

HIV Associated Retinopathy in Current Era: A Case Study at MGMMCH, Jamshedpur

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Abstract

Background: HIV, a retrovirus causing AIDS, often leads to ocular complications, with retinal diseases being a significant cause of vision loss. Retinal disorders in HIV-positive individuals can be classified into infectious and non-infectious categories. The prevalence and nature of these conditions vary based on geographic and socioeconomic factors.

Aim: The present study aimed to determine the status of retinal disease or involvement in patients diagnosed with HIV.

Methodology: A cross-sectional study was conducted with 52 HIV-positive participants, selected based on specific inclusion criteria. Comprehensive ophthalmic examinations were performed, including visual acuity testing, slit-lamp evaluation, fundus examination, and optical coherence tomography (OCT). Retinal disorders were categorized and analyzed using SPSS version 27.

Result: The study found 69% of participants were male, with 54% aged 45–60 years. HIV-associated retinopathy was most prevalent (40%), followed by cotton wool spots (16.7%), retinal hemorrhages (12.5%), CMV retinitis (8.3%), and macular edema (4.2%). Notably, 35% of participants showed no retinal abnormalities, indicating variability in disease manifestation.

Conclusion: The study underscores the high prevalence of retinal diseases among HIV-positive individuals, with HIV-associated retinopathy being the most common. Middle-aged males appear particularly susceptible. Regular ophthalmic screening and targeted interventions, including secondary prophylaxis for opportunistic infections, are vital for preserving vision and improving the quality of life in this population.

Keywords: AIDS, CMV Retinitis, HIV, HIV-Associated Retinopathy, Ocular Complications, Opportunistic Infections Retinal Disorders.

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Introduction

AIDS is a multisystem illness caused by the retrovirus HIV. The signs and symptoms of HIV infection around the eyes might vary depending on the severity of the disease [1]. HIV retinopathy is widespread in HIV-positive people and is one of the leading causes of visual loss. HIV is a retrovirus that targets the immune system, particularly CD4 cells, and is spread by contact with bodily fluids like blood [2]. The three classifications of HIV-positive patients include initial infection, clinical latency, and AIDS, characterised by a CD4+ T cell count of less than 200 cells/mm³. Micro vasculopathy or opportunistic infection is the primary cause of retinopathy in HIV.

HIV individuals who have retinal involvement may have retinal necrosis, Toxoplasmosis Retinochondritis, Syphilitic Retinitis, Fungal Chorioretinitis, or other chorioretinal disorders, such as microangiopathy, an infectious retinal involvement mostly caused by CMV [3]. Cotton-wool spots, retinal hemorrhages, and microvascular abnormalities that do not worsen, grow, or produce visual problems are all considered non-infectious retinopathy. In contrast, HIV neuroretinopathy may result in color vision impairments due to the involvement of the optic nerve. These indicate a generalized involvement of the retinal microvascular system. Ophthalmoscopy-observed

cotton-wool patches are caused by a microinfarction of the retina's nerve fiber layer. Between 50% and 75% of AIDS patients may have a lesion. With a frequency of 16% to 50% in HIV patients after 20 years of AIDS diagnosis, the combination of the previously stated visual impairments has been dubbed HIV neuroretinal disease. Dot-blot hemorrhages, flame-shaped lesions in the posterior pole, or punctate intraretinal hemorrhages on the periphery are the most common forms of retinal hemorrhages. Microaneurysms, telangiectasias, focal regions of nonperfusion, and capillary loss are examples of microvascular findings.

The primary cause of infectious retinopathy is CMV, a double-stranded DNA herpesvirus4 that causes necrotizing retinitis in immunocompromised individuals [4]. With a cumulative lifetime risk of 25% to 40% and an incidence of over 20%, CMV retinitis was the most prevalent ocular infection in AIDS patients before highly active antiretroviral therapy (HAART). Centrifugally moving along retinal arteries, CMV retinitis is a full-thickness retinal infection that begins peripherally as perivascular, opaque white, granular regions of retinal necrosis with accompanying haemorrhages. Rhegmatogenous retinal detachment (RD) may occur three to six months after diagnosis if CMV retinitis is left untreated. It develops and causes full-thickness retinal necrosis. Although HSV can also induce ARN, VZV is often the source of the clinical condition of ARN [5]. Deep retinal whiteness, little bleeding, and quick advancement are the hallmarks of retinitis. In HIV infection, retinal toxoplasmosis might mimic ARN, CMV, or syphilitic retinitis and manifest as local necrotizing non-hemorrhagic retinitis that does not resolve on its own. Thick, densely opaque yellow-white lesions with smooth, nongranular margins, a noticeable vitreous and anterior chamber response, and a relative lack of retinal bleeding all point to toxoplasmosis. PCR methods or endorectal biopsies may be helpful in cases where diagnosis is challenging. Syphilitic retinitis, an aggressive disorder that causes retinal necrosis, vasculitis, and, frequently, papillitis, which can be isolated, is a consequence of central nervous system disease in AIDS patients [6]. Retinitis often manifests as a large, placoid, isolated subretinal macular lesion that is light yellow in color. Clinical presentation and serology are used to make the diagnosis. There are further infectious retinopathies, including fungal infections and *Pneumocystis carinii* choroidopathy.

The World Health Organization (WHO) estimates that the global prevalence rate is 0.8% and that over 50 million people have been infected with HIV since the early 1980s [7]. There might be between 15,000 and 20,000 new infections every day. Almost a million youngsters are living with HIV. The eye condition is thought to affect around 75% of HIV

patients. The majority of HIV patients come from underdeveloped nations [8, 9]. According to studies, 5–25% of HIV patients in underdeveloped nations may suffer blindness at some point in their lives. The most prevalent conditions affecting HIV patients are choroid and retinal diseases, which can result in blindness. About 30 to 40 percent of HIV patients have retinal microvascular disease and CMV retinitis. Compared to industrialized nations, poor nations have lower rates of CMV retinitis, and their HIV-positive population is more vulnerable to infections from *Toxoplasma*, TB, Herpes zoster ophthalmic, and papillomavirus-associated squamous cell cancers. Higher mortality rates early in the course of the disease and more exposure to these causal substances are reflected in this differential.

1. Methodology

2.1. Study Design

This cross-sectional study was conducted to estimate the prevalence of retinal disorders in HIV-positive patients presenting at Mahatma Gandhi Memorial Medical College and Hospital (MGMMCH), Jamshedpur. The study received prior approval from the Institutional Ethics Committee. The study population comprised HIV-positive patients attending the Integrated Testing and Counseling Centre (ITCT) at MGMMCH, Jamshedpur, with complaints of diminished vision.

2.2. Sample Size

A total of 52 patients participated in the research those had intra-articular fractures of the calcaneus and underwent surgical intervention.

2.3. Inclusion and Exclusion Criteria

➤ Inclusion Criteria:

- HIV-positive patients confirmed through standard diagnostic protocols.
- Patients presenting with complaints of diminished vision.
- Patients who provided informed consent.

➤ Exclusion Criteria:

- Patients with ocular complaints not related to retinal involvement (e.g., corneal, lens, or anterior segment pathologies).
- Patients with coexisting systemic or ocular conditions that could confound retinal findings.

2.4. Data Collection

After obtaining informed consent, participants underwent a series of detailed ophthalmic examinations and diagnostic procedures. The methodology focused exclusively on retinal involvement, and other ocular findings were excluded.

2.5. Diagnostic Procedures

Visual acuity assessment performed with a standardized Snellen chart to evaluate baseline visual function. Slit lamp examination conducted to assess the anterior portion of the eye and exclude non-retinal aetiologies of reduced vision. Fundus examination performed with both 90D and 20D lenses to assess the posterior portion of the eye. The findings were recorded with precision. Optical Coherence Tomography (OCT) conducted for comprehensive imaging of retinal layers to detect structural anomalies, such as macular oedema, retinal atrophy, or other alterations linked to HIV retinopathy.

2.6. Study Parameters

- Retinal disorders were classified based on clinical findings and OCT imaging into categories such as:
 - HIV-associated retinopathy
 - Opportunistic infections (e.g., CMV retinitis)

- Other retinal pathologies (e.g., cotton wool spots, retinal hemorrhages).

2.7. Statistical Analysis

Analysis of this study was done by using SPSS version 27. Continuous data were analysed using the mean and standard deviation, whereas categorical variables were summarised using frequencies and percentages. Independent t-tests were used to compare mean outcomes between anaemic and non-anaemic children.

2. Results:

Table 1 displays the distribution of study participants by sex and age. With 28 participants (54%), the majority are between the ages of 45 and 60. Nine people (17%) are in the 30-45 age bracket. With only three participants (6%) in the 15-30 age group and none in the 0-15 age group, there are hardly any participants in the lower age groups. On the basis of sex distribution, 36 participants (69% of the total) are male, and 16 participants (31% of the total) are female.

Table 1. Distribution of Study Participants by Age and Sex

Variables	Frequency	Percentage
Age		
0-15	0	0%
15-30	3	6%
30-45	9	17%
45-60	28	54%
Sex		
Male	36	69%
Female	16	31%

Table 2 shows the frequency of several retinal diseases in persons with HIV. The most prevalent ailment, HIV-associated retinopathy, affects 40% of the sample (21 patients), with cotton wool spots coming in second at 16.7% (9 individuals). Of the

patients, 12.5% (7 patients) had retinal hemorrhages, and 8.3% (4 patients) had CMV retinitis. The HIV-positive individuals, 35% (18 patients) had no retinal abnormalities, whereas 4.2% (2 patients) had macular oedema.

Table 2: Prevalence of Retinal Disorders Among HIV-Positive Patients

Retinal Disorder	Prevalence (n)	Percentage (%)
HIV-associated Retinopathy	21	40
Cotton Wool Spots	9	16.7
Retinal Haemorrhages	7	12.5
CMV Retinitis	4	8.3
Macular Edema	2	4.2
No Retinal Findings	18	35

Discussion

The distribution of study participants by age and sex, as shown in Table 1, reveals a predominantly middle-aged male population. The majority of participants (54%) fall within the 45-60 age bracket, followed by 17% in the 30-45 age range. A very small proportion, 6%, is represented by individuals aged 15-30, with no participants in the 0-15 age

group. This age distribution suggests that the study predominantly involves older adults, which may reflect the population most at risk for the conditions under investigation. The male participants (69%) outnumber female participants (31%), indicating a gender disparity within the study sample. With an incidence of 2.28 cases per 100 PY, more than 20 times greater than the Brazilian population as a whole, our data demonstrates that TB is a prevalent

HIV-related consequence in this group with high doses of ART [10]. The present investigation included 184 HIV-positive individuals, 62 of whom exhibited ocular symptoms. In our investigation, visual symptoms were present in 33.69% of cases. Out of the 125 HIV-positive individuals in the research by Kumar et al., 43 (34.4%) had positive ocular results [11]. In their research of 150 HIV-positive individuals, Sharma et al. [12] observed a similar incidence rate of 35.3%.

Table 2 highlights the prevalence of retinal diseases among individuals with HIV. HIV-associated retinopathy is the most common condition, affecting 40% of the sample, underscoring its significant impact on individuals living with HIV. Cotton wool spots, a notable feature of HIV-associated retinopathy, are seen in 16.7% of participants. Other retinal conditions observed include retinal hemorrhages in 12.5% of patients and CMV retinitis in 8.3%. Interestingly, 35% of the HIV-positive participants showed no retinal abnormalities, suggesting a portion of the population does not exhibit significant retinal complications. Additionally, macular oedema, though present in 4.2% of the sample, remains relatively rare. We also discovered that in patients with higher CD4 cell counts, a prior TB diagnosis was linked to an increased chance of developing TB during follow-up. HIV infection raises the likelihood of recurrent TB by over 19 times due to re-infection or relapse [13, 14]. Our findings revealed that prior TB was a major risk factor for incident tuberculosis in individuals with higher CD4 cell counts. Two other studies have demonstrated that recurrence of tuberculosis is related with lower CD4 cell counts. This disparity may result from variations in the treatment of TB in Brazil, where greater rates of interruption are observed. Although it is not used in the majority of the globe, secondary isoniazid prophylaxis has been shown to be an effective way to prevent TB recurrence in people with HIV [15, 16]. According to our findings, individuals who have already been diagnosed with TB are more likely to get another diagnosis; thus, secondary isoniazid prophylaxis should be carefully addressed in this population.

These findings provide insight into the age, sex, and retinal health profile of individuals living with HIV. The data underscore the importance of age as a factor in the prevalence of retinal diseases, particularly HIV-associated retinopathy, which appears to be the most prevalent condition among the participants. The gender imbalance in the study sample also calls for further exploration into whether this distribution is reflective of broader epidemiological trends.

Conclusion

HIV-associated retinopathy is the most prevalent condition, affecting 40% of participants, followed by cotton wool spots retinal haemorrhages and CMV retinitis. These findings underscore the importance of regular ophthalmic screenings for early detection and management of retinal conditions, particularly HIV-associated retinopathy and opportunistic infections like CMV retinitis. Interventions such as secondary isoniazid prophylaxis may help mitigate associated risks like tuberculosis, which can further complicate retinal health. Overall, the study emphasizes the need for targeted approaches to preserve vision and improve the quality of life in HIV-positive individuals, particularly in resource-limited settings.

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