

Frequency of Thyroid Disorders in a Tertiary Care Hospital of Lahore, Pakistan

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ABSTRACT

Background: Two powerful hormones are produced by thyroid gland, thyroxine (T4) and triiodothyronine (T3). These hormones control all metabolic processes and influence oxygen consumption in nearly all tissues of the body.

Objective: To determine the frequency of various thyroid disorders and association of thyroid disorders with age.

Methods: A retrospective descriptive study was conducted at Chemical Pathology and Immunology department, of a tertiary care hospital Lahore, Pakistan from October 2020 to April 2021. Reports of thyroid function test (TFT) of patients from 1st October 2020 to 31st December 2020 were included. Thyroid profile includes three parameters i.e. thyroid stimulating hormone (TSH), free T3 and free T4. Frequency of thyroid disorders was determined according to age and sex. Chi-square was used to determine association between age-groups and vice versa.

Results: Among 239 thyroid profiles of patients, 146 (61%) were found to be within normal range, whereas thyroid profile of 93 (38.9%) patients was disturbed, and they had various thyroid disorders. Frequency of thyroid disorders were significantly associated with age (p value=0.03). Among the patients with disturbed thyroid profile TSH was low in 14 (15.1%) patients and high in 57 (61.30%).

Conclusion: More than one-third of the suspected patients were found to have thyroid disorder. Thyroid disorders were significantly associated with age. Thyroid dysfunction was more common among female patients and presentation of hypothyroidism was more common among after 30 years of age.

KEY WORDS: Frequency, Thyroid dysfunction, Hypothyroidism, Hyperthyroidism, Thyroid profile.

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INTRODUCTION

Thyroid disorders are prevalent in females compared to males.¹ The prevalence of spontaneous hypothyroidism is between 1 and 2%, and it is more common in older women, who are 10 times more likely at risk than men. Women are 10 times more likely than males to have hyperthyroidism, which has a prevalence of between 0.5 and 2%.² The precise cause of unequal prevalence is unknown, but the higher frequency in females may be related to estrogen and progesterone.³

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Two powerful hormones are produced by thyroid glands, thyroxine (T4) and triiodothyronine (T3). These hormones improve the basal metabolic process and influence oxygen consumption in nearly all tissues of the body. TSH is produced by the pituitary gland and is a critical screening test for hypothyroidism.^{4,5} Thyroid hormones are also responsible of linear growth, neural development, bone development, dentition, and mental abilities such as memory and intelligence.⁴

Thyroid hormones are also involved in the maintenance of cardiovascular homeostasis and modulation of cardiac contraction, heart rate, and systemic vascular resistance.⁴ Accessibility of medical interventions and ease of diagnosis makes thyroid disorder different from other diseases.^{6,7} Early diagnosis and treatment remain critical component of the management of thyroid disorders⁸

A study on the prevalence of thyroid disease found that undiagnosed thyroid disorders were common in the population. The frequency was 9.4% among patients with subclinical hypothyroidism and 0.7% with primary hypothyroidism.⁹ A study published in Nepal in 2022 to know the pattern of thyroid diseases. Hyperthyroidism and hypothyroidism were 9.5% and 16.0% respectively, with hypothyroidism and subclinical hypothyroidism being more common in females and particularly in reproductive age groups.^{5,10}

In 2022, a study was conducted to investigate the various clinical manifestations of thyroid disorder at the Department of Diabetes, Lady Reading Hospital Peshawar.

The majority of the patients (72.7%) were hyperthyroid, followed by hypothyroidism (12.1%), sub-clinical hypothyroidism (9.1%), and sub-clinical hyperthyroidism (6.1%), with a high frequency of thyroid disorders among middle-aged females.¹¹

Another study examined the trend lines and occurrence of thyroid disorders over period of five years. Based on the findings, 12.0% of the participants had subclinical hyperthyroidism, 7.0 % were affected by subclinical hypothyroidism, 6.7% were found with overt hyperthyroidism, and 5.9% had overt hypothyroidism. When compared to males, females had a significantly higher percentage of thyroid disorders. The most common age group tested for thyroid disorder suspicion was 24-33 years (27.9%), followed by 34-43 years (22.9%).¹²

Previous studies suggested that data is insufficient on thyroid disorders and there is a need for it to be improved. The present study was conducted to observe the frequency of thyroid disorders according to age and sex and to determine the association of various thyroid disorders with age among suspected patients at a tertiary care hospital, in Lahore, Pakistan.

METHODS

The study was approved by the Institutional Review Board (IRB) of Central Park Medical College with reference number CPMC-IRB-No /1301. A retrospective descriptive study design was used to find the frequency of thyroid disorders at the Chemical Pathology and Immunology departments of a tertiary care hospital.

The study was conducted during the month of October 2020 to April 2021. Clinical laboratory information management system for patients' data, sex, age and test results was used. All the reports of TFT of suspected patients from 1st October 2020 to 31st December 2020 were included.

Patients with any thyroid malignancy were excluded from this study. Reports with incomplete and repeated thyroid function tests were also excluded.

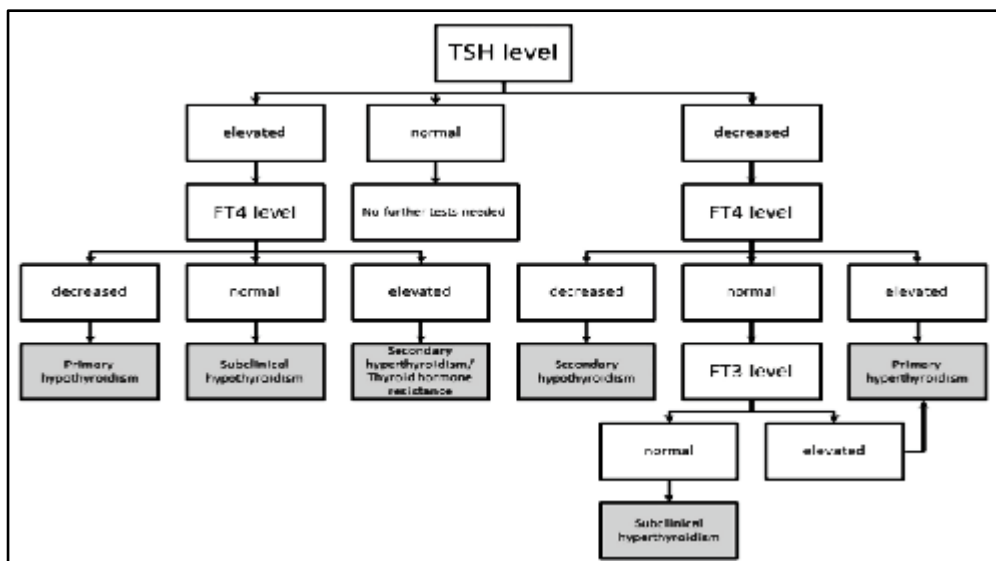


Figure 1: Diagnostic algorithm for differential diagnosis of thyroid disorders (Notas et al., 2018)

An algorithm for the diagnostic interpretation of the thyroid function test was used (Figure: 1). Thyroid profile includes three parameters i.e., free T₃ and free T₄, and thyroid stimulating hormone (TSH). A TSH is a blood test to measure how well the thyroid gland is working.

The normal range of serum free T₄ level is suggested to be 77–155 nmol/l, T₃=1.2–2.8 nmol/L and TSH levels=0.3–4 mU/l.¹³ The level of hormones above or below the normal range indicate hyperthyroidism or hypothyroidism. All results were recorded on a designed proforma along with demographic information. Frequency of thyroid ailment was calculated according to age and gender.

Statistical Analysis

Data was analyzed using IBM SPSS version 26. Descriptive variables were expressed as mean ± S.D or frequency/ percentages. The Chi-square test of association was applied to check the association between different age groups and various thyroid diseases. p-value of <0.05 was considered statistically significant.

RESULTS

Out of 239 patients recommended for thyroid profile, 193 (80.8%) were women and 46 profiles, 146 (61%) reports were found to be

normal and 93 (38.9%) patients had disturbed thyroid profile.

Among 93 patients with disturbed thyroid profile, subclinical hyperthyroidism and hyperthyroidism was 11(11.8%) and 16(17.2%) respectively. About 39(41.9%) had subclinical hypothyroidism and 27(29%) were found to have hypothyroidism (Table:1).

Overall hypothyroidism was more common than hyperthyroidism and subclinical hypothyroidism was observed to be comparatively more prevalent. Most of the participants with hyperthyroidism were found in age group (30–44) years as shown in Table 1. The majority of the patients with hypothyroidism were in the age group (45-60) years (Table 1).

The age of the participants was further categorized in three groups, 15–29 years, 30 – 44 years and 45–60 years. 73 (30.5%) of the study population were in the age-group 15–29 years, 105 (43.9%) were from age group of 30–44 years and 61 (25.5%) in the group of 45 – 60 years. The number of cases was significantly associated with age (Table: 2).

Among the 93 disturbed thyroid profile, 75 (80.9%) patients were female and 18 (19.1%)

were male. TSH was normal in 23.7% of patients, it was low in 15.1% of the patients and high TSH was seen in 61.3% patients. However, free T3 was normal in 72% patients, was low in 17.2% and high in 10.8% patients. Other than that, free T4 was normal in 40 (43.0%) of the patients, was low in 33 (35.5%) of the patients and high in 20 (21.5%) of the patients (Table 3).

Table 1: Frequency of thyroid diseases across various age-groups

Thyroid Disorders	Age-groups (years)			Total (n)
	15-29 (n)	30-44 (n)	45-60 (n)	
Hyperthyroidism	05	08	03	16
Hypothyroidism	04	11	12	27
Subclinical				
Hyperthyroidism	01	05	05	11
Hypothyroidism	12	17	10	39
Total	22	41	30	93

Table 2: Association of thyroid diseased with various age-groups

Age (year)	Thyroid Disorders			p-value
	No (n)	Yes (n)	(n)	
15-29	52	21	73	
30- 44	63	42	105	0.03*
45-60	31	30	61	
Total	146	93	239	

*Chi square test was applied; *p< 0.05 statistically significant*

Table 3: Free T3 and T4 levels of patients with disturbed thyroid profile

Thyroid function tests	Levels	n (%)
Free T3	Low	16 (17.2%)
	Normal	67 (72.0%)
	High	10 (10.8%)
Free T4	Low	33 (35.5%)
	Normal	40 (43.0%)
	High	20 (21.5%)
TSH	Low	14(15.1%)
	High	57(61.3%)

DISCUSSION

Thyroid disorders vary among populations of different geographical regions. This current investigation aimed to explore the frequency of thyroid disorders and the association of thyroid disorders with age and frequency across various age-groups.

We observed 38.9% as the frequency of thyroid disorder. A high thyroid ailment was linked with insufficient dietary intake, iodized salts and autoimmune disorders that leads towards thyroid.¹⁴ A recent study indicated that the frequency of thyroid ailment was 29.3%.¹⁵ Another study observed the frequency of thyroid disorder in Saudi Arabia which was 47.3%, and it was comparatively higher than our findings.¹⁶ Similarly, population-based study was done in India to observe the thyroid dysfunction rate.¹⁷ Ajlouni et al. reported the frequency of thyroid disorders among Jordanian adults to be 1.9%.¹⁸

We found that thyroid disorders were significantly associated with age. Moreover, it has been found to be higher among age-group of 30-45 years and older. Another study observed that the major age-group for thyroid disorders was 24-33 years with a frequency of 27.9% followed by age-group 34-43 years with frequency 22.9%. An upward trend of thyroid dysfunction was seen with increasing age.¹²

The frequency of thyroid disorder was higher in females in our study. A recent study conducted in Sindh, Pakistan included 204 hypothyroid patients, among those 76% were females.¹⁹ Another study reported thyroid disorders were more common among females as compared to males.^{15,20} These findings can be attributed to the high proportion of females in our population. Our results were consistent with various other studies conducted in different countries.²¹⁻²⁵

Our study demonstrated the frequency of subclinical hypothyroidism highest among 41.9% of all suspected patients, followed by hypothyroidism 29%, hyperthyroidism 17.20%

and sub clinical hyperthyroidism 11.80%. Bukhari et al. observed the thyroid dysfunction among patients of diabetes mellitus type II. They reported that 17.4% of the patients had subclinical hypothyroidism, 8.5% had hypothyroidism, 6.0% had hyperthyroidism and 5.0% had sub clinical hyperthyroidism.²⁶ These values-were quite close to our study findings. In another study, hypothyroidism was observed to be higher as compared to hyperthyroidism.²⁷ A study reported the highest frequency of subclinical hypothyroidism as 5.3% followed by hypothyroidism with 3.1% and subclinical hyperthyroidism as 2.5%.¹⁸ Recent study conducted in Saudi Arabia reported 49.76% frequency of thyroid disorders they observed the sub clinical hypothyroidism as the most common type, primary hypothyroidism, and subclinical hyperthyroidism being the second and third most common.²⁰

Quite opposed to our results, a study reported hypothyroidism as the most common thyroid disorder with a frequency of 72.7%, followed by 12.1%, hypothyroidism, 9.1% subclinical hypothyroidism and 6.1% subclinical hyperthyroidism.¹¹ Another study showed that the rate of subclinical hyperthyroidism was more as compared to subclinical hypothyroidism.¹²

CONCLUSION

More than one-third of the suspected patients were found to have thyroid disorder. Thyroid disease was significantly associated with advancing age.

Thyroid dysfunction was more common among older female patients 45 years and above. More than three-fourth of the patients with thyroid disorders were females in our study.

The most common parameter found in thyroid disorder patients was abnormal TSH followed by T4. T3 being the least common in our sample. Hypothyroidism was more common among age-group of 30 years and above. Subclinical hypothyroidism was found with highest frequency among thyroid disorders and

was more common in age group of 30-45 years followed by 45-60 years.

Limitation:

The data was collected from a single center. It could be a multi-centered study.

Recommendations:

The thyroid profile of patients with other comorbid conditions and non-communicable diseases can be observed in future studies.

Conflict of Interest:

All authors declared no conflict of interest.

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The data is available from the corresponding author upon request.

Contributors:

MZ: Proofreading, interpretation, drafting the work

ZH: Drafting the work and revising it critically for important intellectual content.

HT: Data Collection, data entry.

SF: Statistical analysis of data, editing,

TK & NS: Central Idea, contribution in the manuscript write-up, critical review

All authors approved the final version and signed the agreement to be accountable for all aspects of the work.

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