International Journal of Advances in Medicine
Gangannavar AA et al. Int J Adv Med. 2020 Aug;7(8):1264-1268
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20203126

Original Research Article

Prevalence of thyroid abnormalities in HIV/AIDS persons and correlation with CD4 count, HAART drug and duration of illness

Ayyanagouda A. Gangannavar[1], Raghu G.[1]*, Mahendra S. V.[1], Manoj Kumar B. K.[2], Umesh Rajoor[1]

[1]Department of General Medicine, Koppal Institute of Medical Science, Koppal, Karnataka, India
[2]Department of Medicine, Adichunchanagiri Institute of Medical Science Bellur Cross BG Nagara, Karnataka, India

Received: 17 June 2020
Accepted: 08 July 2020

***Correspondence:**
Dr. Raghu G.,
E-mail: raghugangadar6@gmail.com

ABSTRACT

Background: Human immunodeficiency virus (HIV) infection is characterized by decrease in CD4 cell count and immunodeficiency, leading to opportunistic infections (OIs) and tumors. Objective of this study was to find out any association between thyroid function abnormality and CD4 count, duration of disease and ART drugs.
Methods: Among 300 HIV/AIDS Persons attending ART centre, M.Y. Hospital, or attending general OPD, or admitted as in patients Dept. of Medicine, MGM Medical College and M.Y. Hospital, Indore, India.
Results: Amongst 300 HIV patients,62 (20.66%) had thyroid dysfunction, most common being subclinical hypothyroidism (24/300, 8.0%) followed by sick euthyroid (17/300, 5.6%) and subclinical hyperthyroidism (13/300, 4.3%). Overt hypothyroidism was present in 5 of 300 (1.66%) patients and overt hyperthyroidism was present in 3 of 300 (1.0%) patients. 25 of 152 (16.44%) and 37 of 148 (25%) male and female HIV patients had thyroid function abnormality. Thyroid dysfunction was significantly more observed in old HIV patients (42/150, 28.0%) than in newly diagnosed HIV patient's group (20/150, 13.33%).
Conclusions: This prevalence being fairly high, it can be suggested that all retro positive patients, recently diagnosed and on treatment also may be subjected for routine thyroid function testing.

Keywords: CD4 count, HAART drug, HIV/AIDS persons, Thyroid abnormalities

INTRODUCTION

The number of newly diagnosed cases of HIV annually is on the decline, more so in the developed countries where life expectancy has increased and after the first year of ART is very similar to the non-HIV population. 1Therefore common health issues and diseases seen in the context of normal aging population are now seen in the HIV-infected population.[1] Abnormalities of the endocrine function of the pituitary, thyroid, adrenals, gonads, and pancreas and in metabolism are common in patients infected with HIV and are becoming the main conditions affecting the long-term quality of life in HIV infected patients.[2,3] Many studies have reported complications like hypertriglyceridemia and hypercholesterolemia, lipodystrophy and lipoatrophy, glucose intolerance and type 2 diabetes mellitus, gonadal dysfunction, and osteopenia and osteoporosis during HAART.[2,4] Thyroid hormone, a crucial hormone regulating metabolism, can also be affected by HIV infection. Large number of studies have reported that the incidence of thyroid dysfunction is much higher (about 36%-37%) in patients infected with HIV than in the general population.[5,6,] However, in different studies other researchers have suggested that the morbidity of overt thyroid dysfunction in patients infected with HIV is

similar to the general population.[2] Overt hypothyroidism leads to fatigue, weakness, dry skin, cold intolerance, constipation, slowed mentation, hoarse of voice, bradycardia, and delayed relaxation of tendon reflexes. It is not clear why HIV patients are susceptible to thyroid dysfunction, but HIV infection is regarded as a crucial factor. Subtle abnormalities of thyroid function tests with no symptoms of thyroid disorder have been described in a small minority of patients with stable HIV infection.[2,7,8] The common abnormalities in thyroid function tests are those associated with subclinical hypothyroidism.[1,6] Thus the present study was designed to find out any association between thyroid function abnormality and CD4 count, duration of disease and ART drugs.

METHODS

This prospective observational study was conducted among all individuals tested positive for HIV and age more than 18 years attending ART centre, M.Y. Hospital, or attending general OPD, or admitted as in patients Dept. of Medicine, MGM Medical College and M.Y. Hospital, Indore, India. The data collection for the study was conducted between1 March 2017 to 28 February 2018.

Sample size 300 HIV/AIDS Persons attending ART centre, M.Y. Hospital, or attending general OPD, or admitted as in patients in M.Y. Hospital Indore, India.

Thyroid stimulating hormone (TSH), total thyroxine (T4), and total tri-iodothyronine (T3), CD4 count are being analysed in 300 HIV cases of which 150 of them being newly diagnosed or HAART naive.

Inclusion criteria

All individuals tested positive for HIV and age more 18 years attending ART centre, M.Y. Hospital, or attending general OPD, or admitted as in patients in M.Y. Hospital Indore.

Exclusion criteria

HIV/AIDS persons of less than 18 years, persons with known thyroid disorders before diagnosed to have HIV/AIDS, prisoners, pregnancy, patients not giving consent.

Procedure planned

This was a prospective study that included 300 individuals reactive for HIV of which 150 0f them being newly diagnosed or HAART naive attending ART centre, M.Y. Hospital, or attending general OPD, or admitted as in patients in M.Y. Hospital Indore. After valid informed written consent patient's details like name, age, residency, duration of disease and HAART drugs or regimen etc were noted and blood sample were collected for thyroid profile that is thyroid stimulating hormone (TSH), total thyroxine (T4), total triiodothyronine (T3) and CD4 count. out of 300 HIV patients 150 of them who were newly diagnosed or HAART naive were called for follow up after 3 months and again blood sample was taken for thyroid profile i.e. T3, T4 and TSH. Results of thyroid stimulating hormone(TSH), total thyroxine (T4), total triiodothyronine (T3) and CD4 count were analysed.

Data was also analysed to study the correlation between thyroid function abnormality and CD4 count, duration of disease and HAART drug. Association with CD4 count was done with overall 300 HIV patients by mean CD4 count. But association with duration of HIV/AIDS or with HAART drugs or regimen was done in 150 old HIV patients.

Thyroid profile at first visit was analysed with the thyroid profile at 3 months to look for possible changes in it in 3-month period along with 3 months of HAART. We also compared thyroid profile in old HIV patients with thyroid profile in newly diagnosed HIV patients.

Statistical analysis

Data was analyzed using SPSS software and appropriate statistical tests were applied.

RESULTS

It shows the age wise gender distribution in overall HIV patients. Majority of the patients belonged to the age group of <30 years, 30-39, 40-49 years. Accounting for about 79.99% of patients. Followed by 50-59- and 60-69-years age groups respectively. It was true for gender wise distribution also. (male 72.36% and female 87.68%). Table 1.

Table 1: Age wise gender distribution in overall HIV patients.

Age (years)	Male (N/ %)	Female (N/%)	Total (N/%)
<30	28 (18.42)	35 (23.6)	63 (21.0)
30-39	42 (27.63)	46 (31.08)	88 (29.33)
40-49	40 (26.31)	49 (33.10)	89 (29.66)
50-59	21 (13.8)	8 (5.40)	29 (9.66)
60-69	16 (10.52)	7 (4.72)	23 (7.66)
≥70	5 (3.28)	3 (2.02)	8 (2.66)
Total	152 (100.0)	148 (100.0)	300 (100.0)

It shows, 238 out of 300 (79.33%) patients had normal thyroid functions and thyroid function abnormality was found in 62 0f 300 (20.66%) and 16.44%, 25% of males and females had thyroid function abnormality respectively in overall 300 HIV patients included in the study. Indicating increased prevalence thyroid dysfunction in females than males. In thyroid dysfunction noted above, overt hypothyroidism, subclinical hypothyroidism, overt hyperthyroidism,

subclinical hyperthyroidism, and sick euthyroid was present in 1.66%, 8%, 1%, 4.3%, 5.6% of patients respectively. Indicating maximum of subclinical hypothyroidism followed by sick euthyroid. Least was overt hyperthyroid. The findings are also shown in the bar diagram Table 2.

Table 2: Gender wise thyroid profile distribution in overall HIV patients.

Thyroid profile		Male (N/%)	Female (N/%)	Total (N/%)
Hypothyroid	Overt hypothyroid	4 (2.63)	1 (0.67)	5 (1.66)
	Subclinical hypothyroid	9 (5.92)	15 (10.13)	24 (8.0)
Hyperthyroid	Overt hyperthyroid	0 (0.0)	3 (2.02)	3 (1.0)
	Subclinical hyperthyroid	6 (3.94)	7 (4.72)	13 (4.3)
Sick euthyroid		6 (3.94)	11 (7.432)	17 (5.6)
Euthyroid		127 (83.55)	111 (75.0)	238 (79.33)
Total		152 (100.0)	148 (100.0)	300 (100.0)

Table 3: Thyroid profile distribution based on duration of HIV in old HIV patients.

Duration (months)	Euthyroid	Hypothyroid		Hyperthyroid		Sick euthyroid	Overall thyroid dysfunction
		Overt	Sub clinical	Overt	Sub clinical		
<24	1 (0.92)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
24-47	52 (48.14)	1 (25.0)	2 (13.33)	2 (66.66)	2 (25.0)	0 (0.0)	7 (16.66)
48-71	25 (23.14)	1 (25.0)	1 (6.66)	1 (33.33)	4 (50.0)	2 (16.66)	9 (21.42)
72-95	19 (17.59)	1 (25.0)	4 (26.66)	0 (0.0)	2 (25.0)	6 (50.0)	13 (30.95)
96-119	9 (8.33)	1 (25.0)	6 (40.0)	0 (0.0)	0 (0.0)	3 (25.0)	10 (23.8)
≥120	2 (1.85)	0 (0.0)	2 (13.33)	0 (0.0)	0 (0.0)	1 (8.33)	3 (7.14)
Total	108 (100.0)	4 (100.0)	15 (100.0)	3 (100.0)	8 (100.0)	12 (100.0)	42 (100.0)

Table 4: Comparison of mean value of CD4 count according to thyroid profile in overall HIV patients.

Group (thyroid profile)	N	Mean CD4	Std. Deviation	F value	p value
Hypothyroid	29	243.69	159.112	16.04	0.000*
Hyperthyroid	16	425.56	136.997		
Sick Euthyroid	17	339.06	186.475		
Euthyroid (normal)	238	562.19	281.953		
Total	300	511.47	281.555		

p value <.05 Significant

Table 5: Association between thyroid profile and HAART drug in old HIV patients.

ART Drug		Thyroid profile				Total
		Hypothyroid	Hyperthyroid	Sick Euthyroid	Euthyroid (normal)	
SLN	Count	0	0	0	2	2
	%	0.0%	0.0%	0.0%	100%	100%
TLE	Count	15	10	7	66	98
	%	15.30%	10.20%	7.14%	67.34%	100%
ZLE	Count	1	0	1	11	13
	%	7.69%	0.0%	7.69%	84.61%	100%
ZLN	Count	3	1	4	29	37
	%	8.10%	2.70%	10.81%	78.37%	100%
Total	Count	19	11	12	108	150
	%	12.66%	7.33%	8.0%	72.0%	100.0%

Pearson's Chi Square = 6.562, df =9, P Value = 0.683, Non-Significant

Distribution of thyroid profile in old HIV patients based on duration of HIV shows that majority of patients with thyroid function abnormality were distributed more commonly in groups of 24-47 months, 48-71 months,72-

95 and 96-119 months with 16.66%, 21.42%, 30.95%, 23.8% of patients respectively, and maximum being in 72-95 months group. Majority of euthyroid HIV patients being distributed in 24-47months, 48-71 months, 72-95months that is 48.14%, 23.14%, 17.59% of patients respectively. It showed thyroid function abnormality being more common with longer duration of HIV Table 3.

One Way ANOVA applied p value <.05 significant the difference of mean value of Groups was found to be significant (p<.05). The table shows the highest mean score of Euthyroid (normal (562.19) and the lowest mean score (243.69) of Hypothyroid Table 4.

The table shows the highest percentages of TLE drug (67.34%) in Euthyroid (normal) group followed by in hypothyroid (15.30%), Hyperthyroid (10.20%) and sick euthyroid (7.14%) respectively. ZLE was received by 84.61%,7.69%,7.69% patients of euthyroid, hypothyroid, sick euthyroid respectively. Similarly, ZLN was received by 78.37%, 8.10%, 10.81% and 2.70% patients of euthyroid, hypothyroid, sick euthyroid and hyperthyroid respectively. SLN was received by only by 2 patients that too in euthyroid group Table 5.

DISCUSSION

Our study included 150 old and 150 new HIV patients. 152 0f 300 (50.7%) and 148 of 300(49.3%) were males and females respectively. Similarly, 77 of 150 (51.3%) and 73 of 150 (48.7%) and were males and females respectively in old HIV patients. Amongst newly diagnosed HIV patients' males and females were equal in number. Mean age in old HIV patient was 39.87±11.457 months and it was 39.61±13.502 months in newly diagnosed HIV patients. Difference was found to be non-significant (p value >0.05). Mean T3, T4 and TSH in old HIV patients were 1.180±0.288ng/ml, 9.391±1.837 µg/dl, 3.534±5.481mIU/ml respectively. Mean T3, T4 and TSH in newly diagnosed HIV patients was 1.217±0.226ng/ml, 9.380±1.732 µg/dl, 2.760±2.506 mIU/ml respectively. (Difference was found to be non-significant p>0.05). Mean CD4 counts in old and newly diagnosed HIV patients were 480±276.174/µl, 542.71±284.327/µl respectively.

In the present study, 238 out of 300 (79.33 %) patients had normal thyroid functions test. 108 out of 150 (72%) in old HIV patients, and 130 out of 150 (86.6%) in newly diagnosed HIV patients had normal thyroid functions. Thyroid function abnormality was found in 62 of 300 (20.66%), 42 of 150 (28%), 20 of 150 (15.38%) in overall, old and newly diagnosed HIV patients respectively. 25 of 152 (16.44%), 37 of 148 (25%) of males and females had thyroid function abnormality respectively in overall 300 HIV patients included in the study. 19 of 77 (24.67%), 23 of 73 (31.5%) of males and females had thyroid function abnormality respectively in 150 old HIV patients. Similarly, 6 of 75 (8%), 14 of 75 (18.66%) of males and females had thyroid function abnormality respectively in 150 newly diagnosed HIV patients included in the study. It is indicating increased prevalence of thyroid dysfunction in females than males in both old and new HIV patients.

There was lesser prevalence of thyroid dysfunction compared to our study in overall HIV patients and in old HIV patients but similar prevalence in new HIV patients. Meena et al, found abnormal thyroid function in 40.66% (30% sub-clinical hypothyroidism, 10.66% primary hypothyroidism) of HIV patients.[10] It was much higher than our study. According to French study by Grappin M et al, of 212 HIV-infected patients 12.3% of patients had abnormal thyroid function tests.[10] It was lesser compared to our present study.

According to study by Ji S et al of the 178 study patients, 59 (33.1%) had thyroid dysfunction.[11] In these studies prevalence of thyroid dysfunction were very high compared to this study. A study done by Harslo M. et al, in 826 HIV patients 38 (4.6%) had thyroid dysfunction.[12] It included 31 (3.8%) and 7 (0.8%) of hypo and hyperthyroidism respectively. which was low prevalence compared to this study. Baez. M et al, found 22 out of 127 (17.3%) had thyroid dysfunction.[13] It is near to the prevalence in this study. According to study by Sharma N et al, 25% had thyroid dysfunction in 527 HIV patients studied.[14]

According to study by Dev N et al, in 225 HIV patients thyroid dysfunction was found in 75% in contrast to 16% in control population.[15] According to another study in general population normal thyroid functions were present in 80% population studied and thyroid dysfunction was noted in 20% of general population which was similar to this study.[16]

There was increased prevalence of thyroid dysfunction in old HIV patients compared to newly diagnosed HIV patients. 42 out of 150 (28%), 20 out of 150 (13.33%) had thyroid dysfunction in old and new HIV patients respectively. It was statistically significant using pearson's Chi square test (p =0.01). subclinical hypothyroidism was seen 4 of 30 (13.3%) and sick euthyroid in 1 of 30 (3.33%) HIV patients without HAART. In the HAART group, there were 3 of 30 (10%) cases of frank hypothyroid and 2 of 30 (6.66%) cases of sick euthyroid. Overall thyroid dysfunction is same in both groups but subcategories as described above were of different. More prevalence of subclinical hypothyroidism in HAART naive and more of frank hypothyroidism in HAART patients. According to study by Ji S. et al, thyroid dysfunction was significantly more frequent in the HAART group than in the HAART-naive group (p= 0.006,).[11] Of the 104 patients on HAART, 41 (39.4%) had thyroid dysfunction, of the 74 HAART-naive patients, 18 (24.3%) patients had thyroid dysfunction which is in accordance with this present study.

CONCLUSION

Prevalence of thyroid dysfunction (62/300, 20.66%) was not much varying from the prevalence in general population (19.66%) and majority of them were either subclinical hypothyroid or sick euthyroid. so routine screening of all HIV patients may be advised here also to prevent their comorbidities. Thyroid dysfunction was significantly more observed in old HIV patients (42/150, 28.0%) than in newly diagnosed HIV patient's group (20/150, 13.33%). The mean CD4 cell count was significantly lower (246.69±159.112 /μL) in patients with hypothyroidism (overt plus subclinical) than in the other patients. Indicating inverse correlation with hypothyroidism and CD4 count. There was positive correlation between thyroid dysfunction and duration of HIV. Association between Thyroid profile and HAART drugs regimen was found to be statistically non-significant. Thyroid profile at first visit was compared with the thyroid profile during follow up at 3 months in new HIV patients and the association was found to be non-significant.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Antiretroviral Therapy Cohort C. Survival of HIV-positive patients starting antiretroviral therapy between 1996 and 2013: a collaborative analysis of cohort studies. Lancet HIV. 2017;4(8):e349-56.
2. Bongiovanni M, Adorni F, Casana M, Tordato F, Tincati C, Cicconi P, et al., Subclinical hypothyroidism in HIV-infected subjects. J Antimicro Chemo. 2006;58(5):1086-9.
3. Madeddu G, Spanu A, Chessa F, Calia GM, Lovigu C, Solinas P, et al. Thyroid function in human immunodeficiency virus patients treated with highly active antiretroviral therapy (HAART): a longitudinal study. Clin Endocrinol. 2006;64(4):375-83.
4. Brockmeyer NH, Kreuter A, Bader A, Seemann U, Reimann G. Prevalence of endocrine dysfunction in HIV infected men. Hormone Res. 2000;54(5):294-5.
5. Silva GA, Andrade MC, Sugui DD, Nunes RF, Pinto JF, Silva WD et al. Association between antiretrovirals and thyroid diseases: a cross-sectional study. Arch Endocrinol Metabol. 2015;59(2):116-22.
6. Hoffmann CJ, Brown TT. Thyroid function abnormalities in HIV-infected patients. Clin Inf Dis. 2007;45(4):488-94.
7. Dobs AS, Dempsey MA, Ladenson PW, Polk BF. Ladenson, and B. F. Polk. Endocrine disorders in men infected with human immunodeficiency virus. Am J Med. 1988;84(3):611-6.
8. Sellmeyer DE, Grunfeld C. Endocrine and metabolic disturbances in human immunodeficiency virus infection and the acquired immune deficiency syndrome. Endocrine Rev. 1996;17(5):518-32.
9. Meena LP, Rai M, Singh SK, Chakravarty J, Singh A, Goel R, et al. Endocrine changes in male HIV patients. J Assoc Physicians India. 2011;59:365-6.
10. Grappin M, Piroth L, Verges B, Sgro C, Mack G, Buisson M, B, et al. Increased prevalence of subclinical hypothyroidism in HIV patients treated with highly active antiretroviral therapy. AIDS. 2000;14:1070-2.
11. Ji S, Jin C, Höxtermann S, Fuchs W, Xie T, Lu X, et al. Prevalence and influencing factors of thyroid dysfunction in HIV-infected patients. BioMed Res Int. 2016 Apr 20;2016.
12. Harsløf M, Knudsen AD, Benfield T. No evidence of increased risk of thyroid dysfunction in well treated people living with HIV. AIDS. 2018;32(15):2195-9.
13. Báez MS, Zapata Silva A, López Benavides MI, Wilson G. Thyroid dysfunction among HIV infected patients. Rev Med Chil. 2016 Mar;144(3):333-40.
14. Sharma N, Sharma LK, Dutta D, Gadpayle AK, Anand A, Gaurav K, et al. Prevalence and Predictors of Thyroid Dysfunction in Patients with HIV Infection and Acquired Immunodeficiency Syndrome: An Indian Perspective. J Thyroid Res. 2015;2015:517173.
15. Dev N, Sahoo R, Kulshreshtha B, Gadpayle AK, Sharma SC. Prevalence of thyroid dysfunction and its correlation with CD4 count in newly-diagnosed HIV-positive adults--a cross-sectional study. Int J STD AIDS. 2015 Nov;26(13):965-70.
16. Menon U, Sundaram KR, Unnikrishnan AG, Jayakumar RV, Nair V, Kumar H. High prevalence of undetected thyroid disorders in an iodine sufficient adult south Indian population. J Indian Med Assoc. 2009;107:72-7.

Cite this article as: Gangannavar AA, Raghu G, Mahendra SV, Kumar MBK, Rajoor U. Prevalence of thyroid abnormalities in HIV/AIDS persons and correlation with CD4 count, HAART drug and duration of illness. Int J Adv Med 2020;7:1264-8.