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ASSESSMENT OF CD4 CELL COUNT AND VIRAL LOAD TEST IN HIV – INFECTED ADULTS

Microbiology

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ABSTRACT

Introduction – CD4 cell count is an indicator of immune function in PLHIV and key determinant for the need of opportunistic infection prophylaxis. Viral load test is used to diagnose acute HIV infection, guide treatment choices and monitor response to ART. Since there have not been many studies on this topic, this study was done to assess the use of both CD4 cell count and viral load in the monitoring HIV/AIDS progression. **Aim & objective –** To assess the CD4 cell count and viral load in HIV- infected adults.
Methods – This was a retrospective study, conducted on 197 patients receiving ART, from July 2018 to June 2019. CD4 cell count was done by BD FACS count system and viral load test was done by Real – time PCR. **Results –**The mean baseline CD4 cell count was 233.46 cells/mm3 while mean latest CD4 cell count was 371.67 cells/mm3. The mean baseline viral load was 230926.20 copies/ml. Of the 197, 12 underwent both baseline viral load (mean 394499.92 copies/ml) and latest viral load (mean 226389.83 copies/ml). The paired differences of Latest – Baseline CD4 cell count is <0.001 i.e. significant & Latest – Baseline viral load is 0.323 i.e. not significant. **Conclusion –** This study concludes CD4 cell count is simple, convenient and shows significant prognosis results, while viral load testing is a cumbersome and inconvenient method, and does not show effective prognosis. Hence, in Indian scenario set- up CD4 cell count is better than viral load test.

KEYWORDS

Cd4 cell count, Viral load, HIV/AIDS progression, India

INTRODUCTION

HIV continues to be a major global public health issue, having claimed about 38 million lives.[1] India has the third largest HIV epidemic in the world.[2] As per India HIV Estimations 2017 report by NACO: around 0.22% (21.40 lakh) of people living with HIV/ AIDS (PLHA) in India and about 3% (< 1 lakh) of the total PLHA of the country lives in the state of Rajasthan.[3]

On April 28, 2017 the Health Ministry launched "Test and Treat" policy for all PLHIV in the country. By adopting Test and Treat, NACO aims to significantly increasing the number of PLHIV on treatment in order to achieve epidemic control.[4]

PLHIV on first line ART are monitored by baseline and six monthly CD4 count testing to monitor the treatment response.[4] CD4 cell count plays an essential role to monitor HIV treatment outcome, but fails to predict virological failure, while viral load test provides information about virological failure.

So, the viral load test prevents unnecessary change of treatment.[5]

In the 2013 consolidated guidelines, WHO recommends viral load as the preferred approach for monitoring PLHIV on ART over immunological (CD4) and clinical monitoring. This is because viral load provides an early and more accurate indication of treatment failure and the need to switch to second-line drugs. This helps reduce the accumulation of drug-resistance mutations and improve clinical outcomes of the PHLIV on ART. Measuring viral load can also help distinguish between treatment failure and non-adherence.[5]

As there are very few studies on assessment of CD4 cell count and viral load test, this study was done to assess the use of both in the monitoring HIV/AIDS progression.

MATERIALS AND METHODS

This retrospective study was conducted on 197 patients receiving ART, from July 2018 to June 2019 at J.L.N. Medical College & Hospital, Ajmer.

- INCLUSION CRITERIA: HIV–positive patients, aged 15 years or more, who were registered at ART center.
- EXCLUSION CRITERIA: HIV–positive patients, aged less than 15 years, who were registered at ART center.

Laboratory assay for CD4 cell count was done by BD FACS count system and Viral load test was done by Real – time PCR.

Statistical analysis of the data on demographic variables analyzed by frequencies and percentages. The correlation between PVL and CD4 cell count was analyzed by Pearson correlation test ®. For all analyses, $P < 0.05$ was considered statistically significant.

RESULTS

A total of 197 patients were enrolled in the study. The age ranged in the study population was 17–70 years (mean age 34.90 ± 9.21 years). Of the 197 patients, 109 (55.33%) were males and 88 (44.67%) were females. Majority of the cases (i.e., 88.32%)) belonged to the age group of 15–45 years (as shown in Table 1). Based on the history of the participants, the most common route of acquiring HIV-infection was heterosexual intercourse (95.94%) (as shown in Figure 1).

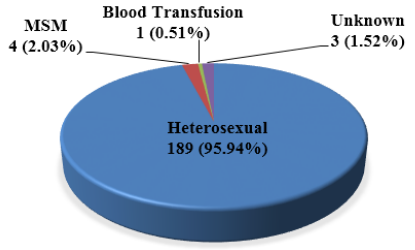
Table 1: Demographic profile of study individuals

CATEGORY	VALUE	PERCENTAGE
AGE GROUPS (IN YEARS)		
15 – 45	174	88.32%
>45	23	11.68%
GENDER		
Male	109	55.33%
Female	88	44.67%
EDUCATION STATUS		
Illiterate	71	36.04%
Primary school	86	43.65%
Secondary school	28	14.21%
College	12	6.09%
OCCUPATION		
Housewife	65	32.99%
Labourer	35	17.77%
Driver	29	14.72%
Farmer	25	12.69%
Unemployed	10	5.08%
Others	33	16.75%
RESIDENCE		
Rural	138	70.05%
Urban	59	29.95%

	Mean	N	Std. Deviation	Std. Error Mean
Latest CD4 Cell Count	371.67	197	212.805	15.162

Baseline CD4 Cell Count	233.46	197	174.401	12.426
Latest viral load	226389.83	12	381721.464	110193.495
Baseline viral load	394499.92	12	414016.556	119516.285

Figure 1: Modes Of Transmission



The mean baseline CD4 cell count was 233.46±12.426 cells/mm3 while mean latest CD4 cell count was 371.67±15.162 cells/mm3 (as shown in Table 2).

The mean baseline viral load was 394499.92±119516.285 copies/mL and mean latest viral load was 226389.83±110193.495 copies/mL (as shown in Table 2).

Table 2: Comparison between latest and baseline CD4 cell count (cell/mm3) & latest and baseline viral load (copies/mL)

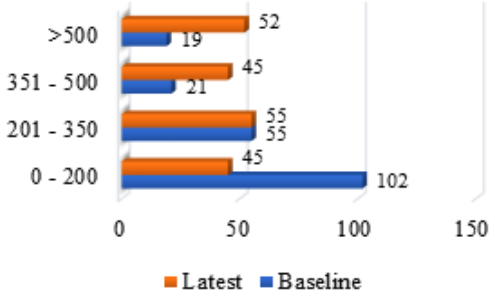
The paired differences of Latest – Baseline CD4 cell count is <0.001 i.e. significant & Latest – Baseline viral load is 0.323 i.e. not significant (as shown in Table 3).

Table 3: Paired Differences

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig. (2-tailed)
				Lower	Upper			
Latest – Baseline CD4 cell count	138.213	226.173	16.114	106.434	169.993	8.577	196	<0.001 S
Latest – Baseline viral load	-168110.083	563345.434	162623.819	526042.626	189622.529	-1.034	11	0.323 NS

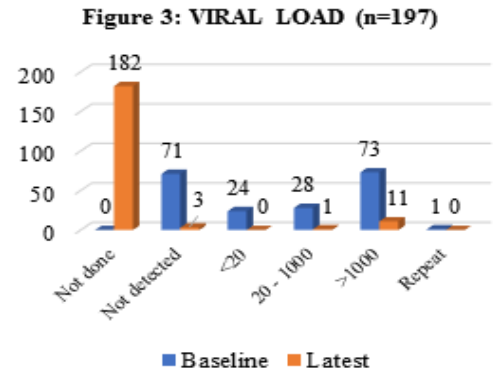
In figure 2, maximum baseline CD4 cell count (>500 cell/mm3) seen in 19 subjects while minimum baseline CD4 cell count (0 - 200 cell/mm3) seen in 102 subjects while maximum latest CD4 cell count (>500 cell/mm3) seen in 52 subjects while minimum baseline CD4 cell count (0 - 200 cell/mm3) seen in 45 subjects.

Figure 2: CD4 CELL COUNT (n=197)



In figure 3, in baseline viral load, >1000 copies/mL seen in 73 subjects while not detected in 71 subjects, and in latest viral load, 182 subjects viral load was not done while 11 subjects had > 1000 copies/mL.

Figure 3: VIRAL LOAD (n=197)



DISCUSSION

Majority of the subjects (88.32%) belonged to age group of 15- 45 years in our study. These findings are similar to Haokip et al., (2018)7, where 94% subjects belonged to age group of 15- 49 years & Chakraborty et al., (2015)6, where 77.21% subjects belonged to age group of 20- 49 years.

Majority of the subjects (55.33%) were males in our study. Chakraborty et al., (2015)6 also reported males to be in higher number (69.29%) while in Haokip et al., (2018)7, females were majority of the subjects (53.70%)

Majority of the subjects (70.05%) were residing in rural areas, while in Chakraborty et al., (2015)6 majority of the subjects were urban residents (60.15%). This difference may be due to study population vary from place to place.

Most common mode of transmission was heterosexual (95.94%) in our study. Haokip et al., (2018)7 also reported most common mode of transmission was heterosexual (75.70%).

In this study, the mean latest CD4 cell count was 371.67±15.162 cells/mm3, which is in agreement with Haokip et al., (2018)7 (348.3 cells/ mm3).

The mean baseline viral load was 394499.92±119516.285 copies/mL in our study while in Haokip et al., (2018)7 the mean viral load was 108,000 ± 206,200 copies/mL among ART naïve individuals. This difference may be due in our study baseline viral load was done in case of non – responsive to first line treatment either subject had persistent low CD4 cell count (<100 cells/mm3) and decrease CD4 cell count by > 50 cells/mm3.

Majority of the subjects (91%) with CD4 cell count <350 cells/mm3 had higher viral load (>1000 copies/mL) and vice versa (82.47% with CD4 cell count >350 cells/mm3 had lower viral load <1000 copies/mL). Our findings are similar to Haokip et al., (2018)7 study. However, this finding is not always absolute, as some individuals with a high CD4 cell count may have high viral load and vice versa.

CONCLUSION

From this study, we can conclude that there is significant difference between the mean baseline and the mean latest CD4 cell counts, whereas there is insignificant difference between the mean baseline and the mean latest viral load. So, in contrast to other studies done on comparison of both CD4 cell count and viral load test; our study concludes that CD4 cell count is a better prognostic test as it is simple, easy, reliable, convenient and less skill and staff required, whereas, HIV viral load test is a cumbersome, inconvenient, require skilled staff and time consuming method; so according to Indian scenario CD4 cell count is better than viral load test.

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