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Original Research Paper

Endocrinology

PREVALENCE OF THYROID DYSFUNCTION IN MALWA REGION OF INDIA

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ABSTRACT

The prevalence of thyroid disorder in Malwa region of India is unknown. The aim of the present study is to estimate the prevalence of overt and subclinical thyroid disorder among the age group of 15 to 69 years after universal salt iodization. A prospective study was conducted from February 2018 to June 2018. Those patients who had performed the serum thyroid stimulation hormone (TSH) were enrolled in the study. All subjects of study were resident of Mandsaur district of Malwa region with age 15 to 69 year. The reference interval for TSH is 0.50 to 4.70 µIU/ml. Thyroid function is categorized as Euthyroidism (Normal TSH), Hyperthyroidism (Decreased TSH) and Hypothyroidism (Increased TSH).

The overall prevalence of thyroid disorder was 23.8%. Prevalence of hypothyroidism was 20.1% and hyperthyroidism was 3.7%. Thyroid disorders were more prevalent among Women. Age group 35 to 44 years was having more thyroid disorders as compared to other age groups. The high prevalence of thyroid disorders is due to iodine deficiency, autoimmune disorders, metabolic disorders and Down's syndrome.

KEYWORDS : autoimmune, Malwa, Mandsaur, thyroid disorders

INTRODUCTION

Thyroid dysfunction is among the commonest endocrine disorders worldwide. India too, is no exception. Thyroid dysfunction is a common endocrine disorder affecting about 300 million people worldwide and over half are presumed to be unaware of their condition. Thyroid dysfunction is also a major health problem of India with affecting nearly 42 million people of India. Thyroid dysfunction are different from other diseases in terms of their ease of diagnosis, accessibility of medical treatment and the relative visibility that even a small swelling of the thyroid offers to the treating physician. Early diagnosis and treatment remains the cornerstone of management.

Thyroid dysfunction is defined as the altered serum thyroid stimulation hormone (TSH) level with normal or altered thyroid hormones (free triiodothyronine- fT3 and free thyroxine- fT4). However, the prevalence and pattern of hypothyroidism depend on ethnic, geographic and environmental factors including iodine intake status. Hypothyroidism and hyperthyroidism are two widespread thyroid problems, of which hypothyroidism is much more common. These disorders are eight times more common in women than in men.

The prevalence of thyroid dysfunction, by definition, is the testing of patients in various geographic regions, primary care clinics and in population that have not been screened previously. Thyroid function test panel is commonly used test for screening and evaluating thyroid dysfunction. The American Thyroid Association recommends that adults be screened for thyroid dysfunction by measurement of the serum thyroid stimulation hormone (TSH) concentration, beginning at age 35 years and every 5 years thereafter. The screening of thyroid dysfunction is strongly recommended in high risk population such as goiter, iodine deficiency disorder, autoimmune disorder etc. India is one of the high risk populations with its high prevalence of iodine deficiency disorder. Thus, the study is designed with an objective to assess the prevalence of thyroid dysfunction in the Malwa region of India which had yet to be assessed.

MATERIAL AND METHODS

Study Design

This is a prospective study includes 1000 subjects visiting the clinic from February 2018 to June 2018. Those patients who had performed the serum thyroid stimulation hormone (TSH)} were enrolled in the study. All subjects of study were resident of Mandsaur district of Malwa region with age 15 to 69 year.

Collection of Blood samples

2.0 ml of venous blood was collected from the subjects attending laboratory. Blood collected in plain vial was allowed to clot and centrifuged at 3000 rpm for 15 minutes. The separated serum was stored at -20 0C for hormone assay.

Assay of thyroid stimulation hormone

Thyroid stimulation hormone (TSH) was assayed by the ELFA (Enzyme Linked Fluorescent Assay) technique using standard kit following the standard protocol provided by the manufacturer (BIOMÉRIEUX, France).

Criteria of thyroid dysfunction

The reference interval for TSH is 0.50 to 4.70 µIU/ml. Thyroid function is considered normal (Euthyroidism) when subjects were presented with normal TSH. Abnormal thyroid function is further categorized as hyperthyroidism (Decreased TSH) and hypothyroidism (Increased TSH).

Statistical analysis

Data were entered and analyzed by Software Package for Social Sciences (SPSS). Data were represented as percentage, frequency, mean and standard deviation. Data were considered significant at $P<0.05$.

RESULTS

In present prospective study, a total of 1000 subjects were enrolled from February 2018 to June 2018. Among these subjects female and male both are equal (500 each). The subjects were classified according to thyroid status as Hypothyroidism, Hyperthyroidism and Euthyroidism taking reference of thyroid stimulation hormone.

In the present study, the female to male ratio is 1:1. Among euthyroid subjects (762), 420 were males and 342 were females. The prevalence of thyroid dysfunction is 31.60% (n= 158) in 500 female subjects and 16.00% (n= 80) in 500 male subjects as shown in Figure 1. The numbers of female subjects with thyroid dysfunction were greater than males. Thyroid dysfunction is more common among middle age group females.

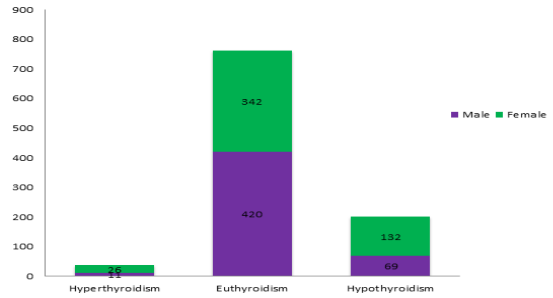

Figure 1. Gender wise prevalence of thyroid dysfunction

***Table 1*: Age wise distribution of thyroid dysfunction**

Thyroid Status	Age Group (in years)				Total
	25 - 34	35 – 44	45 – 54	55 – 64	
Hyperthyroidism	08 (04.0%)	10 (05.0%)	05 (02.5%)	10 (05.0%)	37 (3.7%)
Euthyroidism	151 (75.5%)	145 (72.5%)	155 (77.5%)	150 (75.0%)	762 (76.2%)
Hypothyroidism	41 (20.5%)	45 (22.5%)	40 (20.0%)	40 (20.0%)	201 (20.1%)
Total	200 (100.0%)	200 (100.0%)	200 (100.0%)	200 (100.0%)	1000 (100.0%)

Table 1 represents the distribution of thyroid dysfunction with various groups. Each age group contains 200 subjects. High number of hypothyroidism was observed in 35-44 years age group. In all age group, high prevalence of hypothyroidism was observed. Highest number of hyperthyroidism was observed in 35-44 years and 55-64 years age groups. Maximum euthyroid subject were seen in 15–24 years age group. Lowest number of both hypothyroidism and hyperthyroidism was observed in 15 – 24 years age group.

Table 2 represents the comparison of thyroid stimulation hormone levels in male and females. The mean TSH level in the female was higher than male but it was statistically significant when the student T-Test was applied ($p < 0.00001$).

***Table 2*: Comparison of Thyroid hormone levels in male and female**

Thyroid Hormone	Male (Mean ± SD)	Female (Mean ± SD)	P value
Thyroid Stimulation Hormone (µIU/ml)	3.53 ± 6.51	6.23 ± 12.13	<0.00001

Table 3: Comparison of thyroid stimulation hormone levels among various thyroid dysfunction levels

Thyroid functions	Hyperthyroidism	Euthyroidism	Hypothyroidism	P value
Thyroid stimulation hormone (Mean ± SD)	0.22 ± 0.18	2.25 ± 1.04	15.72 ± 18.15	<0.00001

Table 3 represents comparison of thyroid stimulation hormone levels among various thyroid dysfunctions. The ANOVA test was applied to check the significant difference of variables between each group. Thyroid stimulation hormone was significantly different in various groups of thyroid dysfunction ($p < 0.00001$).

Figure 2 represents the prevalence of thyroid dysfunction in the population of Mandsaur Distt. of Malwa region. Among 1000 study subjects, 23.8% of the subjects had thyroid dysfunction. Among deformity subjects, 20.1% subjects were hypothyroid and 3.7% subjects were hyperthyroid. The high proportions of subjects were suffering from hypothyroidism than hyperthyroidism.

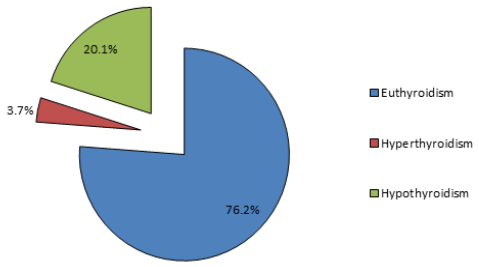

Figure 2. Prevelance of thyroid dysfunction in Mandsaur Distt.

DISCUSSION

Estimation of the prevalence of thyroid dysfunction depends upon methodological factors. The prevalence of thyroid dysfunction was high in study subjects (23.8%). In the present study the females are having more thyroid dysfunction than males. But contrasting result was observed by Baral N et al. (2002), where they reported equal proportion of thyroid dysfunction in male and female. Few studies were concordant with the present study which reported the hypothyroidism was higher in female as compared to males. In other similar study, the prevalence of thyroid dysfunction was more common among women than men. The percentage of thyroid dysfunction among women was 31.60% and among men was 16.00%.

In the present study, the prevalence of hypothyroidism was higher than hyperthyroidism. Hypothyroidisms are generally associated with iodine deficiency and India is an endemic area of iodine deficiency with higher prevalence of iodine deficiency disorder. The iodine deficiency and hypothyroidism may be exacerbated with geographical structure and food habit. Soil erosion with washing away of iodine from soil in hilly areas, use of non-iodized salts and intake of various goitrogens may also have aggravated the problem. The prevalence and pattern of hypothyroidism depend on ethnic, geographic and environmental factors including iodine intake status. The prevalence of hypothyroidism in various studies from around the world shows a considerable variation and its current prevalence ranges from as low as 1% to as high as 26%. In study conducted by Niafar M et al. (2009) hypothyroidism was common in Iranian population, as 12.8% of women and 4.7% of men had hypothyroidism. These data are consistent with reports of the high prevalence of hypothyroidism in other iodine-sufficient populations. As in other studies in developed countries, hypothyroidism tends to increase with age and is more common in women, and people with goiter.

Furthermore, hypothyroidism is the most common thyroid disorder and is more common in older women. However, thyroid dysfunction in elderly individuals often occurs unnoticed, and methods for accurate detection may be controversial. Hypothyroidism is usually autoimmune in origin, presenting as either primary atrophic hypothyroidism or Hashimoto's thyroiditis and rarely pituitary or hypothalamic disorders can result in secondary hypothyroidism. Similarly Baral N et al. (2002) have reported high prevalence of hypothyroidism among thyroid dysfunction.

By contrast hyperthyroidism is much less common compared to hypothyroidism. Graves' disease is the most common cause and affects primarily young adults. Toxic multinodular goiters tend to affect the older age groups. In present study, the prevalence of hyperthyroidism was 3.7%. One similar study showed contrasting result where the overall prevalence of thyroid dysfunction in the sample was 12.7%; relatively low compared with the present study (23.8%). Out of the 1000 participants 201 (20.1%) had hypothyroidism and 37 (3.7%) had hyperthyroidism.

Although all age group presented with thyroid dysfunction a high number of subjects was observed between age groups of 35-44 years of age. One similar study reported the mean age of thyroid dysfunction is approximately 39 years of age, which showed the accumulation and manifestation of disorder symptoms in this age group. Few studies have revealed that incidence of thyroid dysfunction increases with advancing age. Children presented with hypothyroidism which may be associated with iodine deficiency disorder or Down's syndrome which ultimately retards physical and mental development. Few studies have shown obesity, diabetes and metabolic syndrome have strong association with thyroid dysfunction. Some studies have also shown the association of hypothyroidism with depression.

Thyroid dysfunction in India is generally due to Iodine deficiency but the autoimmune etiology and levels of other autoimmune disease such as type-1 diabetes are increasing. It has been suggested that recent years have seen a rise in the level of autoimmune disease and other immune mediated disorders in general; and this has been put forward as a possible reason for the perceived increase in thyroid disorders. It is also possible that there has been an increase in the diagnosis or ascertainment of thyroid disease due to improved practice and increased availability of diagnostic tests. There are a number of other possible reasons for the differences found between the results presented here and those found elsewhere. The population dynamics of the different locations will also have an impact on the levels of thyroid dysfunction, because incidence was higher among females and the elderly. Another possibility is that there is a geographic variation in the risk of thyroid dysfunction between regions, which could reflect a variety of environmental and/or genetic factors. One such factor could be the role of dietary iodine in determining thyroid function. Consequent to the Universal Salt Iodination program, India is making a transition from being an iodine-deficient to an iodine-replete nation.

There were few limitations of our study. The TSH test result is an excellent tool for screening new patients for thyroid disease but the complete thyroid panel is needed for an accurate diagnosis and assessment of thyroid function. First, the present study was based on routine TSH measurement. The present study could have been strengthened if free and total T4, free and total T3, Anti Thyroperoxidase (Anti TPO), anti-thyroglobulin (anti Tg), TSH receptor antibodies and Thyroid stimulating immunoglobulin (TSI) were included in stratifying thyroid dysfunction. Second, the possibility that TSH cut-offs used in the present study may have understated health risk. The cut-offs used were those recommended by the ATA, manufacturer of the kit and other studies.

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