Thyroid Dysfunction in Central Referral Hospital, Sikkim

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ABSTRACT :

The thyroid dysfunction is one of the most common endocrine disorders. Sikkim lies in the severely iodine deficient zone. This was a hospital based cross-sectional study. The serum samples were used to check the levels of thyroid stimulating hormone (TSH), triiodothyronine (T3) and thyroxine (T4). Out of 674 patients with suspected thyroid dysfunction, 83% were Euthyroid followed by 10 % of patients having subclinical hypothyroidism. The incidence subclinical hyperthyroidism (1%) were lowest. Females were found to be maximum with thyroid disorders. The datas were represented as percentage and mean ± SD. Thyroid hormones were compared among the different thyroid disorder by One way analysis of variance (ANOVA).

High incidence of thyroid dysfunction in females with subclinical hypothyroidism indicates that it still exists as a public health problem in Sikkim regardless of the implementation of iodized salt program since the last decade.

Keywords: Subclinical hypothyroidism, Subclinical hyperthyroidism, Tri-iodothyronine, Thyroid stimulating hormone, Thyroxine.

INTRODUCTION:

The thyroid disorders are the most common endocrine diseases in the world. Globally, India has the largest number of children born vulnerable to iodine-deficiency with 42 million people suffering from thyroid disorders [1, 2]. According to the Iodine status conducted by World Health Organization (WHO) in 2004 , classified India as having a optimal iodine nutrition[3]. Sikkim, the small hilly state in the eastern Himalayas lies in the severely iodine deficient zone [4]. In 1989, the state government of Sikkim had implemented Iodine Deficiency Disorder control program in state. Various studies have shown that Iodine Deficiency Disorders is a significant public health problem for the state. Almost all of them have shown high prevalence of goitre and cretinism. According to a survey conducted in 1994, endemic cretinism was observed to be 77.9% in the state [5,6].

Factors like age, sex, ethnicity and geographical locations plays an essential role on the prevalence of thyroid disorders and most commonly on iodine uptake [7]. TSH measurement is considered to be highly sensitive and specific for diagnosing hypothyroidism and hyperthyroidism. The relationship between serum TSH and serum thyroxine are logarithmic so an increase in thyroxine level produces a many fold change in TSH [8].The signs and symptoms of hyper and hypothyroidism are well known and on the other hand subclinical thyroid condition may mimic other diseases. So it is important to develop laboratory strategies to differentiate the various conditions for correct diagnosis and treatment [9].

The study aims to investigate the incidence of thyroid dysfunction in the local population visiting the outpatient department of Central Referral Hospital (CRH), Gangtok, Sikkim.

MATERIALS AND METHODS:

Study design

This was a hospital-based cross-sectional study conducted in the department of Biochemistry, Sikkim Manipal Institute of Medical Sciences,Gangtok, Sikkim .The duration of the study was the month of October 2013 to May 2014.

Sources of data

The suspected subjects with thyroid disorder were selected from the outpatient department, Central Referral Hospital, Gangtok, Sikkim for the study.

Sample collection:

Fasting venous blood samples (2ml) were collected from 643 subjects. The blood sample were collected in a plain vial, centrifuged at 3000 rpm for 15 minutes and the separated serum was stored at -20° C for hormone assay.

Assay

The serum samples were assayed to check the levels of thyroid stimulating hormone (TSH), triiodothyronine (T_3) and thyroxine (T_4) by using standard kits (RFCL,India).

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Conflict of interest: Authors reported none

The procedures were followed as per the kit inserts. T3 and T4 were estimated by competitive enzyme linked immunoassay (ELISA) and TSH by Sandwich ELISA.

The subjects were categorized as euthyroid, subclinical hypothyroidism (Normal T3 , T4 and increased TSH) , overt hypothyroidism (decreased T3,T4 and increased TSH), subclinical
hyperthyroidism (Normal T3 ,T4and decreased TSH), [10] and overt hyperthyroidism (increased T3,T4 and decreased TSH). The subjects were divided in four age groups to determine the occurrence of various thyroid disorders in different age groups.

Statistical Analysis :

Statistical analysis was done using the Statistical Package for the Social Sciences version 16.0 (SPSS Inc, Chicago, IL, USA). The datas were represented as percentage and mean ± SD. Comparison of thyroid hormone levels among the different thyroid disorder was analyzed by One way analysis of variance (ANOVA). P value <0.05 was considered to be significant.

RESULTS:

Table1. represents the normal values of thyroid hormone (T3, T4 and TSH) as per the kit insert.

Table 1. Reference range of different parameters of thyroid profile.

Parameters	Reference range
Serum T3	0.52-1.85ng/ml
Serum T4	Male: 4.4-10.8 ug/dl Female: 4.8-11.6ug/dl
Serum TSH	0.39-6.16 uIU/ml

Normal values of the parameters as per the kit.

Over all distribution of patients with thyroid disorder is presented in Table 2 and figure 1. In the present study, out of total 674 patients with suspected thyroid disorder ,83% (n=560) subjects were found to be Euthyroid having normal levels of T_3,T_4 and TSH (females = 450, males = 129). 3.5% (n=195) belonged to overt hypothyroidism with elevated TSH levels and low T_3 and T_4 levels (female=19 , males = 5). The patients with overt hyperthyroidism were 2.5% (n=17) (females =13, males=4). 10% (n=67) patients were suffering from subclinical hypothyroidism (females = 42 , males=25). The remaining 1 % (n=6) belonged to subclinical
hyperthyroidism (females=, males=3). The females were found to be highest with thyroid disorder with 75.2% (n=507) and 24.6% were males (n=166).

Table 2. Overall distribution of thyroid disorder

Thyroid disorder (total no:674)	Number of patients Female	Male	Total	Percentage (%)
Euthyroid	430	129	560	83.0%
Overt hypothyroidism	19	5	24	3.5%
Overt hyperthyroidism	13	4	17	2.5%
Subclinical hypothyroidism	42	25	67	10.0%
Subclinical hyperthyroidism	3	3	6	1.0 %
Total*	507	166		

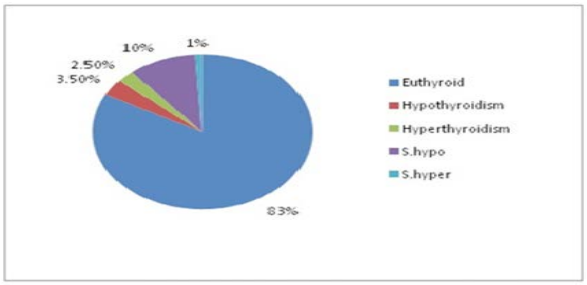

Figure 1. : Distribution of different thyroid disorder

Table 3 shows comparison of thyroid hormone levels among different thyroid dysfunction. By applying ANOVA test, there was a significant differences (p>0.001) among various groups of thyroid disorder. T_3 levels were found to be highest in hyperthyroidism (2.8±3.9) and lowest in hypothyroidism (0.8 ±0.512). Highest level of T_4 were seen in hyperthyroidism (9.4±5.2) with lowest in hypothyroidism (5.02±2.6). High level of TSH was observed in hypothyroidism (12.8±13.1) and lowest in hyperthyroidism (3.2±3.5).

Table 3. Comparison of thyroid hormone levels among various thyroid dysfunction.

Thyroid hormones	Euthyroid (Mean±SD)	Hypo-thyroidism (Mean± SD)	Hyper-thyroidism (Mean± SD)	Subclinical Hypothyroidism (Mean± SD)	Subclinical Hyperthyroidism (Mean± SD)	p value
T3(ng/ml)	1.1±0.554	0.8 ±0.512	2.8±3.9	1.05±0.4	1.05±0.17	0.001*
T4(ug/ml)	6.8±2.4	5.02±2.6	9.4±5.2	5.7±2.0	6.7±2.0	0.001*
TSH(uIU/ml)	3.7±3.6	12.8±13.1	3.2±3.5	9.4±8.0	9.4±8.0	0.001*

p value <0.05 is considered significant*.

The distribution of thyroid disorder according to age is represented in table 4. According to the age group, maximum number of patients (n=195) were in the age group of 21-30 yrs with 29% , followed by 25.7% of patients within the age of group 31-40yrs (n=173). 14.7% of patients belonged to the age group of 41-50 yrs (n=99). The age group between 51- 60 yrs were 11.9% (n=80). 7.3% were found between the 61-70 yrs of age (n=49) and the remain-

ing 3 % were above 71 years of age.

Table IV. Frequency distribution of thyroid disorder according to age

Age	Female (Frequency)	Male	Total Number (N=674)	Total Percentage (%)
11-20yrs	41	16	57	8.4%
21-30yrs	167	28	195	28.9%
31-40yrs	131	42	173	25.7%
41-50yrs	80	19	99	14.7%
51-60 yrs	49	31	80	11.9%
61-70yrs	29	20	49	7.3%
>71yrs	10	10	20	3.0%

DISCUSSION:

In the present study, out of total 674 patients suspected with thyroid disorder, highest number (80%) of subjects were found to be Euthyroid with normal levels of T_3,T_4 &TSH . A hospital based study conducted by Rebecca et al [11] also reported that about 80% of patients were found to be Euthyroid. Among the thyroid disorders, subclinical hypothyroidism (10%) was found to be most prevalent followed by overt hypothyroidism (3.5%) and overt hyperthyroidism (2.5%) and the results were found to be similar in one of the studies (12,13) .Hyperthyroidism (overt hyperthyroidism=2.5% & subclinical hyperthyroidism =1%) had the lowest incidence among the thyroid dysfunction and is comparable to other studies [13,14]. The datas regarding the prevalence of thyroid disorders in India is comparatively scanty, though many studies are carried out to determine the effectiveness of iodinization program [13].

The numbers of females were highest (n=507) indicating a high prevalence of thyroid dysfunction in women than men. This finding is supported by few studies [15, 16]. Majority of female suffering from thyroid dysfunction belonged to subclinical hypothyroidism (n=42) and overt hypothyroidism (n=19) . This may be due to the geographical locations and pattern of iodine deficiency in these regions. A population based study carried out in Cochin, India showed a higher prevalence of subclinical hypothyroidism in women (11.4%) as compared to men [17].

The thyroid disorder cases were divided in seven age groups to determine the occurrence of various thyroid disorders in different age groups (Table 4). It was observed that maximum number of patients were seen between the age group of 21-30 years (29%) followed by 31-40 yrs of age group (25.7%).Lowest was observed above 70 years of age (3%). One of the study conducted in Jammu and Kashmir, showed a similar result of having a maximum number of thyroid patients between the age group of 21-30 yrs [12].

CONCLUSION :

Our study reported a high incidence of hypothyroidism in women as compared to men with maximum number in the age group of 21-30yrs .Though the state has implemented the iodized salt programme and has made remarkable and measurable progress within the last decades controlling the Iodine deficiency disorder but it still exists as a public health problem in Sikkim.

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