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Original Research Article

Prevalence of ocular manifestations in children with HIV/AIDS aged day 1-15 years in a Kolkata teaching hospital

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Abstract

Background: AIDS is one of the dreadful diseases globally which can affect any organ of the body. Paediatric HIV is increasing day by day. Ocular manifestations make the management more difficult. Early diagnosis and intervention can reduce its morbidity. Ocular manifestations in paediatric population has been studied very less in India. This study aims at finding out paediatric ocular manifestations in AIDS.

Aim: To assess the prevalence and types of ocular manifestations in paediatric HIV/AIDS patients aged day 1-15 years.

Materials and Methods: A retrospective descriptive study was done. Data were retrieved from medical records of patients registered at ART (Anti-Retroviral Therapy) centre, KPC medical college and Hospital, Kolkata. Patients included in the study were children of day 1 to 15 years age who got registered at ART centre in between April 2023 to March 2024 (a duration of 12 months). Data was collected in MS Excel and analysed by SPSS software version 29.

Results: Out of total 117 seropositive children 61(52.14%) were male and 56 (47.86%) were female. The most common age group was seen to be that of 11-15 years (46.15%). The most common route of transmission observed was vertical route (92.30%). Most of the children (71.8%) were having absolute CD4 count > 500 cells/mm^3 at the time of enrolment at ART centre. Ocular manifestation was observed in 15.81% of total study population, amongst which allergic conjunctivitis, dry eyes and Molluscum contagiosum were most common anterior segment manifestations while Retinal perivasculitis and Cytomegalovirus (CMV) retinitis were most common posterior segment manifestations.

Conclusion: Allergic conjunctivitis was commonest anterior segment manifestations while retinal perivasculitis was most frequent posterior segment features. Reduced CD4 count plays an important role in predicting ocular associations in HIV. Regular ophthamological examination and referral should be emphasised in HIV/AIDS affected children to prevent blindness and decrease ocular morbidity.

Keywords: Ocular manifestations, Paediatric HIV, Allergic conjunctivitis, Retinal perivasculitis, CD4 count.

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1. Introduction

Acquired immuno-deficiency syndrome (AIDS) is a dreadful disease which is caused by the human immunodeficiency virus (HIV). It causes destruction of specific leucocytes which are absolutely necessary for our body's immune mechanism to function adequately. AIDS was first reported in India in the year 1986.[1,2] AIDS can affect all the age group. It has been reported recently that India has 2.1 million cases of HIV/AIDS and approximately 61,000 children are affected by HIV/AIDS.[3] It has also been reported that paediatric population contributes to about 7% of new total HIV infections in India.[4] Prevention of parent to child transmission programme, introduced in the year 2002 aimed at reduction of perinatal transmission has successfully reduced the incidence of new cases.[4,5] AIDS can affect many organs and ocular involvement is quite common. There are several studies providing information on ocular manifestations in adults affected with AIDS. Ocular involvement when seen in HIV patients is usually due to opportunistic infections and neoplasms which in turn depends on CD4 count. HIV can affect all the ocular components including ocular adnexa, anterior segment, posterior segment and orbit. Neuroophthalmological manifestations might also be observed. In children, ocular

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involvement in HIV was reported as 20-54%.[6] Still, there are fewer studies regarding ocular manifestations in children than that in adults. So, we proceeded with a retrospective descriptive study to assess the spectrum of ocular manifestation in children affected with HIV/AIDS aged day 1-15 years in a teaching hospital in Kolkata.

1.1. Primary objective of the study

To determine the prevalence and types of ocular manifestations in paediatric HIV/AIDS patients aged day 1-15 years.

2. Materials and Methods

We did a retrospective descriptive study. Data were retrieved from patient's medical records from ART (anti- retroviral therapy) centre, KPC medical college and Hospital, Kolkata, who got registered into ART Centre for HIV care and anti-retroviral therapy. Patients included in the study were children of day 1 to 15 years age who got registered at ART centre at KPC medical college and Hospital, Kolkata in between April 2023 to March 2024 and whose complete medical records were available. Patients with age more than 15 years and those whose medical records were not completely available were excluded from the study. Data obtained included age, gender, religion, route of transmission, status of CD4 count at the time of enrolment, status of treatment with HAART (Highly active anti-retroviral treatment) and documented ocular manifestations in the medical records. Data was collected in MS Excel sheet and it was analysed by SPSS software version 29. Ethical clearance of this study (No. KPCMCH /IEC/2024/284) was given by the Ethics Committee of KPC medical college and hospital. Informed consent was kindly revoked by the Ethical Committee. This study was done in accordance with the principles expressed in the Declaration of Helsinki.

3. Results

We observed 117 seropositive children of age-group (day 1-15 years) whose data were obtained. Hence, 234 eyes of 117 patient's data were collected.

3.1. Demographic distribution

1. Sex/Gender

Out of total 117 children, 52.14% (61) patients were male and 47.86% (56) population were female with ratio as 1.09:1 (**Table 1**).

2. Age group

We also observed that the most common age group affected with HIV was that of 11-15 years of age group with 54 in number that is 46.15% of total study population followed by 6-10 years of age group with 46 in number constituting of 39.32% of study population and the least number of cases were observed in, day 1-5 years of age group constituting of about 17 in number that is 14.53% of total study population (**Table 2**). In this study, we observed that most of the study population belonged to Muslim religion which was 51(43.59%) of total study population followed by Hindu which was 47(40.17%) in number and least were that from Christian group being 19(16.24%) of total population (**Table 3**).

3.2. Route of transmission

It was noted that majority of seropositive children in our study population that is 108(92.30%) got infected from their parents via vertical route while rest of the children that is 9(7.70%) were suffering from thalassemia major for which they were receiving regular blood transfusion, which might be the probable reason for HIV infection (**Table 4**).

3.3. CD4 count status in studied cases

As CD4 count is an important indicator for both immune status of the patient and when to start highly active anti-retroviral therapy (HAART), it is very important to detect CD4 cell count.

As per **Table 5**, we observed that CD4 count at the time in 84(71.80%) number of cases population were more than 500 cells/mm^3 followed by 26(22.22%) number of patients with counts between 200-500 cells/mm^3 and 7(5.98%) were with CD4 count < 200 cells/mm^3.

3.4. Ocular associations in relation to CD4 count

We observed that children with CD4 count more than 500 cells/mm^3 had mostly anterior segment ocular associations such as by allergic conjunctivitis, dry eyes, blepharitis. Children with CD4 count in between 200 cells/mm^3 -500 cells/mm^3 had dry eyes, conjunctival xerosis and molluscum contagiosum and those with <200 cells/mm^3 CD4 count had serious retinal features like CMV(Cytomegalovirus) retinitis and retinal perivasculitis (**Table 6**).

Amongst 117 children of our study population 39 (33.33%) received HAART(Highly active anti-retroviral therapy) and 78 (66.67%) did not receive HAART (**Table 7**).

3.5. Ocular associations in the studied population

In this study (**Table 8**) we observed that out of 234 eyes out of 117 seropositive children, ocular manifestations were observed in 37 eyes, so the ocular features were found in 15.8% of cases studied. Both anterior and posterior segment signs were observed. The most frequent anterior segment feature was allergic conjunctivitis in 10 (27.02%) eyes followed by dry eyes in 9(24.32%) eyes, molluscum contagiosum (**Figure 1**) in 3(8.11%) eyes, conjunctival xerosis (**Figure 2**) in 2(5.41%) eyes and blepharitis in 1 (2.71%) eye.

The most frequent posterior segment involvement was noted to be retinal perivasculitis (**Figure 3**) in 10(27.02%)

followed by CMV (Cytomegalovirus) retinitis (**Figure 4**) in 2(5.41%) eyes.

Table 1: Distribution of sex in the study

Sex	Number of cases	Percentage (%)
Male	61	52.14
Female	56	47.86

Table 2: Distribution of cases according to age group in the study

Age (years)	Number of cases	Percentage (%)
Day 1-5	17	14.53
6-10	46	39.32
11-15	54	46.15

Table 3: Distribution of study population as per religion

Religion	Number of cases	Percentage (%)
Muslim	51	43.59
Hindu	47	40.17
Christian	19	16.24

Table 4: Distribution of route of transmission of HIV in study population

Transmission of infection	Number of cases	Percentage (%)
Vertical	108	92.30
Blood transfusion	9	7.70

Table 5: Distribution status of CD4 count at the time of enrolment at ART centre

CD4 count(cells/mm$^{3)}$	Number of cases	Percentage (%)
>500	84	71.80
200-500	26	22.22
<200	7	5.98

Table 6: Distribution of status of CD4 count (at the time of enrolment at ART centre) and ocular manifestations observed

CD4 count cells/mm^3	Ocular manifestations observed
>500	Allergic conjunctivitis, Dry eyes, Blepharitis
200-500	Dry eyes, Conjunctival xerosis, Molluscum contagiosum
<200	Retinal perivasculitis, CMV retinitis

Table 7: Distribution of patient on treatment with HAART

Treatment With Haart	Number of cases	Percentage (%)
Yes	39	33.33
No	78	66.67

HAART: Highly active anti-retroviral therapy

Table 8: Distribution of ocular features in HIV/AIDS in the study group

Ocular Features	Number of Eyes affected (Percentage %)
Retinal perivasculitis	10(27.02%)
CMV retinitis	2(5.41%)
Molluscum contagiosum	3(8.11%)
Dry eye	9(24.32%)
Conjunctival xerosis	2(5.41%)
Blepharitis	1(2.71%)
Allergic conjunctivitis	10(27.02%)

CMV: Cytomegalovirus

Figure 1: Clinical picture showing molluscum contagiosum

Figure 2: Clinical picture showing conjunctival xerosis

Figure 3: Clinical picture showing retinal perivasculitis

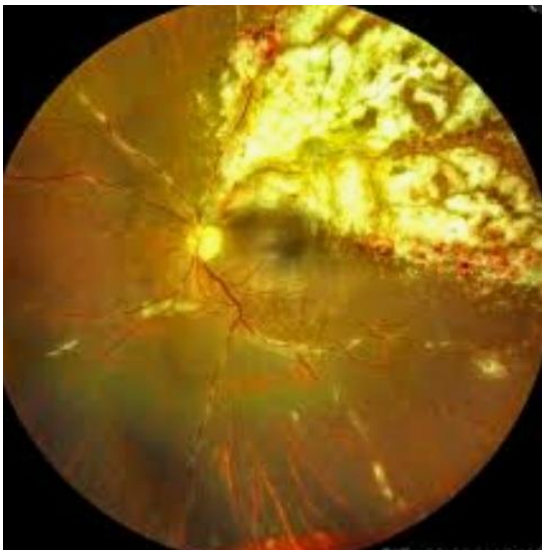

Figure 4: Clinical picture showing CMV (Cytomegalovirus) retinitis

4. Discussion

HIV/AIDS in children is a serious global health problem which is constantly increasing day by day. Ocular involvement in adult population is higher than paediatric population. Ocular manifestations are quite common as opportunistic infections in HIV infected children. Ocular manifestations are sometimes presenting feature of HIV /AIDS which, if can be picked up early can reduce sight threatening complications and thus can reduce ocular morbidity amongst patients.

In this study, we studied 117 children, day 1-15 years of age for ocular manifestations in HIV infected children. Ocular involvement was seen in 15.81% of cases in the studied group. There were 61 males and 56 females in the studied population. The most affected age group was observed to be 11-15 years.

Ghodpade et al reported ocular involvement of 19.13%. More number of boys were affected than girls similar to our study.[7] The most frequent age group involved in this study was 6-9 years of age group. Mohod et al. observed ocular involvement higher than our study with 27.6% in their study population with more in number of boys than girls. The study population involved children from 1-12 years of age group.[8] Sadanand et al also observed higher ocular involvement with 35.29%.[9] In their study, females were seen to be affected more than males. The most common age group involved was that of less than 5 years age. Ikoona et al noted 35% ocular involvement in children with girls being affected more than boys.[10] Biswas et al noticed ocular involvement of 5.5% in their study with boys more than girls being affected.[11] The mean age group in their study was 6.5 years. Domngang C et al observed 52.8% ocular involvement.[12] The study population comprised of 5-18 years age group with boys more than girls.

We observed 92.3% population got infected from their parents via vertical route, rest of the children that 7.70% were suffering from thalassemia major for which they were receiving regular blood transfusion, which might be the probable reason for HIV infection. Biswas et al also observed most common mode of transmission was vertical with 58.33% followed by 16.63% through blood transfusion, while in rest 25% population risk factor could not be determined and was assumed to be vertical transmission.[11]

CD4 count is an important indicator to assess immune deficiency. More the immune deficiency, more are the chances of opportunistic infections and carcinomas. Normal CD4 count is > 500 cells /mm^3. It can be upto 1500 cells /mm^3.When the count falls <500 cells /mm^3, chance of opportunistic infection and carcinoma increases and when it becomes <200 cells /mm^3, the chance increases very much. We observed 71.8% of children were with CD4 count more than 500 cells /mm^3, 22.22% were with 200-500 cells/mm^3 and 7% of population had CD4 count < 200 cells/mm^3 at the time of enrolment at ART centre. We also noted children with CD4 count > 500 cells /mm^3 mostly presented with anterior segment ocular manifestations like allergic conjunctivitis, dry eyes and blepharitis. Children who had CD4 count in range 200-500 cells/mm^3 had dry eyes, conjunctival xerosis and molluscum contagiosum, while those who had CD4 count < 200 cells /mm^3 had posterior segment features like CMV (cytomegalovirus retinitis) and retinal perivasculitis. Ghodpade et al[7] observed that there was no ocular manifestation in cases who had CD4 count > 1000 cells /mm^3 but those who had CD4 count < 200 cells /mm^3 were associated with CMV retinitis, retinal vasculitis and Herpes zoster ophthalmicus. Similar to Ghodpade et al,[7] Mohod et al[8] also observed no ocular manifestation in cases where CD4 count were above 1000 cells /mm^3 and those where CD4 count <200 cells /mm^3 were observed with CMV retinitis, neoplasms, Herpes zoster ophthalmicus and also retinal vasculitis. It was noticed in our study that all children who had CD4 count < 500 cells /mm^3 were having ocular features. Hence, reduced CD4 count can be said to be strong factor for association of ocular involvement in HIV /AIDS positive cases.

We observed various ocular features both from anterior as well as posterior segment of eye. The commonest anterior segment feature observed was allergic conjunctivitis (27.03%). Other anterior segment manifestations observed were dry eyes (24.32%), molluscum contagiosum (8.11%), conjunctival xerosis (5.41%) and blepharitis (2.71%). The most common posterior segment manifestation observed was Retinal perivasculitis (27.02%) followed by CMV retinitis (5.41%). Ghodpade et al also found allergic conjunctivitis (20.45%) as the most frequent anterior segment ocular feature and retinal vasculitis (13.64%) was most frequent posterior segment ocular feature.[7] They observed CMV retinitis in 4.55% of studied cases. Sadanand et al observed dry eyes (10.88%) was the commonest anterior segment feature and perivasculitis (1.36%) was the commonest posterior segment feature while no case of CMV retinitis was reported in their study.[9] As per study by Mohod et al, allergic keratoconjunctivitis and retinal perivasculitis were most common anterior and posterior segment ocular manifestation respectively.[8] CMV retinitis was observed in 3.6% population by Mohod et al., Biswas et al and Ikoona et al found anterior uveitis as the most common anterior segment involvement.[8,11,10]

Highly active antiretroviral therapy (HAART) which started in late 1990s.After introduction of HAART in India, it was documented that there was gross reduction in the incidence of opportunistic infections.[13] There has been also observed decreased incidence of retinitis caused by CMV, varicella zoster virus, tuberculosis and toxoplasmosis.[15] CMV retinitis had incidence of 30-40% before introduction of HAART regimen.[16] There has been 80% decreased incidence of CMV retinitis post-HAART introduction.[14]

Early referral and screening of the HIV affected children for ocular manifestation will lead to significant reduction of blindness and ocular morbidity in them. This in turn will substantially reduce the financial burden of treatment and rehabilitation of these children for the country.

5. Limitations and Future Directions

Our main limitations in this study were small sample size, single- centre and retrospective study. For more detailed and accurate data, study with more sample size with prospective study design or broader epidemiological surveys will be more beneficial. Study cases being from Indian population and from one specific region adds to the drawback for this study. Hence, a multi-centric study across India can give a more accurate assessment of the same.

6. Conclusion

We conclude that ocular manifestations in paediatric HIV can be diverse with both anterior and posterior segment manifestations.Allergic conjunctivitis,dry eyes and molluscum contagiosum were observed to be common anterior sengment manifestations and retinal perivasculitis and CMV retinits and were observed to be common posterior segment manifestations.

Paediatric HIV/AIDS is a major health problem globally.Ocular manifestations are well documented in HIV which may lead to sight-threatening complications causing major morbidity in patients. Since, ocular involvement rate is high in HIV affected patients even in paediatric population ,so regular ophthalmological evaluation of HIV/AIDS patients is very important. Regular ocular examination can detect ocular associations in early stages and can be treated promptly and thus can save patient's valuable sight and ocular morbidity. Increased awareness needs to created more amongst health care professionals, HIV patients as well as their care givers and families regarding ocular involvement in HIV/AIDS and significance of early detection and prompt treatment. Moreover, knowledge of common ocular manifestations in paediatric HIV patients may help in early diagnosis of HIV in children in which an ocular sign is the only presenting feature in an otherwise asymptomatic child.

7. Source of Funding

None.

8. Conflict of Interest

None.

9. Ethical

Ethical No.: KPCMCH /IEC/2024/284).

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