

Correlation between CD4 Count and HIV-1 Viral Load among ART Naive Patients Attending ICTC, SMS Medical College, Jaipur

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ABSTRACT

Objectives: To study the correlation between CD4 count & HIV-1 viral load among ART Naive patients attending ICTC SMS Medical College, Jaipur.

Material and Methods: This study was conducted on 250 HIV serologically confirmed, ART Naive cases from ICTC, SMS Jaipur. RNA extraction was done from plasma samples by Qiagen Viral RNA Mini Kit then HIV-1 Viral load was determined by Qiagen HIV-1 viral load kit on ABI 7500 Fast dx Real Time PCR, while CD4 count was done on FACS CALIBUR flowcytometer (BD Biosciences). SPSS ver. 21.0 was used to determine correlation between CD4 count & HIV-1 viral load.

Results: Out of 250, 216 (86.4%) cases were found in which viral RNA was detected. These samples were correlated with their CD4 Count. The mean of viral load was $194746.2791 \pm 550442.61805$ IU/ml while CD4 count was 282.7674 ± 217.56456 cells/ul. Females were having Avg. Viral load 228506.7273 & CD4 count 337.21 and males were found to have Avg. Viral load 179791.9866 & CD4 count 258.65

Conclusion: This study concluded a negative correlation between HIV-1 RNA viral load and CD4 count in

HIV-seropositive ART naive patients of this part of the country. Our study confirmed that HIV-1 RNA viral load levels are significantly higher in women than in men, but no such significant gender difference in the CD4 count was found.

Keywords: ART Naive HIV, HIV-1 RNA Viral Load, CD4 Count.


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Article History:

Received: 17-05-2019, **Revised:** 14-06-2019, **Accepted:** 12-07-2019

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.4.069	

INTRODUCTION

HIV is a major global public health issue. In 2018, 37.9 million people globally were living with HIV. HIV epidemic in India is slowing down as new infections have decreased 27% from 2010 to 2017. India contributes third highest burden of HIV pandemic worldwide, with 2.1 million people infected with HIV. Out of these 79% cases are aware about their HIV status. 56% are on antiretroviral treatment (ART). Very few studies have yet reported HIV-1 RNA Viral load in ART Naive patients.¹

HIV-1 RNA viral load is generally used as a marker to progression of the disease. CD4 counts being a simpler test helps to start the ART therapy in HIV positive individuals. In a symptomatic HIV1 infected individual, there is low CD4 count and high HIV-1 RNA viral load.^{2,3} However some individuals with a high CD4 count may have a high HIV-1 RNA viral load.⁴ This study was planned to find the baseline HIV-1 RNA Viral Load and its correlation with

baseline CD4 count in newly diagnosed HIV seropositive ART naive patients attending ICTC SMS, Jaipur.

AIMS AND OBJECTIVES

To correlate CD4 Count with HIV-1 RNA Viral load in ART Naive Patients.

MATERIALS AND METHODS

Study Center: 250 HIV-1-infected, who were not on ART, were enrolled for this study between 2014-19.

Inclusion Criteria: Newly diagnosed HIV seropositive cases who had not started ART were included in this study

Exclusion Criteria: On ART patients were excluded.

Permission and Ethical Consideration: Permission for this study was obtained from the Institutional Ethics Committee.

Methodology: This study was conducted on 250 HIV serologically confirmed, ART Naive cases from ICTC, SMS Jaipur. RNA extraction was done from plasma samples by Qiagen Viral RNA Mini Kit then HIV-1 Viral load was determined by Qiagen HIV-1 viral load kit on ABI 7500 Fast dx Real Time PCR, while CD4 count was done on FACS CALIBUR flowcytometer (BD Biosciences). SPSS ver. 21.0 was used to determine correlation between CD4 count & HIV-1 viral load.

RESULTS

A total of 250 HIV serologically confirmed positive samples were tested for HIV-1 RNA viral load & CD Count. Out of 250, viral RNA was detected in 216 (86.4%) cases. In these cases HIV-1 Viral load was correlated with CD4 Count. The mean viral load was

194746.2791 ± 550442.61805 IU/ml while CD4 count was 282.7674 ± 217.56456 cells/ul. Females were having Avg. Viral load 228506.7273 & CD4 count 337.21 and males were found Avg. Viral load 179791.9866 & CD4 count 258.65. For statistical analysis of the data we used SPSS v 21.0. We used Pearson Correlation coefficient and conducted t test for checking for significance of the correlation coefficient. We assume the underlying assumptions of the usual t test to hold and conduct the test at a 5% level of significance. From Table 2 it was observed that the correlation between the two variables is moderately negative and highly significant. The scatter plot (Fig.1) shows a negative relationship between the variables. Females had mean Viral load 228506.7273 & CD4 count 337.21 and males had Avg. Viral load 179791.9866 & CD4 count 258.65. (Fig. 2 & Fig. 3)

Table 1: Mean & Std. Deviation of CD4 count & HIV-1 viral load

Descriptive Statistics			
	Mean	Std. Deviation	N
CD4 Count	282.7674	217.56456	216
Viral Load	194746.2791	550442.61805	216

Table 2: Correlation between HIV Viral Load with CD4 Count

CORRELATIONS			
		CD4COUNT	VIRAL LOAD
CD4 Count	Pearson Correlation	1	-.268**
	Sig. (2-tailed)		.000
	N	216	216
Viral Load	Pearson Correlation	-.268**	1
	Sig. (2-tailed)	.000	
	N	216	216

** . Correlation is significant at 0.01 level (2-tailed).

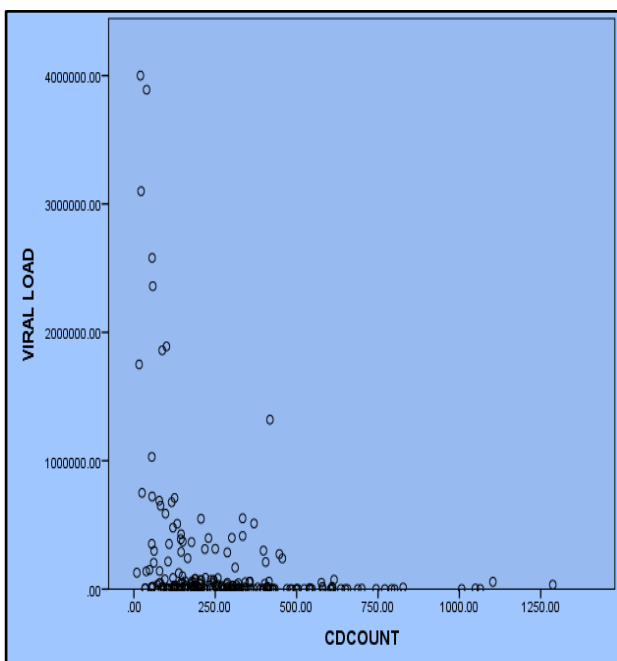


Figure 1: Correlation between HIV-1 Viral load & CD4 Count

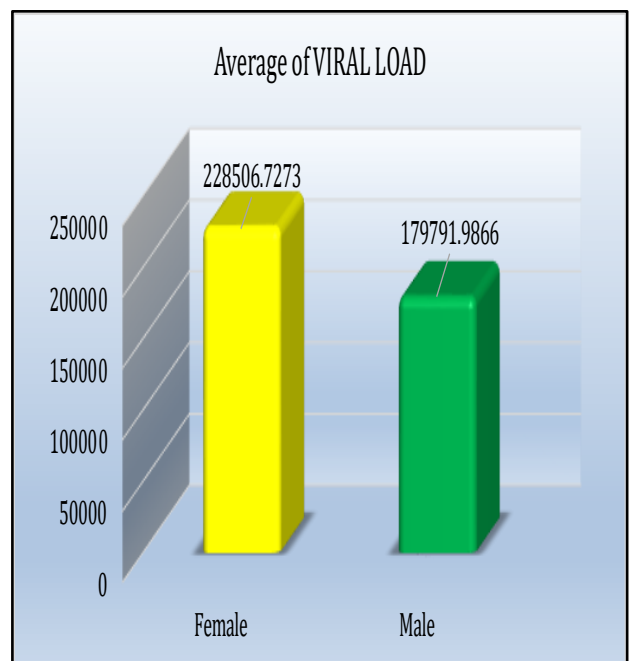


Figure 2: Gender wise distribution of Avg. HIV Viral load among the patients.

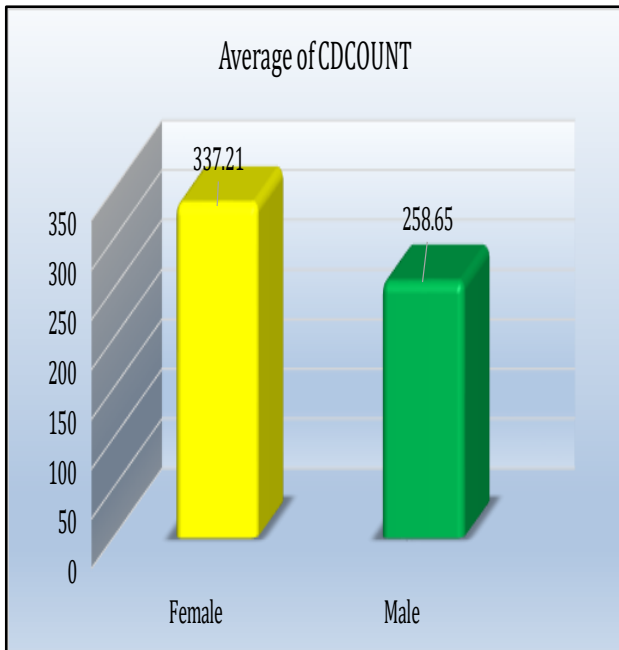


Figure 3: Gender wise distribution of Avg. CD4 Count among the patients.

DISCUSSION

In this study, the mean CD4 count was 282.7674 ± 217.56456 cells/ μ l which is similar with studies among similar patient groups from Nigeria (266 cells/ μ L)⁵ while lower values were reported in a study of H. Gautam et al in Nayak hospital, New Delhi (112 cells/ μ L).⁶ It may be due to difference in immune status and CD4 cell count among healthy HIV-seronegative adults of different parts of India.⁷ Only 19.6% had CD4 count >500 cells/ μ L in our study, but 58.2% cases were reported of >500 CD4 cells/ μ L by Obidiao GN et al in Nigeria in 2013.⁵ This may be due to more awareness and hence early detection of HIV. In present study mean HIV-1 RNA Viral load of $194746.2791 \pm 550442.61805$ copies/ml was found among the ART naïve individuals with detectable HIV-1 RNA viral load, which is equal to the study carried out in Nayak Hospital, New Delhi, 2008⁶ but high HIV-1 RNA Viral load was reported in Nigerian study (450,370 copies/mL).⁵ While 35,730 copies/mL. HIV-1 RNA viral load was found in Spain.⁴ The high viral load in Nigeria may be due to repeated contact with HIV individuals.⁵ Our study showed that HIV-1 RNA was not detectable in 10.4% of the ART naïve patients which was similar with the study done in Spain (16%) and Nigeria (9.5%).^{4,5} It may be due to the presence of variants of HIV-1 that the Qiagen Artus HIV 1 test kit for viral load is unable to detect. Our study showed a statistically significant negative correlation between HIV-1 RNA viral load and CD4 counts in HIV-seropositive ART naïve patients in majority of the individuals (86.4%).

CONCLUSION

This study concluded a negative correlation between HIV-1 RNA viral load and CD4 count in HIV-seropositive ART naïve patients of this part of the country. This shows HIV-1 RNA viral load increases in patients who have a lower CD4 count.

Our study confirmed that HIV-1 RNA viral load levels are significantly higher in women than in men, but no such significant gender differences in the CD4 count was found. We strongly support the WHO recommendation⁸ to start ART with CD4 count $\Rightarrow >500$ cells/ μ l, to reduce the risk of HIV transmission and disease progression in an individual.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

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Cite this article as: Jitendra Panda, Nitya Vyas, Aditya Mishra, Babita Sharma. Correlation between CD4 Count and HIV-1 Viral Load among ART Naive Patients Attending ICTC, SMS Medical College, Jaipur. *Int J Med Res Prof.* 2019 July; 5(4):282-84. DOI:10.21276/ijmrp.2019.5.4.069