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RESEARCH ARTICLE

Assessment of Thyroid Function among the individuals of tea garden community of Assam: A Hospital based Study.

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Abstract

Background: Thyroid disorder has been a very common problem all over the world. Thyroid problem in β -thalassemia major patients are well documented.

Aim of the work: The aim of this study was to find out the status of thyroid profile among the tea garden community of Assam and the effect of hemoglobinopathy and β -thalassemia over it.

Materials and methods: A total 265 patients belonging to the tea garden community were recruited for the study. Laboratory investigations were done for thyroid function, hemoglobin typing and complete blood count. Statistical analysis was carried out using SPSS 21.0 and Pearson correlation and regression analysis were applied.

Results: A total 36 patients were detected with thyroid dysfunction. Among these, 34 have hypothyroidism (12.8%) and 2 have hyperthyroidism (0.8%). Hemoglobinopathies and β -thalassemia were detected in 181 (68.3%) of the patients. About 88% of the studied population was anemic. Female individuals were found to be more anemic than males. The study showed that there were positive correlation between Hb and TSH level ($r = 0.18$, $P = 0.003$), TSH and T4 level ($r = 0.240$, $P < 0.0001$), TSH and T3 level ($r = 0.383$, $P < 0.0001$). The age of the patients were correlated negatively with the T3 ($r = -0.147$, $P = 0.017$) and TSH ($r = -0.157$, $P = 0.012$) levels. Gender had a significant effect on the levels of TSH ($P = 0.01$) and T4 ($P = 0.01$).

Conclusions: The present study was able to show the status of the thyroid profile among the tea garden community of Assam.

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Introduction:-

Thyroid disorders are one of the commonest endocrine disorders worldwide. It has been estimated that about 42 million people in India are suffering from this problem. The two thyroid dysfunctions are hypothyroidism and hyperthyroidism. Subclinical hypothyroidism is a type of hypothyroidism, which is also known as mild thyroid failure. In subclinical hypothyroidism TSH levels are elevated and the total or free T4 and T3 values are normal. The overall prevalence of subclinical hypothyroidism has been reported in the range of 4–10% in large general population screening surveys (Tunbridge et al., 1977; Canaris et al., 2000; Hollowell et al., 1999; Geul et al., 1993; Rivolta et al., 1999) and from 7–26% in studies of the upper age groups (Tunbridge et al., 1977; Canaris et al., 2000; Hollowell et al., 1999; Bagchi et al., 1990; Sawin et al., 1979; Lindeman et al., 1999; Hak et al., 2000; Rosenthal et al., 1987; Parle et al., 1991). Central hypothyroidism is another type of hypothyroidism, which is characterized by a defect of thyroid hormone production due to insufficient stimulation by TSH of an otherwise normal thyroid gland (Hak et al., 2000; Rosenthal et al., 1987; Parle et al., 1991; Yamada and Mori 2008). Globally 2-5% prevalence of hypothyroidism has been reported (Lania et al., 2008). Anemia is a common symptom among the individuals affected with hypothyroidism. It is reported in 20-60% of the patients with hypothyroidism (Rose 2001;

Persani and Beck-Peccoz 2012). In Assam, tea garden community is a distinct occupational group migrated from different states of India (Reddy 2002). Sickle cell anemia and β -thalassemia are highly prevalent among the tea garden community of Assam. Studies have reported the prevalence of thyroid dysfunction among the individuals affected with Sickle cell anemia and β -thalassemia (Mehmet et al., 2012; Antonijevic et al., 1999; Christ-Crain et al., 2003; Ozen et al., 2013; Pantelakis 1994; Landau et al., 1993; Agarwal et al., 1992; Magro et al., 1990).

Therefore, the aim of this study was to find out the status of thyroid dysfunction among the tea garden community of Assam with special reference to hemoglobinopathies and β -thalassemia.

Materials and Methods:-

Patients within the age group of 18-55 years from both Out-Patient Department (OPD) and in-patient department (IPD) of a tertiary care hospital in North East India were included in the study. The whole study was approved by the Institutional Ethics Committee. Written informed consent from each patient was obtained before collection of blood samples. A total of 265 patients were recruited for the study. Both female and male individuals were included. The inclusion criteria for enrollment into the study were: (1) all the persons should belong to the tea garden community of Assam; (2) do not have a blood transfusion history in last 3 months. A detailed questionnaire was used to record information regarding age, gender, ethnicity, history of blood transfusion etc.

Blood sample collection:-

3ml of venous blood was collected under complete aseptic conditions from each individual in K3EDTA vials as well as clot activator vials. The samples collected in clot activator vials were allowed to clot and then centrifuged using standard laboratory procedure to separate the serum.

Hematological tests:-

Complete blood count (CBC) and Hemoglobin typing for all the samples were done using automated blood analyzer (SYSMEX XS- 800i, Japan) and D10 Hemoglobin Testing System (BioRad Laboratories, USA) respectively.

Thyroid profile assay:-

Thyroid profile for all the samples was evaluated by measuring serum total thyroxin (T3), serum total triiodothyronine (T4) and thyroid-stimulating hormone (TSH). All the measurements of thyroid profile were done by IMMULITE[®] 1000 Immunoassay system (Siemens Healthcare, Germany).

Statistical analysis:-

Statistical analysis was carried out using SPSS 21.0 and Pearson correlation and regression analysis were applied in statistical evaluations. Statistical significance was accepted as $P < 0.05$. Results were expressed as mean \pm standard deviation (SD).

Results:-

A total of 265 patients (18-55 years old) were included in the study. The mean age was 26.4 ± 7.9 years. Within these patients 49 were male and 216 were female. After testing their thyroid profile, 36 patients were detected with thyroid dysfunction. Among these, 34 have hypothyroidism (12.8%) and 2 have hyperthyroidism (0.8%). Total 181 (68.3%) patients were detected to have hemoglobinopathies and β -thalassemia. The prevalence of hemoglobinopathies and β -thalassemia in the study population was shown in **Table 1**. In this study, 5 patients were detected with β -thalassemia major and all of them have subclinical hypothyroidism. Sickle cell disease (HbSS) was detected in 8 patients and only one of them has subclinical hypothyroidism. Hyperthyroidism was detected in 2 patients who have sickle cell trait (Hb AS). Data showed that thyroid dysfunction was higher in females (10.9%) than in males (2.6%). About 88% of the study population was anemic. Female individuals were more anemic than males. Among all the anemic patients detected in the study, 14.5% had thyroid dysfunction. There were 4 individuals with central hypothyroidism (1.5%), 30 individuals had subclinical hypothyroidism (11.3%) and 2 individuals had hyperthyroidism (0.8%). Among the 4 central hypothyroidism cases detected during the study, 2 of them have Sickle cell trait (Hb AS). One subclinical hypothyroidism case was detected in a patient who was affected with Hb E/ β -thalassemia. The Mean \pm SD of different hematological parameters and age among the individuals having thyroid dysfunction were shown in **Table 2**. The study showed that there were positive correlation between Hb and TSH level ($r = 0.18$, $P = 0.003$), TSH and T4 level ($r = 0.240$, $P < 0.0001$), TSH and T3 level ($r = 0.383$,

$P < 0.0001$). The age of all the patients were correlated negatively with the T3 ($r = -0.147$, $P = 0.017$) and TSH ($r = -0.157$, $P = 0.012$) levels. Gender had a significant effect on the levels of TSH ($P = 0.01$) and T4 ($P = 0.01$).

Discussion:-

This was the first study of its kind to be conducted among the tea garden community of Assam. In this study, all the individuals were tested for thyroid profile after evaluating their hemoglobinopathy and β -thalassemia status. 36 individuals were found to have abnormalities in thyroid profile, of which 34 had hypothyroidism and 2 were detected with hyperthyroidism. Earlier reports have shown that subclinical hypothyroidism or mild thyroid failure was a common problem, with a prevalence of 3% to 8% in the population without known thyroid disease (Hollowell et al., 2002, Karmisholt et al., 2008). This study showed that the prevalence of subclinical hypothyroidism was 11.3%, which was slightly higher than the other reports. The prevalence of subclinical hypothyroidism in females was higher than males (Hollowell et al., 2002). This study showed the prevalence of subclinical hypothyroidism was 9.4% in females and 1.9% in males. The result of the present study matches with the previous report. In the studied group there was a high prevalence (68.3%) of hemoglobinopathy and β -thalassemia. Thyroid dysfunction in β -thalassemia major patients has been reported with variable prevalence, with a low range of 0% to 12% (Grundy et al., 1994; Gulati et al., 2000; Borgna-Pignatti et al., 2004) or a high of 16% to 35% (Oerter et al., 1993; Cario et al., 2000; Aydinok et al., 2002). In this study the prevalence of thyroid dysfunction in β -thalassemia major individuals was 1.9%. Other studies have reported abnormal thyroid functions in individuals with Sickle cell disease (Phillips et al., 1992; Fung et al., 2006). Present study showed the prevalence of thyroid dysfunction in Sickle cell Disease individuals was 0.4%. Mediocre anemia is commonly seen in hypothyroidism. Anemia is defined in 20-60% of the patients with hypothyroidism (Antonijevic et al., 1999; Christ-Crain et al., 2003). Anemia was the common symptom that has been detected in all the cases during this study. A total of 234 anemic patients have been detected in the study and 13.7% of them have hypothyroidism.

Conclusion:-

We conclude that the prevalence of thyroid dysfunction was high among the tea garden community of Assam. A community based study should be done to get a more accurate picture of it. Proper diagnostic facilities for thyroid dysfunction must be made available by the government in the hospitals of the tea gardens.

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Table 1:- Status of hemoglobinopathy and β -thalassemia in the studied groups

Thyroid profile	Hb AA	Hb AS	Hb SS	Hb AE	Hb EE	Hb E/ β -thalassemia	Hb S/ β -thalassemia	β -thalassemia trait	β -thalassemia major	Total
Central hypothyroidism	2	2	0	0	0	0	0	0	0	4
Subclinical hypothyroidism	15	4	1	0	0	1	0	4	5	30
Hyperthyroidism	0	2	0	0	0	0	0	0	0	2
Normal	67	92	7	7	6	14	3	33	0	229
Total	84	100	8	7	6	15	3	37	5	265

Table 2:- Hematological data and age (Mean \pm SD) of the patients with their thyroid profile

Thyroid Profile	Age (yrs.)	Hb (g/dl)	RBC ($\times 10^6/\mu\text{l}$)	MCV (fl)	MCH (pg)
Central Hypothyroidism	28.5 \pm 4	10.1 \pm 0.2	3.9 \pm 0.4	88.9 \pm 15.8	25.9 \pm 3.3
Subclinical Hypothyroidism	25.2 \pm 6.9	8.1 \pm 3.3	3.4 \pm 1.7	67.4 \pm 31.2	20.2 \pm 9.3
Hyper Thyroidism	28 \pm 0	10.2 \pm 0.3	3.5 \pm 0	87.2 \pm 0	28.9 \pm 0
Normal	26.5 \pm 8.1	9.9 \pm 2.3	4.2 \pm 2.9	78 \pm 22.1	24.2 \pm 5.9
Total	26.4 \pm 7.9	9.7 \pm 2.5	4 \pm 2.8	77.1 \pm 23.3	23.9 \pm 6.4

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