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ASSESSMENT OF IODINE AND NON-IODINE DEFICIENCY HYPOTHYROIDISM IN WOMEN OF REPRODUCTIVE AGES IN THE SUB-HIMALAYAN PLAINS OF WEST BENGAL

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Abstract : Indian women of reproductive age groups commonly suffer from hypothyroidism which may be due to iodine or non iodine deficiency causes. This study was undertaken with a view to ascertain the leading cause of hypothyroidism in women of reproductive age group residing in the sub-Himalayan plain areas of Darjeeling district of West Bengal. Serum TSH, T_4, T_3 and Urinary Iodine Excretion (UIE) levels were measured in 101 non pregnant women. Our results reveal that among 37.62% (n=38) of bio-chemically established hypothyroid women; majority 76.32% (n=29) are suffering from iodine deficiency and the rest 23.68% (n=9) have Hypothyroidism due to other causes. Moreover, iodine deficiency persists among 57.42% (n=58) of the women in our study. We conclude that iodine deficiency disorders are still a major problem in this region and hypothyroidism due to iodine deficiency is more prevalent than the non iodine deficiency causes. Hence lacunae in the iodine supplementation process needs to be reviewed.

Key words : iodine hypothyroidism women UIE

INTRODUCTION

Hypothyroidism, a progressive disorder of the thyroid gland, is a common condition affecting women more than men. The women of the reproductive age group form a vulnerable section of the society because of the association of hypothyroidism with anemia, decreased fertility (1), impaired mental function (2), coronary heart diseases and atherosclerosis (3). This disorder increases the risk of abortion, premature delivery, stillbirth (4) and birth of congenitally defective babies (5) in pregnant women. Hypothyroidism during fetal and post natal life also interferes with normal development and maturation of Central Nervous System (6–7).

A chronic lack of iodine in the diet is the

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most common cause of hypothyroidism in many developing countries. This is now rare in the developed countries because of dietary iodine supplementation. Non Iodine deficiency causes, mainly chronic autoimmune Hashimoto's thyroiditis is the most common in those countries (8–10). However, Iodine Deficiency Disorders (IDD) continues to be a major public health problem in India (11–17). In West Bengal, a few studies, conducted in this direction, confined to the South Bengal districts, have reported the prevalence of endemic goiter and associated iodine deficiency disorders (IDD) in the pregnant ladies and children (18–24). No report is available about the gravity of this problem in the North Bengal region especially in Darjeeling District. It is assumed that due to consumption of iodized salt as the IDD prevention programme (NIDDCP) continues (25–26), non-iodine deficiency disorder may emerge as the leading cause of hypothyroidism in this sub-Himalayan area of West Bengal.

Objective of the study

This study was undertaken with a view to ascertain the leading cause of hypothyroidism as indicated by high serum TSH level and assessment of Iodine status by urinary iodine estimation (UIE) in women of reproductive age group dwelling in this region.

MATERIALS AND METHODS

A total of 101 non-pregnant women between 14 to 49 years, provisionally diagnosed as hypothyroidism, were selected for the study form the Out Patient Departments of North Bengal Medical College and Hospital in Darjeeling district of West Bengal. The provisional diagnosis of these patients for hypothyroidism was made by the clinical parameters as depicted in Table I. Individuals with >4 positive signs/ symptoms were ruled in and considered for further biochemical investigations.

TABLE I : Clinical parameters.

Clinical sign symptoms	*No. of subjects with positive signs/ symptoms*	*No. of subjects with and negative signs/ symptoms*
Thyroid gland size enlarged	32	69
Weight gain	38	63
Loss of Appetite	48	53
Tiredness	75	26
Cold Intolerance	49	52
Hoarseness of Voice	45	56
Bradycardia	52	49
Palpitation	16	85
Rough Skin	58	43
Ankle Reflex	36	65
Menorrhagia	20	81
Periorbital edema	47	54

As the pregnant women may have iodine deficiency due to increased iodine demand (27), they were not included in this study. Patients with premenopausal, perimenopausal and postmenopausal symptoms were excluded from our study. Patients with diabetes mellitus, hypertension, renal failure or other endocrinal diseases were also excluded from the study. With prior clearance from the Ethical Committee of North Bengal Medical College and Hospital, blood samples were collected aseptically from the superficial veins from the individuals after taking informed consent. The serum separated and preserved in –20 degree centregrade for estimation. Urine samples were collected in

a clean and sterile container and preserved similarly. Urine Iodine Excretion (UIE) levels were estimated by wet digestion method (28–29). Serum TSH, T3 and T4 and TPOAb levels were estimated by Immunoenzymometric assay (30–32) in the department of Biochemistry using standardized reagent kits (Lilac). The sensitivity of the tests for TSH, T4 and T3 was 0.078 µIU/ml, 0.4 µg/dl and 0.4 ng/ml respectively. Regarding the within assay and between assay precisions for TSH, the coefficient of variation (C.V.) of this ELISA methods using different pooled serum samples were upto 4.9% and 5.9% respectively. C.V. for the inter assay and intra assay precisions of T3 is upto 7.9% and 4.5% and of T4 is 6.7% and 8.3% respectively.

Statistical analysis

Results were analyzed using SPSS-10 software programme. Unpaired, two tailed t test and Pearson's correlation done to analyze clinical and laboratory data. P≤0.05 was considered statistically significant (33).

RESULTS AND DISCUSSION

Serum TSH, T_3, T_4, UIE and TPOAb values of the study subjects are depicted in Table II. Out of a total number of 101 study subjects, 37.62% (n=38) are suffering from hypothyroidism as indicated by the high level (> 6.16 µIU/ml) of serum TSH in these patients. Remaining 63 (62.38%) subjects are biochemically euthyroid. This indicates quite a very high prevalence of this disease in this region. 29 out of these 38 (76.32%) hypothyroid patients, had their UIE levels below the normal range (< 5 µg/dl) as shown in Fig. 1a. These patients are suffering from iodine deficiency disorder. Hence hypothyroidism due to iodine

TABLE II: Biochemical parameters of the study subjects.

Test parameters	*Values (Units)*	*No. of patients*	*Mean±SD*	*Significance* (P<0.05)*
TSH	High (> 6.16 µIU/ml)	38	11.27±3.32	
	Within Reference Range (0.39–6.16)	63	5.09±0.39	0.001
T_4	Within Reference Range (> 4.8 µg/dl)	90	9.15±5.69	0.002
	Low (< 4.8 µg/dl)	11	2.80±1.40	
T_3	Within Reference Range (>1.1 nmol/L)	99	2.90±1.36	0.005
	Low (< 1.1 nmol/L)	02	0.76±0.46	
UIE	Within Reference Range (> 5 µg/dl)	43	8.39±3.46	0.001
	Low (< 5 µg/dl)	58	2.75±1.08	
High TSH (>6.16 µIU/ml) With Lower UIE Levels		29		
High TSH (>6.16 µIU/ml) With Normal UIE Levels		09		0.005
TPOAb (IU/ml)		09	175±51.5	

*t tests done; P<0.05 considered statistically significant.

deficiency is still the major cause especially in women of reproductive age group in these sub- Himalayan plains of Darjeeling district. The present study is in accordance with the observations by other workers showing similar magnitude of problems existing in Sub- Himalayan plain areas of other state (34–35). Nine (68%) out of 38 patients, having their UIE levels within normal range (5 to 15 µg/dl), are suffering from hypothyroidism due to non- iodine deficiency causes (Fig. 1b). These subjects (66.66%, n=9) had increased serum TPOAb values indicating autoimmune thyroiditis . The present study also revealed that among the biochemically euthyroid ladies (n=63), 46.03% (n=29) had UIE level below normal limit (Fig. 1c). These women have iodine deficiency and potential for developing hypothyroidism in future.

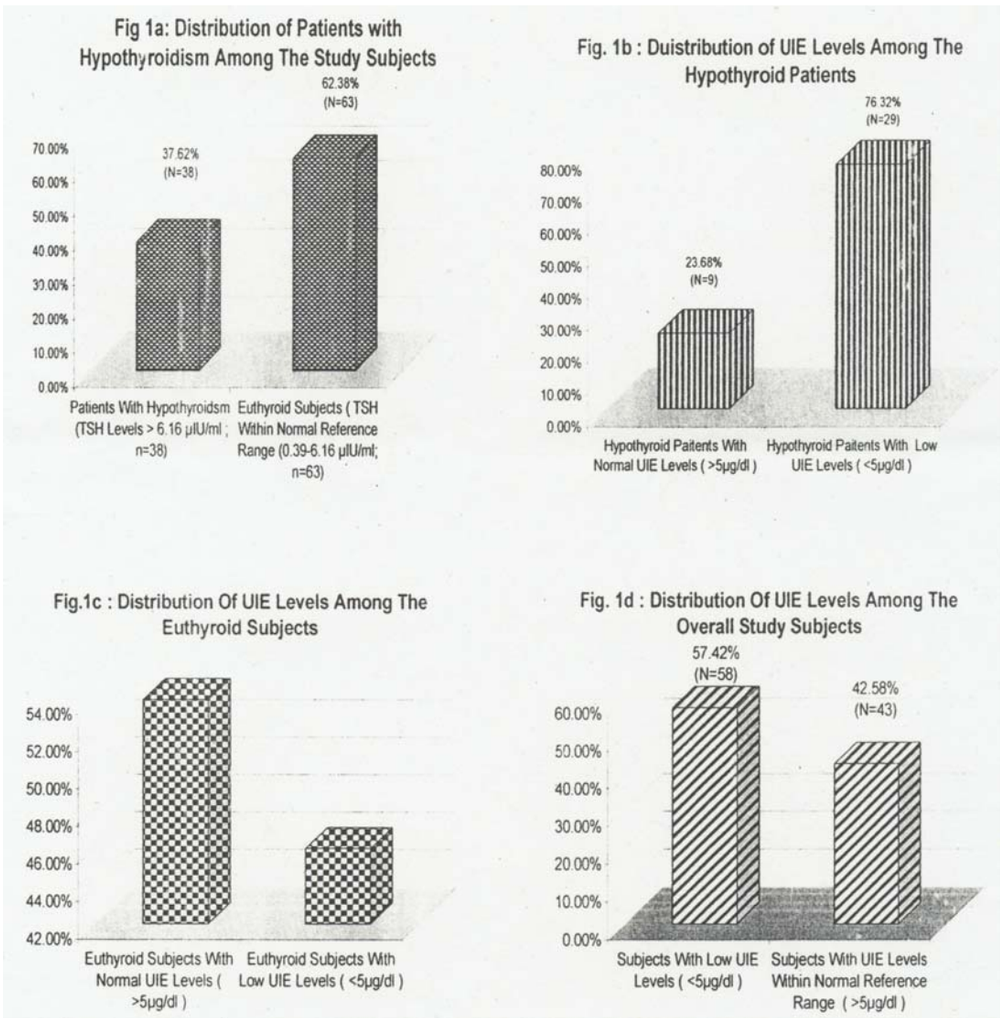

TABLE III: Age wise distribution of serum TSH, T_4 & T_3 and urinary iodine excretion levels in the study subjects.

Groups	*Age (Years)*	*TSH Levels (μIU/ml)*	*T4 (μg/dl)*	*T3 (nmol/L)*	*UIE (μg/dl)*
Group A	15–20	6.95±5.51	8.25±3.45	2.97±1.14	5.15±2.62
Group B	21–30	6.47±5.99	7.60±2.8	2.55±1.53	5.46±3.52
Group C	31–40	6.09±4.46*	8.65±4.5	2.49±1.53	4.18±3.39
Group D	41–49	7.19±1.23*	8.01±3.5	2.60±1.55	5.96±3.70

*t tests done; $P<0.05$ considered statistically significant.

Overall, 58 subjects (29 Patients + 29 euthyroid individuals; 57.42%) among 101 women, in our study, have been identified with iodine deficiency, as evident by the sub-normal level of UIE (Fig. 1d). Therefore, our study reveals that iodine deficiency still remains the major cause of hypothyroidism in this part of country, even after 30 years of iodized salt supplementation programme [NGCR 1962 then renamed NIDDCP; 1992] introduced.

Age wise distribution analysis in our study (Table III) revealed that the non pregnant women in the age group of 41 to 49 years have significantly higher serum TSH values than the other younger groups and hence they are more vulnerable to develop hypothyroidism. This is in accordance with the study in the Danish population (36) which shows that mild and moderate iodine deficiency was associated with a decrease in serum TSH with age.

Although considering a small sample size, our findings showed that iodine deficiency disorder still remains a major problem in this region and hypothyroidism due iodine deficiency is more prevalent than the non iodine deficiency causes in the women of reproductive ages dwelling in this area. Hence Iodine Deficiency Disorders Control Programme needs to be resurveyed and reassessed in this endemic zone and lacunae in the iodine supplementation processes required to be reviewed.

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