

ORIGINAL RESEARCH

Study of ocular manifestations in children (<12 years) with positive HIV status at a tertiary hospital

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ABSTRACT

Background: Pediatric HIV is a major world health problem, which is progressing at an alarming rate. Ocular complications in HIV patients make management of such patients more difficult; if such manifestations can be picked up early, better management results could be achieved with such patients. Present study was aimed to study ocular manifestations in children (<12 years) with positive HIV status at a tertiary hospital. **Material and Methods:** Present study was single-center, prospective, observational study, conducted in children of 2-12 years of age, affected with HIV/AIDS, attending antiretroviral therapy (ART) center of the institute, underwent a thorough ophthalmologic evaluation for ocular involvement. **Results:** In present study, total 460 children underwent ophthalmologic evaluation, 88 children had ocular involvement (19.13 %). Majority were from 6-9 years age group (43.18 %), were boys (54.55 %) & mean age was 7.53 ± 3.81 years. Anterior segment manifestations noted were allergic conjunctivitis (20.45 %), dry eye (19.32 %), hordeolum (12.5 %), molluscum contagiosum (1-bilateral) (4.55 %), blepharitis (4.55 %), herpes zoster ophthalmicus (without keratitis) (3.41 %). Posterior segment manifestations were retinal perivasculitis (13.64 %), CMV retinitis (4.55 %), isolated cotton wool spot (4.55 %), toxoplasma (3.41 %), choroidal tubercle (2.27 %), Roth spots (2.27 %). In children with CD4 count of 200-500 cells/mm³ ocular manifestations noted were hordeolum, blepharitis, molluscum contagiosum, optic neuritis while in children with CD4 count of <200 cells/mm³ ocular manifestations noted were CMV retinitis, herpes zoster ophthalmicus, retinal vasculitis. **Conclusion:** Ophthalmic manifestations of HIV infection are diverse. Both anterior and posterior segments of the eye can be involved. Early detection of the ocular manifestations of HIV/AIDS is critical since this has implications for the prognosis of the disease.

Keywords: Ophthalmic, HIV infection, children, CD4 count

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INTRODUCTION

Pediatric HIV is a major world health problem, which is progressing at an alarming rate.¹ Furthermore, delayed infant diagnosis, lack of pediatric drug formulations, and lack of skilled

personnel in Indian settings have contributed to poor control of pediatric HIV. The impact of the HIV/AIDS pandemic has spurred much research into the disease and its various systemic and ocular complications.²

The ocular complications of HIV in adults are well described in the literature in contrast to the few studies in children. They generally present as opportunistic infections that can affect any of the ocular tissues, from the eyelids to the retina. Nevertheless, the prevalence of ocular involvement during HIV infection in children varies from 20% to 54%.³

Ocular complications in HIV patients make management of such patients more difficult; if such manifestations can be picked up early, better management results could be achieved with such patients. The more compromised the immune status of the HIV patient becomes, the more likely ocular complications can develop in the patient.⁴ Present study was aimed to study ocular manifestations in children (<12 years) with positive HIV status at a tertiary hospital.

MATERIAL AND METHODS

Present study was single-center, prospective, observational study, conducted in Department of Ophthalmology, JIU'S IIMS&R Medical College, Nagpur - Aurangabad - Mumbai Hwy, Warudi, India. Study duration was of 2 years (January 2021 to December 2022). Study approval was obtained from institutional ethical committee.

Children of 2-12 years of age, affected with HIV/AIDS, attending antiretroviral therapy (ART) center of the institute, underwent a thorough ophthalmologic evaluation for ocular involvement. Study was explained to parents/caretakers in local language & written consent was taken for participation in study. Basic socioeconomic and demographic data were also collected after brief interview with the parents or caretakers. Patient's ART case sheet was studied to note previous/active co-morbidities & recent CD4 count was also noted.

Preliminary history which includes blurring of vision, deviation of eyes, night blindness, or any other ocular complaints was documented. Detailed ocular examination was done beginning with visual acuity assessment appropriate for age and extraocular movements. Patients were then dilated with eye drop cyclopentolate 2% for three times every 5 min and were examined after 30 minutes. Detailed slit-lamp biomicroscopy was done to assess any anterior segment involvement followed by indirect and direct ophthalmoscopic examination to rule out any fundal changes. Retinoscopy was done if required.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

In present study, total 460 children underwent ophthalmologic evaluation, 88 children had ocular involvement (19.13 %). Majority were from 6-9 years age group (43.18 %), were boys (54.55 %) & mean age was 7.53 ± 3.81 years.

Table 1: General characteristics

Characteristics	No. of patients	Percentage
Age groups (in years)		
2-5	19	21.59
6-9	38	43.18
10-12	31	35.23
Mean age (mean \pm SD)	7.53 ± 3.81	
Gender		
Boys	48	54.55
Girls	40	45.45

Among 88 children, anterior segment involvement was noted in 61 children (1 bilateral) (70.45 %) while posterior segment involvement was noted in 32 children (36.36 %), 5 children had both anterior & posterior segment involvement. Anterior segment manifestations noted were allergic conjunctivitis (20.45 %), dry eye (19.32 %), hordeolum (12.5 %), molluscum contagiosum (1-bilateral) (4.55 %), blepharitis (4.55 %), herpes zoster ophthalmicus (without keratitis) (3.41 %), episcleritis (2.27 %), nerve palsies (1.14 %) & chronic uveitis (1.14 %). Posterior segment manifestations were retinal perivasculitis (13.64 %), CMV retinitis (4.55 %), isolated cotton wool spot (4.55 %), toxoplasma (3.41 %), choroidal tubercle (2.27 %), Roth spots (2.27 %), myopic fundus (1.14 %), acute retinal necrosis (1.14 %), retinal detachment (1.14 %), disc edema (1.14 %) & optic neuritis (1.14 %).

Table 2: Ocular manifestation

Ocular manifestation	No. of patients	Percentage
Anterior segment manifestations		
Allergic conjunctivitis	18	20.45
Dry eye	17	19.32
Hordeolum	11	12.5
Molluscum contagiosum (1-bilateral)	5	4.55
Blepharitis	4	4.55
Herpes zoster ophthalmicus (without keratitis)	3	3.41
Episcleritis	2	2.27
Nerve palsies	1	1.14
Chronic uveitis	1	1.14
Posterior segment manifestations		
Retinal perivasculitis	12	13.64
CMV retinitis	4	4.55
Isolated cotton wool spot	4	4.55
Toxoplasma	3	3.41
Choroidal tubercle	2	2.27
Roth spots	2	2.27
Myopic fundus	1	1.14
Acute retinal necrosis	1	1.14
Retinal detachment	1	1.14
Disc edema	1	1.14
Optic neuritis	1	1.14

In present study, correlation of in children with CD4 count >1000 cells/mm³ no abnormality was noted, while in children with CD4 count of 500-1000 cells/mm³ ocular manifestations noted were allergic conjunctivitis, dry eye, uveitis, in children with CD4 count of 200-500 cells/mm³ ocular manifestations noted were hordeolum, blepharitis, molluscum contagiosum, optic neuritis while in children with CD4 count of <200 cells/mm³ ocular manifestations noted were CMV retinitis, herpes zoster ophthalmicus, retinal vasculitis.

Table 3: Correlation of ocular morbidity with CD4 count

CD4 count (cells/mm ³)	Ocular features
>1000	No abnormality
500-1000	Allergic conjunctivitis, dry eye, uveitis
200-500	Hordeolum, blepharitis, molluscum contagiosum, optic neuritis
<200	CMV retinitis, herpes zoster ophthalmicus, retinal vasculitis

DISCUSSION

Ocular manifestations have been reported in up to 70% of individuals infected with HIV and it has become apparent that the ocular manifestations almost invariably reflect systemic disease and may be the first sign of disseminated infection in many cases.⁵ Ocular lesions usually occur in the late phase of HIV infection but can also be the presenting manifestation of the disease. Various ocular manifestations—including cytomegalovirus (CMV) retinitis, toxoplasma retinochoroiditis, ocular tuberculosis, and toxoplasma retinochoroiditis—are considered to be AIDS-defining conditions.

Less frequent but important causes of bilateral vision loss in patients with HIV/AIDS include varicella zoster virus and herpes simplex virus retinitis, HIV-related ischaemic microvasculopathy, ocular syphilis, ocular tuberculosis, cryptococcal meningitis, and ocular toxic or allergic drug reactions.⁶ Ocular lesions attributable to HIV are seen in upto 2/3rd of the estimated 2.5 million HIV-positive population in India at some point in their lifetime.⁷

Domngang, C et al.,⁸ studied 53 children, 28 boys (52.3%), for a sex ratio of 1.12. The mean age was 12.7 ± 4.2 years [5 - 18 years]. And 84.9% of children had normal immune status. The average duration of HAART was 8.3 ± 3.9 years with more than half (50.9%) of the children on treatment for more than 8 years. The main eye complaints were pruritus (11.32%), eye pain (11.32%) and tingling (9.43%). The frequency of ophthalmological manifestations was 52.8% with adnexal involvement the most frequent (34%), followed by anterior (7.5%) and posterior segment involvement (1.9%). Anterior segment involvement was marked by granulomatous anterior uveitis, keratouveitis and corneal ulcer. A cytomegalovirus retinitis and a macular scar of a unilateral retinitis were found in 2 patients. In a multivariate analysis, elevated CD4 count (>500) was associated with ocular manifestations.

Mohod S et al.,⁹ examined 506 children, 140 were found to have ocular involvement (27.6%). Anterior segment findings were found in 14.8% whereas retinal and optic nerve findings were found in 12.45% of patients. Ocular manifestations were also co-related with the CD4 count of the patients which showed that lower CD4 counts is significantly associated with increased ocular involvement. They concluded that the most common ocular manifestations in paediatric HIV patients include retinal perivasculitis, allergic conjunctivitis, herpes zoster ophthalmicus and dry eye and also demonstrates that ocular involvement is significantly associated with lower CD4 counts.

HIV-related ocular lesions in children are different when compared to those seen in adults. In a study from India, pediatric HIV was noted in 5.5% (12/218 patients).¹⁰ CMVR was the commonest ocular OI even in children, reported in 1/3rd of patients in the pre- HAART era. With HAART, other ocular manifestations like keratoconjunctivitis sicca (KCS), dry eye, and ocular surface disorders like vernal keratoconjunctivitis (VKC) seem to be on the rise.

Esposito et al. noted ocular involvement in the form of CMVR and ocular toxoplasmosis in 7.7% children prior to HAART but none with the advent of HAART.¹¹ CMVR in children is usually more aggressive, bilateral, has a predilection for the macula, and occurs only with much lower CD4 counts when compared to adults.¹²

Since children may not complain even with advanced vision loss, frequent ophthalmic screening is a must for early detection and initiation of treatment. Molluscum contagiosum affects up to 5% of the HIV infected patients.¹³ Children account for 90% of molluscum contagiosum episodes.¹⁴ A cross-sectional hospital based study in Uganda showed that over 10% of pediatric HIV patients had molluscum contagiosum.¹⁵

Keratoconjunctivitis sicca (KCS) is noted more frequently in both adults and children with HIV. Decreased tear production occurs in up to 20%–25% of patients with HIV infection, but

tear deficiency could not be correlated with CD4+ T- lymphocyte counts. The possible etiopathogenesis include lymphocytic infiltration, cytokine and chemokine response to viral particles destroying the lacrimal gland.¹⁶

In vernal keratoconjunctivitis (VKC), seen more frequently in children with HIV, increased expression of Th2 cells and its cytokines have been described in the conjunctiva. An improvement in CD4+ T- cell count may improve the ocular allergy, which is otherwise refractory to the regular treatment. Shwetha et al.¹⁷ reported a case of VKC in a child with HIV/AIDS who worsened when CD4 counts were low, but improved with rise in CD4 counts due to a change in the HAART regime. The authors suggest that a possible Th1-Th2 shift occurs as a part of immune response in progressive HIV patients with a decreasing CD4 count.

The prevalence of HIV-related ocular manifestations increase as CD4+ T cells count decreases. Diseases like cytomegalovirus (CMV) retinitis, keratoconjunctival sicca, retinal and conjunctival micro vasculopathy occur commonly when the CD4 cells count falls below 100 cells/mm³ and Kaposi's sarcoma occurs when the CD4+T cells count falls below 500 cells/mm³.¹⁸

The spectrum of the HIV associated ophthalmic disease is very broad and it ranges from adnexal disorders to posterior segment disorders, while the asymptomatic ocular lesions occur in the earlier stages, the relentless destructive and blinding infections, especially the opportunistic ones occur in the later stages of the disease.

CONCLUSION

Ophthalmic manifestations of HIV infection are diverse. Both anterior and posterior segments of the eye can be involved. Early detection of the ocular manifestations of HIV/AIDS is critical since this has implications for the prognosis of the disease.

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