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TO COMPARE SERUM ALBUMIN LEVEL WITH CD4 COUNT AS A MARKER OF IMMUNOSUPPRESSION IN PEOPLE LIVING WITH HIV

General Medicine

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ABSTRACT

Introduction: Human immunodeficiency virus (HIV) is a retrovirus that targets T cells, disrupting the body's immune system and causing immunosuppression. CD4 count has been widely employed in describing stages of HIV disease. Although CD 4 counts and RNA levels are easily performed in tertiary government hospitals, they are not available everywhere including primary, secondary and corporate health care settings, and logistical, technological, and budgetary issues limit their use. **Aims &Objective:** To estimate serum Albumin and Absolute CD4+ cell counts in PLHIV and to correlate serum albumin levels with absolute CD4 cell count as a marker of immune suppression. **Materials And Methods:** This cross sectional study was conducted at Hospitals attached to Bangalore Medical College and Research Institute from February 2021 to August 2022. Clinical examination and investigations were done as per the Performa. Serum albumin levels and CD4 counts were measured using standard laboratory techniques. **Result:** A total of 136 individuals participated in the study with the mean age of the sample is 42 years, and a standard deviation of 10 years. The correlation coefficient between albumin and the CD4 count was 0.797 with a p-value of 0.001, indicating a strong positive correlation between these two variables. **Conclusion:** Both Serum albumin levels and CD4 counts decreases as the disease progresses in PLHIV patients. Hence serum albumin levels can be used as a marker of immunosuppression in people living with HIV.

KEYWORDS

SERUM ALBUMIN, CD4 COUNTS, Immune suppression

INTRODUCTION

The retrovirus known as the human immunodeficiency virus (HIV) targets T cells, impairing immunity and leading to immunosuppression. AIDS is a major global health concern. India witnessed the first instance in 1986. Approximately 38 million people worldwide were HIV positive as of 2019. (1-3)

Currently, viral RNA levels and CD4+ cell counts are employed to monitor the progression of disease. RNA levels are more sensitive and can predict a patient's improvement or deterioration, but they cannot anticipate the onset of certain opportunistic infections. Consequently, the use of CD4 count to characterise the stages of HIV infection has been widespread. While CD 4 counts and RNA levels are readily available in tertiary government facilities, their usage is restricted by logistical, technological, and financial constraints, and they are not available in primary, secondary, or corporate health care settings. A decrease in serum albumin levels has been associated with a higher chance of morbidity and mortality in certain clinical conditions. According to recent studies, low serum albumin levels are associated with the progression of the disease and death from AIDS(4-7)

Thus, serum albumin levels can be a useful, affordable, and accessible substitute test for estimating HIV infection severity, evaluating patients before treatment, tracking the clinical response to antiretroviral medication, and determining survival (8). This study assesses immune suppression in HIV patients by comparing blood albumin levels to CD4+ counts.

MATERIALS AND METHODS

This cross sectional study was conducted at Hospitals attached to Bangalore Medical College and Research Institute from February 2021 to August 2022. After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria were enrolled for the study after obtaining consent. Clinical examination and investigations were done as per the Performa. Serum albumin levels were measured using standard laboratory techniques. Data was collected and entered into a pre-designed Performa and data analysis was done using appropriate statistical tests.

RESULTS

A total of 136 individuals participated in the study with the mean age of the sample is 42 years, and a standard deviation of 10 years. The mean duration of RVD is 5, with a standard deviation of 3 (Fig 1).Study population was predominantly male.

Out of 136 total participants, 64 (47.10%) were classified as WHO Stage 1, which indicates that they had asymptomatic HIV infection with a CD4 count >500 cells/mm3. 4 (2.90%) were classified as Stage 2, indicating mild symptoms with a CD4 count of 350-500 cells/mm3. 29 (21.30%) were classified as Stage 3, indicating advanced symptoms with a CD4 count of 200-350 cells/mm3. 39 (28.70%) were classified as Stage 4, indicating severe symptoms with a CD4 count <200 cells/mm3. (FIG 2)

Out of 136 total participants, 32 (24%) had tuberculosis, 18 (13%) had candidiasis (a fungal infection), 7 (5%) had herpes zoster (shingles), 6 (4%) had PCP pneumonia (a lung infection), 4 (3%) had peripheral neuropathy, 2 (1%) had tinea infection (a fungal skin infection), 2 (1%) had HIV retinopathy, 2 (1%) had genital warts (sexually transmitted infection), and 1 (1%) had CSOM (chronic suppurative otitis media). (FIG 3)

Out of 136 total participants, 93 (69%) had no comorbidities, while the remaining participants had one or more comorbidities. Hypertension and diabetes, both of which were present in 19 participants (14%). Hypothyroidism and ischemic heart disease were present in 20 (15%) and 5 (4%) participants, respectively. The remaining comorbidities (seizure disorder, bronchial asthma, hyperthyroidism, and cardiomyopathy) each affected 2 participants (1%) or fewer. (FIG 4)

The mean albumin level in the study population was 2.4 g/dL, with a standard deviation of 0.4 g/dL. The mean TB(total bilirubin) level in the study population was 0.7 mg/dL, with a standard deviation of 0.3 mg/dL. The mean DB(direct bilirubin) level in the study population was 0.31 mg/dL, with a standard deviation of 0.2 mg/dL. The mean AST level in the study population was 36 U/L, with a standard deviation of 17 U/L. The mean ALT level in the study population was 34.1 U/L, with a standard deviation of 18.2 U/L. The mean ALP level in the study population was 88 U/L, with a standard deviation of 35 U/L.(FIG 5)

The mean value of TSH is 3.68 with a standard deviation of 2.74. The mean value of T4 is 7.78 with a standard deviation of 2.27. The mean value of T3 is 154.9 with a standard deviation of 28.93. (FIG 6)

The correlation coefficient between albumin and the CD4 count is 0.797 with a p-value of 0.001, indicating a strong positive correlation between these two variables. (FIG 7)

DISCUSSION

The study included 136 people aged 20–59. 29.41% were 30-39 and 28.68% were 40-49. 13.97% were 20-29, whereas 27.94% were 50-59. The sample's mean age is 42, with a standard deviation of 10. The mean duration is 5, with a standard deviation of 3. The mean CD4 count is 197 and the standard deviation is 122. 45 (33.10%) of 136 participants were female, while 91 (66.90%) were male. Males dominated the study population. 64 (47.10%) of 136 participants had WHO Stage 1, asymptomatic HIV infection with a CD4 level >500 cells/mm3. 4 (2.90%) had Stage 2, minor symptoms with a CD4 level of 350-500 cells/mm3. 29 (21.30%) had Stage 3 symptoms with a CD4 level of 200-350 cells/mm3. 39 (28.70%) had Stage 4 symptoms and a CD4 count <200 cells/mm3.

Out of 136 participants, 32 (24%) had tuberculosis, 18 (13%) had candidiasis (a fungal infection), 7 (5%) had herpes zoster (shingles), 6 (4%) had PCP pneumonia (a lung infection), 4 (3%) had peripheral neuropathy (damage to the nerves that carry information to and from the brain and spinal cord), 2 (1%) had tinea infection (a fungal skin infection), and 2 (1%) had HIV retinopathy (damage to the retina in the eye) (chronic suppurative otitis media, an infection of the middle ear).

93 (69%) of the 136 patients had no comorbidities. 19 individuals had hypertension and diabetes (14 percent). 20 (15%) and 5 (4%) patients had hypothyroidism and ischemic heart disease. The remaining comorbidities—seizure disorder, bronchial asthma, hyperthyroidism, and cardiomyopathy—affected 2 or fewer patients (1%) each. Among adult people in India, the prevalence of hypothyroidism has been recently studied. In this population-based study done in Cochin on 971 adult subjects, the prevalence of hypothyroidism was 3.9%. (9) In this study it has been observed that prevalence of hypothyroidism was significant higher in the HIV population (15%).

Albumin has a substantial positive correlation with CD4 count, 0.797 with a p-value of 0.001. The clinical significance of serum albumin levels and CD4 counts for assessing immunosuppression in people living with HIV has been demonstrated in a study by HS Pralhadrao, C Kant, K Phepale, and MK Mali (2016). This study utilized a sample of 100 HIV-positive individuals to compare serum albumin levels and CD4 counts as predictors of immunosuppression. The results showed that serum albumin levels were significantly correlated with CD4 counts, suggesting that serum albumin levels may be used as a biomarker to predict immunosuppression in HIV-positive individuals. Additionally, the study found that the combination of serum albumin levels and CD4 counts was more accurate in predicting immunosuppression than either measure alone. This indicates that the combined use of serum albumin levels and CD4 counts may be more effective in assessing immunosuppression in HIV-positive individuals than either measure alone. The findings of this study have important implications for clinical practice, as they suggest that the use of serum albumin levels and CD4 counts together could provide more accurate assessment of immunosuppression in HIV-positive individuals.(10)

The 2002 study conducted by CJ Gill, JL Griffith, D Jacobson, S Skinner, and other researchers was aimed at exploring the relationship between serum albumin levels and CD4 counts in people living with HIV. This study suggests that the association between serum albumin levels and CD4 counts is consistent across gender and other population variables. The results of this study provide important information for clinicians and researchers who are working to understand the relationship between HIV and serum albumin levels.(11)

The use of serum albumin levels and CD4 counts to monitor immunosuppression in people living with HIV has been explored in a study conducted by HH Chiang, CC Hung, CM Lee, HY Chen and their colleagues in 2011. The study found that serum albumin levels and CD4 counts can be used together to provide an accurate measure of immunosuppression in people living with HIV. In conclusion, the results of this study demonstrate the potential benefits of using serum albumin levels and CD4 counts to monitor immunosuppression in people living with HIV.(12)

A study by Reddy et al. (2016) investigated the correlation between serum albumin levels and CD4 count in HIV-infected patients. The study included 200 patients and found a statistically significant positive correlation between serum albumin levels and CD4 count ($r = 0.732$, $p < 0.001$). The authors concluded that higher albumin levels may be indicative of better immune function in HIV-infected patients.(13)

Another study by Li et al. (2016) examined the correlation between serum albumin levels and CD4 count in HIV-infected patients with chronic kidney disease (CKD). The study included 104 patients and found a statistically significant positive correlation between serum albumin levels and CD4 count ($r = 0.586$, $p < 0.001$). The authors suggested that monitoring serum albumin levels may be a useful marker of immune function in HIV-infected patients with CKD.(14)

Overall, comparing serum albumin levels and CD4 counts as a marker of immunosuppression in people living with HIV has shown that an increased serum albumin level is positively associated with a higher CD4 count. This finding supports the idea that serum albumin can be a useful predictor of better clinical outcomes in terms of immunosuppression in HIV-positive individuals. Future research should focus on further determining the relationship between these two variables and identifying which measures can be taken to improve pulmonary functioning in HIV-positive individuals.

CONCLUSION

Based on the findings of the study, it can be concluded that serum albumin levels and CD4 counts are strongly correlated in people living with HIV, with a correlation coefficient of 0.797 and a p-value of 0.001. This suggests that serum albumin levels may serve as a useful marker of immunosuppression in this population, in addition to CD4 counts. Overall, the findings of this study suggest that serum albumin levels may be a useful marker of immunosuppression in people living with HIV, and should be considered in conjunction with CD4 counts when assessing disease progression and treatment outcomes.

Table No 1 Showing Age And Duration Of RVD

	Mean	Standard Deviation
AGE	42	10
DURATION OF RVD	5	3

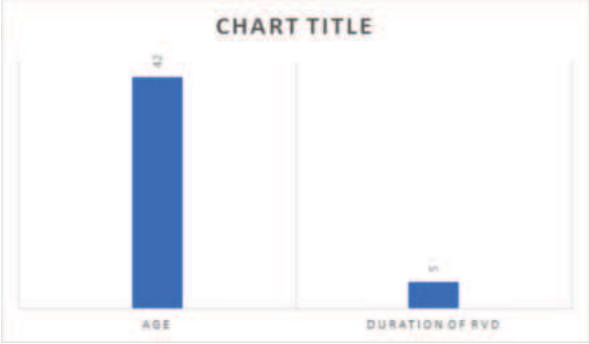

Fig 1 Showing age and Duration of RVD

Table 2 Showing WHO Staging

		Count	Column N %
WHO STAGING	1	64	47.10%
	2	4	2.90%
	3	29	21.30%
	4	39	28.70%

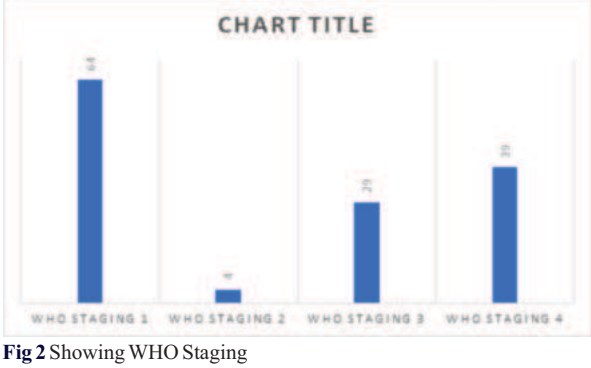

Fig 2 Showing WHO Staging

Table 3 Showing Opportunistic Infections

OPPORTUNISTIC INFECTIONS	N	%
TUBERCULOSIS	32	24%
CANDIDIASIS	18	13%
HERPES ZOSTER	7	5%
PCP PNEUMONIA	6	4%
PERIPHERAL NEUROPATHY	4	3%
TINEA INFECTION	2	1%
HIV RETINOPATHY	2	1%
GENITAL WARTS	2	1%
CSOM	1	1%

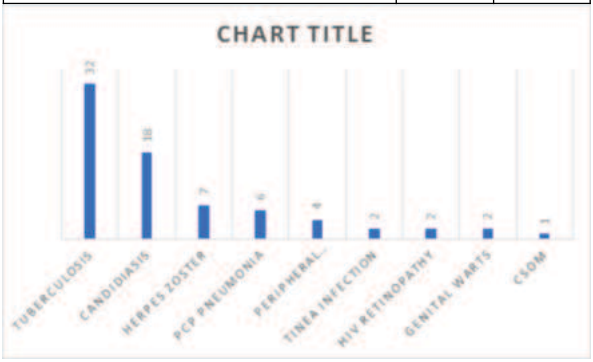

Fig 3 showing opportunistic infections

Table 4 Showing Comorbidities

COMORBIDITIES	N	%
NIL	93	69%
HYPERTENSION	19	14%
HYPOTHYROIDISM	20	15%
DIABETES	19	14%
ISCHEMIC HEART DISEASE	5	4%
SEIZURE DISORDER	2	1%
BRONCHIAL ASTHMA	2	1%
HYPERTHYROIDISM	1	1%
CARDIOMYOPATHY	1	1%

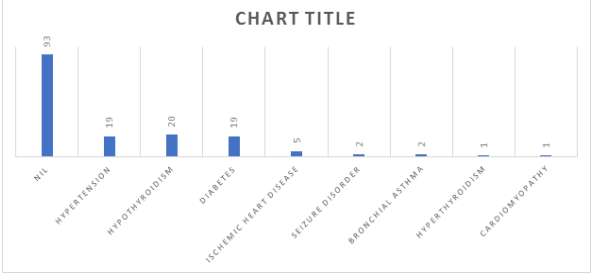

Fig 4: showing comorbidities

Table 5 Showing Liver Function Test

	Mean	Standard Deviation
ALBUMIN	2.4	0.4
TB	0.7	0.3
DB	0.31	0.2
AST	36	17
ALT	34.1	18.2
ALP	88	35

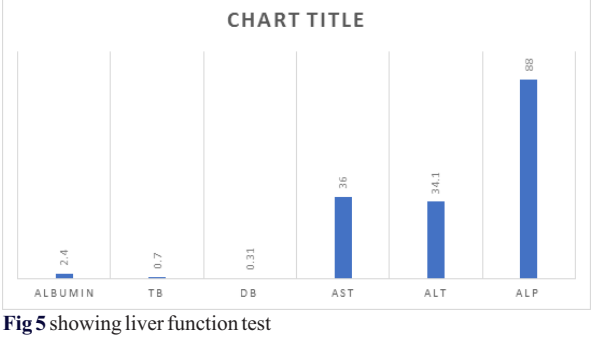

Fig 5 showing liver function test

Table 6 Showing Thyroid Profile

	Mean	Standard Deviation
TSH	3.68	2.74
T4	7.78	2.27
T3	154.9	28.93

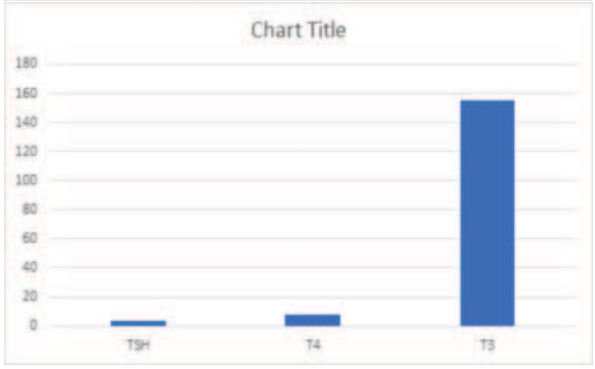

Fig 6 Showing Thyroid Profile

Table 7 Showing Correlation Between Albumin And Cd4

Correlations		
	ALBUMIN	
CD4 (LATEST)	Pearson Correlation	0.797**
	P-VALUE	0.001
	N	136

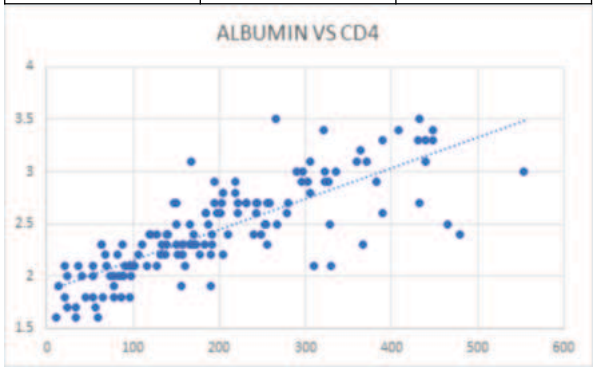

Fig 7 Showing Correlation Between Albumin And CD4

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