Original Article

Ocular Lesions Associated with Human Immunodeficiency Virus Infection

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Abstract

Introduction: This study was undertaken to document the various ocular manifestations in human immunodeficiency virus (HIV) infected individuals and to correlate such findings with CD4+ T lymphocyte levels in individuals with ocular manifestations.
Methods: A total of 150 patients known to be HIV positive referred to a tertiary level army hospital were included in this cross sectional study. All patients underwent complete ophthalmic evaluation. CD4+ count was done only in patients in whom ocular lesions were noted.
Result: Most patients (54.66%) were in the 31-40 years age group. Majority of patients (84.66%) were males. Infection was sexually acquired in 91.33% by heterosexual mode. Majority of cases (34%) examined had presented within 12-18 months of being detected positive for HIV. Ocular involvement was present in 76 (50.66%) cases and the commonest ocular lesion encountered was cytomegalovirus (CMV) retinitis in 23 (30.26%) cases. CD4+ count less than 50 cells/ µl was consistently associated with ocular manifestations in 36.84% of HIV positive patients.
Conclusion: This study showed the whole spectrum of ocular lesions in HIV positive cases from CMV retinitis to adnexal lesions. No case of ocular Kaposi's sarcoma was seen in this study.

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Key Words : Human immunodeficiency virus; Retinitis; CD4

Introduction

India has rapidly become an epicentre of a major epidemic in recent years - the acquired immunodeficiency syndrome (AIDS), caused by a retrovirus, the human immunodeficiency virus (HIV). This virus causes gradual breakdown of immune system of body characterised by depletion of circulating CD4+ T lymphocytes. The profound immunodeficiency results in development of various opportunistic infections and unusual neoplasms. Detected first in the summer of 1981 in the United States in homosexual males presenting with opportunistic infections, AIDS has spread rapidly across the continents and has assumed the proportion of a pandemic.

According to the World Health Organisation (WHO) an estimated 33.4 million (31.1-35.8 million) people were infected with HIV worldwide by end of year 2008 [1]. These include around 31.3 million (29.2-33.7 million) adults and an estimated 2.1 million (1.2-2.9 million) children below 15 years of age [1]. Global percentage of women living with HIV is around 50% [1]. HIV infection is the fifth leading cause of death among Americans aged 25-44 years having dropped from first place within last few years [2,5,14]. In United States, death rates for HIV disease dropped from 16.2 per 100,000 population in 1995 to 4.5 per 100,000 population in 2005 [5].

Out of the total HIV/AIDS cases, 90% are in developing countries [1]. Worst affected is sub-Saharan Africa. All together sub-Saharan Africa is home to 67% of all people living with HIV [1]. South East Asia has 3.8 million (3.4-4.3 million) HIV infected cases [1]. In India, HIV infection was first reported in 1986, in commercial sex workers (CSWs) in Tamil Nadu [4, 5]. According to National AIDS Control Organisation (NACO), New Delhi, the total number of HIV positive patients in India by end of year 2008 was around 2.27 million. People in the age groups of 30 to 44 years are most commonly affected [6].

The lifetime cumulative rate of at least one abnormal ocular lesion developing in HIV positive patient ranges from 52 to 100% in various studies [2,3,8,9,11]. Between 10 to 20% HIV infected patients worldwide can be expected to lose vision in one or both eyes because of ocular cytomegalovirus (CMV) infection [9]. The first case of ocular lesions in AIDS in India was reported in 1995 [7].

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Correlation between the levels of immunosuppression (CD4+ T lymphocyte count) and appearance of various opportunistic infections is well known. The US Centre for Disease Control and prevention (CDC) revised its classification system in 1993 for HIV infected adolescents and adults; categorising persons based on clinical conditions associated with HIV infection and the CD4+ T lymphocyte count [12]. This CD4+ T lymphocyte count correlates well in patients presenting with common HIV associated disorders involving the eyes [10,13].

This study was undertaken to document the various ocular manifestations in HIV infected individuals and to correlate such findings with CD4+ T lymphocyte levels in individuals with ocular manifestations.

Materials and Methods

A total of 150 patients seen at a tertiary care army hospital were included in this study. This study was conducted over a period of two years.

Patients with HIV infection referred to our centre were included in this study. HIV infection was established in all patients by enzyme linked immunosorbent assay (ELISA). These patients were referred for evaluation and management of their HIV status. Systemic evaluation was done at our centre by internists. Patients were referred for other systemic conditions to respective speciality. All systemic findings were noted in these patients. These patients underwent investigations, which included haemoglobin, total and differential white blood cell count. Other investigations like venereal disease research laboratory (VDRL) test, chest radiograph, sputum for acid-fast bacilli (AFB), Mantoux test and cerebro spinal fluid (CSF) analysis were done when indicated.

Evaluation included best corrected visual acuity (BCVA), external ocular examination, ocular motility, pupillary reflexes and anterior segment examination by slit lamp biomicroscopy and dilated fundus examination in all patients.

CD4+ T lymphocyte cell count was done in patients with ocular manifestations only due to resource constraints. External slit lamp photograph and fundus photograph were done in all patients with ocular findings.

Table 1

Age and sex distribution of patients

Age (years)	Males	Females	Total
0 - 10	0	0	0 (0%)
11 - 20	5	0	5 (3.33%)
21 - 30	27	12	39 (26%)
31 - 40	74	8	82 (54.66%)
41 - 50	14	3	17 (11.33%)
51 - 60	6	0	6 (4%)
61 - 70	1	0	1 (0.66%)
Total	127 (84.66%)	23 (15.33%)	150

Table 2

Duration since diagnosis

Duration since diagnosis (months)	Males	Females	Total
3 - 6	3	0	3 (2%)
6 - 12	24	5	29 (19.33%)
12 - 18	48	3	51 (34%)
18 - 24	25	11	36 (24%)
24 - 30	17	2	19 (12.66%)
30 - 36	10	2	12 (8%)

Results

Of the 150 HIV positive patients examined in this study, there were 127 (84.66%) males and 23 (15.33%) females. The age of patients ranged from 18 to 61 years with mean age being 36.4 years. Most patients were in the range of 31- 40 years age group. This group comprised of a total of 82 (54.66%) patients , out of which 74 were male and eight were female. Patients in the range of 21-30 years age group formed the next common group comprising of total 39 (26%) patients (Table 1).

Infection was sexually acquired in 137 (91.33%) cases by heterosexual mode. Homosexual mode was seen only in one (0.66%) case. Two (1.33%) cases gave history of blood transfusion in the past. No history of any high risk behaviour could be found in ten (6.66%) patients.

Majority of cases screened presented within 12-18 months of being detected positive for HIV. This group comprised of 51 (34%) patients. Only three (2%) patients reported within 3-6 months of being detected positive for HIV (Table 2).

Visual acuity measurements were done in all patients. A total of 182 (60.66%) eyes showed a visual acuity of 6/9 or better. However, 13 (4.33%) eyes showed complete loss of vision (Table 3).

Systemic associations were present in 112 (74.66%) cases. Pulmonary tuberculosis was seen in 65 (43.33%) cases. Other systemic manifestations of HIV noted were oral candidiasis (7.66%), pneumocystis carinii pneumonia (3.33%) and HIV enteropathy (6%). Remaining 11 (7.33%) cases showed other systemic diseases.

Ocular involvement was present in 76 (50.66%) cases, of these 65 (85.52%) were males and 11 (14.47%) were females. Ocular involvement was unilateral in 67 (88.15%) patients and bilateral in 23 (30.26%) patients. Many patients had more than one ocular lesion. Commonest ocular lesion encountered

Table 3

Visual acuity range

Visual Acuity	OD	OS	Total
6/6 - 6/9	89	93	182 (60.66%)
6/12 - 6/18	24	22	46 (15.33%)
6/24 - 6/36	14	18	32 (10.66%)
6/60 - 3/60	13	07	20 (6.66%)
3/60 - PL	04	03	07 (2.33%)
NO PL	06	07	13 (4.33%)
Total	150	150	300

Table 4

Ocular manifestations

Ocular findings	Unilateral	Bilateral	Total
CMV Retinitis	19	04	23 (30.26%)
HIV Retinopathy	10	07	17 (22.36%)
Papilloedema	14	01	15 (19.73%)
Optic atrophy	10	00	10 (13.15%)
Uveitis	07	03	10 (13.15%)
Molluscum contagiosum	01	00	01 (1.31%)
Herpes zoster	04	00	04 (5.26%)
Frosted branch angitis	01	00	01 (1.31%)
Blepharitis	01	01	02 (2.63%)
Dry eyes	00	07	07 (9.21%)
Total	67	23	90

*Many patients had more than one ocular lesion

was CMV retinitis (30.26%), followed by cotton wool spots and superficial retinal haemorrhages suggestive of HIV retinopathy (22.36%). Other lesions seen were papilloedema (19.73%), optic atrophy (13.15%) and uveitis (13.15%). Other lesions are depicted in Table 4. About 36.84% of patients with ocular manifestations had CD4+ count less than 50 cells/ µl (Table 5).

Discussion

In this study, majority of the patients (54.66%) were males in the 31-40 years age group . This is also reflected in national statistics and various studies on Indian population [6,8]. Males constituted 84.66% of patients and females 15.33%. National average of HIV infection is 73% in males and 26% in females [6].

The most common mode of transmission was heterosexual exposure (91.33%) to either CSWs or multiple sex partners. National statistics show that heterosexual exposure accounts for 86.27% of total HIV transmission [6]. Only one patient (0.66%) gave history of homosexual exposure and two patients (1.33%) gave history of blood transfusion. As per statistics of NACO, transmission of HIV infection due to contaminated blood or blood products comprises 5.43% of the total HIV transmission in India [6]. In this study, no positive history of high risk behaviour could be elicited from 10 patients.

At the time of presentation, systemic associations were present in 112 (74.66%) cases with pulmonary tuberculosis being the commonest, seen in 65 (43.33%) cases. This is also reflected in a series presented by Biswas et al [8] in Indian population and in other studies [18]. Other systemic manifestations of HIV noted were oral candidiasis (7.66%), pneumocystis carinii pneumonia (3.33%) and HIV enteropathy (6%). The remaining 11 (7.33%) cases showed other systemic diseases.

Ophthalmic manifestations were noted in 76 (50.66%) patients. Various studies have found ocular manifestations in the range of 40-70% [2,3,8,9,15, 22].

Table 5

CD4 count in patients with ocular involvement

CD4+ counts	No of patients (%)
>500	01 (1.31%)
400 - 499	03 (3.94%)
300 - 399	12 (15.78%)
200 - 299	04 (5.26%)
100 - 199	16 (21.05%)
50 - 99	12 (15.78%)
<50	28 (36.84%)

In a series presented by Biswas et al [8] in Indian population, ocular manifestations were noted in 40% of patients.

In this study majority of patients with ocular manifestations were males (85.32%) as compared to females (14.47%). Prevalence of ophthalmic manifestations in males was 51.53% and 47.82% in females. Majority of patients had unilateral involvement (88.15%) as compared to bilateral involvement (30.26%).

Most common ophthalmic manifestation in this study was CMV retinitis seen in 23 patients (30.26%). CMV retinitis is seen as a common ophthalmic manifestation in various studies [15-24]. Out of all 23 CMV retinitis patients, four (17.39%) patients received ganciclovir therapy. Intravenous ganciclovir administered in induction dose of 5mg/kg 12 hourly for two weeks was followed by oral ganciclovir in the dose of 1gm thrice daily as maintenance dose. These patients were followed up regularly. One (25%) patient showed eventual regression of CMV retinitis and one (25%) patient showed no further progression of retinitis. Other (50%) two patients showed continued progression of retinitis.

HIV retinopathy forms the next common group of ocular manifestation (22.36%). Uveitis was seen in ten (13.15%) patients. One (1.31%) patient showed lesions suggestive of 'Frosted Branch Angitis'. Most common neurological manifestation noted was papilloedema (19.73%) followed by secondary optic atrophy (13.15%).

In all, 13 (4.33%) patients were found to have total visual loss with no perception of light (PL). Studies show blindness in HIV patients ranging from 10-20% [9]. The reason for total visual loss in 13 patients was CMV retinitis causing irreversible damage and optic nerve damage. In a series of 100 patients of AIDS reported by Biswas et al [8], not a single case of Kaposi's sarcoma was reported. No case of Kaposi's sarcoma was found in this study either.

CD4+ levels were done only in patients with ocular manifestations. Majority of patients showed CD4+ count less than 50 cells/ µl followed by patients in the range of 100-199 cells/ µl. Only one patient had CD4+ count

above 500 cells/µl. Prevalence of ocular manifestations in low CD4+ count patients is well supported in various studies [20-23].

Studies have shown differences in ocular manifestations in developed and developing countries [3-8]. This study has found a prevalence of ocular manifestation of 50.66% in patients with HIV infection. In a series presented by Biswas et al [8] in Indian population, ocular manifestations were noted in 40% of patients. Ocular manifestations in various reports and studies correlate well with this study [24,25].

Conflicts of Interest

None identified

Intellectual Contribution of Authors

Study Concept : Col AK Upadhyay
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Statistical Analysis : Maj N Vichare
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