

A hospital-based study of prevalence of thyroid dysfunction in Srinagar, Jammu and Kashmir state of India

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Abstract

Background: Significant incidence of thyroid dysfunction, especially hypothyroidism, has been reported in Kashmir Valley of India. There is a paucity of studies that assessed the presence of thyroid dysfunction in various age groups of people in Srinagar.

Objectives: This study aimed to investigate the prevalence of thyroid dysfunction in the local population who visit the outpatient department of Ramakrishna Mission Clinic at Srinagar.

Materials and Methods: This work is a cross-sectional study carried out for 18 months. The study subjects were the patients who attended outpatient department of Ramakrishna Mission Clinic; patients referred by private practitioners of Srinagar and adjoining areas. The data were from those subjects who got thyroid function tests done for the first time. Thyroid function was assessed by clinical examination and thyroid function tests (T3, T4, and TSH).

Results: The total number of subjects tested for thyroid function was 612 of which 120 were men and 492 were women. Total prevalence of thyroid disorders in the study population was 40.36% (247 of 612). Of the total 247 subjects with thyroid disorders, 17.8% were men (44) and 81.2% were women (203). Overall prevalence of subclinical hypothyroidism was 33% (206 of 612); prevalence of overt hypothyroidism was 5% (31 of 612); and prevalence of hyperthyroidism was 1.6% (10 of 612).

Conclusion: There is a high prevalence of thyroid disorders in Kashmir population, and subclinical hypothyroidism is the most prevalent thyroid disorder. In females, maximum prevalence of subclinical hypothyroidism is seen in the reproductive age group.

KEY WORDS: Hypothyroidism, Kashmir, Srinagar, thyroid

Introduction

Diseases of thyroid gland are among the most common endocrine disorders affecting the population worldwide. 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.^[2] Thyroid hormone functions show variations with age, sex, dietary habits, stress, and geographical location.^[2]

The state of Jammu and Kashmir is nestled along the Himalayan range at an average height of 5400 feet above the sea level. In the north, east, and west, this state is guarded by the mountains, and in the south it is cut off from Punjab by rocky barrier of 50–75 m in width. Srinagar, the summer capital, is located at the center of the Kashmir Valley and stands on the banks of river Jhelum. The Majority of population of Srinagar belong to Islamic religion, and their staple diet is rice, fresh green leafy vegetables, and nonvegetarian foods.^[3]

The Himalayan belt is one of the most severe endemic areas for iodine deficiency disease.^[4–6] Prevalence of total goiter rate was reported to be 19.8% in Kangra district of Himachal Pradesh.^[6] The first study conducted on iodine deficiency in Kashmir Valley reported an overall prevalence of

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goiter to be 45.2%.^[7] Recent studies carried out in Srinagar and adjoining areas have reported total goiter prevalence rate of 5.57% in boys and 6.85% in girls.^[8] Clinical presence of goiter in female population of reproductive age group in spite of consumption of iodized salt, which is reported by the researchers, has been attributed to improper storage and cooking practices.^[9]

This study is aimed to investigate the prevalence of thyroid dysfunction in the local population visiting the outpatient department of Ramakrishna Mission Clinic at Srinagar.

Materials and Methods

This work is a cross-sectional study carried out for 18 months. The study protocol was approved by ethics committee of the Ramakrishna Mission Hospital. Voluntary informed consent was obtained from all the study subjects.

Sources of data: The study subjects were the patients who attended outpatient department of Ramakrishna Mission Clinic – patients referred by private practitioners of Srinagar and adjoining areas. The data were from those subjects who got thyroid function tests done for the first time. The subjects were asked to fill a questionnaire on demographic details, habits, diet, family history of thyroid disorders, and any complaints of illness.

Thyroid function tests: Fasting venous blood samples were collected in plain vacutainers taking aseptic precautions, centrifuged at 3000 rpm for 15 min, and sera were separated and stored at 4 °C. Serum samples were assayed for levels of thyroid-stimulating hormone (TSH), triiodothyronine (T3), and thyroxine (T4). Assays of hormones were performed by chemiluminescent immunoassay, using the reagent kits from Acculite. The assay procedures followed were as per kit inserts of the manufacturer. This assay process used high-affinity-specific enzyme-conjugated and immobilized polyclonal antibody in excess. The immobilization takes place at the surface of an opaque chemiluminescent reaction cell through the interaction of streptavidin and exogenously added biotinylated monoclonal antibody coupled to the analyte of interest. Reaction between native antigen and antibodies, formation of soluble sandwich complex, and enzymatic conversion of substrate to product to generate light are the phenomena in the process of chemiluminescence. The light generated is directly proportional to native antigen (hormone) concentration.

The biological reference ranges for TSH, T3, and T4 are as follows (as per kit insert):

Serum T4: 4.8–12.7 µg/dl
 Serum T3: 0.8–2 ng/ml
 Serum TSH: 0.27–4.2 µIU/ml

The study subjects were categorized as euthyroid, subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, and overt hyperthyroidism^[7,10]; the values of TSH are mentioned in Table 1.

Table 1: Categorization of subjects as euthyroid, subclinical hypothyroidism, overt hypothyroidism, and hyperthyroidism based on serum TSH level

Category	Serum TSH (µIU/ml)	Serum T3 (ng/ml)	Serum T4 (µg/dl)
Reference range	0.27 to 4.2	0.8 to 2	4.8 to 12.7
Euthyroidism (n = 365)	2.2 ± 1.5	1.5 ± 0.4	7.6 ± 1.8
Subclinical hypothyroidism	6.5 ± 1.6	Normal	Normal
Overt hypothyroidism	22.5 ± 12.2	–	–
Hyperthyroidism	0.2 ± 0.4	–	–

Results

Results of the study are presented in Tables 2 and 3, and The total number of subjects tested for thyroid function was 612 of which 120 were men and 492 were women. The maximum number of subjects (189) were in the age group of 21–30 years, followed by the age group of 41–50 years (182 subjects). Total prevalence of thyroid disorders in the study population was 40.36% (247 of 612). Of the total 247 subjects with thyroid disorders, 17.8% were men (44) and 81.2% were women (203). The ratio of males/females among the subjects with thyroid disorders was 1:4.6. Of the total 120 male subjects, 36.67% (44) had thyroid disorders, and of the total 492 female subjects, 41.3% (203) had thyroid disorders.

Overall prevalence of subclinical hypothyroidism was 33% (206 of 612). The prevalence of subclinical hypothyroidism among female subjects was 35% (173 of the total 492 women) and prevalence among male subjects was 27.5% (33 of the total 120 men). The majority of male subjects with subclinical hypothyroidism belonged to the age group of 61–70 years (9 of 33; 27.3%), followed by 21–30 years group (8 of 33; 24%), and 51–60 years (8 of 33; 24%). Among the female subjects, major contribution for subclinical hypothyroidism was from the age group of 21–30 years (63 of 173; 36.4%), followed by 41–50 years group (61 of 173; 35.3%).

Overall prevalence of overt hypothyroidism was 5% (31 of 612). The prevalence of subclinical hypothyroidism among

Table 2: Age- and gender-wise distribution of study subjects

Age group (years)	Males	Females
5–10	6	6
11–20	7	35
21–30	24	165
31–40	12	63
41–50	24	158
51–60	32	38
61–70	15	27

Table 3: Sex-wise prevalence of normal thyroid function, subclinical hypothyroidism, overt hypothyroidism, and hyperthyroidism

Age group (years)	Normal thyroid function (n = 365)		Subclinical hypothyroidism (206)		Overt hypothyroidism (31)		Hyperthyroidism (10)	
	Males	Females	Males	Females	Males	Females	Males	Females
5–10	4	4	1	–	–	–	–	2
11–20	4	29	2	–	–	1	1	5
21–30	16	94	8	63	1	6	–	2
31–40	6	34	2	24	4	5	–	–
41–50	21	88	3	61	1	9	–	–
51–60	18	23	8	15	3	–	–	–
61–70	7	17	9	10	1	–	–	–
Total	76 (63% of total males; 20.8% of total normal population)	289 (58.7% of total females; 79.2% of total normal population)	33 (27.5% of total males; 16% of total subclinical hypothyroid population)	173 (35.2% of total females; 84% of total subclinical hypothyroid population)	10 (8.3% of total males; 32.2% of total overt hypothyroid population)	21 (4.3% of total female; 67.8% of total overt hypothyroid population)	1 (0.83% of total males; 10% of total hyperthyroid population)	9 (1.8% of total females; 90% of total hyperthyroid population)

female subjects was 4.3% (21 of the total 492 women) and the prevalence among male subjects was 8.3% (10 of the total 120 men). Of 21 female hypothyroid subjects, 9 (42.9%) were in the age group of 41–50 years, and 6 (28.6%) were in the age group of 21–30 years. Among the male subjects, 40% (4 of 10) were in the age group of 31–40 years, and 30% (3 of 10) were in the age group of 51–60 years.

Overall prevalence of hyperthyroidism was 1.6% (10 of 612). The prevalence among female subjects was 1.8% (9 of 492) and the prevalence among male subjects was 0.83% (1 of 120).

Discussion

This study shows an overall 40.36% prevalence of thyroid disorders in the Kashmir population. As 80% of the study subjects were women, they constituted 81% of the total population with thyroid disorders. Among the male subjects, the prevalence of thyroid disorders was 36.67% and among female subjects, it was 41.3% thus, indicating almost similar prevalence of thyroid disorders among men and women. Subclinical hypothyroidism was the most prevalent thyroid disorder (33.7%) followed by overt hypothyroidism (5.1%) and hyperthyroidism (1.63%). When age-wise prevalence of thyroid disorders is considered, maximum cases of subclinical hypothyroidism (71 of 206) were seen in the 21–30 years age group. With respect to overt hypothyroidism, maximum cases were observed between the age 21 and 50 years (26 of 31). All the 10 subjects with hyperthyroidism were aged 5–30 years, of which 6 subjects aged between 11 and 20 years.

A population-based study carried out in Cochin of Kerala state in India reported a higher prevalence of subclinical hypothyroidism in women (11.4%) as compared to men

(6.4%), and this percentage was found to increase with age.^[11] In this study, we observed that 84% of the total subjects with subclinical hypothyroidism were women. Of the total male population (120), 27.5% had subclinical hypothyroidism whereas in female subjects 35.2% (173 of 492 women) had subclinical hypothyroidism. These findings indicate a higher prevalence of subclinical hypothyroidism among Kashmiri women when compared to men.

A study carried out in Cochin of Kerala state revealed that 53% of cases with subclinical hypothyroidism were positive for anti-TPO antibodies, indicating the autoimmune etiology of this disorder.^[11,12] In the present study, we could not confirm the autoimmune etiology of hypothyroidism. Studies have reported strong association between presence of autoantibodies and poor obstetric outcome of miscarriage and preterm birth. The odds of miscarriage and preterm birth have been observed to be tripled and doubled, respectively, in women with thyroid autoantibodies.^[13] In our study population, a significantly high number of female subjects with subclinical hypothyroidism were in the reproductive age group. Therefore, there is a need for performing assay of antithyroid antibodies in all women in the reproductive age group for the confirmation of autoantibodies in the etiology of hypothyroidism.

Conclusions

There is a high prevalence of thyroid disorders in Kashmir population, and subclinical hypothyroidism is the most prevalent thyroid disorder. In women, maximum prevalence of subclinical hypothyroidism is seen in the reproductive age group. This study had limitations of being hospital based, a small sample size, and the inability to assay autoantibodies. Our research group intends to extend the study to a larger

population, analyzing the antithyroid autoantibodies in cases of subclinical hypothyroidism. We also intend to analyze the role of dietary factors in the etiology of thyroid disorders.

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