

# Thyroid Profile In Goiter Patients

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## ABSTRACT

**INTRODUCTION:** *The most prevalent endocrine condition in clinical practice is thyroid dysfunction, and approximately half of the population with thyroid dysfunction remains undiagnosed. In India, too the burden of thyroid diseases is significant. For normal human growth and mental development, iodine is an important micronutrient with an RDA of 100-150µg. Iodine deficiency disorder (IDD) is a complex clinical and subclinical disorder triggered predominantly by insufficient intake of adequate iodine in foods. One of the most common micronutrient deficiencies globally is iodine deficiency. In clinical practice, thyroid gland enlargement is a common issue associated with iodine deficiency, an increase in the amount of serum thyroid stimulating hormone (TSH), natural goitrogen, smoking, and lack of selenium and iron. At the age of puberty, Goiter is characterized by the enlargement of the entire thyroid gland. It is found in patients who have either hypothyroidism or hyperthyroidism or elevated levels of TSH. The goal of the present study was to identify associations of goiter patients with thyroid hormone levels.*

**METHODS:** *The cross sectional study was carried out at SMHRC, Maharashtra India during the period of 8<sup>th</sup> January 2020 to 7<sup>th</sup> November 2020. We enrolled 144 patients (72study group and 72control group) aged 20-35 years with goiter (Thyroid dysfunction) and normal subject from Nagpur. In each patient, thyroid function test were determined.*

**RESULTS:** *The outcome indicates a substantial difference between goiter and control group individuals in hypothyroid and hyperthyroid patients. The study concluded that goiter prevalence depends on the higher and lower concentration of TSH.*

**CONCLUSION:** *This study concluded that goiter prevalence may rely on the degree of specifically normal and abnormal TSH levels of hormonal dysfunction. As possible predictors of goiter, female gender, thyroid nodules, and TSH levels were established. The presence of thyroid nodules was predicted by the female gender, TSH levels and thyroid volume. The*

*epidemiological profile of the patients with goiter is warranted in future systematic investigation.*

**KEYWORDS:** *Hyperthyroid; Hypothyroid; Thyroid-Stimulating Hormone (TSH), BMI, RDA, IDD, TFTs*

## **INTRODUCTION**

Arguably, thyroid diseases are among the most common endocrine disorders worldwide. Even, India is no exception. It has been estimated that about 42 million people in India suffer from thyroid disorders, according to projections from various studies on thyroid disease. 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, thyroid diseases are different from other diseases. The corner stone in management remains early diagnosis and treatment. [1]

Goiter, which occurs as a result of the interplay between genetic, environmental, or endogenous influences, is the most common thyroid disorder. Goiter affects about 15.8 percent of the general population and the primary environmental factor influencing the prevalence of goiter is iodine [2]. Although most patients may not encounter clinical symptoms of thyroid and goiter nodules, both conditions can be correlated with disorders such as endocrine deregulation, autoimmune thyroid disease, altered body structure or various metabolic abnormalities [3]. In coordinating the basal metabolic rate and thermogenesis, thyroid hormones play a significant role [4].

One of the most common micronutrient deficiencies globally is iodine deficiency. A variety of diseases that include endemic goiter, hypothyroidism, cretinism, reduced fertility rate, increased infant mortality and mental retardation include iodine deficiency disorder (IDD). [5] Internationally, 15.8 percent of the overall prevalence of goiter is estimated. The highest prevalence is 28.3% in Africa, while the lowest prevalence is 4.7% in America. In South East Asia, the incidence is 15.4 percent.[6] Goiter leads to 2.72 percent of all disease sequel globally due to iodine deficiency. This figure makes goiter the 32nd most prevalent sequel of disease in humans. [7] In India, 54 million people are reported to suffer from goiter, 2.2 million from cretinism, and 90,000 stillbirths and neonatal deaths. [8]

Women are more likely to have thyroid disorders, including goiter and thyroid nodules, although no gender-related associations could be verified by some authors [8, 9]. The correlation of functional and morphological changes in the thyroid with individual risk factors has previously been studied. A important association between smoking and increased thyroid volume, the prevalence of goiter in iodine deficiency areas, has been established by some authors [10].

The goal of the present study was to identify associations of goiter patients with thyroid hormone levels.

## **METHODS**

Study design and participants we did a population-based cross sectional study in 144 patients (72 study group and 72 control group) aged 20-35 years with goiter (Thyroid dysfunction) and normal subject admitted in SMHRC, Nagpur from 8<sup>th</sup> January 2020 to 7<sup>th</sup> November 2020. This study was approved by the Institutional Review Board of the JNMC & ABVRH. All participants provided written informed consent before enrolment.

## **PROCEDURES**

At the Biochemistry Department (clinical laboratory), and JNMC & SMHRC patients with goiter and control group people who do not have goiter, the present study was carried out. 144 people are included in the population sample. The entire population has been classified into two main groups, one being an experimental group and the other a control group. Blood test results indicating normal Thyroid Function Test (TFT) values were reported as normal, whereas patients with non-normal TFT values were reported as abnormal. As a control group, the study group included 72 goiter patients and 72 individuals. Abnormal patients were further classified according to the TSH level values into hyperthyroid and hypothyroid. Laboratory tests conducted at SMHRC Nagpur will accurately diagnose hypothyroidism and hyperthyroidism. Patients with

higher TSH concentrations were designated as hypothyroid and hyperthyroid patients with low TSH concentrations. Individuals without a goiter have been taken as a control sample. Via physical examination and clinical examination, patients with goiter were diagnosed. Thyroid function test results were obtained from SMHRC and JNMC laboratories and standard TSH concentrations (0.27 to 4.2 $\mu$ IU/ml) were maintained as criteria for the diagnosis of thyroid dysfunction.

**Study Design, Study Area, Period and Study Group.** A cross-sectional analysis of patients with a thyroid function test (TFT) requested by the SMHRC Nagpur was performed. The research was conducted among patients clinically suspected of having thyroid disorder and was requested by the SMHRC Nagpur from 8<sup>th</sup> January 2020 to 7<sup>th</sup> November 2020. The frequency of thyroid function tests (TFTs) was the foundation of the half-population study of goiter patients.

#### **Sample Size and Dependent and Independent Variables**

Using simple sampling technology, a total of 144 study participants were included. Thyroid dysfunction, age, gender, faith, marital status, residency, thyroid medication, family history, pregnancy, and intake of iodinated salt were dependent and independent variables.

#### **Inclusion Criteria:**

1. 72 goiter Patients with 20-35 age group were included in the study
2. 72 Healthy Individuals with goiter, 20-35 age group included in the study

#### **Exclusion criteria:**

- Pregnant Women
- Individuals Having Liver Disease
- Tuberculosis Patients
- Carcinoma Patients
- Any other Severe Disease patients were excluded

**Data Collection and Laboratory Methods-** The investigators at the SMHRC and JNMC collected socio-demographic and clinical data. In a clear test tube, three milliliters of blood samples were collected, serum samples were separated for the estimation of T3 (nmol/l), T4 (nmol/l), TSH ( $\mu$ IU/ml) FT3 (pmol/l) and FT4 (pmol/l) thyroid function by using an automated immunoassay analyzer.

**Statistical Analysis-** By interviewing patients, the data was obtained and manually checked, sorted, categorized, and coded. Finally, SPSS version 20 was used to enter and analyzed the data. The data was analyzed to assess the prevalence of various types of thyroid dysfunction. The relative frequencies and ratios were calculated for each thyroid dysfunction group and clinical and cytological trends. There was a chi-squared test and a p-value of <0.05 was deemed statistically important. Hypothyroid has been designated for patients with high TSH concentration, and Hyperthyroid has been designated for patients with low serum TSH concentration, while normal thyroid is considered for patients with normal TSH values.

**Ethical Considerations-** The ethical clearance was obtained from the ethical committee of Datta Meghe Institute of Medical Sciences, Nagpur. The authorization letter was also received from the hospital's clinical director and the head of the laboratory for clinical chemistry. After full written consent from each participant was obtained, the data was collected. All participants in the study were told of the intent of the study, and eventually, prior to data collection, written consent were obtained.

**RESULTS**

**Table 1:** Characteristics of the Study Populations.

Thyroid profile	Study group (N= 72)	Control group (N=72)	P-Value
T <sub>3</sub> (nmol/l)	0.95±0.15	0.80±0.17	P < 0.0001
T <sub>4</sub> (nmol/l)	0.85±0.08	0.65±0.46	P = 0.0004
TSH(μIU/ml)	1.1±0.23	0.81±0.19	P < 0.0001
FT <sub>3</sub> (pmol/L)	0.71±0.20	0.50±0.18	P < 0.0001
FT <sub>4</sub> (pmol/L)	0.19±0.10	0.15±0.06	P = 0.0042

The mean level of T3 and T4 of participants was (0.95±0.15, 0.85±0.08) in study group as well as control group; it was significantly higher in study group than in control group (p < 0 0001 and 0.0004) respectively. Normal patients had a higher prevalence of goiter than study group (p < 0 001). Serum concentrations of TSH were greater in study group as compare to the control group, whereas mean levels of FT4 were higher in affected person than in normal persons.

**Table 2:** showing statistical difference between hypothyroid, hyperthyroid and normal TSH patients of goiter versus control individuals.

Number of patient with TSH concentrations	Total No.	Male Age- 20-35 yrs	Female Age- 20-35 yrs
Normal	72	37	35
Abnormal	72	38	34
High	42	18	24
Low	30	20	10

The statistically significant difference between abnormal, hypothyroid and hyperthyroid patients versus control individuals has been shown in the following table above. Patients with abnormal TSH (50%) and goiter levels have shown that the occurrence of goiter depends not just on thyroid dysfunction tests. In addition, 42% low TSH levels and 58% high TSH levels among abnormal patients have shown that goiter depends on the concentration of TSH. Compared to patients with high TSH levels, patients with low TSH levels have a higher risk of developing the disease.

**DISCUSSION**

Thyroid dysfunction is a widespread endocrine disorder that affects about 300 million individuals worldwide and more than half are believed to be unaware of their disease. Hyperthyroidism and hypothyroidism are the main thyroid conditions, with 1.6 billion people at risk in more than 110 countries worldwide [11]. The prevalence in the US population of hypothyroidism was 4.6 percent, but 0.3 percent of hypothyroidism is clinically apparent. Women are 5 to 8 times more likely than men to have thyroid issues. Moreover, one in eight women will develop a thyroid disorder during her lifetime [12, 13].

While the most common thyroid disease in adult populations is nontoxic goiter, the etiology of this condition is not fully known. In this research, we analyzed levels of thyroid hormones in subjects with goiter. A higher risk of goiter has been found to be dependently correlated with

female gender and lower TSH levels. Thyroid volume, female gender, and TSH levels were significantly correlated with the likelihood of an increased prevalence of thyroid nodules. [14,15] Therefore the research study is inconsistent with Dr. Firdushi Begum's findings that the measurement of serum thyroid hormones and TSH concentrations has significant significance for thyroid problem diagnosis. The study is also not based on the results of Ladenson et al. It was also considered that the TSH test was a criterion for the diagnosis of thyroid dysfunction, especially in cases of minimal thyroid failure [16-18]. The study was inconsistent with the findings of Evered et al. that serum TSH was also found to be elevated and T3 values were also observed in the case of mild hypothyroidism. This research will be helpful in understanding the prevalence of goiter in various subjects, as well as recommending steps to reduce the onset of goiter. It is further suggested that the role of hormonal interactions in these patients in relation to their various metabolic disorders, may also be investigated.

TSH plays a major role in controlling the growth and differentiation of thyroid cells and may play a direct role in the development of nodules [19]. Some authors have stated that iodine may modulate the response of thyroid cells to TSH [20]. Others suggested that iodine suppressive effects can increase the influence of other goitrogenic factors and increase the sensitivity of thyrocytes to TSH in areas with iodine deficiency; thus, goitrogen is converted into normal TSH levels [21].

The results of our study showed an inverse correlation between TSH and goiter. This relationship does not appear to be linked to the direct effect of TSH on the thyroid gland, but may be linked to the gradual increase in the production of goiter thyroid hormones or to the increased mass of the thyroid itself. The presence of thyroid-stimulating antibodies may be another reason for lower levels of TSH in larger thyroids. Unfortunately, our patients have not been screened for these antibodies. The current research has also shown that elevated serum TSH is a goiter-dependent risk factor, indicating that TSH is a significant factor in goiter formation [22, 23].

An association has been documented between gender and goiter prevalence. Knudsen et al. observed that goiter was greater in males than in females, but females were 2 to 10 times more likely than males to have goiter [24]. In our sample, relative to men, women had higher mean goiter, but the overall prevalence of goiter did not vary between genders. Some authors have shown that only after puberty have gender-related differences become visible, indicating that sex hormones can play a role in thyroid volume [21]. The relation between thyroid volume and parity status was previously examined in healthy women [25]. Pregnancy has been suggested to increase thyroid volume, particularly when combined with smoking tobacco and iodine deficiency [25, 28].

## CONCLUSION

This study concluded that goiter prevalence may rely on the degree of specifically normal and abnormal TSH levels of hormonal dysfunction. This research has also shown that the increased risk of goiter is independently correlated with female gender and lower levels of TSH. The epidemiological profile of patients with diffuse goiter is warranted for potential systematic investigation.

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