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Spectrum of Thyroid Disorders In Bankura District, West Bengal, India: A Cross-Sectional Observational Study

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Abstract: *Thyroid disorders are the most common endocrine diseases in India. Numerous studies in various countries differ in their prevalence rate for both hypothyroidism and hyperthyroidism. This present cross-sectional observational study was conducted in Bankura Sammilani Medical College, Bankura, West Bengal to find out the prevalence of thyroid disorders among the people of this district. This present study was done over 700 patients, attending hospital suspected of having thyroid disorders, were screened for thyroid function. Serum samples were taken and serum Thyrotrophin (TSH) and free tetraiodothyronine (fT4) were estimated by ELISA method. Of this 700 study subjects, 17.14% were found to have thyroid dysfunction; among them, 7.43% had subclinical hypothyroidism, 5.57% had overt hyperthyroidism and 4.14% were suffering from hyperthyroidism. Females were affected more in both hypothyroidism and hyperthyroidism than males. The age group of 21-30 years was affected more than the others in all types of thyroid disorders.*

Keywords: *Serum TSH, fT4, Subclinical hypothyroidism, Overt hypothyroidism, Hyperthyroidism.*

I. Introduction

Thyroid gland, a butterfly-shaped gland in front of the neck, is very important endocrine gland in the body. The thyroid gland produces three thyroid hormones: thyroxin (T4), triiodothyronine (T3), and calcitonin. Acting through thyroid hormone receptors α and β, these hormones perform a critical role in cell differentiation during development and help maintain thermogenic and metabolic homeostasis in the adult[1]. Iodine is an essential component of the T4 and T3 hormones[2] and must come from the diet. Thyroid diseases are very common endocrine disorder world-wide and also in India. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases[3]. The most common thyroid problems involve abnormal production of thyroid hormones. Too much releasing of thyroid hormones result in a condition known as hyperthyroidism and insufficient production leads to hypothyroidism. Thyroid hormones influence virtually every organ system in the body.

Hypothyroidism is defined as a deficiency in thyroid hormone secretion and action that produces a variety of clinical signs and symptoms of hypometabolism. This common disorder occurs in 2 to 15% of the population, more commonly in women than in men. Subclinical hypothyroidism is defined by a persistent elevation in TSH (6 to 12 weeks or longer) in the setting of fT4 concentrations that are repeatedly found within the reference interval and it is very common and can be seen in 3% to 8 % of general population. Hyperthyroidism, also known as thyrotoxicosis, is the clinical syndrome that results from elevated concentrations of free thyroid hormone in the plasma, associated with clinical evidence of hypermetabolism[4].

In a clinic-based study in Mumbai, suggested that congenital hypothyroidism is common in India, occurring in 1 out of 2640 neonates, when compared with the worldwide average value of 1 in 3800 subjects and it also reported that out of 800 children with thyroid disease 79% had hypothyroidism. Common causes of hypothyroidism in these children were thyroid dysgenesis, dyshormonogenesis, and thyroiditis[5]. According to the studies conducted in western countries around 50% of people in the community have microscopic nodules, 5% of women have overt hypothyroidism or hyperthyroidism, 15% have palpable goiters, 3.5% have occult papillary carcinoma and 10% demonstrate an abnormal thyroid-stimulating hormone level[6,7,8]. Among all these, thyroid cancer is the most common endocrine malignancy with more mortality when compared to all other endocrine cancers[9].

II. Materials And Methods

2.1. Study area: This cross-sectional descriptive study was conducted by the department of Biochemistry, B.S. Medical College, Bankura.

2.2. Sample :
Total 700 samples

2.3. Study duration:
January 2014 - December 2014.

2.4. Study subject:

We have included 700 subjects attending hospital suspected of having thyroid disorders. They were physically examined and information pertaining to demographics, nature of illness was collected from them using a predesigned and pretested questionnaire. Informed consent was also taken from them. This study design was approved by institutional ethical committee.

2.5. Laboratory investigations:

The serum samples were collected from the 700 subjects and stored at -20ºC before analyzing after doing centrifugation. Serum TSH and fT4 levels were estimated by ELISA.

2.6. Statistical analysis:

The data were compiled in MS excel and analyzed by different statistical methods. Data display was done by charts and tables. Data were described by percentages, ratios etc.

III. Results

This study was conducted in B.S.Medical College on total 700 study subjects.
Figure-1 revealed that 53.71% was adult female, 37.86% was adult male and rest was children out of 700 participants (Figure-1)**.**

The normal range of serum TSH and fT4 are 0.4-4.2 mIU/L and 0.8-2.7 ng/dL respectively[4].

The TSH range defining subclinical hypothyroidism still remains controversial. An upper limit of 10 mIU/L has been quoted in the literatures[10,11]. Perhaps this is because of patients found to have an elevated TSH level, the majority (approximately 75%) have values lower than 10 mIU/L.[12].

By definition, when TSH value is in between 4.5 mIU/L and 10 mIU/L and fT4 within normal limit ,then the condition can be called subclinical hypothyroidism. When TSH is > 10 mIU/L and fT4 is low, condition can be called overt hypothyroidism. And when TSH is < 0.1 mIU/L or undetectable and fT4 is elevated, condition is called hyperthyroidism[13].

Table-1 revealed that the serum levels of TSH and fT4 in males and females in subclinical hypothyroid, overt hypothyroid, hyperthyroid and euthyroid groups (Table -1).

In our study 52 (7.43%) were affected in subclinical hypothyroidism, 39 (5.57%) were affected in clinical hypothyroidism and 29 (4.43%) were suffering from hyperthyroidism (Figure-2).

Table no-2 showed that the distribution of thyroid disorder according to age group and it was observed that maximum number of cases was belonged to 21-30 years age group irrespective of sex. This table also showed that the male : female was 1:2.25 in case of subclinical hypothyroidism, 1: 2.55 in case of overt hypothyroidism and 1: 2.22 in case of hyperthyroidism. So, number of female cases was more than males in all three groups (Table -2).

IV. Discussion

The burden of thyroid disease in the general population is enormous. Thyroid disorders are the most common among all the endocrine diseases in India. Despite the coverage of National iodine deficiency diseases control Programmed (NIDDCP) in India, iodine deficiency is still prevalent in many parts of India. There are still many districts in India where the incidence of thyroid disorders is much more. One of such district is Bankura.

In Bankura district of West Bengal, out of 22 blocks 17 are fluoride endemic areas, with high incidence of dental and skeletal and non-skeletal fluorosis symptomatic cases[14]. Fluoride is known to influence at all levels of action including hormone secretion, activity and binding to target issue[15,16]. A Study conducted by Shashi A et al on thyroid function hormones in patients of fluorosis reported that low T3, low T4, and increased TSH in all the fluorosis cases[15].

In this study male : female was 1:2.25 in case of subclinical hypothyroidism, 1: 2.55 in case of overt hypothyroidism. Gopalkrishnan Unnikrishnan A. et al[17], in their study on prevalence of hypothyroidism in urban adults, showed that male : female ratio is 1: 2 among the hypothyroid cases. A study done by Yadav et al[18]

reported male : female ratio of 1:3 in the prevalence of hypothyroidism in Nepalese population. So, the findings of this study were similar to other studies.

In this study, 13% (7.43% subclinical and 5.57% overt)of the total study population were suffering from hypothyroidism. In a study conducted at Pondicherry by Abraham *et al.*[19] showed that 15.8% of study subjects had thyroid dysfunctions and 11.5% had hypothyroidism (2% overt and 9.5% subclinical). Also in the study carried out by Skaria *et al.*[20] revealed that 7.3% had clinical hypothyroidism, and 12.6% had subclinical hypothyroidism and hyperthyroidism was seen in 2.3% (overt 1.1% and Subclinical 1.2%) of the total subjects. Hoogendoorn *et al.*[21] in their (NHANES III) study have reported an incidence of 1.3% (overt 0.5% and subclinical 0.7%) hypothyroidism. This also indicates higher prevalence of clinical and subclinical hyperthyroidism in the present study.

V. Conclusion

Thyroid disorders are major endocrine problem in India. So more studies are required to estimate the actual magnitude of the problem and to deliver proper remedy.

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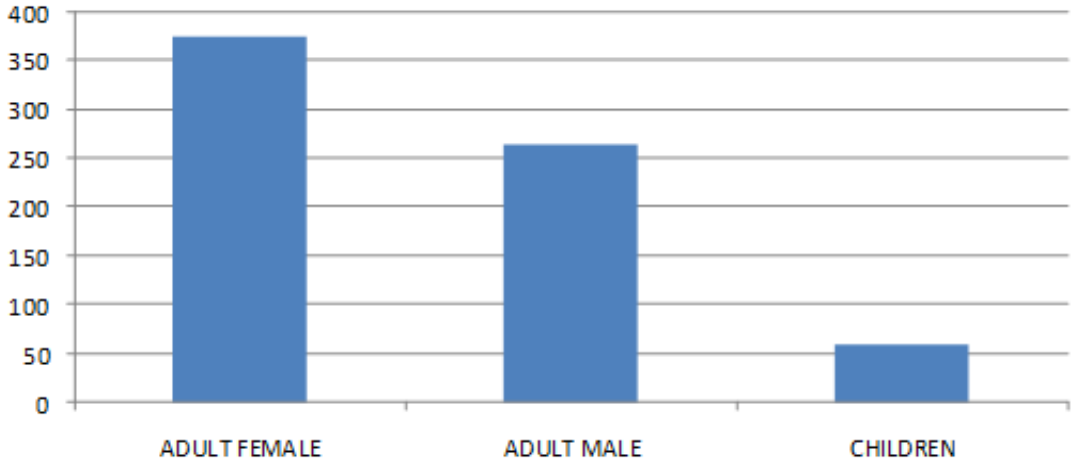

Figure-1: Distribution of study subjects according to sex

Category		TSH in mIU/L Mean ± SD	fT4 in ng/dL Mean ± SD
Euthyroid cases	Male	1.83± 0.94	0.95± 0.23
	Female	2.04± 0.32	1.13± 0.67
Subclinical hypothyroid cases	Male	6.09± 0.98	1.29± 0.14
	Female	7.76± 1.11	0.98± 0.13
Overt hypothyroid cases	Male	13.03± 1.12	0.59± 0.17
	Female	11.56± 0.93	0.55± 0.23
Hyperthyroid cases	Male	0.93± 0.21	2.97± 0.56
	Female	1.11± 0.32	3.75± 0.87

Table-1: Serum TSH and fT4 levels in different groups

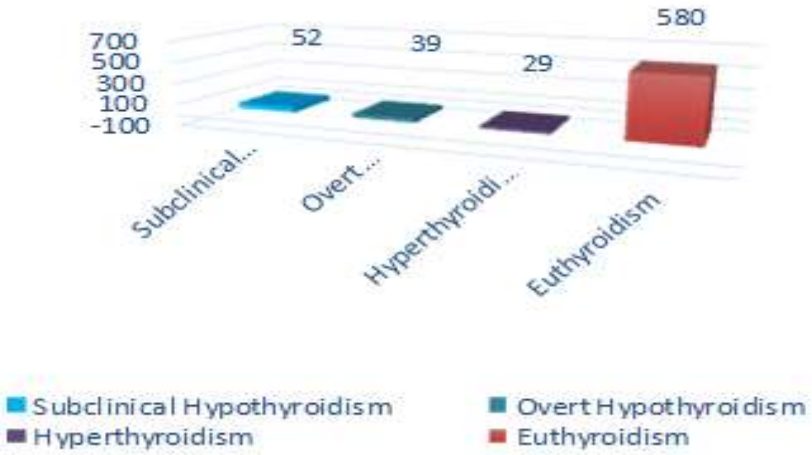

Figure-2: Distribution of the thyroid disorders

Groups	SEX	0-10 YEARS	11-20 YEARS	21-30 YEARS	31-40 YEARS	41-50 YEARS	51-60 YEARS	Total
Subclinical Hypothyroidism	**MALE**	**02**	**03**	**08**	**01**	**01**	**01**	**16**
	FEMALE	**03**	**05**	**14**	**02**	**07**	**05**	**36**
Overt Hypothyroidism	**MALE**	**01**	**02**	**05**	**01**	**01**	**01**	**11**
	FEMALE	**02**	**03**	**14**	**05**	**03**	**01**	**28**
Hyperthyroidism	**MALE**	**00**	**01**	**04**	**01**	**01**	**02**	**09**
	FEMALE	**01**	**01**	**11**	**05**	**01**	**01**	**20**

Table no-2: Distribution of thyroid disorder according to age group