Research Article

Prevalence of thyroid dysfunction in the patients visiting Tertiary Health Care Hospital, Firozabad; Uttar Pradesh

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Abstract

Background: Thyroid disorders (hypothyroidism and hyperthyroidism) are a widespread thyroid problem, but there are no reports on the incidence and prevalence of thyroid disorders in this part of Western Uttar Pradesh of India.

Objective: The aim of this study was to assess the prevalence of thyroid disorders in Firozabad and its adjoining areas.

Materials and Methods: This retrospective hospital-based study involved 982 patients having undergone thyroid function assay, in the central clinical biochemistry laboratory of F.H.Medical College and Hospital, Firozabad. Firozabad is a city in western Uttar Pradesh of India about 40 km from Agra. These patients were evaluated for thyroid hormonal assay- total tri iodothyronine (T3), total tetra iodothyronine (T4), and thyroid stimulating hormone (TSH) by Vidas auto analyzer using enzyme-linked fluorescent assay technique. Statistical analysis was performed by SPSS version 17 software.

Result: Our study shows high prevalence of abnormal thyroid hormone levels (hypothyroidism including subclinical hypothyroidism 43% andhyperthyroidism was 26%) with female preponderance.

Conclusion: The study has defined thyroid function status in thyroid patients of Firozabad, Uttar Pradesh, India. Higher prevalence of hypothyroidism was observed in patients (especially females) in third decade of life. The findings also support the indication of thyroid hormone screening during third decade of life and afterwards.

KEY WORDS: Thyroid disorder, hypothyroidism, subclinical-hypothyroidism, TSH

Introduction

Thyroid dysfunctions are the most common endocrinopathies across the world.[1] Thyroid hormones perform a wide range of functions including regulation of lipids, carbohydrates, and proteins metabolism.[2] Their dysfunction manifests in a wide spectrum of clinical diseases and biochemical abnormalities, from clinically intangible diseases to myxoedema coma.[3] Biochemical decrease in T3 (tri-iodothyronine) and T4 (tetra-iodothyronine) concentrations leads to hypersecretion of thyroid stimulating hormone (TSH) from the pituitary causing an increase in the serum TSH levels. This is a key laboratory finding, particularly in the early detection of thyroid abnormalities.[4] The most common cause of thyroid dysfunction is a primary failure of thyroid gland. Pituitary dysfunction, hypothalamic dysfunction, or generalized tissue resistance to the circulatory thyroid hormones is also found in such cases.[5] In India, having a population of 1.2 billion, an estimated 108 million people suffer from endocrine and metabolic disorders, of these 42 million people suffer from thyroid disorders.

Iodine is essential inherent component thyroid hormones, that is, T3 and T4. The World Health Organization (WHO) recommendation for adequate daily iodine intake of 150 µm for men, non-pregnant, and non-lactating women; 250 µm for pregnant and lactating women; daily intake of iodine of 90 µm for preschool children (0–59 months) and 120 µm for school going children (6–12 years).[6]

There have been several community- and hospital-based studiescarried out in various countries of the world, trying to get proper knowledge of actual prevalence of thyroid dysfunctions in the community at large. The National Health and Nutrition Examination Survey (NHANESIII) data from the

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USA and a comprehensive epidemiologic survey in the UK demonstrated the female ascendancy of thyroid patients, with a prevalence of 1% to 2% in women. In men, the prevalence is about one-tenth.[7]

Therefore, a study was planned to find the prevalence of various thyroid disorders in the different age and sex groups in patients attending FH Medical College and its associated hospital.

Materials and Methods

This study was conducted in the Department of Biochemistry in association with the Department of General Medicine in FH Medical College, Tundla and its associated hospital. Informed consent was obtained from each individual patient. Total of 982 patients were selected for the study. Patients with incomplete thyroid function test and nonsignificant thyroid history were excluded from the study. After an overnight fasting,3 ml venous blood samples were collected in the morning. Blood was allowed to clot and centrifuged at 2500 rpm for 15 min at room temperature. The serum was then assayed for T3, T4, and TSH by enzyme linked florescent assay (ELFA) technique using Vidas auto-analyzer. The reference range for T3, T4, and TSH for our laboratory was as follows:

T3: 1.23–3.23 nmol/L

T4: 59–135 nmol/L

TSH: 0.4–4.2 mIU/L

The patients were categorized into three groups. Those having normal T3, T4, and TSH levels were categorized into theeuthyroid group; patients having low T3, T4, and high TSH were in the hypothyroidgroup; and those having a high level of T3 and T4 and lower TSH levels were regarded as hyperthyroid group. Each of these groups was further divided according to age.

Statistical Analysis

Statistical analysis was carried out with software package SPSS 17. ANOVA was used in evaluation of significance between the means of the two groups. Data were presented as mean ± standard deviation (SD). Intergroup differences were tested by independent sample test (two groups). *P*-value lower than 0.05was taken as significant.

Result

This study included 982 patients for thyroid hormone disorders, of which 671 (68%) were females and 311 (32%) were males. The ratio of female to male in our study is around 2.2:1. The thyroid hormone levels and TSH (mean ± SD) of men in our study was T3 (1.96 ± 0.9); T4 (92.65 ± 18.9); and TSH (2.65 ± 1.9) and that of women were T3 (1.87 ± 1.2); T4 (90.23 ± 39.4); and TSH (3.12 ± 2.1) [Table 1].

The patients were classified according to their thyroid status as hypothyroid, hyperthyroid, and euthyroidas shown in Table 2.

Table 1: Comparison of thyroid hormones and TSH level (mean ± SD) in males and females

Sex	Hormonal level		
	T3 (nmol/L)	T4(nmol/L)	Tsh (miu/L)
Male	1.96 ± 0.9	92.65 ± 18.9	2.65 ± 1.9
Female	1.87 ± 1.2	90.23 ± 39.4	3.12 ± 2.1

Table 2: Thyroid disease spectrum in different age groups of males and females

Thyroid disorders	Age groups (years)				Total
	0–15	16–30	31–45	46–60	
Euthyroid	10(3%)	48(15%)	187(60%)	68(22%)	313(32%)
Hypothyroid	25(6%)	53(13%)	209(50%)	131(31%)	418(43%)
Hyperthyroid	18(7%)	31(12%)	173(69%)	29(12%)	251(26%)

Table 3: Thyroid disease status and mean circulating hormones levels (mean ± SD)

Thyroid hormones	Euthyroidism (Mean ± SD)	Hypothyroidism (Mean ± SD)	Hyperthyroidism (Mean ± SD)
T3	1.79 ± 0.9	1.83 ± 0.7	3.1 ± 0.3
T4	79.34 ± 2.9	89.52 ± 38.5	116.28 ± 71.8
TSH	2.6 ± 1.1	8.9 ± 0.7	0.49 ± 0.2

Comparison of thyroid hormone levels and TSH as mean ± SD in the various thyroid disorders are shown in Table 3.

A higher prevalence of thyroid disorder was seen in patients who are in their third decade of life with a female preponderance. Ahigher prevalence of hyperthyroidism and hypothyroidism was seen in patients in the age group of 31–45 years. A prevalence of hypothyroidism of around 43% and hyperthyroidism of around 26% was noted. The study revealed that women are at more risk to suffer from hypothyroidism in this study.

Discussion

There is limited data available on the prevalence of hypothyroidism and hyperthyroidism in our country. Most of the studies have concentrated on the effectiveness of the iodization program and have looked at the prevalence of residual thyroid disease in school children and adolescents.[8–11]

In this study, we found that thyroid dysfunction prevalence was higher among the female population. A high prevalence of thyroid disorders was observed in the age group of 31–45 years and the women are more likely to suffer from thyroid disorders which is in accordance with study conducted in Meerut, Uttar Pradesh by Ahmad et al. which shows a higher prevalence of thyroid hormone level abnormalities and TSH within the patients who are in their third decades of life.[8]

A study was conducted in the Department of Biochemistry, G.B. Pant Hospital, Delhi. Researchers found the majority of

the patients were hypothyroid.[12] A recent study has been carried out among adult people in India. In this population-based study carried out in Cochin on 971 adult subjects, the prevalence of hypothyroidism was more.[13] In a clinic-based study from Mumbai, of 800 children with thyroid disease, hypothyroidism is more prevalent. In a study conducted in south India by Agarwal et al. shows higher prevalence of hypothyroidism in women population in their studies.[14]

In a study conducted by Desai MP of nearly 800 children referred for thyroid problems, 79% had hypothyroidism, 19% had euthyroid goiters, and 2% had hyperthyroidism.[15] Our study also shows higher prevalence of hypothyroidism in the study population which is in accordance to these studies conducted in different geographical areas.

A study conducted by Vanderpump et al.[16] quoted age preponderance of 34 years and above. Study in Makah on the prevalence of thyroid diseases exhibit similar age group preponderance,that is, 40±12 years[17] which is also in accordance to our study. Prevalence of hypothyroidism was found to be common in Iranian population, as 12.8% women and 4.7% men had hypothyroidism.[18]

A study conducted by Jha et al. in a tertiary healthcare hospital, Haryana revealed the prevalence of hypothyroidism as 23% and hyperthyroidism as 7% and concluded that thyroid dysfunction is more prevalent in females in their study area which is also in accordance to our study, revealing that females are more vulnerable to thyroid dysfunction.[19] Ahmad et al. in their study on 4739 patients revealed that females are more vulnerable to hypothyroidism which is again in accordance to our study.[8]

Conclusion

This is the first study conducted on thyroid disorders in this part of India. This study demonstrates that hypothyroidism was alarmingly high in this region with women preponderance. Since this study was a hospital-based study, it may not aptly represent the entire population. But it has put one's finger on the burden of thyroid dysfunction in the population and can serve as a baseline for further studies. This attempt is made to determine the prevalence of thyroid diseases in the study area from the limited available data and sources.

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