



**ORIGINAL RESEARCH PAPER**

**Medicine**

**A STUDY OF THYROID FUNCTION IN HIV SEROPOSITIVE PATIENTS**

**KEY WORDS:** Thyroid dysfunction, HIV , CD4 cell count etc.

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**ABSTRACT**

**Background:** HIV infection is associated with multiple organ involvement including the endocrine system. In the past few years, several cases of thyroid, adrenal and gonadal dysfunction have been observed, suggesting a possible effect of HIV and/or antiretroviral drugs on the endocrine system. Thyroid dysfunction correlates with advancement of the infection in conjunction with lowering CD4 cell counts. However there is paucity of Indian studies that are needed to evaluate thyroid function in HIV infected patients and hence this study is undertaken to study the thyroid dysfunction in HIV seropositive patients. **Materials and Methods:** In this Hospital based cross sectional study, Initial registered 130 cases were taken over a period of 1 year who were HIV positive patients from outpatient/ART clinic or emergency department SMS medical college & hospital Jaipur. **Results & conclusion:** Among the 130 patients studied, Majority of the study patients 90 (69.23%) belongs to young age group 20-40 years. Male (56.92%) was more expose as compared to female(43.08%). This study shows that mean T3 was  $2.78 \pm 0.67$  ( $r = 0.2314$ ,  $p = 0.0080$ ), mean T4 was  $0.87 \pm 0.24$  ( $r = 0.2338$ ,  $p = 0.0074$ ), mean TSH was  $3.34 \pm 2.31$  ( $r = -0.1848$ ,  $p = 0.0352$ ). This shows that there is direct correlation between T3 and CD4 count ( $p$ -value = 0.0080) as well as T4 and CD4 count ( $p$ -value = 0.0074) and an inverse correlation between TSH levels and CD4count ( $p$ -value = 0.0352) were found. mean CD4 count was  $232.4 \pm 181.9$  ( $p$  value 0.028, statistically significant). We find the association between CD4 and thyroid dysfunction at 5% level of significance, there is a strong statistical significant relationship exist between CD4 count and thyroid dysfunction. In our study, mean Hb was found to be  $11.88 \pm 2.65$  (g/dl) indicating the prevalence of anaemia was significantly higher in HIV positive patients. Mean S.cholesterol level was  $174.74 \pm 74.28$  (mg/dl), mean S.HDL level was  $53.23 \pm 16.88$  (mg/dl), mean S.TG level was  $174.74 \pm 74.28$  (mg/dl) showing that majority of patients who had thyroid dysfunction had decreased S.cholesterol level, S.HDL level within normal range and hypertriglyceridemia. Besides these the study also concluded a statistically significant correlation of HAART with thyroid dysfunction.

**INTRODUCTION**

Human immunodeficiency virus is a lentivirus, a member of the retrovirus family that causes acquired immunodeficiency syndrome<sup>1</sup>. HIV infection is associated with multiple organ involvement including the endocrine system. A high prevalence of abnormalities in thyroid function tests among HIV infected adults has been noted in previous cross sectional studies. Thyroid function may be altered in 10-15% of patients with HIV infection<sup>2</sup>. Both hypothyroidism and hyper thyroidism may be seen. In advanced HIV disease infection of thyroid gland may occur with opportunistic pathogens, including P.jiroveci, CMV, mycobacteria, toxoplasma gondii, & Cryptococcus neoformis. Subclinical hypothyroidism has often been recognized in the past few years in the HIV infected population, with a higher prevalence compared with HIV-negative individuals. The prevalence of subclinical hypothyroidism is 4 to 8 percent in the general population, and up to 15 to 18 percent in women who are older than 60 years. In patients with AIDS, a high prevalence of sick euthyroid syndrome has been reported, probably due to a hypothalamic-pituitary deficit related to the progression of immunodeficiency and cachexia. Thyroid dysfunction correlates with advancement of the infection in conjunction with lowering CD4 cell counts<sup>3</sup>. periodic monitoring of thyroid functions in HIV infected individuals (especially those on ART) has been recommended by various studies across the globe<sup>4,5,6</sup>. However there is paucity of Indian studies that are needed to evaluate thyroid function in HIV infected patients and hence this study is undertaken to study the thyroid dysfunction in HIV seropositive patients.

**MATERIALS AND METHODS**

**Study Design:**

Hospital based cross sectional study.

**Study Area:** Department of Medicine & ART clinic in SMS Medical College and Hospital, Jaipur.

**Study Period:** From June 2019 To Oct 2020.

**Sample size:** Sample Size is 130 cases of HIV positive patients.

**Inclusion criteria:** HIV positive patients visiting ART clinic or admitted in medicine department were included in the study after taking informed consent.

**Exclusion criteria:**

1. Known cases of thyroid disorder, Diabetes mellitus.
2. CAD, Hypertension.
3. Abnormal liver function test.
4. Pregnancy
5. Patients on drugs (Amiodarone, Lithium, PAS, Phenobarbitone, Carbamazepine, Phenytoin)

**Methodology**

HIV positive patients from outpatient/ART clinic or emergency department were enrolled for the study. Informed consent was obtained from all participants. The cases were further scrutinized as per the inclusion and exclusion criteria.

Datas such as

- Age, sex
- Blood investigations: Lipid profile, Electrocardiogram, ESR, Liver function test
- Renal Function Test, Complete blood count Drug history
- CD4 Count
- Thyroid Profile – T3, T4, Thyroid stimulating hormone. All the information was collected on a pre- designed Performa.

Besides these a detailed general physical examination has been carried out Of Cardiovascular system, Gastrointestinal tract, Neurological system and Respiratory system.

Venous blood sample taken for – Hemoglobin levels, Random Blood Sugar, Renal function tests, Liver function tests, Thyroid

profile, and CD4 count (BD FACS Calibur) for cases.

**Statistical Analysis:**

Significance of difference in proportions were assessed by Chi-square Test. Quantitative data was expressed in the form of Means and Standard Deviations. Significance of difference in means were assessed by un paired t -Test (Anova test) was calculated. p value <0.05 considered statistically significant.

**RESULTS AND OBSERVATIONS:**

**Table 1: Distribution of study patients based on Age group**

Age group (years)	Number of patients	Percentage
10-20	8	6.15 %
20-30	49	37.69 %
30-40	4116	31.54 %
40-50	14	12.31 %
50-60	2	10.77 %
>60		1.54 %

Mean ± SD = 35.1 ± 10.88

**Table 2: Distribution of study patients based on gender**

Gender	No. of patients	Percentage
Male	74	56.92 %
Female	56	43.08 %

**Table 3: Distribution of study patients based on CD4 count**

CD4	Male (%)	Female (%)	Total (%)
<200	28 (21.54%)	23 (17.69%)	51 (39.23%)
200-500	36 (27.69%)	23 (17.69%)	59 (45.38%)
>500	10 (7.69%)	10(7.69%)	20 (15.38%)
Total	74 (56.92%)	56 (43.08%)	130 (100.00%)

Mean ± SD = 296.89 ± 168.99

**Table 4: Distribution of thyroid function abnormality according to CD4 counts**

CD4	Overt hypothyroidism	Subclinical hypothyroidism	Isolated low FT4	Sick euthyroidism	Total
<200	0(0.00%)	6(37.50%)	2(12.50 %)	3(18.75 %)	11(68.75%)
200-500	1(6.25%)	2 (12.50%)	0(0.00%)	0(0.00%)	3(18.75 %)
>500	0 (0.00%)	1(6.25%)	0(0.00%)	1(6.25%)	2(12.50 %)
Total	1(6.25%)	9(56.25%)	2(12.50 %)	4(25.00 %)	16(100 %)

**Table 5: Distribution of patients according to Thyroid parameters**

Thyroid Parameters	Male	Female	Total
T3: <1.7	9 (6.92%)	2 (1.54%)	11 (8.46%)
1.7-4.2	65 (50.00%)	54 (41.54%)	119 (91.54%)
>4.2	0 (0.00%)	20 (0.00%)	0 (0.00%)
T4: <0.8	29 (22.31%)	28 (21.54%)	57 (43.85%)
0.8-1.8	45 (34.62%)	28 (21.54%)	73 (56.15%)
>1.8	0 (0.00%)	0 (0.00%)	0 (0.00%)
TSH: <0.3	0 (0.00%)	0 (0.00%)	0 (0.00%)
0.3-5.5	62 (47.69%)	49 (37.69%)	111 (85.38%)
>5.5	12 (9.23%)	7 (5.38%)	19 (14.62%)

**Table 6: Correlation between study parameter and CD4 count**

Study parameter	N	Mean ± SD	Pearson Correlation	p-value	Correlation is
T3	130	2.78 ± 0.67	0.2314	0.0080	Significant
T4	130	0.87 ± 0.24	0.2338	0.0074	Significan
TSH	130	3.34 ± 2.31	-0.1848	0.0352	Significant

**Table 7: Distribution of CD4 count based on thyroid dysfunction**

CD4	With thyroid dysfunction	Without thyroid dysfunction	Total	p-value
<200	11	40	51	0.028 significant
200-500	3	56	59	
>500	2	18	20	
Total	16	114	130	

**Table 8: Correlation of Hb levels in HIV positive patients with thyroid dysfunction**

Hb(g/dl)	With thyroid dysfunction	Without thyroid dysfunction	Total	p-value
<6	0 (0.00%)	3 (2.31%)	3 (2.31%)	0.6859 (NS)
6-9	1 (0.77%)	12 (9.23%)	13 (10.00%)	
>9	15 (11.54%)	99 (76.15%)	114 (87.69%)	
Total	16 (12.31%)	114 (87.69%)	130 (100%)	

**Table 9: Correlation of duration time in HIV positive patients with thyroid dysfunction**

Duration	Time With thyroid dysfunction	Without thyroid dysfunction	Total	P-value
<4	4 (3.08%)	41 (31.54%)	45 (34.62%)	0.4102 (NS)
4-8	10 (7.69%)	51 (39.23%)	61 (46.92%)	
>8	2 (1.54%)	22 (16.92%)	24 (18.46%)	
Total	16 (12.31%)	114 (87.69%)	130 (100%)	

**Table 10: Correlation of regime in HIV positive patients with thyroid dysfunction**

Regime	With thyroid dysfunction	Without thyroid dysfunction	Total	p-value
TLD	4 (3.08%)	7 (5.38%)	11 (8.46%)	0.02127 (S)
TLE	12 (9.23%)	95 (73.08%)	107 (82.31%)	
Others	0 (0.00%)	12 (9.23%)	12 (9.23%)	
Total	16 (12.31%)	114 (87.69%)	130 (100%)	

**Table 11: Correlation of S.Lipid profile in HIV positive patients with thyroid dysfunction**

S.Triglycerides (mg/dl)	With thyroid dysfunction	Without thyroid dysfunction	Total	p-value
<= 150	8 (6.15%)	58 (44.61%)	66 (50.77%)	1.000 (NS)
>150	8 (6.15%)	56 (43.08%)	64 (49.23%)	
Total	16 (12.31%)	114 (87.69%)	130 (100%)	

S.HDL	With thyroid dysfunction	Without thyroid dysfunction	Total	p-value
<=40	4 (3.08%)	22 (16.92%)	26 (20%)	0.8413 (NS)
>40	12 (9.23%)	92 (70.77%)	104 (80%)	
Total	16 (12.31%)	114 (87.69%)	130 (100%)	

S.Cholesterol (mg/dl)	With thyroid dysfunction	Without thyroid dysfunction	Total	P-value
<=200	12 (9.23%)	81 (62.31%)	93 (71.54%)	0.9338 (NS)
>200	4 (3.08%)	34 (26.15%)	37 (28.46%)	
Total	16 (12.31%)	114(87.69%)	130 (100%)	

**Table 12: Correlation of HIV positive patients with opportunistic infections**

CD4 COUNT	No	Hepatitis B	+ VDRL	+ Total
<200	49 (37.69%)	2 (1.54%)	0 (0.00%)	51 (39.23%)
200-500	55 (42.31%)	2 (1.54%)	2 (1.54%)	59 (45.38%)
>500	20 (15.38%)	0 (0.00%)	0 (0.00%)	20 (15.38%)
Total	124 (95.38%)	4 (3.08%)	2 (1.54%)	130 (100%)

**Table 13: Distribution of type Tuberculosis in HIV positive patients**

Type of TB	No. of cases	Percentage
Pulmonary	26	70.00%
Abdominal	4	11.00%
TBM	1	3.00%
Peural	2	5.00%
MDR	1	3.00%
Potts Spline	1	3.00%
Both Pulmonary and abdominal	2	5.00%

**DISCUSSION:**

**Correlation with age group**

Out of the 130 patients, 37.69% were between 20-30 years of age and 31.54% between 31-40 years. In our study, Mean age was 35.1 ± 10.88.

**Correlation with sex**

Out of 130 study patients, total numbers of male were 74 (56.92%) and female were 56 (43.08%). This shows that male was more expose as compared to female.

**Correlation with type of thyroid dysfunction**

Among various thyroid function, 50% were of subclinical hypothyroid status followed by 28.57% for sick euthyroidism, 14.29% for isolated FT4 levels and 7.14% were of overt hypothyroid status.

**Correlation of CD4 distribution according to sex**

The Mean CD4 count is 232.4±181.9. Among the group of patients (39.23%) having CD4 < 250, 21.54% was male and 17.69% was female. For the range of CD4 at 200- 500 for the patients (45.38%), 27.69% and 17.69% were male and female respectively. Only 7.69% in each gender (male and female) was distributed in the range of CD4 that have more than 500 counts from the total patients are 15.38%. This division is similar to study by KK Sawlani, et al which had similar groups according to CD4 counts. In Jain et al study, 8% patients had CD4> 500/μL, 42% patients had CD4 between 200-500/μL.

**Correlation of CD4 count with thyroid dysfunction**

From the study, we found that T3, T4 and TSH cell were statistically significant to measure the association with the level of CD4 count. From the results, we also observed that T3 and T4 have a positive correlation with CD4 counts whereas a negative correlation is occurred with the TSH parameter. Similar results were obtained by Palanisamy et al, Jain et al, and the Sunder et al where they found an inverse correlation of CD4 counts with TSH levels. In our study of 130 HIV individuals, among them 12.3% had thyroid dysfunction and remaining were without thyroid dysfunction.

**Correlation of haemoglobin level in HIV positive patients**

In our study of 130 HIV positive patients, mean Hb was found to be 11.88±2.65(g/dl), with thyroid dysfunction mean Hb was 11.97±2.34(g/dl) and without thyroid dysfunction was 11.88±2.65(g/dl) , such that throid dysfunction in HIV positive patients has a significant coorelation with anaemia.

The prevalence of anaemia was significantly higher in immunological and clinical AIDS, i.e., 42.05% and 70.58% respectively in contrast to only 28.57% in asymptomatic HIV infection. Normocytic, normochromic, anaemia was most common (66.5%).

**Correlation of s.lipid profile in HIV positive patients**

In our study of 130 HIV positive patients, mean S.cholesterol level was 174.74±74.28(mg/dl), with thyroid dysfunction mean S.cholesterol level was 163.75±61.87(mg/dl), without thyroid dysfunction was 174.50±75.6(mg/dl). Mean S. HDL level in HIV positive patients was 53.23± 16.88(mg/dl), with thyroid dysfunction mean S.HDL level was 50.25± 15.13(mg/dl), without thyroid dysfunction was 53.65± 17.13(mg/dl). In our study of 130 HIV positive patients , mean S.TG level was 174.74±74.28 (mg/dl), with thyroid dysfunction mean S.TG level was 170.75±66.19 (mg/dl), without thyroid dysfunction was 175.30±75.6(mg/dl).

**Correlation of thyroid dysfunction with type of regimen (HAART)**

In our study of 130 HIV positive patients , majority(82.31%) of patients were found to be on TLE regimen, out of which 9.23% had thyroid dysfunction .8.4% patients were on TLD regimen, out of which 3% had thyroid dysfunction. This shows that HIV positive patients who were on TLE regimen have statistically significant coorelation with thyroid dysfunction (p value 0.02127).

**Correlation of HIV positive patient with opportunistic infection**

In our study of 130 HIV positive patients, 37 patients had opportunistic infection of Tuberculosis. Among all, pulmonary tuberculosis was commonest (70%). 4 patients (11%) had abdominal tuberculosis, 2 patient (5%) had pleural tuberculosis, 3% patient had tubercular meningitis, 3% patient had Potts spine, 3% patients had MDR TB, 5% patients had both pulmonary and extrapulmonary TB.

**CONCLUSION:**

From this study it was concluded that majority of HIV positive patients were in the age group of 20-40 years. Thyroid dysfunction was found more in males in our study group. This study indicated that out of 130 HIV individuals, 12.3% had thyroid dysfunction, out of which subclinical hypothyroidism was more common followed by sick euthyroidism. From this study majority of cases had CD4 count in between 200-500, this showed that there is a very strong correlation between decline in CD4 count and increased incidence of thyroid dysfunctions, suggesting a significant inverse correlation between CD4 count and thyroid dysfunction. In this study, there was high prevalence of anaemia in HIV positive patient with thyroid dysfunction. There was significant correlation between duration of HIV infection and prevalence of thyroid dysfunction which was found more in patients with longer duration of HIV infections. Thyroid dysfunction especially subclinical hypothyroidism was common in patients who were on Tenofovir, Lamivudine and Efavirenz (HAART). In this study, patients with thyroid dysfunction had hypocholesterolemia, hypertriglyceridemia and normal S.HDL level. In this study, among opportunistic infections, pulmonary tuberculosis was most common.

Hence, it is advisable to screen the patients of HIV for thyroid dysfunction so that early identification and treatment can provide a healthier life ahead.

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