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Research Article

CD4 Count Pattern and Demographic Distribution in HIV Positive Patients in Northern Part of India

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Abstract

The aim of this study is to determine the percentage of HIV - positive people requiring treatment at the time of enrollment using the count of CD4 as a tool.

One hundred cases (37 males and 63 females) of different kinds of HIV/AIDS were included in this study. Written consent was obtained from each participant for their information to be stored in the clinic database and used for research purposes. Blood samples were collected from these volunteers in the sterilized vials and processed for CD4 count. Data were analyzed with statistical package (SPSS 16.0) software and correlation coefficients and correlation matrix were determined.

One hundred cases (37 males and 63 females) of different kinds of HIV/AIDS were included in this study with a mean age ranged from 33.45 ± 13.052. Half of the patients below 29 years of age and only 4% are above 59 years of age. Overall, the mean CD4 count was of 467.23 ± 291.34 cells/mm3. The mean CD4 count of males was 436.43 ± 283.50 cells/mm3 and that of females 485.32 ± 269.59 cells/mm3. There was no significant gender difference in CD4+ve patients by CD4 cell count.

Females account for more than half of registered patients in HIV clinic and have a comparatively higher CD4 count than males. Nearly 3/4 of HIV positives require antiretroviral therapy at the time of registration.

Keywords: CD4 Count; Demographic; HIV; Blood; Gender; India

Introduction

India has the world's third biggest HIV epidemic. The prevalence of HIV among adults (15-49 years old) was estimated at 0.2% in 2017. This figure is small compared to most other middle - income countries, but this is equivalent to 2.1 million people living with HIV due to India's huge population (1.3 billion people) [1-2]. Overall, India's HIV epidemic is slowing down. Between 2010 and 2017 new infections declined by 27% and AIDS-related deaths more than halved, falling by 56%. However, in 2017, new infections increased to 88,000 from 80,000 and AIDS-related deaths increased to 69,000 from 62,000 [3].

CD4 count measures the degree of immunosuppression in HIV-positive patients. There is an inverse relationship between CD4 count and degree of immunosuppression. CD4 count is used in monitoring disease progression, deciding when to commence therapy, staging the disease, determining treatment failure, and defining the risk for mother-to-child transmission. Laboratory markers used in monitoring management in HIV-positive patients are HIV-RNA assay (Viral load) and CD4 count. The former is the gold standard, its use is, however, limited because of its cost and technology. Furthermore, there is a mismatch between an undetectable viral load (<50 copies/mL) and the absence of immune reconstitution, which can be confusing to both the treatment provider and patient.

Several studies have shown that CD4 count is the strongest predictor of disease progression and survival [4]. The cost of CD4 count is cheaper than viral load, it is increasingly becoming more affordable to patients in resource-poor countries [5-6]. All HIV-positive patients in resource rich and an increasing number of patients in resource-poor countries have baseline CD4 count on enrollment [7].

The U.S. Centre for Disease Control (CDC) and the prevention [8] staging system used the CD4 count as a tool to stage HIV into categories A, B, and C based on whether the CD4 count is >500 cells/mm^3, between 200–499 cells/mm^3 and <200 cells/mm^3, respectively. It defines AIDS as all HIV-positive patients with CD4 count <200 cells/mm^3 or CD4% < 14%. On the contrary, in order to accommodate resource - constrained settings where CD4 count testing may not be available, the WHO staging is based on clinical findings and does not require CD4 count.

CD4 count is an important tool to determine HIV - positive patients ' treatment failure. The 2010 World Health Organization (WHO) [9] revised guideline defined immunological failure as a fall of CD4 count to baseline level or below, or 50% fall from on-treatment peak value or persistent CD4 count below 100 cells/mm^3. There must, however, be absence of concomitant infection to cause transient CD4 count decrease. A patient presenting with immunological or clinical failure (new or recurrent stage 4 disease) with viral load copies >5000 copies/mL is deemed to have treatment failure and switched to second-line regimens [9].

The introduction of HAART as a treatment method in HIV -

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Table 1: Distribution of age at different intervals with CD4 positivity.

Age	CD4 +ve (*n*=73)		CD4 -ve (*n*=27)	
	n	%	*n*	%
Less than 29	32	43.84	7	25.93
between 29 to 39	16	21.92	9	33.33
between 40 to 49	11	15.07	3	11.11
between 50 to 59	11	15.07	7	25.93
Above 59	3	4.11	1	3.70

Applied χ^2 test for significance. P value = 0.413.

Table 2: Gender distribution in CD4 positivity.

Gender	CD4 +ve (*n*=73)		CD4 -ve (*n*=27)	
	n	%	*n*	%
Male	30	41.10	12	44.44
Female	43	58.90	15	55.56

Applied χ^2 test for significance. P value = 0.042.*

positive patients resulted in a dramatic reduction in morbidity and mortality associated with AIDS and a significant improvement in the number of patients with CD4 [10]. Hence, HAART - experienced patients must be excluded from the study in order to determine the true picture of CD4 count pattern in HIV positive. The data can be used to determine the percentage of patients infected with HIV who need antiretroviral therapy (ART) when registering. This will help clinicians and policy makers determine the point to start treatment and the percentage of infected patients requiring treatment at registration. Therefore, this study aimed to determine the percentage of HIV - positive people requiring treatment at enrollment using the count of CD4 as a tool.

Materials and Methods

One hundred cases of different kinds of HIV/AIDS, age ranging from 18 to 60 years were selected from Sanjay Gandhi Post Graduate Institute of Medical Sciences (SGPGIMS), Lucknow, India. Written consent was obtained from each participant for their information to be stored in the clinic database and used for research purposes.

Lucknow is the capital city of Uttar Pradesh's Indian state, and is also the administrative headquarters of the district and division of the same name. It is India's 11th - populated city and 12th - populated urban agglomeration. SGPGIMS is a state law medical institute based in Lucknow, Uttar Pradesh. SGPGIMS provides tertiary medical care, teaching, training and research super - specialties.

Using vacutainer / needle, tenniquoit, and a swab spirit, the CD4 count blood samples were taken at 9am from the antecubital vein of the patient. The swab spirit was used to clean the area in which blood was taken from the antecubital vein with the tenniquoit tied just above the antecubital area and 10ml of blood was taken as previously described [11]. 20µl of the entire blood sample was mixed with 20µl CD4 easy count antibody in a level tube, then incubated for 15min at room temperature in the dark. Using cyflow SL green, 800µl of CD4 easy count no lyse buffer was diluted. It was evaluated after reading and the count noted per ml. To find the CD4 count in µl, the report was created using a report template (software, cyflow SL Green, Partec, Germany) to arrive at CD4/µl.

Data were analyzed with statistical package (SPSS 16.0) software and correlation coefficients and correlation matrix were determined. Results were presented with frequencies and percentages in simple tables, while differences were considered statistically significant when the P value obtained was less than 0.05.

Results

One hundred cases (37 males and 63 females) of different kinds of HIV/AIDS were included in this study with a mean age ranged from 33.45 ± 13.052. Half of the patients below 29 years of age and only 4% are above 59 years of age. Frequency distribution of age intervals according to CD4 positivity are summarized in Table 1. Statistically, this percentage difference among groups was not significant ($p > 0.05$).

Frequency distribution of Gender according to CD4 positivity is summarized in Table 2. Statistically, this percentage difference among groups was significant ($p < 0.05$).

Frequency distribution of Gender with age category according to CD4 +ve patients are summarized in Table 3. Statistically, this percentage difference among groups was not significant ($p > 0.05$).

Frequency distribution of Gender according to CD4 +ve patients according to CD4 cell count categories are summarized in Table 4. Statistically, this percentage difference among groups was not significant ($p > 0.05$).

This study reported mean CD4 counts in HIV positives of 436.43 ± 283.50 and 485.32 ± 269.59 cells/mm^3, respectively, for males and females and an overall mean of 467.23 ± 291.34. cells/mm^3.

Discussion

In 1986, Dr. Suniti Solomon and her student Dr. Sellappan Nirmala diagnosed the first known case of HIV among women sex workers in Chennai, Tamil Nadu. Sex workers began to show signs of this deadly disease later that year. At the time, Indian foreigners traveled to and from the country [12].

Although it is home to the third largest HIV/AIDS population in the world (with more in South Africa and Nigeria), the prevalence

Table 3: Frequency distribution of gender and age intervals according to CD4 +ve and –ve patients.

Gender	Age Category	CD4 +ve (*n*=73)		CD4 -ve (*n*=27)		*p* value
		n	%	*n*	%	
Male	Less than 29	14	19.18	5	18.52	0.071
	between 29 to 39	12	16.44	3	11.11	
	between 40 to 49	4	5.48	2	7.41	
	between 50 to 59	0	0.00	2	7.41	
	Above 59	0	0.00	0	0.00	
Female	Less than 29	18	24.66	3	11.11	0.380
	between 29 to 39	4	5.48	5	18.52	
	between 40 to 49	7	9.59	1	3.70	
	between 50 to 59	11	15.07	5	18.52	
	Above 59	3	4.11	1	3.70	

Applied χ2 test for significance.

Table 4: Gender distribution with CD4 cell count in CD4 +ve patients.

Cases (*n*=100)						
CD4 +ve (*n*=73)						
Gender	<200		between 200 to 500		>500	
	n	%	n	%	n	%
Male	8	40	16	45.71	6	33.33
Female	12	60	19	54.29	12	66.67

Applied χ^2 test for significance. P value = 0.682.

of AIDS in India is lower than in many other countries. India's large population has led to a large number of affected people while the overall Prevalence rate is low. India's AIDS prevalence rate was around 0.26 percent in 2014 — the 90th highest in the world [13].

One hundred cases (37 males and 63 females) of different kinds of HIV/AIDS were included in this study with a mean age ranged from 33.45 ± 13.052 similar to other studies [14-15]. Half of the patients below 29 years of age and only 4% are above 59 years of age. This is understandably so because, when sexual activity is at its peak, most patients in the HIV clinic are between 31–50 years of age. Frequency distribution of age intervals according to CD4 positivity are summarized and found approx. 50% are below the age of 29 years. There was no significant difference between age and gender in CD4+ve HIV patients.

This study reported mean CD4 counts in HIV positives of 436.43 ± 283.50 and 485.32 ± 269.59 cells/mm^3, respectively, for males and females and an overall mean of 467.23 ± 291.34. cells/mm^3. This could be compared with 303.16 ± 234.32 cells/mm^3 and 308.24 ± 232.2 cells/mm^3, respectively, for males and females and an overall mean CD4 count of 306.65 ± 232.24 cells/mm^3 reported by Akinbami et al. in an earlier study [16]. Females have been found to have a higher CD4 count than males in both studies.

Oladepo et al. [17] established in healthy Nigerian adults a reference value for CD4 of 365 to 1,571 cells/μL. with a mean CD4 count of 847 cells/μL similar to the mean value of 828 cells/μL reported by Aina et al. [18] in an earlier study in Nigeria. Females were found to have significantly higher values of absolute CD4 counts in Oladepo's study in contrast to the earlier limited study by Aina et al. in Nigeria. This observation of higher CD4 count in females was also disclosed in several other countries among Nigerians [19], Ugandans [20], and Ethiopians [21]. A sex hormone effect is one possible explanation for the reported gender difference in CD4 counts [21]. There was no significant gender difference in CD4+ve patients by CD4 cell count.

Conclusion

At registration, nearly 3/4 of HIV - positive people require ART when 2010 WHO criteria are used to initiate therapy, the female population in the HIV clinic is higher than the male population and the former has a relatively higher CD4 count than the latter.

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