A study on HIV-infected individuals who reported CD4+ cell count below 100 cells/μl multiple times after more than 6 months of antiretroviral therapy at the apex tertiary referral hospital of India

Sir,

CD4+ cell count is a reliable predictor of the risk of disease and death among HIV-infected individuals. CD4+ cell count below 100 cells/μl multiple times despite antiretroviral therapy (ART) is considered immunological failure to ART.[1] A 6-month time period after initiation of ART regimen is considered sufficient to lift CD4+ cell count to normal levels.[2] Recognizing the significance of such cases, we analyzed data of HIV-infected individuals who reported two or more CD4+ cell count below 100/μl after >6 months of first-line ART during 2009–2018 (10-year study group). COVID-19 period was excluded as it disrupted HIV testing and was associated with reduced CD4+ cell count.[3,4]

12.3% of ART-treated HIV-positive individuals reported two or more CD4+ cell count <100 cells/μl after >6 months of first-line ART. Such cases have gradually increased since 2012. Compared with control group (i.e., individuals with last CD+ Cell count >500 cells/μl after >6 months of first-line ART during the same period), there were significantly higher proportionate of individuals in age groups 30–40 years, 40–50 years, 50–60 years, and >60 years in study group ($P < 0.0001$, >30 years vs. <30 years; Chi-square test) [Table 1]. There were significantly higher numbers of males and lower females in study group than control group ($P < 0.0001$; Chi-square test). There was significantly higher percentage of individuals with monthly income below Indian rupee (INR) 10,000 in study group in comparison to control group ($P = 0.05$, INR <10,000 vs. INR >10,000; Chi-square test). Study group had 7.5 times more individuals with baseline (i.e., at the time of HIV confirmation) CD4+ cell count <100 cells/μl ($P < 0.0001$; Chi-square test) and nine times less individuals with baseline CD4+ cell count >500 cells/μl ($P < 0.0001$; Chi-square test) than control

Table 1: Factors associated with CD4+ cell count <100 cells/µl on multiple occasions after >6 months first-line antiretroviral therapy treatment (study group), the control group included those with current CD4+ cell count >500 cells/µl after >6 months of first-line antiretroviral therapy treatment

Factors	Study group (*n*=387)	Control group (*n*=1936)
Age at confirmation of HIV infection (years)		
<5	0	68 (3.5)
5-15	15 (3.8)	137 (7.0)
15-30	102 (26.3)	750 (38.7)
30-40	154 (39.8)	615 (31.7)
40-50	79 (20.4)	241 (12.4)
50-60	28 (7.2)	96 (4.9)
>60	9 (2.3)	29 (1.5)
Sex		
Male	299 (77.2)	1115 (57.5)
Female	87 (22.5)	816 (42.1)
Transgender	1 (0.2)	5 (0.2)
Education		
Illiterate	35 (9.0)	216 (11.1)
Primary	301 (77.7)	1396 (72.1)
Secondary	32 (8.2)	186 (9.6)
Higher	19 (4.9)	138 (7.1)
Monthly income (INR)		
<10,000	282 (73)	1310 (67.8)
10,000-20,000	70 (18.1)	446 (23.1)
>20,000	34 (8.8)	174 (9.0)
Mode of infection		
Heterosexual	344 (88.8)	1575 (78.8)
Mother to child	21 (5.4)	260 (13.4)
Blood transfusion	1 (0.2)	15 (0.77)
Men to men sex	2 (0.5)	14 (0.72)
Unsafe injection	5 (1.2)	19 (0.9)
Unknown	14 (3.6)	52 (2.6)
Baseline CD4+ cell count (cells/µl)		
<100	210 (54.2)	143 (7.3)
100-200	94 (24.2)	198 (10.2)
200-350	47 (12.1)	515 (26.6)
350-500	14 (3.6)	443 (22.8)
>500	14 (3.6)	634 (32.7)
Unavailable	8 (2.0)	3 (0.1)
ART adherence		
>95%	197 (50.9)	580 (29.9)
80%-95%	53 (13.6)	212 (10.9)
<80%	14 (3.6)	71 (3.6)
Unavailable	123 (31.7)	1073 (55.4)
Tuberculosis		
HIV-TB	28 (7.2)	106 (5.4)
Non-HIV-TB	359 (92.7)	1830 (94.5)
IPT	37 (9.5)	150 (7.7)
Non-IPT	350 (90.4)	1786 (92.2)
Fatality		
Died	58 (14.9)	29 (1.4)
Alive on ART	171 (44.1)	716 (36.9)
Transfer out	118 (30.4)	60 (3.1)
LFU	40 (10.3)	1131 (58.4)

HIV=Human immunodeficiency virus; INR=International normalized ratio; ART=Antiretroviral therapy; TB=Tuberculosis; IPT=Isoniazid Preventive Therapy; LFU=Lost to follow up

group. Only 9.7% of individuals in study group could reach last CD4+ count >500 cells/µl, 37.5% had last known CD4+ count >200 cells/µl, 19.1% had last known CD4+ count 100–200 cells/µl, and 43.0% reported last known CD4+ count <100 cells/µl. There was nonsignificant difference in the existence of tuberculosis in study group and control group (P = 0.21, HIV-TB vs. Non-HIV-TB; Chi-square test); although study group had higher tuberculosis incidence than control group (7.2% vs. 5.4%) [Table 1]. The death rate in study group was 14.9% and it was significantly higher in comparison to control group (1.4%) (P < 0.0001, died vs. alive; Chi-square test) [Table 1]. Among those who died in the study group, only 1.7% had CD4+ cell count >500 cells/µl at the time of HIV confirmation.

CD4+ cell count at the time of HIV confirmation is the strongest predictor of recovery in CD4+ counts following initiation of ART.[5] Starting ART at CD4+ cell count >500 cells/µl and within 4 months of HIV seroconversion is associated with a greater long-term increase in CD4+ count.[5] ART is now initiated as soon as HIV infection is diagnosed, however, late diagnosis of HIV infection complicates CD4+ cells recovery. Awareness campaigns regarding "health hazards in late ART initiation" are needed to motivate people for early HIV testing and ART initiation at healthy baseline CD4+ cell count.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Shesh Prakash Maurya, Ravinder Singh, Sanjeev Sinha[1], Hitender Gautam, Bimal Kumar Das

Department of Microbiology, National HIV Reference Laboratory, All India Institute of Medical Sciences, [1]ART Clinic, Department of Medicine, All India Institute of Medical Sciences, New Delhi, India

Address for correspondence:
Dr. Bimal Kumar Das,
National HIV Reference Laboratory,
All India Institute of Medical Sciences, New Delhi, India.
E-mail: tezpur.bimal@gmail.com

References

1. World Health Organization. Consolidated Guidelines on the Use of Antiretroviral Drugs for Treating and Preventing HIV Infection. 2nd ed. Switzerland: World Health Organization; 2016. Available from: https://apps.who.int/iris/bitstream/handle/10665/208825/9789241549684_eng.pdf?sequence=1. [Last accessed on 2021 Nov 07].
2. World Health Organization. Antiretroviral Therapy for HIV Infection in Adults and Adolescents. Recommendations for a Public Health Approach. Geneva, Switzerland: WHO; 2010. Available from: https://apps.who.int/iris/bitstream/handle/10665/44379/9789241599764_eng.pdf?sequence=1. [Last accessed on 2021 Nov 07].
3. Maurya SP, Sharma A, Singh R, Gautam H, Das BK. HIV testing & diagnosis in 2020 at the apex tertiary referral hospital of India: Impact of COVID-19 pandemic. AIDS Care. 2021 Sep 8;1-4. doi: 10.1080/09540121.2021.1975631. Online ahead of print.
4. Xu B, Fan CY, Wang AL, Zou YL, Yu YH, He C, *et al.* Suppressed T cell-mediated immunity in patients with COVID-19: A clinical retrospective

study in Wuhan, China. J Infect 2020;81:e51-60.
5. Stirrup OT, Copas AJ, Phillips AN, Gill MJ, Geskus RB, Touloumi G, *et al.* Predictors of CD4 cell recovery following initiation of antiretroviral therapy among HIV-1 positive patients with well-estimated dates of seroconversion. HIV Med 2018;19:184-94.

Access this article online

Quick Response Code:

Website: www.ijstd.org

DOI: 10.4103/ijstd.ijstd_103_21

How to cite this article: Maurya SP, Singh R, Sinha S, Gautam H, Das BK. A study on HIV-infected individuals who reported CD4+ cell count below 100 cells/μl multiple times after more than 6 months of antiretroviral therapy at the apex tertiary referral hospital of India. Indian J Sex Transm Dis 2022;43:216-8.

Submitted: 08-Nov-2021 **Revised:** 14-Mar-2022
Accepted: 15-Mar-2022 **Published:** 01-Aug-2022