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Spectrum of Thyroid Dysfunction in Bastar, Chhattisgarh: A Hospital Based Study

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Abstract

Background: *Thyroid disorder is most common endocrine abnormality in the general population and its prevalence increases with age. Thyroid disorder may occur at any stage of life. They are more commonly encountered in the mid age and adulthood. The screening of thyroid disorder is advised in high risk population.* ***Materials and Methods:*** *This hospital based cross-sectional study was conducted in Department of Biochemistry, Late Shree BRKM, Government Medical College, Jagdalpur. Thyroid parameters such as T3, T4 and TSH were measured by ELISA technique.* ***Results:*** *Among total 878 subjects 740 (84.28%) were female whereas 138 (15.71%) were male. The prevalence of thyroid dysfunction was 31.32% (n=275). The different patterns of thyroid dysfunction in Bastar Chattisgarh were: hypothyroid (15.94%), subclinical hypothyroid (6.71%), hyperthyroid (5.01%), and subclinical hyperthyroid (3.64%) respectively. Subjects having all thyroid parameters normal i.e. euthyroid were 68.67%.* ***Conclusion:*** *This study reveals a higher prevalence of thyroid dysfunction in Bastar region. This study recommends community based epidemiological studies on a regular basis to monitor thyroid dysfunction in the populations.*

Keywords: *Hyperthyroidism, Hypothyroidism, Subclinical hyperthyroidism, Subclinical hypothyroidism, Thyroid stimulating hormone*

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Introduction

Thyroid disorder is defined as the abnormal thyroid stimulating hormone (TSH) with normal or abnormal thyroid hormone. Thyroid disease is being increasingly diagnosed with greater awareness and is one of the chronic non-communicable disease affecting women more, though male population is not spared of the ailment. Impaired thyroid gland [1] function is accompanied by signs and symptoms that mimic those of other common diseases, such as fatigue, dyspnea, weight gain, palpitations associated with anemia, cold intolerance, and tiredness. However, laboratory detection of subclinical or early thyroid disease usually occurs before these manifestations of disease develop. [2]

It has been estimated that about 42 million people in India have thyroid dysfunction and hypothyroidism is the most common thyroid disorder [1]. Thyroid hormones have an indispensable role in metabolic processes in human body, and numerous physiological and pathological stimuli are known to influence thyroid metabolism [3]. Thyroid hormone functions show variations with age, sex, dietary habits, stress, and geographical location [1]. In a 1997 study of 800 children in India referred for thyroid problems, investigators determined the percentages of the children whose laboratory tests determined their thyroid status: 79% were hypothyroid, 19% were euthyroid, and 2% were hyperthyroid [4]. In 2005 and 2006, The Third National Family Health Survey was conducted in India. The study was coordinated by the

International Institute for Population Sciences and was under the aegis of the Government of India. Data collected in the Survey indicated that the proportion of women in the Chhattisgarh region who were undernourished was 43%. This compared with 46% in Bihar, 42% in Madhya Pradesh, and 41% in Orissa [5]. Data from the survey also indicated that in older patients and in pregnant women, symptoms were so common, in fact, that it [6] became meaningless to try to distinguish which people had thyroid diseases on the basis of symptoms or a virtual lack of symptoms. In other words, symptoms were not a useful criterion for predicting who had and did not have thyroid disease. Due to lack of information on the thyroid status of women of Bastar, we conducted the present study to evaluate the thyroid dysfunction among these populations.

Materials & Methods

This hospital based study was conducted in Department of Biochemistry at Late Shree BRKM Govt. Medical College Jagdalpur, Chhattisgarh, India. The subjects (n=878) attending Medicine outpatient department from March 2011 to January 2014 were referred to Department of Biochemistry for thyroid function tests and were enrolled for the study after taking appropriate consent. Duplication of persons involved in follow up was excluded. The subjects in the study group had no history of medication for any thyroid disorder, thyroidectomy or any exposure to radioiodine. None of the subjects were diagnosed for any renal, hepatic or pancreatic disorder, diabetes mellitus or familial hyper-cholesterolemia.

Venous blood sample (2-3 ml) was collected from ante-cubital vein of the subjects. Blood sample was collected in plain vial, and were allowed to clot then subsequently centrifuged at 3000 rpm for 10 minutes. Serum was separated and stored at -20°C until thyroid hormones were estimated. Thyroid hormones (T3 and T4) and TSH were assayed by direct immunoenzymatic colorimetric method using ELISA technique [7,8,9]. The internal quality control was included in each batch of tests performed.

Ethical clearance was taken as per the guidelines of the institute. The normal laboratory reference values considered were; for TSH (0.28-6.28 µIU/mL), T4 (4.8-11.6 4 µg/dL in females), T (4.4-10.8 µg/dL in males), and T3 (0.52-1.85 ng/mL). Data was analyzed using Graph Pad Prism software [Trial version].

Results

A total of 878 subjects were enrolled in this study with 740 (84.28%) female and 138 (15.71%) males (Table- 1). Thyroid disorder was found in 275 (31.32%) subjects, 86 (31.27%) were male and were 189 (68.72%) female (Figure- 1). The mean TSH concentration in male was higher than in female but not statistically significant (p=0.4199). T3 concentration were slightly higher in male but not significantly different than female cases (p=0.2268). T4 concentration were slightly lower in male but not significantly different than female cases (p=0.492) table- 2.

Figure- 1: Spectrum of Thyroid disorders

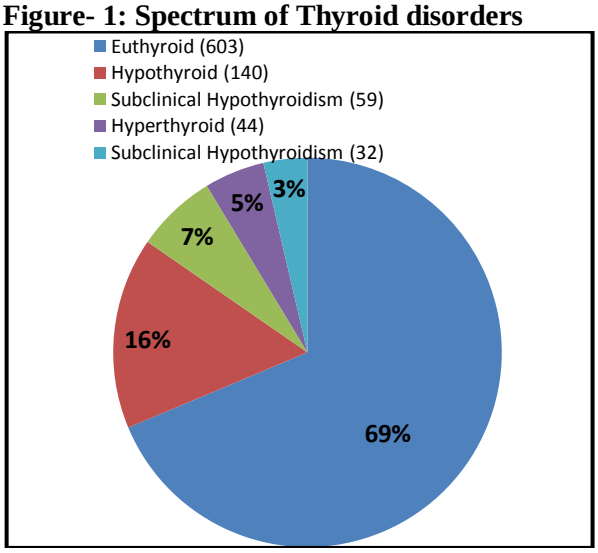

Table- 1: Age-sex wise distribution of cases

Age Group (Years)	Total n =878	Males n =138	Females n =740
<20	113	13	100
21-30	304	37	267
31-40	238	35	203
41-50	121	25	96
51-60	70	18	52
61-70	32	09	23

Table- 2: Thyroid hormones levels

Thyroid Hormones	Male	Female	P value
T3	1.03±1.41	0.93±0.73	0.23
T4	7.59±2.89	9.44±31.7	0.49
TSH	6.45±11.03	5.73±9.42	0.42

Among the females thyroid dysfunction pattern seen was; hypothyroidism 124 (14.12%), sub-clinical hypothyroid 48 (5.46%), hyperthyroid 32 (3.64%), sub-clinical hyperthyroidism 22 (2.5%). Among the males it was; hypothyroidism 16 (1.82%), sub-clinical hypothyroid 11 (1.25%), hyperthyroid 12 (1.36%), sub-clinical hyperthyroidism 10 (1.13%). Total of 603 (68.67%) were euthyroid, out of which 516 (58.76%) were females and 89 (10.13%) were males. There was no significant difference in the thyroid dysfunction status of male and female (p=0.482) table- 3.

Table- 3: The status of thyroid disorders

Cases	Sex	Frequency	Percentage	P-value
Euthyroidism	Total	603	68.67%	
	Male	89	10.13%	
	Female	516	58.76%	
Clinical Hyperthyroidism	Total	44	5.01%	
	Male	12	1.36%	
	Female	32	3.64%	
Subclinical Hyperthyroidism	Total	32	3.64%	
	Male	10	1.13%	0.482
	Female	22	2.50%	
Clinical Hypothyroidism	Total	140	15.94%	
	Male	16	1.82%	
	Female	124	14.12%	
Subclinical Hyporthyroidism	Total	59	6.71%	
	Male	11	1.25%	
	Female	48	5.46%	

Table- 4: Age wise distribution according to thyroid dysfunction status

Age (Year)	Euthyroid	Hypothyroid	Subclinical Hypothyroidism	Hyperthyroidism	Subclinical Hyperthyroidism
<20	98(11%)	2(0.2%)	10(1.1%)	1(0.1%)	2(0.2%)
21-30	213(24%)	54(6.1%)	11(1.25%)	15(1.7%)	11(1.25%)
31-40	173(19.7%)	39(4.4%)	8(0.9%)	12(1.3%)	6(0.68%)
41-50	69(7.8%)	23(2.6%)	14(1.6%)	9(1.0%)	6(0.68%)
51-60	32(3.6%)	20(2.3%)	9(1.0%)	5(0.56%)	4(0.45%)
61-70	18(2.05%)	2(0.2%)	7(0.79%)	2(0.2%)	3(0.34%)

(p value=0.7301)

Among different age groups highest number of thyroid dysfunction were between 21-30 years (n=91). Highest number of total hypothyroidism was observed in this age group (n=54). In the age group <20 years, total no of thyroid disorder (n=15) was seen. There was no significant difference (p=0.7301) among the age groups having different thyroid dysfunction status (Table- 4).

Discussion

Data on the prevalence of thyroid disorders in India is relatively scanty. Many of the studies carried out to determine the effectiveness of iodinization program. However, WHO assessment status classified India having optimal iodine nutrition (Iodine status worldwide 2004, Andersson M et al., 2005) and hence iodine deficiency does not seem to play important role for thyroid disorders presently for India.

Hormones are key bio regulatory molecules, elaborated and secreted into the circulation to achieve timely growth and organ development as well as to adaptively regulate metabolism to achieve bodily homeostasis. Conversely, disorders of different organ systems can in turn influence the endocrine functions. Therefore, hormone measurement has recently achieved a position of pivotal importance in the practice of scientific medicine. The Bastar region in Chhattisgarh has heavy rainfall; because of this, frequent flooding is particularly likely to wash away and therefore decrease the iodine of the

superficial layer (in which iodine is present) of the soil. Iodine deficiency in the soil is aggravated by soil erosion from deforestation. In areas with no iodine deficiency, 60% to 75% of the iodine needs are met by the iodine present in the diet and the rest through the iodine content of water [10]. Because the sea is far away from this region, the consumption of iodine-containing sea foods is low in this region. With severe and prolonged iodine deficiency, the effects of an inadequate supply of thyroid hormone may occur. This condition is referred to as "hypothyroidism."

In the study conducted at Pondicherry by Rebecca et al., 15.8% of study subjects had thyroid disorder, functions: 11.5% had hypothyroidism (2% overt and 9.5% subclinical) [11]. In contrast, in our present study, 31.32% of subjects had thyroid dysfunctions: 15.94% had hypothyroidism, 5.01% had hyperthyroidism, and 3.64%, 6.71% had subclinical hyperthyroidism, subclinical hypothyroidism respectively. The strikingly larger percentage of subjects with thyroid dysfunctions in our study is most likely based on the subjects' high iodine and goitrogen ingestion. Pondicherry is a Coastal Union Territory where far more sea food is consumed in the Bastar region. Bastar is away from the sea and hence consumption of iodine-containing sea food is deficient. Also, it has been observed that residents of Bastar consume more goitrogenic foods than in many other regions. Most goitrogens are naturally occurring chemicals that are ingested in foods or drugs.

These chemicals can interfere with thyroid function in different ways. Some goitrogenic compounds induce antibodies that cross-react with the thyroid gland; others interfere with thyroid peroxidase, the enzyme that organifies iodide to iodine and adds the iodine to tyrosine residues on thyroglobulin during the production of thyroid hormones. Either way, the thyroid is not able to produce as many of thyroid hormones as are needed to regulate metabolism. Also in such patients, intake of non-goitrogenic foods should be enhanced. Such foods have the opposite effect on the thyroid gland, stimulating rather than suppressing the gland's function. [12]

In contrast to our findings, the Hallowell et al. study suggested that serum TSH values were slightly higher in children aged 12 to 19 years than in young adults aged 20 to 29 years. We found instead that TSH levels increased in the 20 to 29 year old group compared to children aged 12 to 19. [13]

One more objective of the present study was to learn the prevalence of subclinical thyroid disorder. Of our total randomized study population, we found that 6.71% were classified as subclinical hypothyroidism and 3.64% subclinical hyperthyroidism. This contrasts with the higher prevalence of subclinical hypothyroidism of 4.3% to 9% in Hollowell et al. and Colorado studies [13,14]. Data on the incidence of subclinical hypothyroidism appears to be scantier in India and the present data strongly suggests increase more awareness among clinicians to detect these cases.

Conclusion

This study suggests that the prevalence of thyroid disorders in this region is high and the subclinical hypothyroidism and Subclinical hyperthyroidism is more common. The study revealed that the age group 20 and 40 years are more prone to thyroid disorders. The findings are such that they strongly warrant further evaluation of thyroid dysfunction among the larger population of this area.

Conflict of Interest: *None declared*
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