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General Medicine

CORRELATION BETWEEN CLINICAL PROFILE, CD4 COUNT AND TOTAL LYMPHOCYTE COUNT IN HIV INFECTED PATIENTS

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ABSTRACT **Background** Monitoring of HIV infection is traditionally done using CD4 count. However, this process is cumbersome and requires use of flow cytometry. Total Lymphocyte count has been advocated as a measure to predict CD4 count and stage HIV in resource poor settings. TLC is easily obtained by multiplying percentage lymphocytes by leukocyte count from routine complete blood picture with differential count. The purpose of this study is to assess the capability and clinical utility of TLC change to serve as a surrogate marker for CD 4 count change in monitoring patients, which has important implications for resource-limited settings. **Methods –** A total 50 patients were studied, out of which 38 were males and 12 were females. All the patients were clinically examined and subjected to relevant investigations including CD 4 Count and TLC.To find the correlation of CD4 counts with study parameters Pearson correlation co-efficient has been used. **Results** The Total Count showed an upward trend with CD 4 count. The Pearson Correlation between TC and CD 4 Counts was 0.45, which is significant at P < 0.0001 and shows a moderate correlation between the two variables. In our study the Total Lymphocyte Count showed an upward trend with CD 4 count. The Pearson Correlation for TLC with CD 4 Counts was 0.45 (moderate correlation), which is significant at P < 0.0001.

- In our study, Total count and Total Lymphocyte Count were showing positive trend to CD 4 counts and are statistically significant.The Total Counts of 4850 cells/μl and 9200 cells/μl showed similar observations to CD 4 counts of 200 cells/μland 350 cells/μl.
- The Total Lymphocyte Counts of 1750 cells/μl and 2450 cells/μl showed similar observations to CD 4 counts of 200 cells/μl and 350 cells/μl respectively.

Conclusion In the present study, males (38) outnumbered females (12). There is no overall significant difference of mean age between male and female. The patients in the age group of 20-40 years were the most involved group. Fever, Anorexia, Weight loss, Cough, Diarrhea, Mouth ulcers and Lymphadenopathy were the most common clinical presentations.TB, Chronic diarrhea and Oropharyngeal candidiasis were the commonest opportunistic infections. Majority of the patients with opportunistic infections had a CD 4 count less than 350 cells/μl.

INTRODUCTION:
- Worldwide approximately 36 million people are infected with Human Immuno-Deficiency Virus(HIV)
- The current number of people living with HIV infection in India is more than 6 million.
- Almost 90 percent of HIV infected people live in resource poor developing countries.
- As a signatory to the United Nations declaration on Sustainable Development Goals (SDGs), India is committed to achieving the "End of AIDS as a public health threat" by 2030.
- Specific 2020 Fast-Track Targets, including 75% decline in new HIV infections from the 2010 baseline value, attainment of 90-90-90 treatment goals, elimination of MTCT of HIV and elimination of HIV,AIDS-related stigma and discrimination have been identified to anchor the global AIDS response towards attaining the 'ENDGAME' by 2030.

CD4 count:
- The strength of the immune system in people who have been diagnosed with HIV is evaluated by CD 4 count test.
- CD 4 cells are infected by HIV. Gradual drop in the number of CD 4 cells over time is seen in people who are not being treated.
- Health of the immune system and the likelihood that opportunistic infections may occur is indicated by number of CD4 cells.
- CD4 count should be done every 3 to 6 months.
- Above 500 CD 4 cells: No unusual condition likely
- 200-500 CD 4 cells : Increased risk of H.zoster, Thrush, Skin infections, Bacterial sinusitis and lung infections and TB
- 50-200 CD 4 cells : Increased risk of PCP and other opportunistic infections
- < 50 CD 4 cells : Increased risk for opportunistic infections including MAC and CMV
- The latest WHO guidelines recommend ART initiation for all HIV positive persons regardless of CD4 count or viral load.

BACKGROUND:
- Monitoring of HIV infection is traditionally done using CD4 count. However, this process is cumbersome and requires use of flow cytometry.
- Total Lymphocyte count has been advocated as a measure to predict CD4 count and stage HIV in resource poor settings.
- TLC is easily obtained by multiplying percentage lymphocytes by leukocyte count from routine complete blood picture with differential count.
- The purpose of this study is to assess the capability and clinical utility of TLC 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 data for the study was collected from inpatients and outpatients of King George hospital , Vishakhapatnam who are HIV positive.
- The time frame of the study was from August 2020 to June 2021.
- Study design: Cross sectional descriptive study
- A total 50 patients were studied, out of which 38 were males and 12 were females.
- All the patients were clinically examined and subjected to relevant investigations including CD 4 Count and TLC.
- Inclusion criteria: All HIV positive patients attending medical OPD
- Exclusion criteria: HIV positive patients on cyto-toxic drugs
- For evaluation of CD 4 count venous samples were sent . For evaluation of Total count and Differential count, sample taken at the same time was also sent. By Flow cytometry method CD 4 counts were measured.
- To prove HIV infection: ELISA method for HIV antibody detection.
- By multiplying the differential count (DC) with Total

leukocytecount (TC)Total lymphocyte count (TLC) was calculated. (TLC = TC × DC)

Statistical methods:

- To find the significance of study parameters with variations with CD4 counts analysis of variance has been used .To find the correlation of CD4 counts with study parameters Pearson correlation co-efficient has been used.
- The Statistical software namely SPSS 21 and Anova test were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Distribution according to age and sex:

Age in years	Male		Females		Total	
<30	5	13.1%	3	25%	8	16%
31-40	16	42.1%	6	50%	22	44%
41-50	12	31.5%	1	8.3%	13	26%
51-60	5	13.1%	1	8.3%	6	12%
>60	0	-	1	8.3%	1	2%
Total	38	100%	12	100%	50	100%
Mean+- SD	41.1+-10.0		35.5+-8.5		40.0+-10.0	

In above table the distribution of sex and age is shown. Between age group 31-40, 22 persons are observed, which constitutes 44%. Total number of females are 22(24%) and total number of males are 38 (78%). The males with mean age was 41.38yrs and females with mean age was 35.45yrs.

Distribution according to CD4 counts:

Cd4 COUNT	NUMBER	PERCENTAGE
<100	4	8%
101-200	16	32%
201-350	22	44%
>350	8	16%

- Under four different headings, The CD 4 counts were grouped. <100 cells/μl, 101-200 cells/μl, 201-350 cells/μl and >350 cells/μl are the 4 different groups.
- The CD 4 counts in 4 (8%) patients were less than 100/μl and in 16(32%) patients between 101-200/μl, and in between 201-350/μl the number of patients are 22(44%) and in 8 (16%) patients more than 350/μl are observed.
- 85 cells/μl and 90 cells/μl are the lowest CD 4 count recorded in 2 patients who had Extra pulmonary tuberculosis. 850 cells/μl is the highest CD 4 count recorded in a patient who was asymptomatic.

Mean pattern of study parameters with CD4 counts:

Study parmeters Mean +-SD	CD4 COUNT				Overall	p value
	<100	100-120	201-350	>350		
Total count	4835.33+-1483.36	4881.33+-2072.0	6101.33+-1816	9227.0+-4249.60	6089.0+-2784.01	0.0001
Total lymphovyte count	1782.67+-383.5	1772.33+-685.4	1801.67+-1084.33	2488.75+-1084.33	1891.33+-696.74	0.0001

The study parameters CD 4 counts with Total count and total lymphocyte count show upward trend with p value of 0.0001& 0.0001 respectively.

Study parameter	Pearson coefficient	P values
Total count	0.45	0.0001
Total lymphocyte count	0.45	0.0001

The Total Count showed an upward trend with CD 4 count. The Pearson Correlation between TC and CD 4 Counts was 0.45, which is significant at P < 0.0001 and shows a moderate correlation between the two variables. In our study the Total Lymphocyte Count showed an upward trend with CD 4 count. The Pearson Correlation for TLC with CD 4 Counts was 0.45 (moderate correlation), which is significant at P < 0.0001.

DISCUSSION:

- In our study, Total count and Total Lymphocyte Count were showing positive trend to CD 4 counts and are statistically significant. The Total Counts of 4850 cells/μl and 9200 cells/μl showed similar observations to CD 4 counts of 200 cells/μl and 350 cells/μl.
- The Total Lymphocyte Counts of 1750 cells/μl and 2450 cells/μl showed similar observations to CD 4 counts of 200 cells/μl and 350 cells/μl respectively.
- The P value was highly significant with Pearson Correlation of 0.45 for Total Counts (P value < 0.0001) and 0.45 for Total Lymphyocyte count.
- This demonstrates the suitability of the use of Total Lymphocyte Count in the absence of CD 4 count.
- It becomes more feasible especially in developing countries as CD 4 count costs around 30 US Dollars while Total Lymphocyte Counts cost around 0.80 US Dollars.
- Monitoring the patients with Total Lymphocyte Count has an enormous Cost Benefit in patients living in resource limited countries.
- The cost of TC and DC in standardized laboratories in India is around Rs. 50 and CD 4 count is around Rs. 500.

Summary:

- In the present study, males (38) outnumbered females (12).
- There is no overall significant difference of mean age between male and female. The patients in the age group of20-40 years were the most commonly involved group.
- Fever, Anorexia, Weight loss, Cough, Diarrhea, Mouth ulcers and Lymphadenopathy were the most common clinical presentations.
- TB, Chronic diarrhea and Oropharyngeal candidiasis were the commonest opportunistic infections.
- Majority of the patients with opportunistic infections had a CD 4 count less than 350 cells/μl.
- There was no relation between the specific opportunistic infection and CD 4 counts. However, Extrapulmonary Tuberculosis was more common in patients with CD 4 counts lesser than 200 cells/μl.
- The Total Lymphocyte Counts of 1750 cells/μl and 2450 cells/μl correlated to CD 4 counts of 200 cells/μl and 350 cells/μl respectively.
- In our study, the correlation betweenTotal Lymphocyte Count and CD 4 count were highly significant.

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