

Absolute Leucocyte count as a laboratory tool to monitor disease progression in HIV

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ABSTRACT:

Background & Objectives: HIV infection can be monitored by laboratory and clinical markers of disease progression. In the absence of CD 4 count, the use of Absolute Lymphocyte Count has been advocated to predict CD 4 count and to stage HIV disease. This study was undertaken to show whether the ALC accurately predicts a low CD 4 count in HIV infected persons and its clinical correlation.

Methodology: The data for the study was collected from inpatients and outpatients of MGM Hospital, Navi Mumbai from August 2011 to August 2013, which included 150 patients. All patients were clinically examined and subjected to relevant investigations including CD 4 count and ALC. ALC was obtained by multiplying Total Leucocyte Count and percentage of Lymphocyte in Differential Count.

Results: In our study, males (105) outnumbered females (45). 42% of the patients had a CD 4 count in the range of 201 – 350, while only 6% patients had their CD4 count less than 100. Absolute Lymphocyte Count and CD4 counts had a linear relationship in our study.

Interpretation & Conclusion: There was a linear correlation between CD 4 Count and Absolute Lymphocyte Count which was statistically found to be highly significant. Absolute Lymphocyte Count can be used as an effective laboratory tool to monitor disease progression in HIV infected persons, especially where resources are limited and CD 4.

Key Words: *TLC, CD 4 Count, HIV infection, Correlation.*

INTRODUCTION

There are around 60 million people living with HIV in low-income countries and an estimated 10 million people in these countries currently requiring life- sustaining ART. One of the major obstacles to the administration of ART is the absence of sophisticated and expensive laboratory equipment and infrastructure required for monitoring the efficacy of therapy¹. Standard methods of CD4 count and plasma viral load enumeration require highly trained personnel and tens of thousands of dollars of initial investment in laboratory instrumentation². WHO recommends the use of ALC to monitor the immune response to ART.³ ALC (absolute lymphocyte count) is an inexpensive and widely available laboratory parameter. The purpose of this study was to

assess the clinical utility of ALC change to serve as a surrogate marker for CD 4 count change in monitoring patients, which has important implications for resource-limited settings.

METHODOLOGY

The present cross-sectional Prospective study was conducted at a Tertiary Care Hospital in Navi Mumbai over a period of 2 years.

Inclusion Criteria

1. IPD and OPD patients aged 14 years and above with diagnosed HIV disease.

Exclusion Criteria

1. Patients not giving consent.

A detailed history was obtained from all the patients, who were included in the study. Further, detailed systemic examination followed by relevant investigations were

conducted and results were noted. Venous samples were sent for evaluation of CD 4 count. Sample taken at the same time was also sent for evaluation of Total count and Differential count. CD 4 counts were measured by Flow cytometry method.

ALC was obtained by multiplying Total Leucocyte Count and percentage of Lymphocyte in Differential Count.

We evaluated changes in Absolute Lymphocyte count as a diagnostic monitoring marker of benchmark changes in CD4 count that indicates favourable response to ART.

Analysis of variance has been used to find the significance of Absolute Leucocyte Count with variations with CD4 counts. Pearson correlation co-efficient has been used to find the correlation of CD4 counts with Absolute leucocyte count.

RESULTS:

Our study shows that CD4 count was in the range 201-350 in maximum number of patients (42%); while only 6% patients had their CD4 count values less than 100.

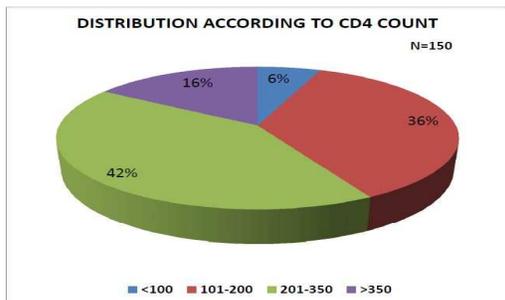


Figure 1: Distribution of Patients according to CD4 count (n=150)

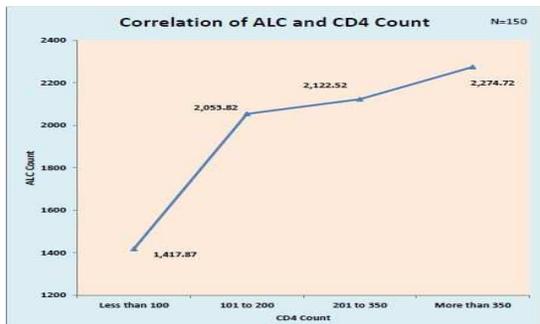


Figure 2: Comparison of ALC with CD4 count

To test the relationship between ALC and CD4 count, a linear regression analysis is conducted by taking CD4 as dependent variable and ALC

as independent variable. The regression analysis indicates that ALC is a good predictor of CD4 count (P < .001). The results are shown in the following table. (Table 1)

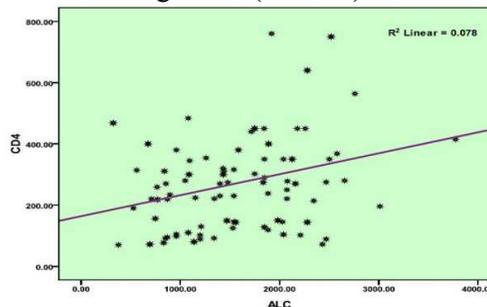


Fig 3: Scatter Diagram Showing association between CD4 & ALS.

The regression equation between CD4 count and ALC is as follows:

CD4 Count = 63.749 + 0.068 ALC.

Table 1: Regression Analysis (n=150)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	63.749	34.609		4.731	<.01 *
ALC	0.068	0.021	0.279	3.324	<.01 *

*: Significant at 1% level of significance

Regression Analysis

By regression analysis; there exists a significant co-relation between ALC and CD4 count (p value <0.001) which is highly significant in our study.

DISCUSSION

Despite the myriad abnormalities of immune function seen at all stages of human immunodeficiency virus infection, reflected by both qualitative and quantitative T-cell, B-cell and monocytes alterations, depletion of peripheral CD 4 helper inducer T- lymphocytes remains the best surrogate for clinical progression of HIV disease.

CD 4 counts are subject to variability. CD 4 cell counts tell us how many cells are present, but do not tell us about their function. The CD 4 count because of its cost, has limited availability in both resource poor and developing countries.

In the absence of CD 4 count, the use of ALC has been advocated to predict CD 4 count and to stage HIV disease. A low ALC was found to predict progression of clinical AIDS. WHO Global Programme on AIDS (2001) strongly recommends TLC as an alternative indicator of HIV disease progression instead of CD 4 cell count, where latter is not available, affordable and accessible.

Owing to the ever-expanding access to HAART (highly active anti-retroviral therapy) in resource-limited settings, there is a need to evaluate alternate markers like absolute lymphocyte count (ALC) as a surrogate for CD4 counts. This study was done to assess the usefulness of ALC as a surrogate marker for CD4 counts in monitoring HIV-infected patients after HAART initiation.

In our study, Absolute Lymphocyte Count showed a linear co-relation with CD 4 counts and was statistically significant. Pearson Correlation was 0.222 which showed a good co-relation between these two variables. Our study results corroborated with the results of studies conducted by A.Kakar et al (2011)⁴, Srirangraj S et al (2011)⁵ and Venkatesha D et al (2012)⁶. Their studies also showed an upward trend between CD4 counts and absolute lymphocyte counts. Pearson co-relation coefficient in their studies was 0.714 and 0.5604 respectively.

Table 2: Comparison with other studies

CD4 counts	Our Study	A. Kakar (2011)	S. Srirangraj (2011)	D. Venkatesha (2012)
101-200	2053	<1200	1200	1348
201-350	2122	1200	1800	1597
>350	2274	1520	2000	2237

A significant correlation between the above two parameters was noted in other studies too (Table 2), especially in patients with symptomatic HIV disease. This demonstrates the suitability of the use of Absolute Lymphocyte Count in the absence of CD 4 count for monitoring disease progression.

The pattern of CD 4 counts over time is more important than any single CD 4 count value. Serial recording of Absolute Lymphocyte Count can equally give a stable reflection of progression of disease and development of AIDS in HIV infected persons.

CONCLUSION

Although CD 4 counts are the gold standard in assessment of disease progression in HIV infected persons, Absolute Lymphocyte Count can be used as a surrogate marker in resource poor countries. Simple investigations like absolute lymphocyte count can provide a clue to the underlying degree of immunosuppression and indicate the necessity to start anti-retroviral therapy in our patients who are from the lower socio-economy strata. Absolute Lymphocyte Count can serve as a cost effective, affordable index to start ART and also to monitor ART in HIV infected persons.

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