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Role of serum albumin level compared to CD4 cell count as a marker of immunosuppression in HIV/AIDS patients

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Abstract

Introduction:- HIV infection is very widespread affecting the human society but due to financial constraints there is a need to identify an alternate prognostic markers of immunosuppression other than CD4+ cell count in HIV.

Aims:- To evaluate the role of serum albumin level compared to CD4+ cell count as a markers of immunosuppression in HIV/AIDS patients.

Material and Methods:- This prospective follow up case control study included 60 HIV/AIDS patients and controls were age and sex matched normal people.

Results:- In our study the mean albumin level was 2.70 ± 0.6 , There was a Significant positive correlation between CD4 count and albumin level. $p=.037$, $P<0.001$. This suggest that the serum albumin marker could be used as a surrogate marker for immunosuppression in HIV/AIDS patients.

Conclusion:- Albumin could be used as a supplementary marker for immunosuppression in HIV/AIDS patients.

Keywords: Immunosuppression, albumin, CD4+ cell count

Introduction

AIDS is one of the most devastating infectious Diseases in human history, and its causative agent HIV.^{1,2} It belongs to the family of human retroviruses (Retroviridae) and the subfamily of lentiviruses. The four retroviruses known to cause human disease belong to two distinct groups: the human T lymphotropic viruses (HTLV)-I and HTLV-II, which are transforming retroviruses; and the human immunodeficiency viruses, HIV-1 and HIV-2, which cause cytopathic effects either directly or indirectly. The most common cause of HIV disease throughout the world, is HIV-1, which comprises several subtypes with different geographic distributions.⁶ The disease progression in HIV is defined on the basis of clinical features, CD4 cell count and HIV virus levels

estimated by RNA or DNA PCR. CD4+cell counts and HIV RNA levels have been widely accepted as the most reliable indicators of HIV disease progression. Through the advancement there has been improvement in life expectancy.³ RNA levels are more sensitive and define earlier deterioration or improvement in patients but the onset of various opportunistic infections cannot be correlated with the viral load. Therefore, CD4 count has been used generally in defining stages of illness in HIV⁵. CD4 cell count and HIV viral load measurements are readily available and widely utilized in developed world, but same is not the case with the developing countries where, demographic, financial, logistical and technical issues limit the use of CD4 count and viral RNA levels. As an alternate to these

two tests, many other biological and biochemical markers have been tried to prognosticate or qualitatively define various stages of HIV disease. Recent studies have also suggested that low levels of serum albumin are associated with disease progression, AIDS associated mortality and all-cause mortality in PLHIV independent of CD4 cell Counts and HIV RNA titre.⁸ Serum albumin level could be useful, cheap and easily available surrogate test for predicting severity of HIV infection, for pre-treatment assessment & clinical monitoring of response to anti retro viral therapy and as a predictor of survival.

Aims and Objective

To monitor and follow up the levels of serum albumin and absolute CD4+ cell counts in HIV infected individuals and assess their correlation as a marker of immunosuppression.

Methods

This prospective follow up case control study included 60 HIV/AIDS patients presented to Guru Nanak Dev Hospital during the period of June 2016 to oct. 2017 and controls were age and sex matched normal people. Descriptive and Analytical Statistics were done to find correlation of albumin with CD4+ T lymphocyte count in HIV/AIDS patients.

A detailed history, clinical examination and laboratory investigations including Hb, TLC, DLC, Hematocrit, LFT with serum albumin level, RFT, CD4+Cell Counts, HIV test was done. Patients were called for follow up after 3 months and then serum albumin and CD4 count was repeated.

Inclusion criteria

HIV infected/AIDS patients > 18 years of age.

Exclusion criteria

- A. Any pre-existing hepatobiliary disease causing decrease in albumin level.
- B. Any pre-existing renal disease / chronic kidney disease causing decrease in albumin level.
- C. Any pre-existing gastrointestinal disease causing decrease in albumin level.
- D. Any clinical evidence of congestive cardiac failure
- E. Any clinical evidence of shock
- F. Any h/o burns in last 21 days

Results

Mean Age of the patients was 39.6 ± 10.7 years. The age of the youngest patient was 18 years age and oldest was 75 years. Maximum 21 cases were between 18-30yrs of age.

Table 1: Age Distribution

Age	Frequency
18-30	21
30-40	20
40-50	13
50-60	4
>60	2

Table 2: Time since diagnosis

Time since diagnosis	Frequency
<3 MONTHS	39
3-6 MONTHS	8
6-12 MONTHS	3
>12 MONTHS	10

Most common presenting complaint of patients in this study was fever (30%) followed by cough =(18.3%). Diarrhoea and Seizures were third most common presenting features at 10%. Also 3 patients (5%) were found positive during admission and pre-operative work up.

Significant weight loss was presenting complaint of 4 patients (8.3%). Neck swelling, breathlessness and altered sensorium were present in decreasing order as presenting feature.

Table 3: Clinical presentation at time of diagnosis

Clinical	Frequency	Percentage
Cough	14	23.33
Fever	20	33.33
Diarrhoea	8	13.33
weight loss	4	6.67
Arthritis	1	1.67
Altered	2	3.33
Seizure	5	8.33
neck swelling	3	5
breathlessness	3	5
	60	

Present study showed opportunistic infections⁴ in 48.3 % of total cases and most common was pulmonary tuberculosis (24/60 = 40%) followed by candidiasis (20/60 = 33.3%).

Most common high risk behaviour was intravenous drug abuser (29/60 = 48.3%) Followed by history of blood transfusion in 41.6% (25/60) and heterosexual

in 22 patients (36%). None of the patients had history of men having sex with men.

In our study mean albumin was 2.98±0.6, Albumin showed a direct correlation with CD4 count both at baseline (p<0.001) and during follow up (p<0.001) in cases. Such correlation was absent in the controls both at baseline and follow up. Regression analysis showed linear trend between albumin and CD4 count (p=0.01).

Table 4: Laboratory parameters

Study subjects	cases		controls	
	Baseline	Follow up	Baseline	Follow up
Haemoglobin	9.13 ± 1.33	10.70 ± 2.01	11.29 ± 1.58	12.00 ± 1.86
Total count	6885 ± 2565	7038 ± 2190	7743 ± 1986	7207 ± 2143
Cd4 count	265.7± 191.5	282.83±169.74	1004 ± 206	1085 ± 253
albumin	2.70 ± 0.6	3.05 ± 0.6	4.26 ± 0.8	4.4 ± 0.8

Discussion

Age distribution showed maximum number of cases between 21-40 years of age(40%). Males constituted 70% of cases while females constituted 30% of cases. Most of the patients included in the study had been diagnosed recently in last three months: 39/60 = 65%.

Most common presenting complaint of patients in this study was Fever = 30% Present study showed

opportunistic infections in 48.3 % of total cases and most common was pulmonary tuberculosis (24/60 = 40%). Manish Ghete et al¹³ reported incidence of Opportunistic infection 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 Opportunistic infections in India.¹⁴ Most common high risk behaviour was intravenous drug abuse (29/60 = 48.3%).

In the study done by Mehta et al¹¹ the effect of albumin before and after HIV seroconversion on disease progression was examined among individuals already infected with HIV at entry into a community-based cohort (n = 453) and further assessed among HIV seroconverters with albumin concentrations measured after (n =219) and before seroconversion (n = 138). The prognostic effect of albumin on AIDS, AIDS mortality, and all-cause mortality was examined and among 453 HIV-infected individuals, albumin <35 g/liter was associated with faster progression to AIDS [adjusted relative hazard (ARH), 1.8], AIDS mortality (ARH: 2.2), and all-cause mortality (ARH: 2.4). Analyses restricted to HIV seroconverters were similar. Albumin showed a direct correlation with CD4 count both at baseline(p<0.001) and during Follow up study (p<0.001) Such correlation was absent in the controls both at baseline and follow up.

Conclusion

1. Males were more common and presented at decompensated stage more often.
2. Recent onset of illness was common (<3 months).
3. Most common opportunistic infection was pulmonary tuberculosis.
4. Intravenous drug abuse was most common risk factor of our study patients
5. There was a strong direct correlation between CD4 count and Albumin in cases both at baseline and follow up indicating that albumin could be used as a surrogate marker for immunosuppression in HIV/AIDS patients. (correlation coefficient= 0.52 (p<0.001)).
6. Regression analysis showed significant linear trend suggesting albumin as a variable is an important factor affecting change in CD4 count (p=0.01)

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Conflicts of interest: There are no conflicts of interest

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