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Study of Functioning of Thyroid in HIV Infected Patients.

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ABSTRACT

Background: Even though the introduction of ART has decreased the incidence of opportunistic infections in HIV, infection itself is associated with a number of endocrine abnormalities. There are only very few studies available to understand thyroid function in HIV patients. Aim - To determine thyroid function and to correlate clinical stage and CD4 count with the level of thyroid dysfunction. **Methods:** This was an observational cross-sectional study conducted in 76 newly diagnosed HIV positive patients in the Department of Medicine & Endocrinology, JIPMER over a period of 1.5yrs. Demographic data were collected, patients satisfying inclusion criteria were assessed, staged based on CD4 levels, blood samples were taken and thyroid hormone levels estimated. **Results:** Of 76 patients, 35 were with abnormal thyroid levels, 28 hypothyroid and 7 hyperthyroid. Among 28 hypothyroid, 12 were in WHO stage 1, 4 in stage 2, 6 in stage 3 and 6 in stage 4. There was no correlation between thyroid hormone levels and CD4 counts. **Conclusion:** 45% (35 cases) of patients with HIV infection had thyroid dysfunction, 28 of them hypothyroid and 7 hyperthyroid, most common abnormality being isolated low FT3.

Keywords: HIV infection, Thyroid dysfunction, CD4 count.

INTRODUCTION

The introduction of antiretroviral therapy (ART) has decreased the incidence of opportunistic infections associated with HIV.[1] However, other systemic disorders including endocrine disorders in HIV patients are still common at present. Infection with HIV is associated with a number of endocrine abnormalities; adrenal insufficiency, thyroid disorders, insulin resistance, overt diabetes mellitus, osteopenia and osteoporosis, and hypogonadism.[2] The potential contributors of pathophysiology include malnutrition, mediators of systemic inflammatory response, direct effects of HIV, opportunistic infections with pathogens like cytomegalovirus, Toxoplasma, Pneumocystis carinii, and neoplasms like kaposi sarcoma.[3] Metabolic and endocrine abnormalities can also occur as a complication of therapy with antiretroviral drugs.[4] There are only very few studies available to evaluate the functioning of the thyroid in various stages of HIV patients in India. Hence, this study has been undertaken to understand the thyroid function in HIV patients. An effort will also be made to correlate these changes with the CD4 counts and stage of the disease of the HIV patients.

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Aim

To determine the functioning of thyroid through clinical examination and hormone studies and to correlate the clinical stage and CD4 count with the level of dysfunction of thyroid.

MATERIALS AND METHODS

This observational cross-sectional study was conducted in the department of Medicine and Endocrinology, JIPMER from December 2013 to August 2015. The study group Included 76 newly diagnosed HIV-positive patients admitted in medicine ward or followed up in HIV clinic of JIPMER.

Inclusion criteria

All drug naïve HIV infected patients > 18 years attending HIV clinic or admitted in medical wards.

Exclusion criteria

Pregnant / Lactating mothers, on hormone therapy (Thyroxine, OC pills, Ketoconazole, glucocorticoid), having life threatening infections.

Patients satisfying the inclusion /exclusion criteria were informed about the study after which a consent form was signed. Demographic data was collected from each individual in the study, following which they were clinically assessed in detail, staged based on the WHO staging then categorized based on their CD4 counts. Blood samples were taken and hormone levels (serum freeT4, free T3, TSH) estimated, hypothyroidism defined as low free T3 and/or low free t4 and/or high TSH and hyperthyroidism as high

free T3 and/or high free t4 and /or low TSH. Statistical analysis with clinical and biochemical parameters expressed as mean with standard deviation or median with range, were carried out using Independent Student's T-test or Mann Whitney U test. Spearman correlation analysis was used to assess the relation between the study variables. All statistical analysis was carried out at 5% level of significance and p value of <0.05 was considered as significant.

RESULTS

A total of 76 HIV infected population was studied. The baseline characteristics of the population are given in [Table 1].

Table 1: Baseline characteristics of the study population.

Demographic characters	Mean ± standard deviation
Age (years)	40.2±9.35
Weight (kg)	51.85±10.39
BMI (kg/m2)	21.25±3.55
Fasting plasma glucose (mg/dl)	96.10±43.40
HbA1C (%)	5.02±1.07
CD4/mm^3	278±206.81

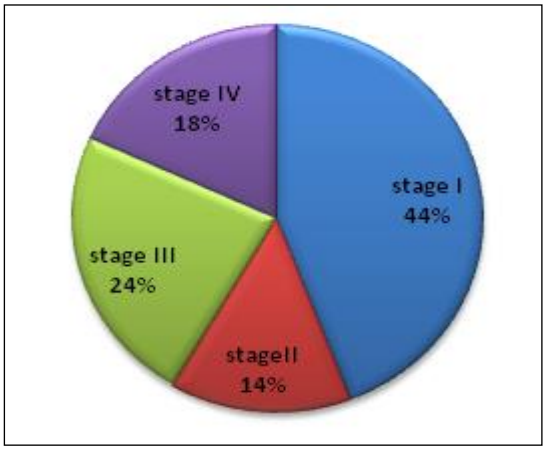

Figure 1: Classification of patients based on WHO Staging 2014 (n=76)

Of the 76 patients studied, 41 had normal thyroid levels, 28 were hypothyroid and 7 were hyperthyroid. Out of the 41 patients, 22 were males and 19 were females. Among the 28 hypothyroids, 16 were male and12 were females and among the 7 hyperthyroids, 5 were male and 2 were females. In the 28 hypothyroid patients, 14 had low free T3, 9 had low free T4, 2 had overt hypothyroidism and 3 had subclinical hypothyroidism. Among 7 hyperthyroid patients, high free t3 was seen in 3 patients, high free T4 in 2 patients and 2 patients had subclinical hyperthyroidism. Among 28 hypothyroid patients, 12 were in WHO stage 1, 4 in stage 2, 6 in stage 3 and 6 in stage 4 [Table 2]. There was no correlation between the thyroid hormone levels and CD4 counts.

Table 2: The distribution of patients based on WHO staging.

WHO Stage	Euthyroid	Hypothyroid	Hyperthyroid	P value
I	19	12	3	0.923
II	6	4	1	
III	11	6	1	
IV	5	6	2	

DISCUSSION

The mean age of the study population was 40.2±9.35. The mean age of the study population was similar to other studies. The majority of the patients were included in the study immediately after the detection of infection. The mean CD4 count of the study group was 278±206.81/mm3. This is similar to the study by Tripathy et al (201.5±159.9/mm3).[5] Another study by Mandal et al from eastern India had a CD4 count ranging from 43-189/mm3.[6] The high CD4 count among our study group is due to the fact that we have included newly detected treatment naïve population in our study. Majority of patients in our study belonged to WHO stage I as we included mostly treatment naïve individuals. We did not include critically ill patients in our study.

Table 3: The comparison of prevalence of endocrine disorders in various Indian Studies among HIV positive patients

Organs affected	Meena et al[7]	Tripathi et al[5]	Mandal et al[6]	Our study
Pancreas	NA	NA	31.2%	28.6%
Thyroid	40.6%	60.4%	20.8%	46%
Adrenal	2.7%	27.9%	8.2%	7.1%
Gonads	33%	88.3%	33%	35%
Parrathyroid	NA	NA	NA	21%

In our study 35 (46%) patients showed abnormal thyroid function (28 were hypothyroid and 7 were hyperthyroid). All patients were asymptomatic. This was similar to previous studies by Meena et al (41%).[6] Mandal et al and Tripathy et al showed the thyroid dysfunction rate of 20.8%and 60.4% respectively.[5,6] The higher prevalence of thyroid disorders could be due to sick euthyroid syndrome. Isolated low fT3 was the most common (20%) thyroid dysfunction seen in our study. This was similar to study by Tripathy et al.[5] This could be due to the release of inflammatory mediators like IL-6, and TNF –α resulting in impaired de-iodination for fT4.

In our study, we correlated the thyroid hormone levels with CD4 count but no significant correlation between thyroid hormone levels and CD4 count was found. This was similar to the study by Tripathy et al and Mandal et al.[5,6] This could be due to low sample size in our study. The Study by Meena et al, and Jain et al showed the inverse correlation between CD4 count and hormone levels.[7] Another study by Thongam et al showed inverse correlation between

TSH and CD4 count among HIV infected children. They had shown that TSH level could be used as a surrogate marker in advancing HIV infection.[8]

CONCLUSION

The study was conducted among 76 treatment naïve HIV patients of which 33 were females and 43 were males. The median age group among the population was 40.2 yrs. 44% of patients in our study belonged to WHO stage I. The mean CD4 count of the study group was 278/mm3. 35 (45%) cases had thyroid hormone dysfunction. 28 patients had hypothyroidism and 7 patients with hyperthyroidism. Most common abnormality was isolated low free T3.

Limitations

The limitation of the study includes the small sample size and we did not do Oral glucose tolerance test in patients who had impaired fasting plasma glucose. Hence the number of diabetics in our study is underestimated. we also were not able to perform TBG levels and thyroid scan to determine the cause of thyroid dysfunction in our study we did not follow up the patients .hence we could not find what is the further course of disease and how the dysfunction changes ,after initiation of treatment .we also did not do vitamin D level and bone scan due to financial constraint to determine the etiology of abnormal bone mineral metabolism Hence future studies are needed based on our study to determine the exact cause for thyroid dysfunction ,bone mineral metabolism in HIV positive patients and to direct towards appropriate management of various endocrine disorders.

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