

Report

Skin disease: clinical indicator of immune status in human immunodeficiency virus (HIV) infection

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Abstract

Background Dermatological manifestations are seen at every stage of HIV/AIDS (human immunodeficiency virus), and are often the presenting features. These manifestations not only act as markers but also reflect the underlying immune status.

Objective To establish skin diseases as clinical indicators of underlying immune status in HIV disease by estimating and correlating with the CD_4 , $CD_4 : CD_8$ ratio.

Materials and Methods The CD_4 , CD_8 , $CD_4 : CD_8$ ratios were estimated using the fluorescence activated cell sorter (FACS) count system in 20 asymptomatic HIV patients, 80 HIV patients with various skin manifestations and 72 healthy volunteers as the control group.

Results In comparison with the CD_4 cell count of the control group (mean $885/mm^3$, standard deviation 331), that of the HIV-positive individuals (mean $409.83/mm^3$, standard deviation 263.07) was statistically correlated with low counts ($z = 10.099$ and $P < 0.05$). Similarly there was statistical significance with the $CD_4 : CD_8$ ratio among these two groups.

In comparison with the CD_4 cell count of the asymptomatic HIV-positive individuals (mean $620.65/mm^3$ and standard deviation 262.065), the CD_4 cell count of the HIV-positive patients with various dermatological manifestations (mean $357.15/mm^3$, standard deviation 236.95) was statistically correlated with low counts ($z = 4.0978$ and $P < 0.05$). Similarly there was statistical significance with the $CD_4 : CD_8$ ratio among these two groups.

Conclusions There was an inverse relation between the CD_4 counts and the incidence and severity of skin diseases in the HIV/AIDS patients. Cutaneous manifestations of HIV can be considered as good clinical indicators to predict and assess the underlying immune status in resource-poor countries.

This article is linked to: Waugh M. Skin diseases – clinical indicator of immune status in HIV infection. *Int J Derm* 2004; doi: 10.1111/j.1365-4632.2004.02052.x.

Introduction

Dermatological manifestations are seen at every stage of HIV/AIDS and are often presenting features.¹⁻⁵ Approximately 90% of HIV-infected patients develop cutaneous diseases, which may be infectious or noninfectious.⁶ These skin manifestations not only act as markers but also reflect the underlying immune status. Various studies have been conducted in correlating CD_4 and various skin manifestations in HIV.⁷⁻¹² Though CD_4 counts help in clinical monitoring and understanding of the underlying immune status, estimation methods are expensive and not available in resource-poor countries. Therefore the possibility of using various clinical indicators like skin manifestations to predict low CD_4 counts and disease progression needs to be explored. The purpose of our study is to establish skin diseases as clinical indicators of

underlying immune status by estimating and correlating with the CD_4 , $CD_4 : CD_8$ ratio.

Materials and Methods

One hundred HIV-infected patients, 20 asymptomatic and 80 with various dermatological diseases, belonging to an age group of 6 to 50 year-olds of both sexes, attending the Department of Dermatology, King George Hospital, Visakhapatnam, Andhra Pradesh, India, between March 2000 and April 2001, were included in the present study. Seventy-two healthy individuals of varying age groups belonging to both sexes were taken as controls. In all cases clinical examination and relevant investigations were also performed.

The CD_4 , CD_8 and $CD_4 : CD_8$ ratio were estimated by the fluorescence activated cell sorter (FACS) count system based on flow cytometry.

Statistical analysis

Mean of the CD₄, CD₈ and CD₄ : CD₈ ratio was calculated both in the asymptomatic and symptomatic HIV patients with various skin diseases and also in the controls.

Statistic value (Z) has been calculated to demonstrate the significance between the controls and the HIV-positive individuals; asymptomatic and symptomatic HIV-positives with various dermatological manifestations. Z tab at 5% level of significance = 1.96. P-value of < 0.05 was taken as the conventional level of significance.

Results

Among the 100 HIV-positive individuals, 20 asymptomatic and 80 with various dermatological manifestations, 67 were male and 33 were female, ages varying from 6 to 50 years. The mean CD₄ cell count of the control group was 885/mm³ with a range from 533 to 1869. Among the asymptomatic individuals, 13 (65%) had a CD₄ cell count of more than 500 while seven (35%) individuals were within a range of 351–500 cells/mm³.

In the HIV-positive patients with various skin manifestations, the majority, i.e. 62 (77.5%), had CD₄ counts of less than 500 and 18 of them (22.5%) had a CD₄ count of more than 500. Mean CD₄, CD₈ and CD₄ : CD₈ ratios in various dermatological diseases are given in Table 1.

In comparison with the CD₄ cell count of the control group, the CD₄ cell count of the HIV-positive individuals was statistically correlated with low counts (Table 2).

In comparison with the CD₄ cell count of the asymptomatic HIV-positive individuals, the CD₄ cell count of the symptomatic HIV-positives with various dermatological diseases was statistically correlated with low counts (Table 3).

Discussion

Skin manifestations are hallmarks of HIV infection. CD₄ cell count is a useful measure of a patient's immuno-competence or disease progression¹³. It is observed that the incidence and severity of skin disorders increase as the immune function deteriorates. Nevertheless, data to substantiate this relation remains limited. In this study an attempt was made to determine whether a correlation exists between the degree of immunosuppression (measured by CD₄ antigen bearing helper/suppressor lymphocytes) and the incidence of specific skin disorders in patients with HIV, and also to establish them as clinical indicators of the underlying immune status.

In comparison with the CD₄ cell count of the control group (72; mean 885/mm³, standard deviation 331) that of the HIV-positive individuals (100; mean 409.83/mm³, standard deviation 263.07) was statistically correlated with low counts

Table 1 CD₄, CD₈, CD₄ : CD₈ in dermatological manifestations of HIV

Disease	Number of cases	Mean CD ₄ cells/mm ³	Mean CD ₈ cells/mm ³	Ratio
Viral infections				
Herpes zoster	16	347.18	1208.06	0.28
Molluscum contagiosum	12	208.25	1229	0.17
Herpes simplex	7	339.57	1104	0.307
Bacterial infections				
Staphylococcal infections	7	465	1395.28	0.33
Fungal infections				
Dermatophyte infections	7	496.42	1288.7	0.38
Oral candidiasis	3	239.34	1574	0.15
Miscellaneous				
Toxic epidermal necrolysis	5	211.4	1277.4	0.24
Secondary syphilis	4	212.5	1596.75	0.13
Pruritic papular eruption	4	244	754.75	0.32
Scabies	4	472.5	1299.5	0.36
Acneiform eruption	3	378	1718	0.22
Seborrhoeic dermatitis	3	530	469	1.13

Table 2 Statistic value (Z) and P value in studying the difference between controls and HIV positive individuals

Parameter	Control group (72)		HIV positive (100)		Statistic value (Z)	P value
	Mean	Standard deviation	Mean	Standard deviation		
CD ₄	885	331	409.83	263.07	10.099	P < 0.05
CD ₄ /CD ₈	1.34	0.64	0.3766	0.323	11.7416	P < 0.05

Table 3 Statistic value (Z) and P value in studying the difference between asymptomatic and symptomatic HIV positive individuals

Parameter	Asymptomatic HIV positive individuals (20)		Symptomatic HIV positive individuals (80)		Z value	P value
	Mean	Standard deviation	Mean	Standard deviation		
CD ₄	620.65	262.065	357.12	236.95	4.0978	P < 0.05
CD ₄ /CD ₈	6.493	0.22	0.347	0.339	2.351	P < 0.05

($z = 10.099$ and $P < 0.05$). Similarly there was statistical significance with the CD₄ : CD₈ ratio among these two groups.

In comparison with the CD₄ cell count of the asymptomatic HIV-positive individuals (20; mean 620.65/mm³ and standard deviation 262.065) that of the HIV-positive patients with various dermatological manifestations (80; mean 357.15/mm³, standard deviation 236.95) was statistically correlated with low counts ($z = 4.0978$ and $P < 0.05$). Similarly there was statistical significance with the CD₄ : CD₈ ratio among these two groups.

This study clearly establishes the inverse relation between the CD₄ cell counts and the incidence of skin diseases in HIV/AIDS.

In the present study, 25 different types of skin disease were associated with HIV/AIDS, among which Herpes zoster (16%) was the commonest, with a mean CD₄ cell count of 347.18/mm³. In three cases of Herpes zoster with pulmonary tuberculosis, the mean CD₄ count was 260.34/mm³, and a very low CD₄ count of 8/mm³ was observed in one case of Herpes zoster with Scrofuloderma and pulmonary tuberculosis. Previous studies¹⁴⁻¹⁶ showed Herpes zoster with CD₄ 300-400/mm³. Kumarswamy *et al.*¹ reported low CD₄ (176.33/mm³) with Herpes zoster.

Second commonest skin disease in this study was Molluscum contagiosum with a mean CD₄ count of 208.25/mm³. Similar values were reported in previous studies.^{13,14,17} In contrast, Schwatz *et al.*¹⁸ and Goldstein *et al.*⁸ observed Molluscum with a CD₄ count less than 100/mm³. Similar low levels of CD₄ were observed in two of our 12 cases with extensive Molluscum on the face and groins with 36/mm³ and 81/mm³, respectively.

In seven cases of Herpes simplex the mean CD₄ cell count was 339.57/mm³, which was higher than the values of other studies.^{9,13,14} The mean CD₄ cell count in staphylococcal infections (seven) in our study was 465/mm³; similar to previous studies.^{1,14}

Dermatophyte infections (seven) were observed at a mean CD₄ cell count of 496.42/mm³. Barton *et al.*¹⁴ reported them in the range 350-400/mm³. The mean CD₄ cell count of *Oropharyngeal candidiasis* in our study was 239.34/mm³, and two out of three patients had CD₄ counts less than 50/mm³. Barton *et al.*¹⁴ and Neal Gregory *et al.*¹³ observed oral

candidiasis with mean CD₄ counts of 250/mm³ and 300/mm³, respectively.

In four cases of secondary syphilis, the mean CD₄ cell count was 212.5/mm³. Pruritic papular eruptions (four) in our series were associated with a mean CD₄ cell count of 244/mm³, which was higher, whereas other workers reported at very low levels.^{19,14} Five cases of severe drug reactions like toxic epidermal necrolysis to thioacetazone and cotrimoxazole were seen at a mean CD₄ cell count of 311.4/mm³.

In our study Seborrhoeic dermatitis was seen as an early manifestation with a higher mean CD₄ count of 530/mm³.

Conclusion

There was an inverse relation between the CD₄ counts and the incidence and severity of skin diseases in the HIV/AIDS patients. Cutaneous manifestations can be considered as good clinical indicators to predict and access the underlying immune status in resource-poor countries.

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