

# Free Thyroid Hormones in Subclinical Hypothyroidism and Its Preponderance in Jammu Region

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## ABSTRACT

Hypothyroidism is one of the commonest endocrine disorders. Subclinical hypothyroidism is characterized by increased thyroid stimulating hormone levels and normal free T3 and free T4 levels. It is more common in females than males. Its prevalence varies with population, race, region, age, and sex, the presence of auto antibodies to thyroid hormone and method of TSH estimation. It is interrelated with various disease conditions like cardiovascular diseases, hip fractures, cognitive dysfunctions and pulmonary complications and in women, it is related with dysfunctional uterine bleeding, increased incidence of preeclampsia. The present study was conducted in the Department of Biochemistry with the aim to find out the prevalence of subclinical hypothyroidism. It was observed that out of 500 patients included in the study, 24.4% have subclinical hypothyroidism which includes 18% females and 6.4% males. Thus, the prevalence of subclinical hypothyroidism is much more in females. Hence, future studies which include the thyroid antibodies should be done to find the exact reason behind this preponderance of thyroid disorder in women.

**Keywords:** thyroid diseases, subclinical hypothyroidism, prevalence, gender.

## INTRODUCTION

Hypothyroidism is the most common endocrine disorder worldwide. In the developed countries the prevalence of hypothyroidism is about 4-5% and that of subclinical hypothyroidism is about 4-15%.

<sup>[1]</sup> In India, the hypothyroidism is equally as common as in the other countries. Subclinical thyroid disease is defined as high or low serum thyroid stimulating hormone level with a normal serum-free thyroxine (T4) level. Subclinical hypothyroidism is also referred to as mild thyroid failure and is characterized by mildly elevated thyroid stimulating hormone (TSH) but serum free thyroid hormone levels are within the normal range. <sup>[2]</sup> It is a

common problem occurring in 3% to 8% in the population with no known history of thyroid diseases and carries a risk of progression of 2-5% per year to overt hypothyroidism. <sup>[3]</sup> It is the most common thyroid disorder in adults, although more common in females as compared to males, elderly age and there is increase in the incidence with greater iodine intake. <sup>[4]</sup> Iodine deficiency is the commonest cause of goiter. The prevalence of subclinical hypothyroidism varies with population, race, region, age, sex, the presence of auto antibodies to thyroid hormone and method of TSH measurement. Thus, the normal reference range for TSH should be standardized, and an appropriate quality

control procedure should be established by each laboratory. Previously, a panel of experts defined the reference range of normal serum TSH concentration as 0.45 to 4.5 mIU/L based on a statistically defined reference range. [5]

Subclinical hypothyroidism is related with various disease conditions like cardiovascular diseases mainly due to dyslipidemia, hip fractures, cognitive dysfunctions and pulmonary complications. [6] In women, it is associated with dysfunctional uterine bleeding, increased incidence of preeclampsia and pregnancy outcomes. [7] Subclinical hypothyroidism is a laboratory diagnosis, in which most of the patients are asymptomatic without any typical presenting signs and symptoms.

American Thyroid Association (ATA) has also recommended routine screening of TSH at the age of 35 years for both the genders and every 5 years thereafter due to asymptomatic nature of subclinical hypothyroidism. [4] However, the clinical implication and the optimal cutoff values of TSH in these subclinical abnormalities are still controversial. Elevated or depressed TSH is associated with imprecise and mild symptoms in most cases. [8] The treatment of subclinical hypothyroidism is usually considered in patients with infertility, pregnancy, associated symptoms, or high risk of progression to overt hypothyroidism. [9] The treatment of subclinical hypothyroidism is considered in patient who are elderly or at the higher risk of developing osteoporosis [10] or cardiovascular diseases. [11] Progression to overt thyroid disease varies depending on the baseline TSH level and the presence of underlying thyroid disease. Keeping these points in mind, the present study was conducted with aim to find the prevalence of subclinical hypothyroidism in Jammu region.

## MATERIALS AND METHODS

The study was conducted in the Department of Biochemistry, Super Specialty hospital, Government Medical

College, Jammu. 500 apparently healthy individuals in the age range of 20-70 years of age were selected irrespective of their sex. All of the participants were randomly selected. Patients who were fitting into the inclusion criteria and willing to enroll in our study were selected. Informed Consent was obtained from patients enrolled for the study. Patients were excluded from the study if they were using amiodarone, corticosteroids or received any iodinated contrast agent within the previous two weeks or those with diseases that are known to affect thyroid function tests, such as neoplasia, chronic renal failure, cirrhosis of liver, chronic obstructive pulmonary disease requiring antibiotic therapy, diabetic ketoacidosis and pregnant females. Serum obtained from 3 ml of blood drawn from the ante-cubital vein under aseptic conditions from each individual with his/her consent, duly following the guidelines and norms of the hospital, was taken for the estimation of thyroid stimulating hormone and free T3 and free T4 levels. The FT3, FT4 and TSH levels were estimated in Abbott architect chemiluminescent microparticle immunoassay. [12, 13] The reference ranges for the parameters are FT3:1.2-4.4 pg/ml, FT4: 0.8-2.0 ng/dl and TSH: 0.35-4.94  $\mu$ IU/mL. When TSH level is more than 5  $\mu$ IU/ml with normal FT3 & FT4 level, then it is diagnosed as subclinical hypothyroidism. The results were analyzed by applying standard statistical procedures.

## RESULTS

Out of total 500 patients, 7 (1.4%) patients have hyperthyroidism, 355 (71%) patients were normal, 16 (3.2%) patients have hypothyroidism and 122 (24.4%) patients have subclinical hypothyroidism. The TSH levels were ranged between 5.01–17.08  $\mu$ IU/ml with mean value 7.76  $\mu$ IU/ml in patients of subclinical hypothyroidism whereas in normal subjects, the TSH levels were ranged between 0.48-4.95  $\mu$ IU/ml with mean value 2.51  $\mu$ IU/ml. The FT4 ranged between 0.78-1.63 ng/dl with mean value 0.95 ng/dl in patients with subclinical

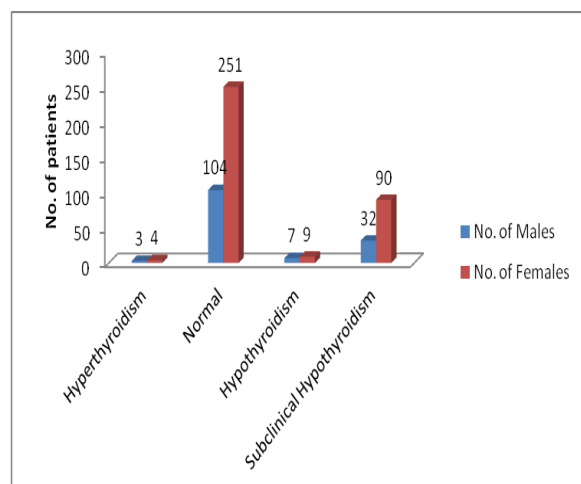
hypothyroidism whereas the value of FT4 ranged between 0.87-1.97 ng/dl with mean value 1.07 ng/dl in normal subjects. The FT3 was ranged between 1.18-2.61 pg/ml in subclinical hypothyroid patients with mean value 1.16 pg/ml whereas it was ranged between 0.46-4.28 pg/ml with mean value 2.97 pg/ml in normal subjects. Out of the total 500 patients, there were 90 (18%) females and 32 (6.4%) males who have subclinical hypothyroidism.

**Table1: Gender distribution of patients in different thyroid disorders**

	No. of Males (Percentage)	No. of Females (Percentage)	Total (Percentage)
Hyperthyroidism	3 (0.6%)	4 (0.8%)	7 (1.4%)
Normal	104 (20.8%)	251 (50.2%)	355 (71%)
Hypothyroidism	7 (1.4%)	9 (1.8%)	16 (3.2%)
Subclinical Hypothyroidism	32 (6.4%)	90 (18%)	122 (24.4%)

**Table 2: Range of FT3, FT4 and TSH in patients suffering from various thyroid disorders**

	No. of patients	Range of FT3 (pg/ml)	Range of FT4 (ng/dl)	Range of TSH (μIU/mL)
Hyperthyroidism	7	5.17-8.71	2.53-20.9	0.01
Normal	355	0.46-4.28	0.87-1.97	0.48-4.95
Hypothyroidism	16	0.68-2.11	0.53-1.28	5.30-45.6
Subclinical Hypothyroidism	122	1.18-2.61	0.78-1.63	5.01-17.08



**Figure 1: Gender wise distribution of patients in different thyroid disorders**

## DISCUSSION

In the present study, it was observed that 24.4% patients suffer from subclinical hypothyroidism; out of these 18% were females whereas only 6.6% were males. Our study was in corroboration with the previous

studies done in coastal Andhra Pradesh, Mumbai and Kashmir which showed more prevalence of subclinical hypothyroidism in females as compared to males. [14-16] As reported by Kim et al, in the previous studies, it was observed that subclinical hypothyroidism showed a higher prevalence in women (6% to 10%) than in men (2% to 4%). [5] One possible explanation for this is might be the higher prevalence of autoimmune thyroid diseases in women. In the Whickham survey, women elderly than 45 years showed more prevalence of subclinical hypothyroidism. [17] In another study conducted by Pedersen et al., [18] on thyroperoxidase antibodies (TPO Ab) and thyroglobulin antibodies (Tg Ab) in 4,649 Danish subjects. It was observed that the presence of both antibodies was more common in females, and a correlation was seen with subclinical hypothyroidism. There is inverse relationship between the iodine intake and thyroid function; decreased iodine intake is associated with hyperthyroid status, while increased or proportionate intake of iodine is related with hypothyroidism. The various risk factors for subclinical hypothyroidism include thyroid autoantibodies, smoking status, environmental temperature and ethnicity. In another study done in North Indian women, subclinical hypothyroidism was more women. Goel M et al, observed normal serum TSH level in 66.2 % women, subclinical hypothyroidism in 32.5 % women and overt hypothyroidism in 1.3% women. [19] Marwaha et al., also observed normal serum TSH level in 90.6% women, 8.1 % women had sub clinical hypothyroidism and 1.3% women had overt hypothyroidism using 5 mIU/L as upper limit of TSH. [20] Dhanwal et al. in their study performed in 2013 reported prevalence of hypothyroidism in 14.3%, patients with a cut-off value of 4.5 mIU/L. [21] Another researcher observed that the annual progression rate of overt hypothyroidism was 1% to 4%, [22] while that of subclinical hyperthyroidism was 0.5% to 1%. [23]

## CONCLUSION

Hypothyroidism is a major health problem worldwide as well as in India. Thus, in our study it was concluded that the prevalence of subclinical hypothyroidism is more in the Jammu region than to more frequent in women. The thyroid disorders including subclinical as well as overt hypothyroidisms are more common in the northern part of the country. Subclinical hypothyroidism is significantly more common in females, and usually present with vague symptoms. Hence the understanding of the prevalence and risk factors of subclinical thyroid disorders could be helpful in the identification/screening, management and follow up of these patients.

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