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EVALUATION OF THYROID PROFILE OF KNOWN CASES OF THYROID DISEASE AMONG THE POPULATION OF KOLHAPUR- A RETROSPECTIVE OBSERVATIONAL STUDY

Surgery

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ABSTRACT

Background & Aim: Despite India being in the post iodization era; thyroid disorders continue to be prevalent in various parts of the country. Hence, the aim of the study was to assess the prevalence of thyroid disorders in Kolhapur region of India. **Material and Methods:** This retrospective hospital-based study was conducted using previous 6 months medical records at the department of Surgery and ENT at a tertiary care hospital in Kolhapur, India. Case records of 167 patients; in the age group of 10-60 years; diagnosed with thyroid disease were reviewed. Patients were divided into cases of euthyroidism, hypothyroidism and hyperthyroidism; based on thyroid function tests namely; serum TSH, serum T3 and serum T4 levels. Data was analyzed using R software version 3.6.1. Variables were represented using frequency distribution. **Results:** Of the total participants (n=167), female preponderance was seen (n=159) and were in the age group of 31-40 years (n=52). Around half the sample were suffering from hypothyroidism (n=86). The mean values for serum TSH, T3, and T4 in hypothyroidism cases were 7.8 µIU/ml, 176.18 ng/dl and 11.0 µg/dl, respectively. **Conclusion:** Hypothyroidism was observed to be more common among the thyroid disorders in Kolhapur region.

KEYWORDS

Females, hypothyroidism, hyperthyroidism, iodine, medical records

INTRODUCTION

Thyroid gland disorders are among the most common endocrine diseases worldwide; second only to diabetes and India is no exception to it. According to recent reports, 300 million people are suffering from thyroid disorders globally; and among them, about 42 million reside in India.(1) Thyroid hormones have an indispensable role in the metabolic processes of the human body and iodine deficiencies are known to influence the secretion of the thyroid gland.(2) Thyroid diseases have also been known to show variation with sex and geographical location.

Thyroid disorders are most commonly seen in women than in men. One in every eight women during their lifetime has a risk for thyroid disorders. The higher prevalence in females may be attributed to hormones namely estrogen and progesterone.(3)

In India, hypothyroidism is categorized as iodine deficiency disorders (IDDs). (1) As per previous survey reports, Maharashtra is one of the known IDD-endemic regions. It can be ascribed to iodine deficiency in the soil; hence there is a iodine deficiency in crops grown on the deficient soil; and consequently, inadequate iodine in the consumed diet. Previously it was thought that iodine deficiency causes only goiter and cretinism. However, over the years, it has become increasingly clear that one of the major causes of hypothyroidism is iodine deficiency.(4,5)

It has been also seen in previous researches that in mild-to-moderate iodine deficiency cases, increased thyroid activity can compensate for low iodine intake; and therefore, maintained in a euthyroid state in most individuals. Hence, chronic thyroid stimulation results into an increase in the prevalence of hyperthyroidism in populations.(6–8)

Furthermore only few data is available from the IDD-endemic region related to thyroid diseases in post iodization phase in India.(1,9) Hence, the aim of the study was to evaluate the thyroid profile of patients with thyroid disorders in Kolhapur region.

MATERIALS & METHODS

A retrospective observational study was conducted from the previous 6 months medical records; in the department of Surgery & ENT, at tertiary care hospital in Kolhapur, Maharashtra. Prior permission was obtained from the Institutional Ethics Committee.

The case records of 167 patients; in the age group of 10-60 years; diagnosed with thyroid disease (goiter) were reviewed. Patients were randomly selected from various tehsils of Kolhapur region. The criteria of selection of patients were based on; thyroid-stimulating hormone (TSH) levels (normal range was taken as 0.45 to 4.5µIU/ml, based on laboratory limits); Normal triiodothyronine (T3) (70-204 ng/dl) and thyroxine (T4) levels (4.87–11.72 µg/dl). Patients diagnosed with thyroid cancer or pregnant patients were excluded from the study. Sample size was calculated by using the formula,

$$n = \frac{Z^2\, p\,(1-p)}{d^2}$$

(n = sample size, Z = Z statistic for a level of confidence, P = expected prevalence or proportion was 8.9%), and d = precision (in proportion of one; if 5%, d = 0.05). Minimum sample size calculated was 125.

Patients clinical data was collected in terms of past history, family history and history of presenting illness (data not presented). Patients were classified as euthyroid, hypothyroid or hyperthyroid based on thyroid function tests namely, serum TSH, serum T3 and serum T4 levels.

The method used to estimate thyroid levels was chemilu minescence immuno assay (CLIA based equipment: ADVIA Centaur CP, Siemens, Germany).

Statistical analysis

Data were analyzed using R software version 3.6.1. Variables were represented using frequency distribution tables. Mean serum TSH, serum T3, and serum T4 values were evaluated for euthyroidism, hypothyroidism and hyperthyroidism. P value less than 0.05 was considered significant.

RESULTS

Of the total participants (n=167), female preponderance was observed (n=159). A significant number of the female subjects belonged to the age group of 31-40 years (n=52). (Table 1) Tehsil wise distribution of participants is illustrated in Figure 1.

Table 1: Demographic distribution of study subjects

Age group (years)	Males n (%)	Females n (%)
10-20	0 (0.0)	12 (7.18)
21-30	5 (2.99)	34 (20.36)
31-40	2 (1.19)	52 (31.14)
41-50	1 (0.59)	45 (26.95)
> 50	0 (0.0)	16 (9.58)

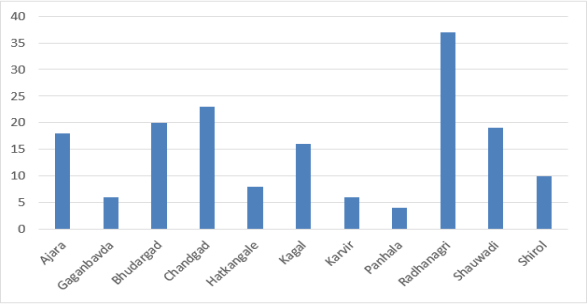

Figure 1: Tehsil wise distribution of participants

A significant number of the subjects were found to be suffering from Hypothyroidism (n=86). (Table 2)

Table 2: Distribution of various Thyroid disorders

Thyroid disorders	n (%)
Euthyroidism	52 (31.13)
Hypothyroidism	86 (51.49)
Hyperthyroidism	29 (17.36)

Mean serum TSH, serum T3, and serum T4 values in hypothyroidism cases were 7.8 µIU/ml, 176.18 ng/dl and 11.0 µg/dl, respectively. Table3

Table 3: Mean Serum TSH, Serum T3, and Serum T4 values in study patients

	Reference range	Euthyrodism	Hypothyroidism	Hyperthyroidism
Mean Serum TSH (µIU/ml)	0.45-4.5	1.86	7.8	0.01
Mean Serum T3 (ng/dl)	70-204	80.99	176.18	363
Mean Serum T4 (µg/dl)	4.87–11.72	7.83	11.0	20.0

DISCUSSION

About 32% of Indians suffers from various forms of thyroid disorders, thus making it one of the commonest endocrine disorders in India.(9) Even a small swelling of thyroid disorders offers a clue for diagnosis to the treating physician.(4) Hence, it emphasizes the importance of knowing the distribution of variant of thyroid diseases in Kolhapur region.

Thyroid disorders were found to be more prevalent in females (n=159). Similar findings were observed in previous studies.(10,11) It can be linked to female hormones and thus, estrogen dominance over progesterone has been implicated as a contributing factor in the disease process. Estrogen influences the growth and function of thyroid gland through estrogen receptors (ER). Estrogen receptors affect the sodium/iodide symporter (NIS) gene expression; which has an impact on iodide uptake; and along with the increase in cell growth which is induced by estrogen, can cause thyroid diseases in women.(12,13)

Thyroid disease was seen to be more common with increasing age in women. Similar findings were seen in other studies.(11) This points towards changes in the endocrine system which occurs with increasing age. It can lead to the changes in the quantity of hormones secreted, alteration in the susceptibility of target organs or alteration in the metabolic rate of other hormones (e.g., enhanced peripheral degradation of hormones secreted by thyroid gland). (14)

Hypothyroidism was observed to be the most common among the thyroid disorders (n=86). Similar findings were observed in studies conducted in other regions of Maharashtra.(1,11) This can be attributed to flooding, changing course of rivers and deforestation; which leads to leaching of iodine present in top soil; hence there is an iodine deficiency in crops grown on deficient soil; and consequently, inadequate iodine in the diet. This finding increases the speculation of deficiency of iodine in the region despite India being in the post iodization era.(1) Additionally, the autoimmune nature of the disease cannot be neglected. Autoimmune thyroid diseases are mostly accompanied by elevation of anti-thyroid peroxidase (TPO). Thyroid peroxidase is a glycosylated membrane-bound enzyme, which helps in iodine oxidation and iodination of residues of tyrosyl. (I2). Based on its intracellular localization, it has been termed as microsomal antigen. Hence, antibodies react against conformational epitopes. Anti-TPO antibodies act by destroying thyrocytes and leads to competitive inhibition of enzymatic activity. Hence, anti-TPO positivity is considered as marker of autoimmune thyroid diseases.(15)

Mean serum TSH levels in Hypothyroidism cases were 7.8 µIU/ml. This raised TSH level points towards the pituitary gland's response to a drop in circulating thyroid hormone and is considered as the first indication of thyroid gland failure. Since the inference of the level of TSH is dependent on the level of other thyroid hormones; TSH is mostly used in conjunction with other thyroid function tests such as the T3 and T4.(16) Additionally in hypothyroidism, serum TSH has also become the therapeutic target for levothyroxine replacement therapy and serum TSH is helpful in suppression therapy for differentiated thyroid cancer.(17)

Euthyroidism was the next most common thyroid disorder after hypothyroidism (n=52). This has been observed in other iodine-replete populations in previous studies.(18) This thyroid disorder is also dependent on the existence of underlying autoimmunity and TSH levels (even in the normal range). Hence, it can also be pointed that euthyroid state leads to progression of thyroid dysfunction.(19,20) This finding point towards more researches in the region for euthyroid state with thyroid antibody testing.

Study limitations include the relatively small sample size and lack of assessment of anti-TPO positivity. Further studies taking the above limitations into consideration would help in providing better insights on the profile of the disease.

CONCLUSIONS

Among the studied sample, thyroid disease is more common among women. Hypothyroidism was the common thyroid diseases in Kolhapur region. Thyroid disorder appears to be distributed through most tehsils across Kolhapur. It is recommended that the departments related to public health should carry out an extensive survey in the region to confirm and take appropriate measures to diagnose and manage thyroid imbalance in the region.

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