57%) have depression and 8(4.5%) patients have myocardial infarction.

Diabetes mellitus and thyroid disease are the two most common endocrine disorders. Thyroid hormone is a major regulator of metabolism and energy expenditure, is directly involved in the control of insulin secretion and glucose homeostasis and has been shown to preserve beta-cell viability and proliferation. Lack of thyroid hormone is also associated with a decrease in peripheral insulin sensitivity and glucose intolerance and treatment of hypothyroidism has been shown to improve insulin sensitivity.[10]

Thyroid hormones significantly affect lipoprotein metabolism as well as some CVD risk factors, thus influencing the overall CVD risk. Thyroid hormones induce 3-hydroxy-3-methylglutarylcoenzyme A (HMGCoA) reductase, which is the first step in cholesterol biosynthesis. Triiodothyronine (T3) causes an upregulation of LDL receptors, controls the sterol regulatory element binding protein-2 (SREBP-2), which in turn regulates LDL receptor's gene expression and protects LDL from oxidation. [11]

The mechanism of increased blood pressure in hypothyroidism is not known; however, an acceleration of structural change of vascular tissue by thyroid hormone deficiency may be a local factor in causing a higher total peripheral resistance. Furthermore, alteration of autonomic nervous function by thyroid hormone deficiency could cause hemodynamic changes.[12]

Hypothyroidism is a frequent cause of infertility. If the thyroid in underactive, the hypothalamus and pituitary gland can sense this and try to kick things back to normal by increasing levels of the hormones TRH and TSH in your body. TRH produced by the hypothalamus prompts the pituitary to release TSH, which in turn stimulates the thyroid to do its job. However, TRH also prompts the pituitary to release more of the hormone prolactin. Elevations of prolactin can interfere with ovulation by suppressing release of the hormones LH and FSH, which stimulate the ovary. Low levels of thyroid hormone can also interfere with the rate at which your body metabolizes sex hormones, which can also cause ovulatory disorders.[13] Migraine, anemia, depression, myocardial infarction are the other co-morbidities seen in this study.

Table: 3 Comparison of comorbidities between overt and subclinical hypothyroidism

Co-morbid diseases	Overt (n=66)	Subclinical (n=82)
Diabetes Mellitus	**20 (30.30%)**	**33 (40.2%)**
Hyperlipidemia	**16 (24.24%)**	**24 (29.2%)**
Hypertension	**12 (18.1%)**	**23 (28%)**
PCOD	**9 (13.6%)**	**17 (20.7%)**

In this 40.24% subclinical hypothyroid and 30.30% overt hypothyroid patients were suffering from diabetes. Table 4 shows Diabetes patients have subclinical hypothyroid than overt hypothyroid. 29.26% subclinical hypothyroid and 24.24% overt hypothyroid were suffering from Hyperlipidemia. 28.04% subclinical hypothyroid and 18.18 with overt hypothyroid were suffering from PCOD.

TSH level is more affected than FT4 level indicating that subclinical hypothyroidism is more common than overt hypothyroidism in Type 2 Diabetes patients and both overt & subclinical hypothyroidism were more common in diabetic females as compared to males.[14]

Subclinical Hypothyroidism (SCH) is more common than overt hypothyroidism in Hyperlipidemic patients. Although it is generally accepted that overt hypothyroidism causes secondary hyperlipidemia and promotes atherosclerosis. In recent times subclinical hypothyroidism is being diagnosed more frequently as compared to overt hypothyroidism. Overt hypothyroidism is associated with abnormalities of lipid metabolism, which may predispose to the development of atherosclerotic coronary artery disease (CAD).[15]

Subclinical hypothyroidism was an independent risk factor for atherosclerosis and myocardial infarction. Blood hypercoagulability, blood viscosity and lipid abnormalities presenting in subclinical hypothyroidism patients could increase the risk for atherosclerosis. These factors may also be involved in the pathogenesis in which subclinical hypothyroidism affects blood pressure.[16]

CONCLUSION

Hypothyroidism was reported more in the female population and in age group above 59 years. Diabetes, Hyperlipidemia, Hypertension, PCOD, Migraine, Anemia and Depression were associated co-morbid diseases in hypothyroid patients. Subclinical hypothyroid patients are more commonly suffering due to these co-morbid diseases than overt hypothyroid patients. It is clear that screening tests for this co-morbid conditions should carry out in hypothyroid patients for early diagnosis and treatment because their prevalence is much higher.

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