

ASSESSMENT OF THYROID FUNCTION DISORDERS AMONG THE SUBJECTS ATTENDING CENTRAL LABORATORY OF A TERTIARY CARE HOSPITAL: AN OBSERVATIONAL, CROSS-SECTIONAL STUDY

ALAK KUMAR DAS¹, SREYASHI RAY², JINIA GHOSH^{3*}

¹Department of Pharmacology, Jalpaiguri Government Medical College and Hospital, Jalpaiguri, West Bengal, India. ²Department of Biotechnology, Maulana Abul Kalam Azad University of Technology, Kolkata, West Bengal, India. ³Department of Pharmacology, Calcutta National Medical College and Hospital, Kolkata, West Bengal, India.

*Corresponding author: Jinia Ghosh; Email: dr.jiniaghosh@gmail.com

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ABSTRACT

Objective: Thyroid disorders are the most common endocrine disorders worldwide and India is not an exception. Several factors may determine the prevalence of thyroid dysfunction including age, gender, geographical and ethnic background, and most importantly iodine intake. Therefore, data related to thyroid disorders from one population cannot be extrapolated to another. In this study, we aimed to assess the disorders of thyroid function among the subjects attending the central laboratory of a tertiary care hospital.

Methods: This observational, cross-sectional study was conducted in the Department of Pharmacology and the Department of Biochemistry of the same institute over a period of 3 months. All subjects of either sex attending the central laboratory of the institute for estimating thyroid function on their outpatient visit during the study period were included. Subjects who were on any medications known to alter the thyroid hormone status or diagnosed with a thyroid disorder and/or on therapy were excluded. A pre-designed and pre-tested data collection form was used for taking interviews to collect relevant data including sociodemographic characteristics, comorbid conditions, thyroid illness, and investigational reports.

Results: A total of 132 subjects were included in the study. The majority of them were female (72.27%) and residents of urban areas (52.27%). The most common comorbid conditions and presenting symptoms were hypertension (25.76%) and fatigue (46.97%), respectively. The majority of the subjects were found to be euthyroid (81.81%). About 18.19% of the study subjects were having thyroid disorders, most commonly subclinical hypothyroidism (SCH) (13.64%), followed by primary hypothyroidism (2.27%), secondary hyperthyroidism (1.52%), and subclinical hyperthyroidism (0.76%). Thyroid disorders were mainly found in females, such as primary hypothyroidism (66.67%), SCH (66.67%), and subclinical hyperthyroidism (100%). The majority of the thyroid disorders were found in the age group of 26–50 years (20.27%), where females were found to have more primary hypothyroidism (3.17%), and SCH (12.70%).

Conclusion: The findings of our study call for a review of current practices regarding thyroid disorders to include active screening of thyroid function among the subjects at greater risks and an emphasis on regular monitoring of the thyroid status.

Keywords: Thyroid disorders, Cross-sectional, Tertiary care hospital, Central laboratory.

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INTRODUCTION

Thyroid dysfunction is a group of illnesses that can show up as hypo or hyperfunctioning thyroid glands, as indicated by levels of thyroid stimulating hormone (TSH), thyroxin (T4), and triiodothyronine (T3) in the blood. Thyroid hormone abnormalities may be the primary cause of pituitary illnesses, secondary to thyroid gland diseases, or tertiary to hypothalamic diseases [1].

The most prevalent endocrine illnesses in the world are thyroid problems. The iodine shortage affects over 1 billion individuals globally; however, it is unclear how frequently this results in hypothyroidism [2]. Geographical location affects the prevalence of thyroid disorders. For instance, the general population's prevalence of overt hypothyroidism varies between 0.2% and 5.3% in Europe [3,4] and between 0.3% and 3.7% in the USA [5]. This number may potentially be greater, ranging from 4% to 15% in the industrialized world, when overt hypothyroidism and subclinical hypothyroidism (SCH) are taken into account [6,7].

In this sense, India is no exception. Out of all the endocrine diseases, thyroid disorders are the most prevalent in India [8]. With a population of around 1.25 billion, an estimated 42 million people

suffer from thyroid disorders [8,9]. In India, the prevalence of SCH and overt hypothyroidism is between 4% and 5% [6,9]. There are not many researches that evaluate the prevalence of thyroid problems in India. But there is a lot of variety among those, ranging from 15% to 25% [10-14].

The frequency of thyroid dysfunction may vary depending on several factors. These include age, gender, geography, ethnic background, and iodine intake – the last being the most crucial. As a result, information about thyroid conditions from one community cannot be generalized to another. Thyroid diseases persist in many parts of India despite the National Iodine Deficiency Diseases Control Program being successfully implemented and widely covered [15]. All of these suggest that thyroid diseases are not receiving enough attention [16].

In this study, we aimed to assess the thyroid function disorders among the subjects attending the central laboratory of a tertiary care hospital.

METHODS

This observational, cross-sectional study was conducted in the Department of Pharmacology and the Department of Biochemistry of the same institute over 3 months, from March to May 2024.

All subjects of either sex attending the Central Laboratory, Medical College, Kolkata for estimating thyroid function on their outpatient visit during the study period, and willing to give written informed consent to participate in the study were included. On the other hand, subjects on any medications known to alter the thyroid hormone status were excluded. Patients already diagnosed with a thyroid disorder and/or on therapy were also excluded.

To collect pertinent data, interviews were conducted using a pre-tested and pre-designed data collection form. The research participants were enlisted in 3 days a week. Information was gathered about co-occurring diseases, thyroid disorders, sociodemographic traits, and investigative reports.

Subjects were classified using the following definitions

Parameters	Definition
Primary hypothyroidism	TSH >4.78 mIU/mL and fT4 <0.8 ng/dL or fT3 <60 ng/dL
Subclinical hypothyroidism	TSH >4.78 mIU/mL and normal fT4, normal fT3
Secondary hypothyroidism	fT4 <0.8 ng/dL or fT3 <60 ng/dL and a TSH level that is not appropriately elevated
Hyperthyroidism	TSH <0.4 mIU/mL and fT3 >180 ng/dL or fT4 >1.76 ng/dL
Subclinical hyperthyroidism	TSH <0.4 mIU/mL and normal fT3, normal fT4
Secondary hyperthyroidism	fT3 >180 ng/dL or fT4 >1.76 ng/dL and a TSH level that is not appropriately suppressed

TSH: Thyroid stimulating hormone, fT4: free T4, fT3: free T3

The subjects were questioned face-to-face by the investigator using a pre-tested, pre-designed, three-part data-collecting form after giving their consent to participate in the study. The demographic information in Part 1 included data on age, sex, place of residence, employment, level of education, marital status, and addiction. Part 2 of the data collection form was used to gather information about thyroid disease and other comorbidities. Part 3 was utilized to collect data from the investigative reports following 5 days of blood collection from the Central Laboratory, Department of Biochemistry. The collected data were transcribed into an Excel database and made ready for analysis.

RESULTS

A total of 201 study participants were recruited, 69 of them were on medications for thyroid disorders. Hence, after excluding them a total of 132 subjects were included in the study.

The mean age of the study subjects was 39.71±15.09 years. The majority of the subjects were female (72.27%), belonging to the age group of 26–50 years (50.06%), residents of the urban area (52.27%), completed primary level of education (41.67%), married (86.36%), and housewife (56.82%). The majority of them were non-smokers (94.7%), non-alcoholic (98.48%), and did not chew tobacco (83.33%). About 6.06% of the subjects had a positive family history of thyroid disorders. The demographic profile of the study subjects is presented in Table 1.

The distribution of study subjects according to age and sex is presented in Fig. 1.

Hypertension (25.76%) was the most common comorbid condition of the study subjects followed by diabetes mellitus (12.12%) and dyslipidemia (12.12%). Comorbid conditions of the study subjects are presented in Fig. 2.

The majority of the subjects were presented with fatigue (46.97%), followed by generalized body pain/joint/muscle pain (26.52%), and weight gain (15.91%). Other symptoms were irregularity of

Table 1: Demographic profile of the study subjects

Parameter	Distribution (N=132)	Percentage
Sex		
Male	30	27.73
Female	102	72.27
Age		
1–25 years	24	18.18
26–50 years	74	50.06
>50 years	34	31.76
Residence		
Rural	63	47.73
Urban	69	52.27
Education		
Illiterate	26	19.70
Primary	55	41.67
Secondary	30	22.73
HS	10	7.58
College	11	8.32
Profession		
Student	7	5.3
Housewife	75	56.82
Unemployed	16	12.12
Employed	6	4.55
Self-employed	28	21.21
Marital status		
Never married	13	9.8
Married	114	86.36
Widowed	5	3.79
History of alcohol intake		
Yes	2	1.52
No	130	98.48
History of smoking		
Yes	7	5.3
No	125	94.7
History of tobacco chewing		
Yes	22	16.67
No	110	83.33
Family history of thyroid disorder		
Positive	8	6.06
Negative	124	93.94

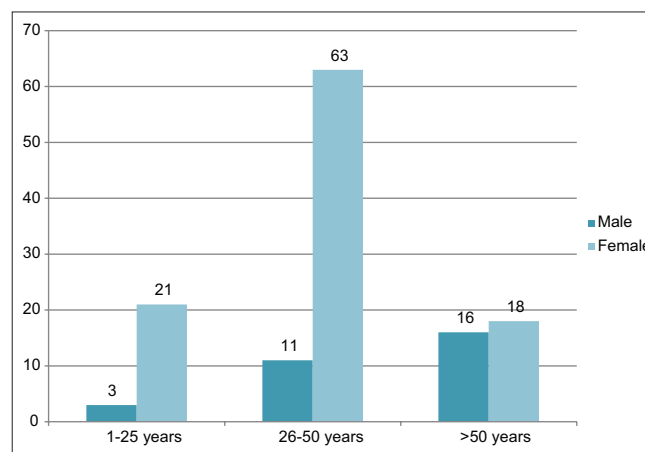


Fig. 1: Distribution of study subjects according to age and sex (n=132)

menstruation (15.15%), infertility (11.36%), and swelling of the anterior aspect of the neck (5.3%). Presenting complaints of the participants are presented in Fig. 3.

A total of 108 (81.81%) subjects were found to be euthyroid. About 18.19% of the study subjects had thyroid disorders, most commonly SCH (13.64%), followed by primary hypothyroidism (2.27%), secondary hyperthyroidism (1.52%), and subclinical hyperthyroidism

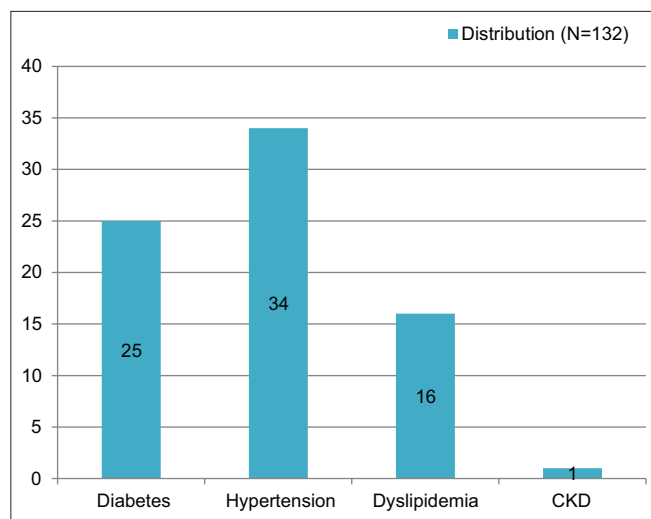


Fig. 2: Comorbid conditions of the study subjects

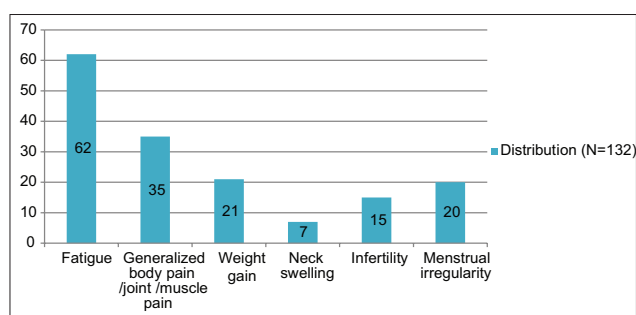


Fig. 3: Presenting symptoms of the study subjects

(0.76%). Thyroid disorders in the study subjects are presented in Table 2.

Most of the disorders of thyroid function were commonly found among the females. These included primary hypothyroidism (66.67%), SCH (66.67%), and subclinical hyperthyroidism (100%). Secondary hyperthyroidism was equally found among both the sexes. Thyroid disorders based on gender are presented in Table 3.

The majority of the thyroid disorders were found in the age group of 26–50 years (20.27%), followed by the age group of >50 years (17.65%). In the age group of 26–50 years, females were found to have more primary hypothyroidism (3.17%), and SCH (12.70%). Secondary hyperthyroidism was found to be more common among males (9.09%) than females (1.59%) in this age group. Males were predominant in having thyroid disorders over 50 years (25%) compared to females (11.11%). In this age group, males were found to have more primary hypothyroidism (6.25%), and SCH (18.75%). In the age group of 1–25 years, no male was found to have thyroid disorders. In this age group, 9.52% of the females had SCH. The only subject of subclinical hyperthyroidism was a female belonging to this age group. Thyroid disorders based on gender and different age groups are presented in Table 4.

DISCUSSION

The current study was carried out at the central laboratory of a tertiary care institution to determine the prevalence of thyroid function problems among the participants undergoing an estimate of thyroid function tests. In this study, 18.19% of the participants had abnormal thyroid function. This high frequency of thyroid problems is consistent with previous data from Gopaliah *et al.* (15.73%) [17] and Unnikrishnan (19.6%) from Cochin [10].

Table 2: Thyroid disorders in the study subjects

Thyroid disorders	Distribution (N=132)	Percentage
Primary hypothyroidism	3	2.27
Subclinical hypothyroidism	18	13.64
Subclinical hyperthyroidism	1	0.76
Secondary hyperthyroidism	2	1.52
Total subjects with thyroid disorders	24	18.18

Table 3: Thyroid disorders based on gender

Thyroid disorders	All subjects (N=132) n (%)	Gender	
		Male (N=30) n (%)	Female (N=102) n (%)
Primary hypothyroidism	3 (2.27)	1 (3.33)	2 (1.96)
Subclinical hypothyroidism	18 (13.64)	6 (20)	12 (11.76)
Secondary hyperthyroidism	2 (1.52)	1 (3.33)	1 (0.98)
Subclinical hyperthyroidism	1 (0.76)	0	1 (0.98)
Total subjects with thyroid disorders	24 (18.18)	8 (26.67)	16 (15.69)

According to the current study, males had a higher prevalence of thyroid dysfunction (26.67%) than females (15.69%). This, however, contradicts recent Indian studies that found a higher prevalence of thyroid problems in females [11-14].

Approximately 13.64% of the study subjects had the most prevalent thyroid function anomaly, which we identified to be the SCH. This was comparable to other cross-sectional investigations that were carried out in Delhi (19.3%) and Cochin (9.4%) [11,14]. However, in our study, men (20%) were more likely than women (11.76%) to have SCH. Gopaliah *et al.* found that SCH was more common in females (11.76%) than in males (5.71%) in their study [17].

According to multiple studies, the age range of 20–45 years had the highest prevalence of SCH, followed by ≥46 years, whereas the age group of 1–19 years had the lowest frequency. According to this research, the prevalence of SCH rises with age [11,12]. According to our research, SCH was most prevalent in the 26–50-year-old age group (14.86%), followed by the >50-year-old age group (14.70%). In the age range of 1–25 years, SCH was found to be the least common (8.3%).

In our investigation, hypothyroidism – which affected 2.27% of the participants – was found to be the second most prevalent thyroid condition. This was comparable to a small number of population-based investigations carried out in Cochin (3.9%) and Delhi (4.2%) [11,14]. The frequency of hypothyroidism was determined to be 4.2% by Gopaliah *et al.* [17]. However, the prevalence rate of hypothyroidism varies from 8.88% to 21.67% depending on the research location [12]. Thyroid dysfunction is not limited to the traditional iodine-deficient sub-Himalayan region; rather, it is also seen in plain lands and areas where the majority of people consume iodized salt, as evidenced by the high prevalence rate in Cochin and Delhi.

In our study, hyperthyroidism affected 1.52% of survey participants; males were more likely to have it (3.33%) than females (0.98%). Nevertheless, 2.77% of participants in the Gopaliah *et al.* study were found hyperthyroid; this condition is more common in girls than in males [17]. Prior research from Pondicherry's Abraham *et al.* [13] and Cochin's Unnikrishnan and Menon [10] revealed that the prevalence of overt hyperthyroidism was 1.2% and 1.3%, respectively.

According to the current study, the prevalence of subclinical hyperthyroidism in people aged 1–25 was 0.76%. This is smaller than

Table 4: Thyroid disorders based on gender and different age groups

Parameter	All subjects	1-25 years		26-50 years		>50 years	
		Male (n=3)	Female (n=21)	Male (n=11)	Female (n=63)	Male (n=16)	Female (n=18)
Primary hypothyroidism	3	0	0	0	2	1	0
Subclinical hypothyroidism	18	0	2	3	8	3	2
Secondary hyperthyroidism	2	0	0	1	1	0	0
Subclinical hyperthyroidism	1	0	1	0	0	0	0

what was found in research by Gopaliah *et al.*, where the prevalence was reported to be 1.60% [17]. Analogous to our research, prior investigations have documented a prevalence rate of subclinical hyperthyroidism ranging from 0.6% to 1.6% [11,13].

CONCLUSION

The findings of our study call for a review of current practices regarding thyroid disorders to include active screening of thyroid function among the subjects at greater risks and an emphasis on regular monitoring of the thyroid status.

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AUTHORS' CONTRIBUTIONS

The study protocol was prepared by Alak Kumar Das. Sreyashi Ray was associated with the collection of data. The manuscript was prepared by Jinia Ghosh and Alak Kumar Das.

CONFLICT OF INTEREST

There is no conflict of interest.

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