ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 03 | March - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CORRELATION BETWEEN CD4 CELL COUNT WITH ABSOLUTE LYMPHOCYTE COUNT & TOTAL LEUCOCYTE COUNT IN HIV AIDS PATIENT VISITING ART CENTER, BHAVNAGAR.

Pathology

Dr. Kirti Chaudhari Resident Doctor, Department Of Pathology, Government Medical College, Bhavnagar

Dr. Alpeshpuri Goswami* Associate Professor, Department of Pathology, Government medical college, Bhavnagar *Corresponding Author

Dr. Parth Goswami Assistant Professor, Department of Pathology, All India Institute of Medical Sciences, Rajkot

ABSTRACT

Background: Human Immunodeficiency Virus (HIV) is a lentivirus that causes Acquired Immunodeficiency Syndrome (AIDS). In developed nations, changes in CD4 count and viral load are used to determine the responses of antiretroviral therapy. **Objectives:** To assess the correlation between CD4 cell count with absolute lymphocyte and total leucocyte count in HIV AIDS patients **Methods:** This study was conducted in HIV positive patients attending ART center of Sir Takhtasinhji General Hospital, Bhavnagar. All the sample of patients were tested for CD4 count and CBC. Patients taking post-exposure prophylaxis were excluded from the study. The data was entered in Excel sheet and analysed by Epi info software. **Result:** Data of 728 cases was collected. Out of which 75.13% patients had normal haemoglobin level. Anemia was seen in 24.86%, of which 43.29% were female and 16.29% were male. Leukopenia was observed in 6.32% and lymphopenia was observed in 61.68% of patients. The positive linear correlation between CD4 cell count with absolute lymphocyte and total leucocyte count was established by Pearson's coefficient value 0.2189 and 0.1831, and it was statistically evident with p-value of <0.001. **Interpretation & Conclusion:** The use of Total Lymphocyte Count (TLC) and Absolute lymphocyte count (ALC) can be used as an alternative to CD4 cell count and viral load to monitor response to ART. Both are simple, accessible, reliable, less expensive and widely available laboratory parameter as it is easily obtained and calculated from the routine complete blood count (CBC).

KEYWORDS

ALC, ART, CBC, CD4, HIV-AIDS, TLC

INTRODUCTION

Human Immunodeficiency Virus (HIV) is a lentivirus (a member of the retrovirus family) that causes acquired immunodeficiency syndrome (AIDS).[1]

HIV mainly targets CD4 T cells by binding to the CD4 molecule as well as a chemokine co- receptor, usually CCR5 or CXCR4, on the cell surface.

In addition, macrophages, monocytes and dendritic cells can be infected by HIV.

A variety of hematological manifestations is seen at every stage of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV-AIDS) and often pose a great challenge in the comprehensive management. These manifestations also reflect the underlying immune status if interpreted cautiously, especially if the patient is in regular follow-up. They may cause symptoms that are life-threatening and impair the quality of life of these patients. [2]

Changes in CD4 cell count and plasma viral load are used to determine the responses of the virus to antiretroviral therapy.

MATERIAL & METHODS

The study was conducted in HIV-AIDS positive patients attending ART center, Sir Takhtasinhji General Hospital, Bhavnagar, Gujarat. Study was under taken after approval from ethical committee of government medical college, Bhavnagar and my EC approval No. is 1064/2021 & CTRI No. REF/2021/06/044476.

Inclusion Criteria

HIV-AIDS patients tested for CD4 cell count and CBC.

Exclusion Criteria

Patients on post-exposure prophylaxis.

Cross-sectional study of 728 HIV-AIDS positive cases were conducted at sir t hospital, Bhavnagar from time period of 01/06/2021 to 02/03/2022. Blood samples were collected in two EDTA vaccute at the ART center for CD4 cell count and CBC. Data was collected from record of ART center.

RESULTS

Total 728 HIV-AIDS positive patients were included in the study.

In Present study patients included ranging from 2 to 92 years. The maximum number of HIV-AIDS cases 258 (35.44%) were observed 4th decade.

Out of 728 cases, 497 (68.27%) were males, 231 (31.73%) were females and transgender 0 with M:F ratio of 2.1:1.

We observed haemoglobin level of all patients, among them 547 (75.13%) patients were having normal haemoglobin, 181 (24.86%) patients were having low haemoglobin level. Among them, 81 (16.29%) were male & 100 (43.29%) were female patients. Degree of anemia of HIV-AIDS patients was more common in female.

Table I: Distribution of HIV-AIDS cases according to CD4 cell count

CD4 count (cell/µL)	No. of cases	Percent
<200	13	1.79 %
200-350	157	21.57 %
350-500	390	53.57 %
>500	168	23.08 %
TOTAL	728	100 %

Table II: Total Leucocyte count in HIV- AIDS cases

Total Leucocyte count (/cumm)		Frequency
Normal (>3500/cumm)		682 (93.68%)
Leucopenia (<4000/cumm)	Mild (3000-3499/cumm)	15 (2.06%)
	Moderate (2000-2999/cumm)	24 (3.29%)
	Severe (<2000/cumm)	7 (0.96%)

Table III: Absolute Lymphocyte count in HIV- AIDS cases

Absolute lymphocyte count (/cumm)		Frequency
Normal (>2000/cumm)		279 (38.32%)
Lymphopenia (<2000/cumm)	Mild (1500-1999/cumm)	190 (26.09%)
	Moderate (1000-1499/cumm)	161 (22.11%)
	Severe (<1000/cumm)	98 (13.46%)

Table IV: Mean Pattern of Study Parameters with CD4 Counts

Study parameter (mean ± SD)	CD 4 count(cell/µL)			
	<200	200-350	350-500	>500
Total Leukocyte count (/cumm)	6423.07± 3346.67	5856.68± 2074.91	6487.30± 2119.36	7082.73± 2118.91
Absolute Lymphocyte count (/cumm)	1432.61± 884.41	1694.87± 795.70	1808.52± 755.44	2030.92± 718.49

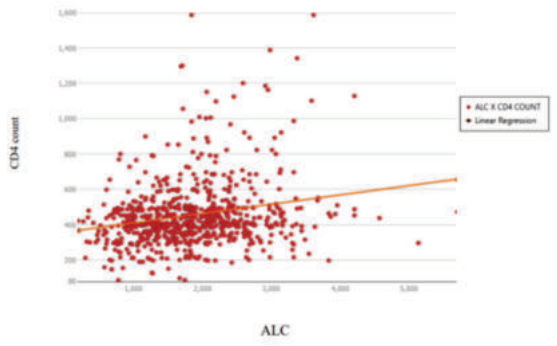

Figure no. A: Scatter graph showing correlation between ALC and CD4 count

The Pearson's coefficient for Absolute lymphocyte count and CD4 count is r = 0.2189, r is between 0 to 1 which establishes positive correlation between ALC and CD4 count. This is statistically significant as the p-value is <0.0001 which is less than 0.05.

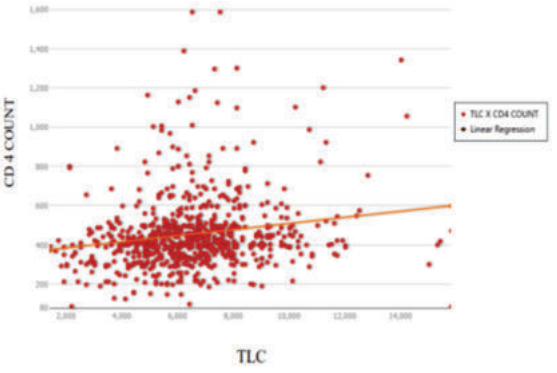

Figure no. B: Scatter graph showing correlation between TLC and CD4 count

The Pearson's coefficient for Total leucocyte count and CD4 count is r = 0.1831, r is between 0 to 1 which establishes positive correlation between Total leucocyte count and CD4 count. This is statistically significant as the p-value is <0.0001 which is less than 0.05.

Table V: Comparison of total and absolute leucocyte counts in patients with different CD4 counts

Parameter	Level	Cd4–>500 cells/µL (n=168)	Cd4–200 to 499 cells/µL (n=547)	CD4–<200 cells/ µL (n=13)	Statistical test	Re-marks (p value)
Total leucocyte count (/cumm)	<2000	00	07	00	$\chi 2$ = 19.87	P = 0.002
	2000-2999	03	21	00		
	3000-3499	00	13	02		
	>3500	165	506	11		
Absolute lymphocyte count (/cumm)	<1000	11	83	04	$\chi 2$ = 22.62	P = 0.001
	1000-1499	29	128	04		
	1500-1999	43	144	03		
	>2000	85	192	02		

From our study, we can conclude that Absolute lymphocyte count and Total lymphocyte count decreases with decrease in CD4 count in HIV-AIDS patients.

DISCUSSION

There were 728 HIV positive patients taken to correlate CD4 count with absolute lymphocyte count and total leucocyte count in our study.

Most common age group affected by HIV-AIDS patients in our study was 31-40 years with 35.44% which was similar to other studies conducted by Srinivasa Rao B and SS Parinitha [3] with 44% and 43.2% respectively.

Male to female ratio in our study was 2.1:1 which was similar to other study conducted by Adediran IA [4] (1.8:1). Various other studies Kothari K [5], Sircar AR [6], Keshva HK [7] also observed male predominance.

SS Parinitha et al did Haematological changes in HIV infection with correlation to CD4 cell count and concluded that haemoglobin range from 2.3 to 19.3 gm/dl and mean was 10.2 [3]. Kaloutsi V et al concluded that haemoglobin range from 3.8 to 17.3 gm/dl and mean was 10.8 [10]. In our study haemoglobin range is from 1.8 to 19.8 gm/dl and mean was 13.35. The mean haemoglobin is slightly higher in our study as we have included the patients already on ART while, the other studies have the cases not taking ART.

In our study 24.86 % patients had anaemia which is comparable with various other studies. Various other studies conducted by Karcher [11], Tripathi AK [12], Kaloutsi [10], SS Parinitha [3] and Sitalakshmi [13] concluded the number of cases of anemia as 89%, 82.4%, 85%, 84% and 64.2% respectively. The cases of anemia in our study is slightly lower than other studies as we had taken patients taking ART and taking monthly follow up at ART centre.

Table VI: Comparison of distribution according to CD 4 counts in different studies

CD4 counts	Our study (n= 728)	Obirikorang C (8) (n= 228)	Paul Nji Wankah (9) (n=81)	SS Parinitha(3)
<200 Cells/cumm	1.79 %	53.5 %	32.1 %	70 %
200-499 Cells/cumm	75.14 %	27.6 %	48.1 %	21.6 %
>500 Cells/cumm	23.08 %	18.9 %	19.8 %	8.4 %

As shown in Table 6, CD4 count of maximum patients was between 200-499 cells/cumm with 75.14% which is in concordance with other study conducted by Paul Nji Wankah with 48.1%. While, other studies conducted by Obirikorang C and SS Parinitha found maximum patients with CD4 count <200 with 53.5% and 70% respectively.

In our study mean total leucocyte count was within normal limit which is comparable to SS Parinitha[3] and Kaloutsi V[10] study. In our study leucopenia is 6.32% and in S S Parinitha study it is 20.8%. The percentage of patients having leucopenia are less in comparison to SS Parinitha study because in our study patients were taking ART and SS Parinitha had included the patients which were not taking ART.

In our study lymphopenia is comparable to study SS Parinitha[3] and Treacy M[14] . In our study Lymphopenia is 61.68% and in S S Parinitha, and Treacy M 65.2% and 70% respectively.

In our study, on calculating p-value, significant correlation was established between CD4 cell count with Absolute lymphocyte count and Total Lymphocyte count. Thus, correlation was proved that CD 4 cell count decreases with decrease in ALC and TLC. Similar results were concluded by various studies conducted by SS Parinitha [3], Keshva HK [8] and Tripathi AK. [13]

The present study showed significant correlation of Total Leukocyte count and absolute lymphocyte count with CD4 cell counts. So, the use of Total Lymphocyte Count (TLC) and Absolute lymphocyte count (ALC) can be used as an alternative to CD4 count and plasma viral load to monitor response to ART. Both are simple, accessible, reliable, less expensive and widely available laboratory parameter as compare to CD4 count. Hence, it can be used in centers where CD4 count evaluation is not available.

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