



SUBCLINICAL HYPOTHYROIDISM: PREVALENCE AMONG APPARENTLY HEALTHY ADOLESCENT TRIBAL POPULATION LIVING IN A FLOOD PRONE REGION OF UPPER ASSAM

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ABSTRACT Subclinical hypothyroidism is a laboratory diagnosis where TSH level is raised, T₄ and T₃ normal, without any visible clinical features suggestive of thyroid disorders. Flood prone areas are deficient in Iodine and population of such areas are prone to develop Iodine deficiency disorders (thyroid hormone abnormalities are thus frequent in such populations). A cross sectional study involving 384 apparently healthy adolescent population belonging to Mising Tribe living in flood prone riverine areas of Majuli district of upper Assam was undertaken to see the variation of T₃, T₄ and TSH levels in the studied population. It was seen that most of the subjects were euthyroid and 35 out of 384 (9.1%) subjects had higher TSH than the upper limit of reference range. Thus the study implies an importance of Thyroid function testing in differential diagnosis and treatment of population belonging to the region.

KEYWORDS : Subclinical hypothyroidism, T₃, T₄, TSH

Introduction:

The term *subclinical hypothyroidism* is defined as a condition with a low-normal free T₄ but a slightly elevated serum TSH level. Other terms for this condition are *mild hypothyroidism*, *early thyroid failure*, *preclinical hypothyroidism*, and *decreased thyroid reserve*. The TSH elevation in such patients is modest, with values typically between 4 and 15 mU/L, although patients with a TSH above 10 mU/L more often have a reduced free T₄ and may have some hypothyroid symptoms. The definition of this syndrome depends significantly on the reference range for a normal TSH concentration. This syndrome is most often seen in patients with early Hashimoto's disease and is a common phenomenon, occurring in 7% to 10% of older women.^{[1][2][3]}

A number of studies on the effects of thyroid hormone treatment in such patients have used physiologic end-points (e.g., measurements of various serum enzymes, systolic time intervals, serum lipids, psychometric testing), and results have been variable. In the most carefully controlled studies, one or another of the parameters has returned to normal in about 25% to 50% of patients.^{[3][4][5][6]} In general, free T₄ and TSH levels normalize, but free T₃, usually normal at the outset, does not change.

The association of mild hypothyroidism with an increase in risk for atherosclerotic heart disease has been shown by some,^{[7][8][9]} but not other studies.^{[4][10]} The impact of treatment to reduce the risk of atherosclerotic heart disease, other than reduction in risk factors such as cholesterol and C-reactive protein, have not yet been studied.

Subclinical hypothyroidism is thus a clinical entity before progressing to frank hypothyroidism and it is a laboratory diagnosis.

Majuli is the largest inhabited riverine island and the country's only river island district. The island is heavily affected by flood annually leaving the soil a iodine deficient one and the population to be vulnerable to iodine deficiency disorders. Iodine is a micromineral required in the synthesis of thyroid hormones (T₃ and T₄). Thyroid stimulating hormone (TSH) controls the synthesis of T₃ and T₄. Thus it is evident that the population of the flood prone island may be affected by iodine deficiency with thyroid hormonal variation in their blood. The Mising tribe is the largest tribe living in the island maintaining their cultural legacy around the riverine flood prone areas. The changes in adolescence (10-19 yrs), as defined by WHO, have health consequence not only in adolescence but also over the life-course. Thus the study was done among adolescent population in the flood prone island to see variation of T₃, T₄ and TSH of the studied population.

Materials And Methods:

Permission/clearance from the Institutional Human Ethics Committee was obtained prior to commencement of the study.

CRITERIA FOR SELECTION OF STUDY POPULATION:

The study was a Cross-Sectional community based Study and it was carried out among Mising tribal population of Majuli district of Assam, in the adolescent age group (10-19 yrs). 384 number of subjects were included in the study for testing the serum T₃, T₄ and TSH levels.

A community development block of Majuli District was selected by simple random process. In the Block, Study population were selected from the villages having the tribal Mising population, by systematic random process and thus every 15th adolescent Mising tribal subject was chosen to include in the study. During the house visits, purpose of visit and procedure of testing were explained first. An informed consent for participating in the test was recorded.

Inclusion criteria:

1. Subject of age group 10 to 19 years.
2. Subject of both male and female sex in the age group
3. Subject who are permanent inhabitant of Majuli.
4. Subject belonging to Mising tribe

Exclusion criteria:

1. Subject below 10 yrs and above 19 yrs will be excluded
2. Subject with personal or family history of thyroid disorders like goiter, hypothyroidism, hyperthyroidism
3. Subject with presence of any fever, hypertension, renal failure, diabetes, hepatic cirrhosis, malignant neoplasm, psychological abnormality and other acute or chronic illness
4. Subject on medication for thyroid disorders.

COLLECTION OF BLOOD SAMPLE:

Under all aseptic and antiseptic conditions 2cc of venous blood was collected from each subject from a suitable peripheral vein (preferably antecubital vein) by venepuncture using a sterile disposable syringe and immediately transferred to sterile clot vial. Samples were allowed to clot and serum was separated. Then the vials containing serum was stored and transported in ice boxes till they reached Biochemistry wing of Central Clinical Laboratory, JMCH and Estimation was carried out in Access Immuno Assay Systems (Beckman Coulter). Quality control (QC) was run regularly and results were accepted when QC was within normal limits.

Results And Observations:

Table 1: Comparison Of T3, T4 And TSH According To Gender (10-19yrs)

GENDER GROUP	T3(ng/ml)	T4(μ g/dl)	TSH(μ IU/ml)
	MEAN \pm SD	MEAN \pm SD	MEAN \pm SD
MALE(N=203)	1.24 \pm 0.21	8.88 \pm 0.99	2.68 \pm 1.39
FEMALE(N=181)	1.23 \pm 0.23	8.99 \pm .94	2.53 \pm 1.52
P VALUE	0.6563	0.2664	0.3131
INFERENCE	Not significant	Not significant	Not significant

From the above given tables and figures it is seen that on comparing between males to female's values of T3, T4 and TSH, the mean and SD values of T3 is slightly higher in males (1.24 \pm 0.21) than females (1.23 \pm 0.23) but this rise is insignificant as p value is >0.05. In T4 estimation, mean values in males (8.88 \pm 0.99) is insignificantly lower than females (8.99 \pm 0.94). On comparing TSH it was seen that the mean of males (2.68 \pm 1.39) were higher than females (2.53 \pm 1.52), but it is not statistically significant with a p value of >0.05.

Table 2: Comparison of subclinical hypothyroidism (SCH) in male and female adolescent age group.

	Male	Female	P value (Fisher's Exact Test)
Number of subjects with SCH	20	15	0.7229
Number of subjects without SCH	183	166	

From the above table it is seen that 20 male and 15 female had subclinical hypothyroidism. Using Fisher's Exact Test, the significance of subclinical hypothyroidism was tested in male and female population and it was found to be non-significant. (p value > 0.05)

Discussion:

Evaluation of serum T3, T4 and TSH categorises the results into clinical conditions Subclinical Hypothyroidism (High TSH, Normal T3, T4) Hypothyroidism (High TSH, Normal/low T3, low T4), Subclinical Hyperthyroidism (Low TSH, Normal T3, T4) and Hyperthyroidism (low TSH, High/Normal T3, T4).^[11]

The reference range in the present study laboratory were as such -T3 (0.87-1.78 ng/mL), T4 (6.09-12.23 μ g/dL) and TSH (0.34-5.0 μ IU/ml). Results were analysed clinically based on these normal range values of the parameters.^[12,13]

The present study population was euthyroid with normal T3, T4 values and 9.10% of the total population having above normal TSH value. This showed prevalence of subclinical hypothyroidism in the age group studied.

Catli G et al states that the prevalence of Subclinical hypothyroidism in children and adolescents is reported between 1.7% and 9.5%. It was suggested that SCH is entirely an asymptomatic laboratory diagnosis.^[14]

Seshadri KG states that the prevalence of Subclinical hypothyroidism in the paediatric and adolescent population is <2%. Despite the limited data available, subclinical hypothyroidism in children and adolescents appears to be a benign and remitting disease with a low risk of evolution to OH. It appears that thyroid hormones appear to be functioning well despite elevated TSH.^[15]

In the present study the percentage of subclinical hypothyroidism was higher than Catli G et al and Seshadri KG et al study findings.

Although High TSH levels are found in iodine deficient zones but some studies say that TSH level may be normal despite iodine deficiency.^[16]

Bhattacharjee A et al evaluated Thyroid hormone profile (T3, T4 and TSH) in 140 school children living in Sub Himalayan Tarai region, an area with moderate iodine deficiency. In their study, none of the study population had overt hypo or hyperthyroidism. It is exactly similar to the present study. Both the studies advocated prevalence of subclinical hypothyroidism in iodine deficient regions. Bhattacharjee A et al found that 10% of the children had above normal TSH value with normal T4. The present study is comparable to this study. In the present study,

percentage of population having above normal TSH with normal T3, T4 value was 9.10%. In the present study higher percentage of male had above normal TSH values (5.20%) than females (3.9%). In the Bhattacharjee A et al study also 7.7% girls and 12.9% boys had high TSH. Thus there is similarity in this finding between the two studies.^[16]

Yavuz O et al study in an iodine deficient region of Turkey found no overt hypothyroidism or hyperthyroidism in their study population based on thyroid hormone estimation. 4.2% of the total population had subclinical hypothyroidism with not much difference between girls (1.5%) and boys (2.7%). This finding is comparable to the present study with 9.1% having subclinical hypothyroidism, male (5.2%) and female (3.9%), with no frank hypo or hyperthyroidism.^[17]

Conclusion:

The apparently healthy population under the present study showed a normal T3 and T4, with a raised TSH levels in 35 subjects (9.1%) out of total 384 subjects studied. Thus it implies that subclinical hypothyroidism is present in the present study population in a masked manner and a larger population based study is thus advocated.

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