



ORIGINAL RESEARCH PAPER

Medicine

Serum T3,t4 And Tsh Levels In Healthy Adolescent Female Subjects Belonging To An Ethnic Community Living In A Flood Prone Riverine Island Of Assam

KEY WORDS:
T3,T4,TSH,Adolescent

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ABSTRACT

Thyroid hormone regulates almost every systemic human physiology. Population living in flood prone riverine areas are more susceptible to iodine deficiency. As this micromineral is required in organification- a step in the synthesis of the two active thyroid hormone T3 and T4,thus in such population altered thyroid function is most likely. Adolescent growing population of such regions specially female population upon whom thyroid hormones have specific regulatory effects on puberty,reproduction,pregnancy etc.are quite vulnerable to health disorders as this period is important for somatic and reproductive growth. Research on them is an indirect reflection of implementation and impact of health policies also.In the present study, among the 181 apparently healthy adolescent female population of Mising community (the community with highest percentage population wise) living in Majuli,a rive island in Assam, the thyroid hormone status measuring T3, T4 and TSH was evaluated. The subjects were mostly euthyroid and Serum TSH level was significantly higher in late adolescent females than early adolescent female (P value <0.05).The study implied effects of iodine deficiency in a flood prone region, on the serum TSH leves in apparently healthy female subjects and importance of measuring serum TSH as a physiological marker in differential diagnosis of adolescent female health disorders.

Introduction:

Thyroid gland produces two related hormones thyroxine (T4) and triiodothyronine(T3). The thyroid hormone secretion is controlled primarily by thyroid-stimulating hormone (TSH) secreted by the anterior pituitary gland.⁽¹⁾

Under normal conditions,TSH level in blood vary according to thyroid hormone levels. High TSH level indicates lowered thyroid activity and vice versa. Thus blood TSH concentration is a useful physiological marker of thyroid hormone activity.⁽²⁾

Serum TSH level has been found to change with age in relation to the iodine intake.The thyroid gland requires iodine for hormone synthesis, hence adequate dietary intake of iodine is, therefore,essential.⁽³⁾The daily dietary intake of iodine varies widely throughout the world, depending on iodine content of soil and water and on dietary practice.⁽⁴⁾The population iodine intake level is a major determinant of the types of thyroid abnormalities prevalent in a particular community⁽⁵⁾ Iodides ingested orally are absorbed from the gastrointestinal tract into the blood in the same manner as chlorides. Normally most of the iodides are rapidly excreted by the kidneys, but only after about one fifth are selectively removed from circulating blood by cells of the thyroid gland and used for synthesis of the thyroid hormones.⁽⁶⁾

Human needs approximately 130-150 µgm of iodine daily for normal thyroid activities.⁽⁷⁾ Dietary iodine deficiency stimulates TSH secretion which results in thyroid hypertrophy. The enlargement of the thyroid gland due to Nutritional iodine deficiency is called endemic goiter. Iodine intakes consistently lower than 50 µgm/ day usually result in goiter. With severe and prolonged iodine deficiency, the effects of a deficient supply of T3 and T4 hormones may occur.⁽⁸⁾

Thyroid diseases in older age group differ from those observed in younger age group in their prevalence and clinical expression. Their treatment often deserves special attention because of increased risk of complications.⁽⁹⁾During childhood and adolescence, basal TSH levels are presumed to be the most valuable parameter for diagnosing hypothyroidism and hyperthyroidism.⁽¹⁰⁾

Adolescence is one of the most rapid phases of human

development. The World Health Organization (WHO) defines an adolescent as any person between ages 10 and 19 years.⁽¹¹⁾ This vulnerable growing period creates increased demands for energy and of nutrients. Nutrition and physical growth are integrally related. Like increase in recommended amounts of other dietary elements, dietary requirement of the micro-mineral Iodine also increases during growth from 120µgm/day in 9-13 years to 150-120µgm/day in 14-18 years and 19-30 years accordingly.⁽¹²⁾

The changes in adolescence have health consequence not only in adolescence but also over the life-course. The unique nature and importance of adolescence mandates explicit and specific attention in health policy and programmes.⁽¹³⁾

The functions of thyroid gland have much to do with a women's reproductive system ,particularly if the thyroid is overactive or underactive. The imbalance in hormone levels may have various effects on puberty and menstruation, reproduction, pregnancy and post-partum period.⁽¹⁴⁾

Taking into account the above considerable points a study was undertaken to measure the thyroid hormone (T3,T4 and TSH) status among the adolescent(10-19 years) female population of the Mising community living in Majuli,a heavily flooded iodine deficient zone.

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) female subjects . 181 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 systemic random process and thus every 15th adolescent female 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 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 and male subjects were 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:

T3, T4 and TSH levels of the present study population were found to be according to table no. 1

TABLE 1: T3, T4 AND TSH LEVELS IN TOTAL POPULATION (10-19 YRS)

GENDER GROUP	T3(ng/ml)	T4(µg/dl)	TSH(µIU/ml)
	MEAN±SD	MEAN±SD	MEAN±SD
(N=181)	1.23±0.23	8.99±0.94	2.53±1.52

Table 2: Comparison of T3, T4 and TSH in different age group of subjects:

AGE GROUP (YEARS)	T3(ng/ml)	T4(µg/dl)	TSH(µIU/ml)
	MEAN±SD	MEAN±SD	MEAN±SD
(EARLY ADOLESCENT) 10- <15 (N=65)	1.24±0.16	9.12±0.73	2.21±0.89
(LATE ADOLESCENT) 15 – 19 (N=116)	1.22±0.26	8.92±1.03	2.69±1.70
UNPAIRED t VALUE	0.5629	1.382	2.118
P VALUE	0.5742	0.1686	0.0356
INFERENCE	Not significant	Not significant	Significant (p value <0.05)

The total 181 subjects were categorised into age groups of early adolescence (10- <15 yrs) and late adolescence (15 – 19 yrs). From the comparison of T3, T4 and TSH in different age group of subjects (Table 2), it is seen that the mean T3 value is insignificantly higher in early adolescents (1.24±0.16) than late adolescents (1.22±0.26), also the mean values of T4 was higher in early adolescents (9.12±0.73) than late adolescents (8.92±1.03) and however both changes statistically not significant. When the TSH level was compared there was also increase in late adolescents (2.69±1.70) than early adolescents (2.21±0.89), and it was statistically significant (p value <0.05).

Table 3: No. of subjects having subclinical hypothyroidism

	Subclinical hypothyroidism	Hypothyroidism	Subclinical hyperthyroidism	Hyperthyroidism
(early adolescent) 10-<15 yrs	3	-	-	-
(late adolescent) 15-19 yrs	12	-	-	-

Statistical Analysis: Statistical analysis was done using MS-Excel and online graph pad instat software.

DISCUSSION:

In the study population the mean± SD T3(ng/ml) values were respectively 1.24±0.16 and 1.22±0.26 in early and late adolescence. None of the changes were statistically significant, relatively high T3 values were found in the younger populations.

In the study population the mean±SD T4(µg/dl) values were respectively 9.12±0.73 and 8.92±1.03 in early and late adolescent period. None of the changes were statistically significant, relatively high T4 values were found in the younger populations.

In the study population the mean±SD TSH (µIU/ml) values were 2.21±0.89 and 2.69±1.70 in early and late adolescence respectively. These changes were statistically significant, significantly higher TSH values were found in the late adolescent populations.

In the present study T3, T4 values decreased relatively in the late adolescence than the early one. These pattern of variation in T3, T4 of present study population is comparable with the different literature of Carabulea G et al⁽¹⁵⁾, Kaloumenou I et al⁽¹⁶⁾, Elmlinger MW et al⁽¹⁷⁾ and Radicioni A F et al⁽¹⁸⁾

In the present study TSH increased significantly in the late adolescence than the early one. The studies of Thakur C et al⁽¹⁹⁾ and Kaur G et al⁽²⁰⁾ done in known iodine deficient Indian regions and the studies of Dambal AA⁽²¹⁾, Kumari T et al⁽²²⁾ done to see the age and gender specific changes in healthy individuals of different ages of India are comparable to the present study. Different ethnicity, geographical location, slight differences in the age groups compared and amount the iodine intake are some of the reasons for the similarities and dissimilarities of these findings to the present study.

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).⁽²³⁾ The reference range in the present study laboratory were as such -T3 (0.87-1.78 ng/mL), T4 (6.09-12.23 µg/dL) and TSH (0.34-5.0 µIU/ml). Results were analysed clinically based on these normal range values of the parameters.^(24,25) In the present study higher number (12 numbers) of subclinical hypothyroid subjects were found in late adolescents than early adolescents (3 numbers). The present study population showed iodine deficiency induced change patterns were in T3, T4 and TSH levels. Further, elder adolescents with poor thyroid function than the younger ones suggested an effect of duration of iodine deficiency and physiological variations from adolescence to adulthood. Our findings are comparable to studies of Mahanta A⁽²⁶⁾, Begum F⁽²⁷⁾.

CONCLUSION:

The present study population of adolescent apparently healthy female subjects were although euthyroid showed a higher TSH values with increasing age, iodine deficiency of the land mass due to frequent flood can be an indicative of their higher TSH. The present study population were mostly belonged to a poor section of society. Total thyroid function (T3, T4, TSH) test if not permitted due to financial constraints, at least TSH measurement should be routinely included and advised in differential diagnosis for

people of this region. Awareness of Iodinated salt consumption is to be more invasively undertaken among the community studied as they are living in a flood affected isolated landmass with lower access to readily available print and electronic information sources.

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