



Original Research

Prevalence of Ocular Manifestations in HIV in Association with CD4 Count in Tertiary Care Centre

Dr. Alpana Badolia^{1*}, Dr. Vivek Som², Dr. Bharti Ahuja³, Dr. Kavita Kumar⁴

^{1,2,3,4} Department of Ophthalmology, Gandhi Medical College and Associated Hamidia Hospital, Bhopal, Madhya Pradesh

Received: 21 Oct 2025 / Accepted: 19 Nov 2025

Abstract

Introduction: Human immunodeficiency virus (HIV) is a retrovirus which causes a multisystemic disease called acquired immune deficiency syndrome (AIDS). Ocular lesions usually occur in the late phase of the disease but can also occur in the early stages. 5-25% of all HIV patients in developing countries may become blind in their lifetime. Hence early detection of the manifestations is critical which has got an impact on the prognosis of the disease.⁷ **Methodology:** A cross-sectional prospective study was conducted over 18 months at ART centre, Department of Medicine and Department of Ophthalmology, Gandhi Medical College, Bhopal, Madhya Pradesh. Total 100 patients were screened. **Results:** Out of 100 patients ocular adnexal involvement was noted in 5 patients (CDC 2%, ADC 1%, HZO 1%, preseptal cellulitis 1%), anterior segment manifestations in 16 patients (keratitis 1%, Dry eye 3%, KCS 1%, OSSN 3%, uveitis 1%, Fuchs dystrophy 1%, cataract 6%), posterior segment manifestations in 12 patients (RMV 5%, CMV retinitis 3%, retinitis 1%, toxoplasmosis 1%, Choroiditis 1%, RD 1%) and neuro-ophthalmic manifestations in 4 patients (Optic neuropathy 2%, Optic atrophy 1%, papilledema 1%). Ocular manifestation was common in patients with a CD4+Tcell count of <250 cells/ μ l. Overall prevalence of ocular manifestations in patients with low CD4 count but the observed association was statistically insignificant for individual manifestations except retinal micro-vasculopathy, CMV retinitis, OSSN and cataract. **Conclusion:** HIV-positive patients' ocular manifestations can range widely in presentation and outcome, from asymptomatic to irreversible blindness. If treated appropriately and diagnosed early, blindness can be avoided in a large proportion of people. As some patients were unaware of their ophthalmic status and were asymptomatic. So early identification of ocular manifestation and their appropriate treatment may prevent or delay the development of vision loss.

Keywords: CDC; chronic dacryocystitis, ADC; acute dacryocystitis, HZO; herpes zoster ophthalmicus, KCS; keratoconjunctivitis sicca, OSSN; ocular surface squamous neoplasm, RMV; retinal micro-vasculopathy, CMV; cytomegalovirus.

Introduction

Human immunodeficiency virus (HIV) is a retrovirus which causes a multisystemic disease called acquired immune deficiency syndrome (AIDS). HIV is a retrovirus which replicate in CD4 lymphocytes¹. Ocular lesions usually occur in the late phase of the disease but can also occur in the early stages. 5-25% of all HIV patients in developing countries may become blind in their lifetime. Hence early detection of the manifestations is critical which has got an impact on the prognosis of the disease.² The prevalence of HIV-related ocular manifestations are inversely proportional to CD4-count. The ocular manifestations in HIV infected patients may result from the underlying infection itself (HIV induced retinopathy), Opportunistic infections (CMV retinitis), Neoplasms due to impaired surveillance (Intra ocular lymphoma), Complications arising from treatment (Cidofovir induced uveitis) and Altered immune regulation giving rise to autoimmune phenomenon (Keratoconjunctivitis sicca). Ocular manifestations in HIV/AIDS patients range from adnexal disorders to the posterior segment disease³.

The present study has been evaluating the correlation of the prevalence of ocular morbidity and its correlation with CD4 count.

Materials and Methods

A cross-sectional prospective study was conducted to evaluate prevalence of ocular manifestations in HIV in association with CD4 count at tertiary care centre. The total duration of the study was 18 months, from May 2023 to October 2024. The study population included Patients diagnosed as seropositive for HIV and attended OPD of ART Centre in Department of Medicine and HIV patients with ophthalmic complaints, patients referred to or attending the Department of Ophthalmology, Gandhi Medical College, Bhopal. Ethical clearance was obtained from the Institutional Ethics Committee of Gandhi Medical College and Associated Hamidia Hospital. Participants were briefed about the study's purpose and process. Written informed consent and assent were taken prior to data collection, and all participants were assured of confidentiality and anonymity. Data were collected using a predesigned proforma and was spread in Microsoft excel-sheet for analysis. Patients were asked about the presence or absence of ocular symptoms. CD4 count, demographic profile (Age/sex/Education/Occupation/Marital status), Mode of infection, History of tuberculosis, Duration of HIV infection and duration of HAART.

Statistical Analysis

Data was compiled using MS excel and analyzed using IBM SPSS software version 20. Data was grouped and expressed as proportions. Chi square test was used to assess the association between proportions. P value <0.05 was considered statistically significant.

The analyzed data and review was checked for plagiarism using SmallSEO Tools.com.

Results

Mean CD4 count among HIV patients was 361.96 cu.mm. (Standard Deviation: 89.41) (Table 1). Ocular manifestations were documented in 36% cases. Out of total patients with ocular manifestations anterior segment manifestations were most common, observed in 16% patients, followed by posterior segment manifestations in 12%. Adnexal and neuro-ophthalmic manifestations in 5% and 4% patients respectively (Table 2). The present study found Herpes zoster ophthalmicus and chronic dacryocystitis in 2% patients, whereas Acute dacryocystitis and preseptal cellulitis in 1% of the patients (Table 3). In the present study, out of 100 patients anterior segment manifestations were noted in 16 (16%) patients. Out of them, Cataract was the most common anterior segment manifestation seen in 6% of patients with HIV. However dry eye and OSSN was noted in 3% of patients each. Anterior Uveitis was observed in 1% of patients (Table 4). The higher incidence of cataract may be due to age related changes in older age group patients. The present study found Retinal microvasculopathy to be the most common posterior segment manifestation noted in 5% of patients whereas CMV retinitis was the next common ocular manifestation involving posterior segment observed in 3% of patients followed by retinitis, toxoplasmosis, Choroiditis, Retinal detachment 1% patients each (Table 5). The present study found Neuro-ophthalmic manifestations in 4 patients. Out of them, Optic neuropathy was noted in 2% of patients whereas Optic atrophy and papilledema was noted in 1% of patients each (Table 6). Amongst various ocular manifestations only retinal micro-vasculopathy, CMV retinitis, OSSN and cataract were statistically significant ($p < 0.05$), whereas all other ocular manifestations were not significantly associated with CD4 count ($p > 0.05$) (Table-7). No significant association was found with the demographic profile, mode of transmission, duration of HIV and concurrent history of tuberculosis.

1. DISTRIBUTION OF HIV PATIENTS AND OCULAR MANIFESTATIONS ACCORDING TO CD4 COUNTS

CD4 count	Frequency (n=100)/ Percentage	No. of patients with ocular manifestations	Proportion	P value
<150	11	10	90.90	<0.001
150-250	20	17	85	
250-500	37	7	18.91	
>500	32	2	6.25	

2. ANATOMICAL DISTRIBUTION OF OCULAR MANIFESTATIONS IN HIV PATIENTS

Manifestations	Frequency (n=100)/ Percentage	Proportion	P value
ADNEXAL	6	15.78	0.007
Anterior segment	16	42.10	
Posterior segment	12	31.57	
Neuro-ophthalmic	4	10.52	

3. DISTRIBUTION OF HIV PATIENTS ACCORDING TO ADNEXAL MANIFESTATIONS

ADNEXAL manifestation	Frequency (n=100)	Percentage
Herpes zoster	2	2
Pre-septal cellulitis	1	1
Acute DCT	1	1
Chronic DCT	2	2

4. DISTRIBUTION OF HIV PATIENTS ACCORDING TO ANTERIOR SEGMENT MANIFESTATIONS:

Anterior segment manifestation	Frequency (n=100)	Percentage
keratitis	1	1
Dry eye	3	3
KCS	1	1
OSSN	3	2
uveitis	1	1
Fuchs dystrophy	1	1
cataract	6	6

5. DISTRIBUTION OF HIV PATIENTS ACCORDING TO POSTERIOR SEGMENT INVOLVEMENT:-

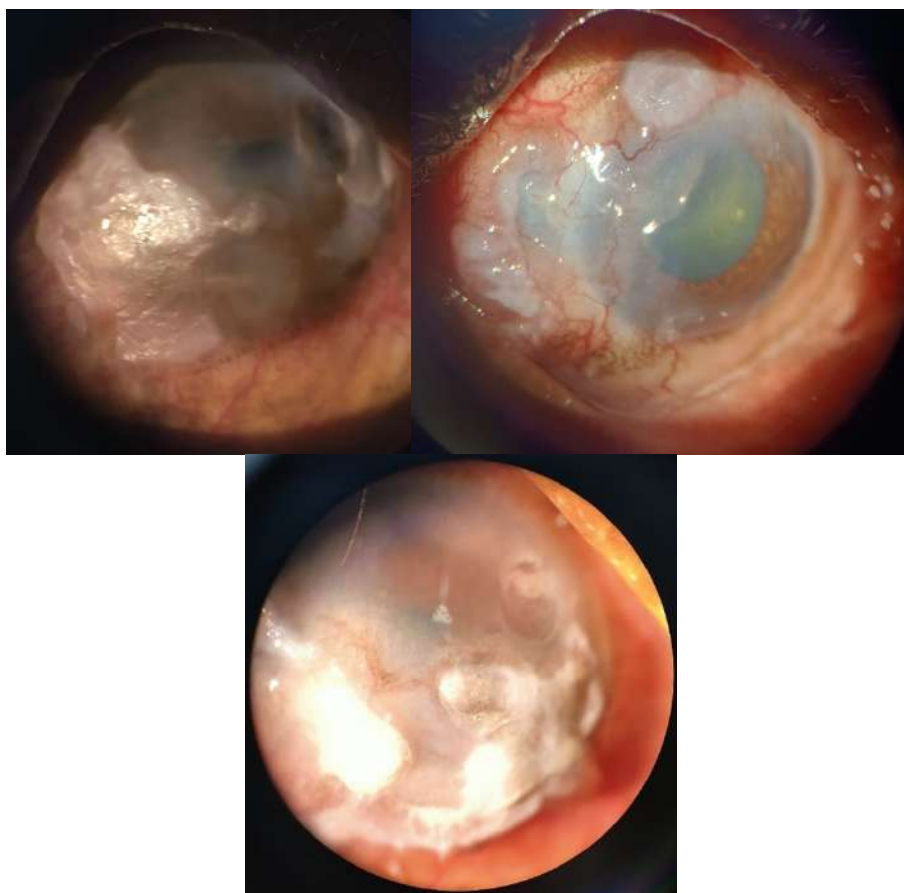
Posterior segment manifestation	Frequency (n=100)	Percentage
Retinal micro-vasculopathy	5	5
CMV retinitis	3	3
retinitis	1	1
toxoplasmosis	1	1
Choroiditis	1	1
Retinal detachment	1	1

6. DISTRIBUTION OF HIV PATIENTS ACCORDING TO NEURO-OPHTHALMIC MANIFESTATIONS:

Neuro-ophthalmic manifestations	Frequency (n=100)	Percentage
Optic neuropathy	2	2
Optic atrophy	1	1
papilledema	1	1

7. ASSOCIATION OF CD4 COUNT WITH OCULAR MANIFESTATION IN HIV PATIENTS

CD4 count	100-150	150-250	250-500	>500	X ²	P value
Ocular manifestations	11	18	7	2		
Herpes zoster	0(0.57)	2(0.95)	0(0.37)	0(0.11)	2.334	0.505
Pre-septal cellulitis	0(0.29)	1(0.47)	0(0.18)	0(0.05)	1.146	0.765
Acute DCT	0(0.29)	1(0.47)	0(0.18)	0(0.05)	1.146	0.765
Chronic DCT	0(0.57)	2(0.95)	0(0.37)	0(0.11)	2.334	0.528
keratitis	0(0.29)	1(0.47)	0(0.18)	0(0.05)	1.146	0.765
Dry eye	0(0.868)	3(1.42)	0(0.55)	0(0.16)	3.6203	0.305
KCS	0(0.29)	1(0.47)	0(0.18)	0(0.05)	1.146	0.765
OSSN	0(0.868)	0(1.42)	3(0.55)	0(0.157)	14.501	0.004
Fuchs dystrophy	0(0.29)	0(0.47)	1(0.18)	0(0.05)	4.666	0.206
uveitis	0(0.29)	1(0.47)	0(0.18)	0(0.05)	1.146	0.765
cataract	1(1.73)	2(2.84)	1(1.11)	2(0.32)	11.175	0.024
Retinal micro-vasculopathy	4(1.45)	1(2.37)	0(0.92)	0(0.26)	7.44	< 0.0001
CMV retinitis	3(0.86)	0(1.42)	0(0.55)	0(0.16)	8.08	0.044
retinitis	1(0.29)	0(0.47)	0(0.18)	0(0.05)	2.51	0.490
toxoplasmosis	0(0.29)	1(0.47)	0(0.18)	0(0.05)	1.146	0.765
Choroiditis	0(0.29)	(0.47)	1(0.18)	0(0.05)	4.666	0.206
Retinal detachment	1(0.29)	0(0.47)	0(0.18)	0(0.05)	2.51	0.490
Optic neuropathy	0(0.57)	2(0.95)	0(0.37)	0(0.11)	2.334	0.505
Optic atrophy	0(0.29)	(0.47)	1(0.18)	0(0.05)	4.67	0.206
papilledema	1(0.29)	0(0.47)	0(0.18)	0(0.05)	2.51	0.490



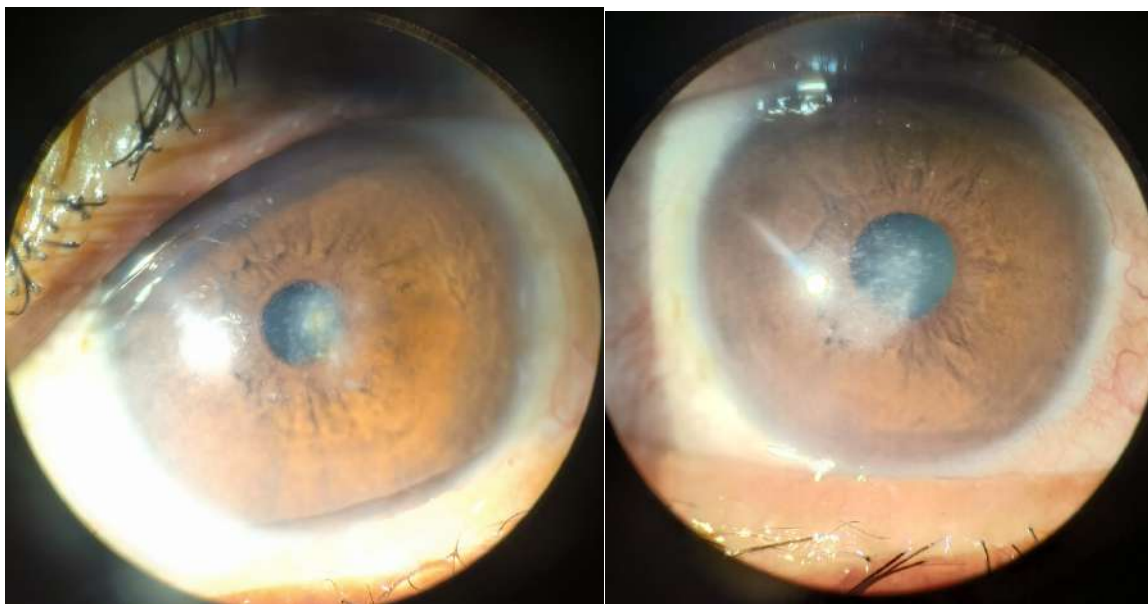
FIGURES SHOWING OCULAR SURFACE SQUAMOUS NEOPLASM



FIGURES SHOWING HERPES ZOSTER OPHTHALMICUS



FIGURES SHOWING ACUTE DACRYOSISTITIS



FIGURES SHOWING FUCHS CORNEAL DYSTROPHY

Discussion

HIV is a multisystemic disease caused by a group of retrovirus. Ocular manifestations often associated with HIV infection. Ocular manifestations in these patients were first documented by Maclean more than 20 years ago.⁴ The ocular manifestations may results in opportunistic infections, vascular abnormalities, neoplasms, neuro-ophthalmic conditions, and adverse effects of medications.⁴ The present study was done to evaluate the ocular manifestations among the patients of HIV. This study was conducted on a total of 100 patients with HIV

who presented at study centre. All these patients are subjected to detailed ocular examination and prevalence of ocular manifestations among them were assessed.

CD4 counts reflect immunity levels in patients of HIV. Low CD4 counts are associated with higher risk of opportunistic infections and thus CD4 counts may be associated with ocular manifestations. CD4 count is an determinant in the causation of ocular manifestation in HIV patients. important Maintenance of CD4 count above 500 cells through treatment will help avoid ocular involvement.

In the present study, 78.22% of patients with CD4 count between 150-250 cu/mm had ocular manifestations and the prevalence of ocular manifestations was found to increase with decreasing CD4 counts. The p-value is approximately < 0.001 . This suggests that, based on the chi-square test, there's a significant difference in the proportion of patients with ocular manifestations across different CD4 count groups.(Table 1)

The present study documented overall prevalence of ocular manifestations in patients with low CD4 count but the observed association was statistically insignificant for individual manifestations except retinal microvasculopathy, CMV retinitis, dry eye and OSSN.(Table 7)

Conclusion

HIV-positive patients' ocular manifestations can range widely in presentation and outcome, from asymptomatic to irreversible blindness. If treated appropriately and diagnosed early, blindness can be avoided in a large proportion of people.

The prevalence of ocular symptoms, associations with CD4 counts, and the importance of screening in HIV-positive individuals have all been highlighted in this study and in many others.

Since young men were found to have higher rates of HIV, it is crucial to educate this demographic since they are a vital component of society and their morbidity could have an impact on the nation's economic standing.

Most of the patients were diagnosed earlier even before they develop advanced disease. The present study conducted in the population of central India has highlighted the importance of screening for ocular manifestations in patients with HIV. As some patients were unaware of their ophthalmic status and were asymptomatic. So early identification of ocular manifestation and their appropriate treatment may prevent or delay the development of vision loss

CONFLICT OF INTEREST: All authors declare no conflict of interest.

SOURCE OF FUNDING: None

CONSENT: As per international standards or university standards written participant consent has been collected and preserved by the authors.

ETHICAL APPROVAL: As per international standards or university standards written ethical permission has been collected and preserved by the author(s).

References

1. Jabs DA, Van Natta ML, Pak JW, Danis RP, Hunt PW. Association of retinal vascular caliber and age-related macular degeneration in patients with the acquired immunodeficiency syndrome. *Investigative ophthalmology & visual science*. 2018 Feb 1;59(2):904-8.
2. Khan S, Rani T, Pant K, Charan LS, Rehmani A. A Review Study on Ocular Posterior Segments & Neuro-Ophthalmic Manifestations Associated with Human Immunodeficiency Virus (HIV) Infection and its Management Options.
3. Xie LY, Chen C, Kong WJ, Du KF, Guo CG, Wei WB. A comparative study on retinal thickness of the macular region among AIDS patients with normal ocular fundus, HIV-related microvascular retinopathy patients, and cytomegalovirus retinitis patients. *Medicine*. 2019 Jun 1;98(26):e16073.
4. Feroze KB, Wang J. Ocular manifestations of HIV.