ISSN 2822-2032 (Print) 2822-2040 (Online)

Medical Journal of Eastern Nepal

Volume 03, Number 02, Issue 06, July-December 2024, 13-16

Original Article

PREVALENCE OF THYROID DISORDERS IN THE PATIENT VISITING TERTIARY CARE HOSPITAL IN JHAPA DISTRICT, NEPAL

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ABSTRACT

Background

Thyroid dysfunction is a leading global endocrine disorder, affecting 30-40% of endocrine patients. Thyroid hormones regulate metabolism, growth, and cardiovascular health. Both hyper- and hypothyroidism are linked to serious health issues. Undiagnosed cases are common, with 42 million affected in India. Screening programs, especially for women, are vital for early detection and treatment.

Methods

This is a prospective hospital based study was conducted in the central laboratory at B&CMedical College Teaching Hospital and Research Centre Birtamode, Jhapa from March 2022 to January 2023.Venous Blood samples was collected and fT3,fT4 and TSH was estimated by Chemiluminescence Immunoassay (CLIA) method using Backman Coulter Access 2 analyser. Thyroid statuses were categorized as euthyroid, hypothyroid, subclinical hypothyroid, hyperthyroid, and subclinical hyperthyroid based on test results.

Results

The most common thyroid disorder in female was sub-clinical hypothyroidism (14.7%) and the least common was hypothyroidism (0.8%). The most common thyroid disorders was sub-clinical hypothyroidism (11.8%) and the least common was hypothyroidism (1.2%) in male. Among the thyroid disorders, subclinical hypothyroidism was most prevalent in all the age groups. Hyperthyroidism and its subclinical type (0.6%) were the least prevalent in the age group less than 15 years.

Conclusions

The prevalence of subclinical hypothyroidism was more significant and it increased with the age. Cross-sectional study comparing with different etiological factors like stress levels, geographic, environment, auto immunity, drugs, iodine status etc. may be required.

Keywords: Thyroid hormones, Thyroid dysfunction, Hypothyroidism, Hyperthyroidism

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Citation
Sinha AK, Shah TN, Rai U, Prevalence of Thyroid Disorders in the Patient Visiting Tertiary Care Hospital in Jhapa District, Nepal, MJEN. 2024 December; 3(2):13-16.

INTRODUCTION

Thyroid dysfunction is one of the leading endocrine disorders in the world. It represents around 30% to 40% of the patients seen in an endocrine practice[1]. Thyroid hormone plays a pivotal role in human metabolism. It is important in all processes in the body, including metabolic pathways, growth, development, cognition, energy homeostasis and temperature regulation. Peripheral thyroid hormone levels are closely regulated by the pituitary gland[2]. Osteoporosis and cardiovascular difficulties are linked to thyrotoxicosis and even mild (subclinical) hyperthyroidism, whereas dyslipidemia, atherosclerosis, and an elevated risk of cardiovascular events are linked to hypothyroidism[3–6]. Both excess and insufficiency of thyroid hormone are common, and are easily detected and treated. Serum cholesterol levels, heart rhythm, heart rate, ventricular function, risk of coronary artery disease, and cardiovascular mortality are all apparently impacted by even slightly changed thyroid status[7]. The American Association of Clinical Endocrinologists (AACE) estimated that in the United States approximately 13 million people, or 4.78% of the population, have undiagnosed thyroid dysfunction[8]. Based on projections from multiple thyroid disease research, the projected number of thyroid disease cases in India is 42 million[9]. Another significant health issue in eastern Nepal is thyroid dysfunction, which was shown to be about 30% common in 2002 research. Geographical, ethnic, and environmental factors, such as the degree of iodine intake, influence the pattern and prevalence of thyroid problems[10, 11]. Numerous issues could be avoided by implementing regular screening programs that offer prompt and appropriate treatment. The American Thyroid Association (ATA), Endocrine Society Consensus Statement, and the 2005 AACE offer the greatest endorsement for screening, recommending thyroid screening for all women starting at age 35 and every five years after that[12].

Based on the importance of thyroid hormones in our health and limited similar researches in our region, we have planned to conduct a research to know the status of thyroid disorders in the patient visiting tertiary care hospital in Jhapa district, Nepal.

METHODS

The study was carried out using data retrieved from the computer maintained in the central laboratory services(CLS) of the B&C Medical College Teaching Hospital and Research Centre, Birtamode, Jhapa between March 2022 to January 2023 after the approval from the Institutional Review Committee with the reference number IRC.0022022

The Venous blood samples were taken from the patients who visited the Central laboratory and got their TFTs estimated done during this period. The serum was separated from the blood samples and fT3, fT4 and TSH (TFTs) were measured in Backman coulter Access 2 based on CLIA following its specific protocol. Initially, the data were recorded in MS-Excel, and later, statistical analysis was performed using SPSS software. Statistical significance was determined at the $p < 0.05$ level.

The references ranges of fT3, ft4 and TSH were 2.3-4.0pg/mL,0.60-1.2ng/dL and 0.35-5.5 µIU/mL respectively.The thyroid status were considered as euthyroidism (fT3, fT4, TSH all normal), hypothyroidism (increased TSH and decreased fT3, fT4), subclinical hypothyroidism (increased TSH and normal fT3, fT4), hyperthyroidism (decreased TSH and increased fT3, fT4) and subclinical hyperthyroidism (decreased TSH and normal fT3, fT4).

RESULTS

Table 1: In this study, a total of 6,375 participants were involved, with an average age of 45.70 ± 16.88 years. The majority of participants were female, Specifically, 4,596 participants were female, making up 72.1% of the total group, while 1,779 participants were male, representing 27.9%. This shows a significant gender imbalance, with females being the predominant group in the study. The mean age was consistent across both genders.

Table 1: Participants frequency based on gender.

Sex	Participants number	Percentage	Mean age of the participants(years)
Female	4596	72.1	45.70 ±16.88
Male	1779	27.9	
Total	6375	100	

Table 2: The participants in this study were divided into different age groups, with the highest percentage (31.2%) belonging to the 31-45 age group, accounting for 1,986 participants. The smallest group was participants under 15 years of age, representing only 2.6% (163 participants). Other age groups included 1,101 participants (17.3%) in the 15-30 age range, 1,850 participants (29%) in the 46-60 age range, and 1,275 participants (20%) aged over 60 years. The total number of participants was 6,375.

Table 2: Age group with participants frequency.

Age group in years	Participants number	Percentage
< 15	163	2.6
15 - 30	1101	17.3
31 – 45	1986	31.2
46 – 60	1850	29
➢ 60	1275	20
Total	6375	100

Table 3: In this study, a total of 6,375 participants had their free triiodothyronine (fT3) and free thyroxine (fT4) levels measured, while thyroid-stimulating hormone (TSH) was estimated for 6,372 participants. The mean values of thyroid function tests (TFTs) are presented in the table. The mean and standard deviation level of fT3 level was 2.93 ± 0.96, fT4 level was 1.01 ± 0.39 and the TSH level averaged 3.57 ± 5.63.

Table 3: Participants frequency with their mean TFT values

TFT	Number of participants	Mean ± SD
fT3	6375	2.93 ± 0.96
fT4	6375	1.01 ±0.39
TSH	6372	3.57 ± 5.63

Table 4: The thyroid function test (TFT) results were compared between genders in this study. A total of 4,596 female participants had their fT3 and fT4 levels measured, and 4,595 female participants had their TSH levels estimated. In male participants, 1,779 had their fT3 and fT4 measured, and 1,777 had their TSH levels estimated. The mean and standard deviation of TFT values for both genders are shown in the table. In females, the mean and standard deviation of fT3 was 2.88 ± 0.88, fT4 was 0.99 ± 0.37, and TSH was 3.55 ± 5.01.In males, the mean and standard deviation fT3 was 3.07 ± 1.15, fT4 was 1.04 ± 0.42, and TSH was 3.63 ± 6.99. This shows slight differences in TFT values between the genders

Table 4: Participants frequency with their mean TFT values in different gender.

Sex	TFT	Number of participants	Mean ± SD
Female	fT3	4596	2.88 ± 0.88
	fT4	4596	0.99 ± 0.37
	TSH	4595	3.55 ± 5.01
Male	fT3	1779	3.07 ± 1.15
	fT4	1779	1.04 ± 0.42
	TSH	1777	3.63 ± 6.99

Table 5: The thyroid hormone levels were compared between male and female participants in this study. The mean values for fT3, fT4, and TSH are shown in the table. Males had a mean fT3 level of 3.07 ± 0.02 pg/ml, while females had a slightly lower mean of 2.88 ± 0.01 pg/ml, with a statistically significant difference ($p < 0.001$). For fT4, males had a mean of 1.04 ± 0.01 ng/ml, compared to 0.99 ± 0.01 ng/ml in females, also showing a significant difference ($p < 0.001$). However, the difference in TSH levels between males (4.29 ± 0.27 µIU) and females (3.83 ± 0.12 µIU) was not statistically significant ($p = 0.071$).

Table 5: comparison of TFT among the genders

Thyroid hormones	Male (Mean ± SD)	Female (Mean ± SD)	P-value
fT3 (pg/ml)	3.07 ± 0.02	2.88 ± 0.01	<0.001
fT4 (ng/ml)	1.04 ± 0.01	0.99 ± 0.01	<0.001
TSH (µIU/ml)	4.29 ± 0.27	3.83 ± 0.12	0.071

Table 6: Of the total female participants, 78.6% had euthyroidism. The most common thyroid disorder in female was sub-clinical hypothyroidism (14.7%) and the least common was hypothyroidism (0.8%). Increased and decreased TSH were 15.5% and 3.9% respectively in the female participants. Similarly 80.8% of the total male participants had normal thyroid function. The most common thyroid disorders was sub-clinical hypothyroidism (11.8%) and the least common was hypothyroidism (1.2%) in male similar to female. Increased and decreased TSH were 13% and 3.9% respectively in the male participants.

Table 6: Thyroid function status in different gender.

Sex	Euthyroidism Frequency (%)	Hypothyroidism Frequency (%)	Subclinical hypothyroidism Frequency (%)	Hyperthyroidism Frequency (%)	Subclinical hyperthyroidism Frequency (%)
Female	3613	37	675	48	133
(4596)	(78.6%)	(0.8%)	(14.7%)	(1%)	(2.9%)
Male	1438	21	210	30	39
(1779)	(80.8%)	(1.2%)	(11.8%)	(1.7%)	(2.2%)

Table 7: Among the thyroid disorders, subclinical hypothyroidism was most prevalent in all the age groups. Hyperthyroidism and its subclinical type (0.6%) were the least prevalent in the age group less than 15 years. Hypothyroidism was the least in 15 – 30, 31 – 45 and 46 - 60 years age group respectively. Hyperthyroidism was least prevalent in the age group more than 60 years.

Table 7: Thyroid function status in different age groups.

Age group	Euthyroidism Frequency (%)	Hypothyroidism Frequency (%)	Subclinical hypothyroidism Frequency (%)	Hyperthyroidism Frequency (%)	Subclinical hyperthyroidism Frequency (%)
< 15	126 (77.3%)	2(1.2%)	22(13.5%)	1(0.6%)	1(0.6%)
15 - 30	919(83.5%)	7(0.6%)	116(10.5%)	19(1.7%)	20(1.8%)
31 – 45	1610(81.1%)	16(0.8%)	257(12.9%)	25(1.3%)	46(2.3%)
46 – 60	1406(76%)	15(0.8%)	320(17.3%)	18(1%)	54(2.9%)
➢ 60	990(77.6%)	18(1.4%)	170(13.3%)	15(1.2%)	51(4%)

DISCUSSIONS

The frequency of thyroid function abnormalities is still up for discussion. The prevalence estimates of hyperthyroidism, hypothyroidism and their subclinical states vary between several studies conducted in different nations. While Tunbridge et al.

discovered that 2.8% of men and 7.5% of women of all ages in Whickham, England, had TSH levels higher than normal, this study's participants had raised TSH levels in 15% of the male and 15% of the female participants[13]. Hypothyroidism was also common in Iranian population, as 12.8 % of woman and 4.7% of man had hypothyroidism[14]. The most common thyroid disorder in female in this study is sub-clinical hypothyroidism (14.7%) which also concides with the studies done at coastal Andhra Pradesh, Kashmir valley and Mumbai where there is significant prevalence of subclinical hypothyroidism in females[15-17]. It is evident from our present study that the prevalence distribution of subclinical hypothyroidism is increasing as the age advances from 15 to 60. Similar result with the prevalence of subclinical hypothyroidism from the age 15 to 67 was found in the study done[18]. This study has limitations too. Since the study participants are the individuals who visited the hospital for TFT estimation so the pattern of thyroid disorders cannot be generalized with the general populations. Moreover the factors which affected the TFT like drugs, geographical locations, environment, stress, medical problems, and physiological problems like pregnancy are also not mentioned.

CONCLUSIONS

This is a study conducted on the prevalence of thyroid disorders by measuring the fT3, fT4 and TSH of the individuals. The prevalence of subclinical hypothyroidism was more significant and it increased with the age from 15 to 60 years of age. We hope to extend our study to a large cross section of population in this region comparing with different etiological factors like stress levels, geographic, environment, auto immunity, drugs, iodine status etc.

ACKNOWLEDGEMENT

The authors are grateful to all the staff at the clinical Biochemistry laboratories, B&C Medical College Teaching Hospital and Research Centre, Birtamode, Jhapa for their cooperation.

Conflict of interest: None

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