CORRELATION OF SERUM ALBUMIN AND CD4 COUNT AS A MARKER OF IMMUNOSUPRESSION IN PATIENT LIVING WITH HIV- A COMPARATIVE STUDY

Dr. Nitin Mehta[1]*, Dr. S. Banarjee.[2]

[1,2]Department of General Medicine, National Institute of Medical Sciences, Jaipur

***Corresponding Author:** Dr. Nitin Mehta
*Department of General Medicine, National Institute of Medical Sciences, Jaipur

Abstract:

Background: HIV infection is still considered pandemic by the World Health Organization (WHO). HIV infects the vital cells of the human immune system such as helper T cells (CD4+T cells), macrophages, and dendritic cells. When CD4+T cells decline below a critical level cell- mediated immunity will be lost, and hence the body progressively become more susceptible to all the opportunistic infections. This study was proposed among patient living with HIV to find out correlation between serum albumin and CD4 cell count as a marker of immunosuppression.

Material & Methods: This prospective study was conducted in Medicine Department, NIMS Hospital, Jaipur between July 1, 2022, to May 31, 2023, and included HIV patients of age 18 years and above living around Jaipur.

Results: Total 102 study subjects were enrolled in this study and majority belonged to age 31-40 years (52%) and 41-50 years (36%) with male predominance (58%) over female. Most of them were presented with fever, weakness and altered bowel habits. A strong positive correlation was found with statistically significant p values of < 0.0001 & <0.00001 respectively. There is linear trend in regression analysis.

Conclusion: This study concluded that there is a positive correlation between serum albumin and CD4 cell count among patient living with HIV. Serum albumin could be used as surrogate marker of immunosuppression in HIV/AIDS patients.

Keywords: Human Immunodeficiency virus (HIV), Immunosuppression, CD4 Cell, Serum Albumin

BACKGROUND:

Human immunodeficiency virus (HIV)/AIDS is still considered a pandemic by the World Health Organization (WHO), the most commonly encountered illness in developing countries.[1]

HIV causes systemic infection in humans and particularly affects the immune system of the body, a subgroup of T lymphocytes called CD4 cells. [2] It infects the vital cells of the human immune system such as helper T cells (CD4+T cells), macrophages, and dendritic cells. When CD4+T cells decline below a critical level cell-mediated immunity will be lost, and hence the body progressively becomes more susceptible to all the opportunistic infections.

Widely CD4 count has been used as a prognostic marker of HIV disease progression and interventions. These markers are often not adequately used in resource-limited setups due to underlying high costs and technology.[3]

During past decades studies have been suggested that low level of albumin in HIV-infected patients are associated with rapid progression and may associated with high mortality in HIV-infected individuals. So, the baseline levels of albumin have been found to be a predictor of survival of patients with low CD4 count. [4-6]

This study was proposed among patient living with HIV to find out correlation between serum albumin and CD4 cell count as a marker of immunosuppression. So, this study was proposed among patient living with HIV with following objectives**;**
1. To estimate the level of serum albumin and absolute CD4 cell counts in HIIV infected study patients.
2. To find out the correlation between serum albumin and CD4 cell count as a marker of immunosuppression.

MATERIAL & METHODS:
This observational prospective study was conducted in Medicine Department, NIMS Hospital, Jaipur between July 1, 2022, to May 31, 2023,

Study Population: All HIV infected patients of age 18 years and above residing around Jaipur has included.

Inclusion Criteria:
- HIV/AIDS infected patients age 18 years and above
- Patients already on TLE-HAART Regimen

Exclusion Criteria:
- Include patients with pre-existing hepatobiliary disease-causing decrease in albumin level.
- Pre-existing renal disease /chronic kidney disease causing decrease in albumin level C.
- Pre-existing gastrointestinal disease-causing decrease in albumin level.
- Clinical evidence of congestive cardiac failure.
- Any h/o burn in 21 days.

Methodology:
After taking permission from Scientific and Institute Ethics Committee the study has started and HIV/AIDS infected patients age 18 years and above who gave consent were enrolled for study according to inclusion and exclusion criteria. General personal details, clinical profile, venous blood (3 ml of venous blood) and urine samples of each study patients were collected in a detailed proforma. After that following laboratory investigations were performed; Complete blood counts, Liver function tests which includes direct and total bilirubin, serum AST ALT and ALP levels,, serum albumin levels and Renal function tests including CD 4 count, Urine routine examination which includes urine albumin by dipstick method urine sugars and urine microscopy.

Data collection & Analysis:
All Data was entered into Microsoft Excel (Windows 7; Version 2007) and analyses were done using the Statistical Package for Social Sciences (SPSS) for Windows software (version 23.0; SPSS Inc, Chicago). Descriptive statistics such as mean and standard deviation (SD) for continuous variables, frequencies and percentages were calculated for categorical Variables were determined. Association between variables was analyzed by using Chi-Square test for categorical Variables. Bar charts and Pie charts were used for visual representation of the analyzed data. Level of significance was set at 0.05.

OBSERVATIONS & RESULTS:

Out of total 102 study subjects, majority of them were belonged to age 31-40 years, 54 (52.9%) and 41-50 years, 37(36.3%) with male predominance 60(58.8%) than female. [Table 1]

Table 1. Distribution of Age & Gender of Study Subjects

VARIABLES	SUB GROUP	FREQUENCY (n=102)	PERCENTAGE
Gender	Male	60	58.8%
	Female	42	41.2%
Age	18-30 years	08	7.8%
	31-40 years	54	52.9%
	41-50 years	37	36.3%
	51 and above	3	2.9%

Most of our study subjects presented with fever 58(56.8%), weakness 21(20.6%), followed by altered bowel habits 23(22.5%). [figure 1] Opportunistic infections were seen in half of total cases and most common was candidiasis 36(35.3%), out of which oral candidiasis is the commonest form.
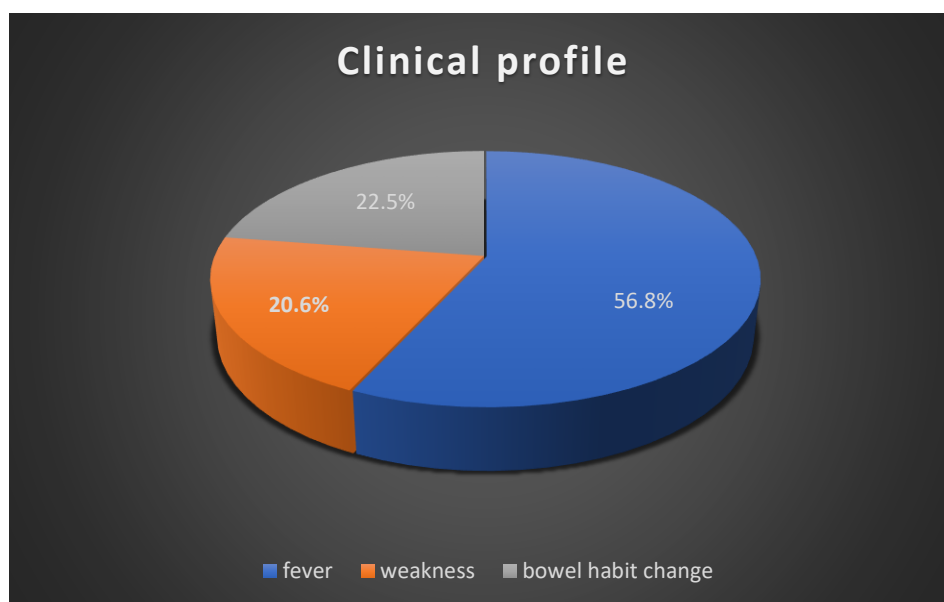

Figure 1: Clinical profile of Study Subjects

All patients were subjected for laboratory investigations for estimation of Hb, CBC, TLC, CD 4+ count and serum albumin. Hemoglobin showed no significant change in mean hemoglobin at baseline and follow up visit for study subjects. [Table 2]

Table 2. Distribution of laboratory parameters in Study Subjects

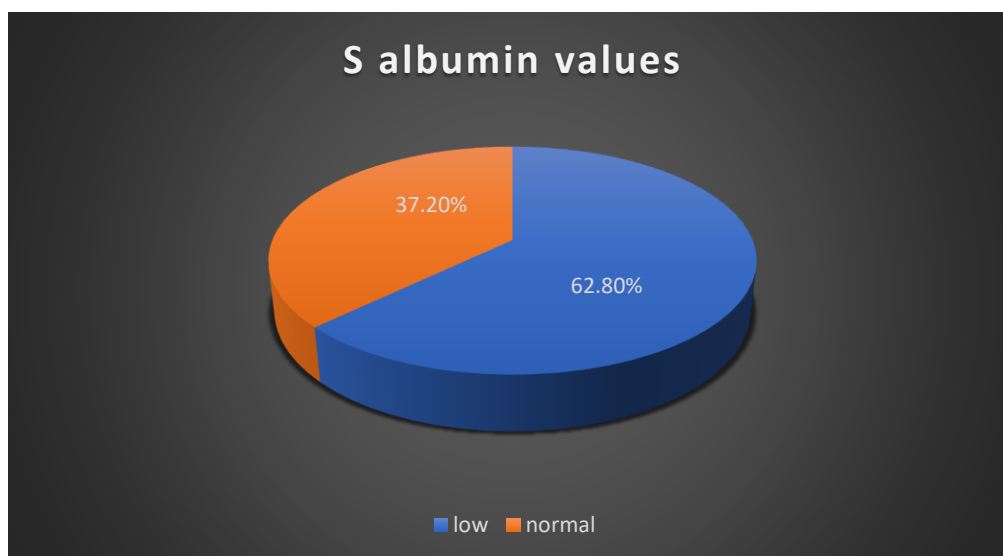| Variables	Sub-group	Minimum	Maximum	Mean +/- S.D.	p-Value
Hb (gm%)	Baseline	7.2	15.5	11.30+/-2.10	0.77
	Follow up	7.0	15.5	11.27+/-1.98	
Total count	Baseline	1850	89000	7752+/-8592	0.09
	Follow up	2000	11000	7136+/-2135	
CD4+ count	Baseline	14	820	261+/-180.7	**0.023**
	Follow up	58	890	268+/-180.9	
S. albumin	Baseline	1.2	4.3	3.0+/-0.61	**0.024**
	Follow up	1.2	4.1	3.0+/-0.63	

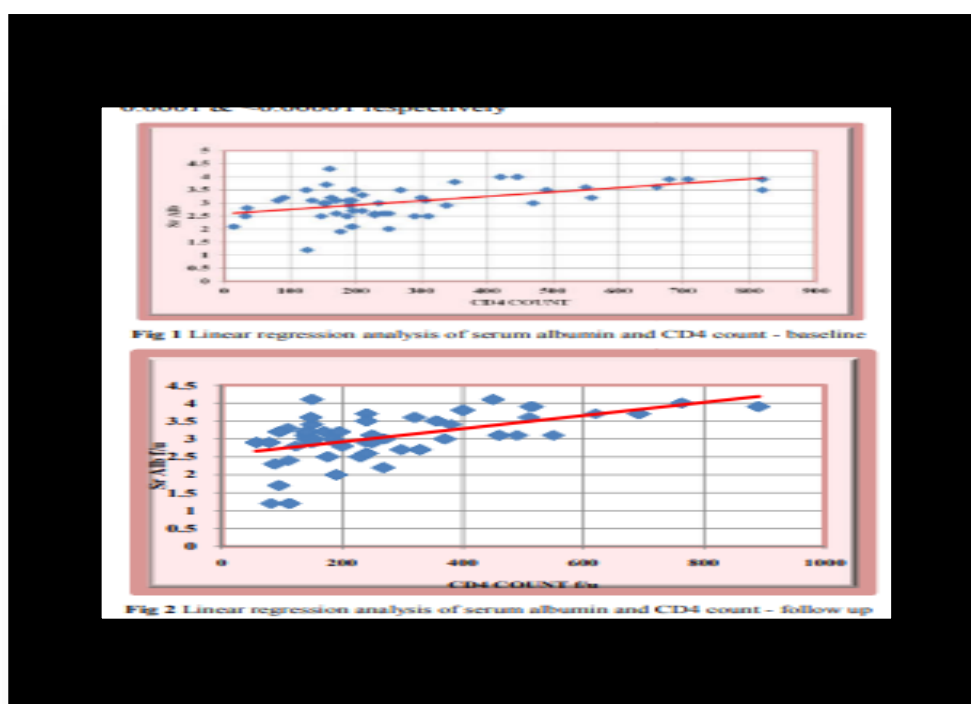**Figure 2: Distribution of S. albumin among study subjects**

Figure 3: Linear regression analysis of serum albumin & CD count (a. baseline b. follows up)

To find correlation between serum albumin and CD4 cell count in HIV patients the baseline and follow up values of albumin and cd4 counts were estimated. A strong positive correlation was found with correlation coefficient of 0.49[baseline] and 0.5265[follow up] with statistically significant p values of < 0.0001 & <0.00001 respectively. [Table 3, figure 3]

Table 3. Association of Serum albumin level to CD4 counts in study patients

S. albumin levels	CD4 Count <200	CD4 Count >200	r-value	p-value
Baseline	2.87	3.17	0.49	**<0.0001**
Follow up	2.82	3.25	0.52	**<0.00001**

This suggests that serum albumin levels decreased significantly with decrease in CD4 count which shows decline in cell-mediated immunity of the cases.

DISCUSSION:

In our study observational study 60% subjects were male 37(36.3%) with male predominance. The study of S Shah et al [7] & SS sharma et al. [8] showed similar pattern of presentation. In a similar study by Manish Ghate et al. [9] the number of females was 16% and males 84%. The gross difference in presentation of males and females is due to multiple factors like males are migrators and primary disease spreaders. It can due to fact that females generally have poor health seeking behavior.

In our study, half of total cases were diagnosed to have one or more opportunistic infections during the study period out of which oral candidiasis is the commonest form. Manish Ghete et al. [9] reported incidence of OI to be 35.7/100 person years and the most common infection in his study was Tuberculosis. Tuberculosis and oral candidiasis are the most commonly reported HIV-related OI in India. [10]

In our study, CD4 counts and serum albumin levels at presentation and at 6 months did not show any significant improvement but a significant correlation was found between pre-treatment serum albumin levels and pretreatment CD4 cell count pre-treatment serum albumin levels and pre-treatment weight. Analysis of change in CD4 counts with change in serum albumin level showed significant positive association with correlation coefficient of 0.52 (baseline) and 0.51 (follow up) with both statistically significant p values of <0.001. This is same as with the study of Olawuni HO et al. [11] & SS sharma et al. [8] findings been seen in association with some other chronic illnesses like tuberculosis.

Also in our study, falling albumin level correlated with disease progression. This suggests that serum albumin levels decreased significantly with decrease in CD4 count which shows decline in cell-mediated immunity can be used as surrogate marker of immunosuppression in HIV/AIDS patients.

CONCLUSION:

This study concluded that there is a positive correlation between serum albumin and CD4 cell count among patient living with HIV. Serum albumin could be used as surrogate marker of immunosuppression in HIV/AIDS patients. Though such strong correlation in short term (6 month) follows up but for further assessment of its effect on mortality needs a longer duration of follow up in a multicentic study cohort.

REFERENCES:

1. Sashindran VK, Chauhan R. Antiretroviral therapy: shifting sands. Med J Armed Forces India. 2016; 72:54- 60.
2. Centers for disease control and prevention. 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. MMWR Recomm Rep. 1992; 41:1-19.
3. Kannangai R, Kandathil AJ, Ebenezer DL, Mathai E, Prakash AJ, Abraham OC et al. Usefulness of alternate prognostic serum and plasma markers for antiretroviral therapy for human immunodeficiency virus type 1 infection. Clin Vacc Immunol. 2013; 20:154.
4. Olawumi HO, Olatunji PO. The value of serum albumin in pre-treatment assessment and monitoring of therapy in HIV/AIDS patients. HIV Med. 2006; 7:351-5
5. Gupta T, Prakash J, Acute kidney injury in patients with human immunodeficiency virus infection.Indian J Nephrol. 2015; 25:86-90
6. Rankin WW, Brennan S, Schell E, Laviwa J, Rankin SH. The stigma of being HIV-positive in Africa. PLoS Med. 2005;2:e247.
7. Shah S, Smith CJ, Lampe F, Youle M, Johnson MA, Phillips AN et al. Haemoglobin and albumin as markers of HIV disease progression in the highly active antiretroviral therapy era: relationships with gender. HIV Med. 2007;8(1):38-45

8. Sharma SS, Jamra Y, Hawaldar S, Meshram A. Study of serum albumin as surrogate marker of immune suppression in patients living with HIV and AIDS. Int J Adv Med 2016; 3:152-6.
9. Ghate M, Deshpande S, Tripathy S, Thakur A, Rishud A, Bollinger R et al. Incidence of common opportunistic infection in HIV-infected individuals in Pune, India; analysis by stages of immunosuppression represented by CD4 counts. Intern J Infect Dis. 2009;13: e1-8.
10. Steinbrook R. Tuberculosis and HIV in India. N Engl J Med. 2007; 3:1198-9.
11. Olawuni HO, Olatunji PO. The value of serumalbumin in pre-treatment assessment and monitoring of therapy in HIV/AIDS patients. HIV Med. 2006; 7:351-5.