

ORIGINAL ARTICLE

Clinical Profile of Pediatric HIV Infection from India\*

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**Background.** Our aim was to study the clinical profile of pediatric patients admitted with HIV infection.

**Methods.** The prospective study was conducted from January 2000 to October 2001 at a tertiary care referral teaching hospital in Mumbai, India. Admitted in-patients (aged 1 month to 12 years) detected to be HIV-positive (on triple ELISA test) were enrolled in the study. HIV status of patients <18 months of age was confirmed by DNA-PCR testing. Demographic data, clinical features, investigations and outcome were recorded in a pre-designed proforma.

**Results.** Fifty HIV-positive children (31 males and 19 females; M:F = 1.6:1) were enrolled. Thirty cases were completely immunized, 9 were partially immunized while 11 were not immunized. Forty-two were perinatally infected, while eight cases were infected via blood transfusion (patients with thalassemia major on chronic transfusion therapy). Clinical features at presentation in 42 symptomatic cases included protein-energy malnutrition (90%), fever >1 month (50%), weight loss >1 month (50%), persistent generalized lymphadenopathy (24%) and skin manifestations (79%). The gastrointestinal (62%) and respiratory (52%) were the most commonly involved organ systems. Opportunistic infections noted included tuberculosis (19 cases), candidiasis (6 cases), *Pneumocystis carinii* pneumonia (4 cases), herpes zoster (3 cases) and giardiasis (1 case). Six patients died (mortality, 14%).

**Conclusions.** Perinatal transmission is the most common mode of acquiring HIV in the pediatric age group. Most patients have protein-energy malnutrition. Tuberculosis is common in HIV-infected Indian children. Patients with HIV-encephalopathy have a poor outcome. © 2005 IMSS. Published by Elsevier Inc.

**Key Words:** Pediatric HIV/AIDS, ELISA, Immunodeficiency, Infection, Malnutrition, Tuberculosis.

Introduction

According to the estimate of the World Health Organization, approximately 2 million children had been infected with human immunodeficiency virus (HIV) by the year 2000 (1).

Vertical transmission (mother to child) is the main route by which childhood HIV infection is acquired, the risk of perinatal acquisition being about 25% (1,2). Perinatal transmission of infection accounts for 80–90% of pediatric HIV disease (1,2). HIV infection has had an exponential rise in developing countries like India, especially in urban areas (2–8). The present study aimed to detail the clinical profile of pediatric HIV-infected patients admitted to a tertiary care referral hospital in an urban city of India. Though there exists significant literature on the clinical features of HIV infection in the pediatric age group from the rest of the world, there have been few studies from India (1–18). Also, it is possible that the spectrum of clinical manifestations of pediatric HIV infection in India may differ from the rest

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of the world. Hence, we conducted this study and compared our findings with some of the studies previously reported from India and other countries.

### Patients and Methods

The study was conducted prospectively from January 2000 to October 2001 (22 months) and included children (aged 1 month to 12 years) admitted consecutively to the pediatric wards with the diagnosis of HIV infection. Children were tested for HIV if they had one or more of the following manifestations: prolonged unexplained fever, chronic diarrhea, generalized lymphadenopathy, recurrent systemic infections, septicemia or failure to thrive. Patients with thalassemia major (followed at our institution for chronic transfusion therapy in a specialized day-care unit) are screened annually for HIV infection and those who were diagnosed to have HIV infection during the study period were also included. Informed consent was obtained from the parent/guardian for the HIV testing with appropriate pre- and post-test counseling. ELISA testing for HIV antibodies was performed for establishing the diagnosis. If detected to be positive, confirmation was done by two more ELISA tests. Children <18 months of age underwent confirmation by DNA-PCR testing. HIV status of the parents and siblings of the affected children was also requested (after appropriate counseling).

A special proforma was designed to record the following information: demographic data, history at presentation (admission to the hospital ward), clinical examination findings, relevant investigations, outcome and HIV status of siblings and parents. Special investigations were performed if clinically indicated (depending on the symptomatology at presentation). Pulmonary tuberculosis was diagnosed on the basis of positive Mantoux test (erythema and induration >5 mm), chest radiograph, screening of family members for tuberculosis, nonresponse to conventional antibiotic therapy and good response to antitubercular drugs. Additionally, tuberculosis of the lymph nodes was diagnosed on the basis of aspiration cytology or excision biopsy while abdominal tuberculosis was diagnosed on the basis of findings on ultrasonography of the abdomen and also barium studies. HIV-encephalopathy was diagnosed on the basis of clinical features, neuroimaging findings, CSF (cerebrospinal fluid) studies and exclusion of other processes causing similar clinical manifestations. HIV cardiomyopathy was recognized by virtue of the color Doppler findings. Patients were treated symptomatically based on their clinical presentation. Opportunistic infections were treated adequately and appropriate prophylaxis was administered for prevention of recurrence of opportunistic infections.

### Results

The study was conducted from January 2000 to October 2001 (22 months). A total number of 7765 pediatric patients

were admitted during the study period. Fifty HIV-positive children (31 males and 19 females; M:F ratio = 1.6:1) were enrolled in the study. Nine patients were <1 year of age, 21 were between 1 and 5 years and 20 were >5 years of age at admission to the hospital. Their ages ranged from 1 month to 12 years (mean age: 56.75 months and median age: 48 months). Ten patients were <18 months and four were 18 months of age at presentation. Thirty cases were completely immunized for age, 9 were partially immunized while 11 were not immunized. Forty-two patients were infected perinatally while eight were infected via blood/blood product transfusions (all were patients of thalassemia major on chronic blood transfusion therapy).

HIV status of the parents of the infected children is given in Table 1. All parents of HIV-positive patients with thalassemia major tested HIV negative. Of the 218 siblings of the 50 children, 108 were tested and 96 were detected to be HIV-positive; 110 siblings could not be tested because of parental refusal or inability of the parents to bring the siblings to our center (as they resided in the native villages outside of Mumbai).

Eight children were asymptomatic in the study. These included six children with thalassemia major and two siblings of patients (admitted for social reasons). Clinical features in the 42 symptomatic study subjects (at presentation) are given in Table 2. Their organ/system specific manifestations are presented in Table 3. The most common clinical manifestations included fever >1 month, 21 cases (50%); weight loss >1 month, 21 cases (50%); severe protein-energy malnutrition (PEM), 26 cases (62%); skin manifestations, 33 cases (79%); hepatomegaly, 22 cases (52%); tuberculosis, 19 cases (45%); and recurrent/chronic diarrhea, 15 cases (36%) (14 bacterial and 1 case of giardiasis). Children with thalassemia major who were symptomatic included a 12-year-old female child with weight loss, generalized lymphadenopathy and chronic otorrhea and the second being a 5-year-old male child with similar manifestations except for chronic otorrhea.

The clinical categories as per the Centers for Disease Control and Prevention (CDC) guidelines included 8 children in the 'N' category, 3 in 'A', 20 in 'B' and 19 in 'C' category. CD4 counts were done in 11 patients (4 with no

**Table 1.** HIV status of parents of study population

HIV status	Mother (n = 50)	Father (n = 50)
HIV-positive	39	26
HIV-negative	8	14
Death (HIV-positive)	3	5
Not tested/refusal	–	5*

Note: All parents of HIV-infected patients with thalassemia tested HIV-negative.

\*These were fathers of patients who were infected perinatally by vertical transmission.

**Table 2.** Clinical features at presentation in symptomatic patients with HIV infection

No.	Feature	Number of cases (n = 42)	Percentage of study population
1	PEM (IAP Classification)	38	90.47
	Grade I	3	7.14
	Grade II	9	21.42
	Grade III	11*	26.19
	Grade IV	15*	35.71
2	Skin manifestations	33	78.57
	Nutritional deficiencies (crazy pavement, flaky paint and enamel paint dermatosis)	23*	54.76
	Pyoderma	1	2.38
	Scabies	2	4.76
	Measles	1	2.38
	Varicella	1	2.38
	Herpes zoster	3	7.14
	Eczema	2	4.76
3	Fever >1 month	21	50
4	Weight loss >1 month	21*	50
5	Chronic otorrhea	12*	28.57
6	Persistent generalized lymphadenopathy	10**	23.80

PEM = protein-energy malnutrition. IAP = Indian Academy of Pediatrics (Classification: Grade I: 71–80%; Grade II: 61–70%; Grade III: 51–60%; Grade IV: <50% of weight for age). \*Included one case of thalassemia major; \*\*included two cases of thalassemia major. Some patients had more than one clinical feature.

evidence of immunosuppression, 4 with moderate immunosuppression and 3 with severe immunosuppression). The actual CD4 counts of these 11 cases are mentioned in Table 4. Opportunistic infections noted by us included tuberculosis (19 cases: 8 pulmonary, 6 disseminated, 3 abdominal, 1 pericardial effusion and 1 tuberculous meningitis), candidiasis (6 cases: 5 oral, 1 esophageal), *Pneumocystis carinii* pneumonia (4 cases), herpes zoster (3 cases) and giardiasis (1 case). One patient had pulmonary arteriovenous fistula. The results of investigations are given in Table 5.

Six patients died (of whom five had HIV-encephalopathy with multisystemic involvement and one had pyogenic meningitis). Age at death ranged from 50 to 70 months. Eight patients were readmitted during the study period for weight loss, persistent fever, repeated bacterial infections and nutritional rehabilitation. None of these patients died. The remaining 36 patients are being followed on an outpatient basis and did not require readmission during the study period. Antiretroviral drugs could not be administered to any patient because of cost constraints.

## Discussion

Clinical features in HIV-infected children in our study had some similarities and few differences from the previous

**Table 3.** Organ/system specific manifestations in symptomatic patients with HIV infection

No.	System	Number of cases (n = 42)	Percentage of study population
1	Gastrointestinal system	26	61.90
	Chronic diarrhea	14*	33.33
	Giardiasis	1	2.38
	Hepatitis	1	2.38
	Esophageal candidiasis	1	2.38
	Hepatomegaly	22**	52.38
	Abdominal tuberculosis	4	9.52
2	Respiratory system	22	52.38
	Pneumonia	8	19.04
	<i>Pneumocystis carinii</i> pneumonia	4	9.52
	Lymphoid interstitial pneumonia	1	2.38
	Pulmonary tuberculosis	8	19.04
	Pulmonary arteriovenous fistula	1	2.38
3	Cardiovascular system	6	14.28
	Congestive cardiac failure	3	7.14
	Cardiomyopathy	2	4.76
	Pericardial effusion	1	2.38
4	Central nervous system	8	19.04
	HIV-encephalopathy	6	14.28
	Meningoencephalitis	1	2.38
	Bacterial meningitis	1	2.38
5	Hematological manifestations	22	52.38
	Anemia	22	52.38

\*Included one case of thalassemia major; \*\*included two cases of thalassemia major.

Indian studies (3–5,7,10,12,13). Tables 6 and 7 compare demographic data and clinical features of our study with those of previously reported Indian studies. As in the previous series, perinatal transmission was the most common mode of transmission in our study (3–6,11,13). Multitransfused patients like those with thalassemia major, hemophilia,

**Table 4.** CD4 counts in the study population

Sr. No.	Age (years)	CD4 count (cells/mm <sup>3</sup> )	CD4 count for age		
			No immunosuppression (>25%)	Moderate immunosuppression (15–24%)	Severe immunosuppression (<15%)
1	1.5	862	>1000	500–999	<500
2	2	200	>1000	500–999	<500
3	3	800	>1000	500–999	<500
4	3.5	800	>1000	500–999	<500
5	6	1000	>500	200–499	<200
6	6	59	>500	200–499	<200
7	6	800	>500	200–499	<200
8	7	157	>500	200–499	<200
9	9	583	>500	200–499	<200
10	10	250	>500	200–499	<200
11	12	551	>500	200–499	<200

**Table 5.** Investigations in symptomatic HIV-infected patients

No.	Investigation	Number of cases (n = 42)	Percentage of study population
1	Anemia (hemoglobin <8 g%)	22	52.38
2	Positive blood culture	2	4.76
3	Abnormal chest radiograph	26	61.90
	Tuberculosis	8	19.04
	Pneumonia	8	19.04
	<i>Pneumocystis carinii</i> pneumonia	4	9.52
	Lymphoid interstitial pneumonia	1	2.38
	Hilar lymphadenopathy	5	11.90
4	Positive Mantoux test	3	7.14
5	Neuroimaging (CT scan/MRI-Brain)	6	14.28
	Cerebral atrophy	6	14.28
	Infarct	1	2.38
	Tuberculous meningoencephalitis	1	2.38
	Calcification	1	2.38
6	Color Doppler of heart	3	7.14
	Cardiomyopathy	2	4.76
	Pericardial effusion	1	2.38

etc. can get the infection via transfusion of infected blood (2,3,5,10). Patients with thalassemia can acquire the infection despite the screening of donors due to the presence of the seronegative window period during which the antibodies are not detected but the donor is infectious (3,5,13). Also, some multitransfused patients can acquire HIV through blood transfusions received prior to the compulsory screening of donors (10). Compulsory screening of blood for HIV was started in India (including the study location) in 1989. Lodha et al. (13) have shown that despite mandatory screening, 30% of children in their series were infected through

blood transfusions (some mothers had also acquired the infection due to blood transfusions) and considering the presence of 'window period' they recommend that blood products should be used only when absolutely indicated (13). Though Sen et al. (10) have described weight loss, prolonged pyrexia, generalized lymphadenopathy, epistaxis, extensive purpuric lesions and thrombocytopenia in these patients, most of our cases with thalassemia major were asymptomatic with regard to the HIV infection. The age of patients in the study by Sen et al. was 5.5 to 19.5 years, which was older than our patients with thalassemia major; this may explain the difference in the clinical manifestations (10). In the study by Dhurat et al. (4), six multitransfused HIV-positive patients were asymptomatic for a median period of about 3.5 years (range, 1 to 5 years). This strengthens the idea that children who acquire HIV infection perinatally become symptomatic before those infected by other routes (4,5). It also suggests that blood/blood products should be used judiciously (4). HIV acquired via sexual abuse has been reported previously (4) but was not encountered by us.

Daga et al. (12) reported the presence of known HIV infection in one/both parents in 7 cases and poor compliance on the part of the fathers in 17 cases. This may be due to the social impact of the disease in India. In our study, a systematic attempt was made to study the HIV status of the parents and siblings after proper counseling. However, five fathers of affected children could not be tested because of denial. In fact, Daga et al. have hypothesized to suspect HIV infection in a child where the father does not visit the hospital or has infrequent visits (12). Of the 218 siblings of the 50 children, 108 were tested and 96 were detected to be HIV positive. This relatively high percentage of HIV positivity in the siblings may be deceptive as 110 siblings were not tested. Twenty patients were either not immunized

**Table 6.** Comparison of demographic data of pediatric HIV infection (Indian studies)

Demographic data	Daga et al. (12)	Dhurat et al. (4)	Lodha et al. (13)	Merchant et al. (5)	Karande et al. (7)	Madhivanan et al. (8)	Our study
Total number of cases	28	55	27	285	24	58	50 (42 symptomatic)
Males	18 (64.3%)	28 (50.9%)	20 (74.1%)	–	13 (54.2%)	39 (67.2%)	31 (62%)
Females	10 (35.7%)	27 (49.1%)	7 (25.9%)	–	11 (45.8%)	19 (32.8%)	19 (38%)
Mean age at presentation or onset of symptoms and range	10 months (3 to 96 months)	Range: 2 months–13 years (median 3.2 years in perinatally infected and 9 years in multitransfused)	Median 4.5 years (1 month to 15 years)	213 (74.7%) below 5 years of age	–	4 years (6 months to 15 years)	57 months (1 month to 12 years)
Follow-up period	10–18 months	Median 9 months (2–28 months for perinatally infected)	–	–	–	–	–

**Table 7.** Comparison of clinical profile of pediatric HIV infection (Indian studies)

Clinical features	Daga et al. (12) (n = 28)	Dhurat et al. (4) (n = 55)	Lodha et al. (13) (n = 27)	Merchant et al. (5) (n = 285)	Karande et al. (7) (n = 24)	Madhivanan et al. (8) (n = 58)	Our study (n = 42)
Recurrent/chronic diarrhea	12 (42.8%)	10 (18.1%)	10 (37%)	43 (15%)	6 (25%)	4 (6.89%)	15 (35.71%)
Otitis media/chronic otorrhea	09 (32.1%)	–	–	26 (9.1%)	–	–	12 (28.57%)
Tuberculosis	08 (28.5%)	27 (49%)	13 (48.1%)	84 (29.4%)	11 (45.8%)	24 (41.37%)	19 (45.23%)
MT/tuberculin positivity	04	0	–	–	–	–	3
Recurrent/persistent lower respiratory infection	06 (21.4%)	11 (20%)	19 (70.3%)	24 (8.4%)	–	15 (25.86%)	08 (19.04%)
PCP	–	–	–	11 (3.8%)	–	2 (3.44%)	04 (9.52%)
Oral candidiasis	06 (21.4%)	13 (23.6%)	08 (29.6%)	42 (14.7%)	13 (54.1%)	–	05 (11.9%)
Severe PEM (IAP classification grades III & IV)/failure to thrive	17 (60.7%)	19 (34.5%)	22 (81.4%)	127 (44.5%)	19 (79.1%)	10 (17.24%)	26 (61.90%)
Dermatological manifestations	03 (10.7%)	16 (29%)	–	63 (22.1%)	–	–	33 (78.57%)
Hepatomegaly +/- splenomegaly	–	20 (36.3%)	18 (66.6%)	82 (28.7%)	–	8 (13.79%)	22 (52.38%)
Generalized lymphadenopathy	–	13 (23.6%)	09 (33.3%)	67 (23.5%)	–	8 (13.79%)	10 (23.8%)
HIV encephalopathy/CNS involvement	–	–	03 (11.1%)	13 (4.5%)	–	–	06 (14.28%)
Fever	–	–	21 (77.7%)	PUO: 36 (12.6%)	–	–	>1 month: 21 (50%)
Death	10 (35.7%)	14 (25.4%) (eight perinatally acquired and six thalassaemic children)	–	30 (10.5%)	–	8 (13.79%)	6 (14.28%)
Age at death	Median: 18 months	Median: 8.5 months in perinatally acquired (0.3 months to 2 years)	–	–	–	–	50–70 months
Causes of death	04-Multiorgan failure (sepsis); 04-Unknown	–	–	07-HIV- encephalopathy; 05-Disseminated TB; 04-Pneumonia and sepsis; 03- Neurotuberculosis; 02-Grade IV PEM; 02-PCP; 02-Fungal sepsis	–	–	05-HIV- encephalopathy 01-Pyogenic meningitis
Lost to follow-up	6 (21.4%)	11 (20%)	–	39 (13.6%)	–	21 (36.2%)	–
Survivors	12 (42.8%)	41 (74.5%)	–	255 (89.4%)	–	50 (86.2%)	44/50 (88%)
Asymptomatic	–	10 (18.1%)	05 (18.5%)	48 (16.8%)	–	16 (27.58%)	08/50 (16%)

PCP = *Pneumocystis carinii* pneumonia; PEM = protein-energy malnutrition; IAP = Indian Academy of Pediatrics; CNS = central nervous system; PUO = pyrexia of unknown origin.

Figures in parentheses indicate percentages.

or partially immunized in our study. It is necessary to ensure complete immunization in all these patients to protect them from vaccine-preventable diseases.

Hepatomegaly was seen in 52% of our cases and was one of the most common manifestations in our study. Hepatomegaly can be caused by the replication of the HIV within the reticuloendothelial system and early onset lymphadenopathy and hepatomegaly in the first 3 months of life is associated with rapid disease progression (9). Hepatosplenomegaly was

seen in 28.7% of cases in the study by Merchant et al. (5) and in 36% of the cases studied by Dhurat et al. (4).

In the present study, diarrhea was the presenting manifestation in 15 children, 35.7% (14 had bacterial diarrhea and 1 had giardiasis). Infections causing diarrhea in HIV-infected children include rotavirus, *Shigellae*, *Campylobacter*, *E. coli*, cryptosporidiosis, isosporiasis, cytomegalovirus and atypical mycobacteria (5,9). However, we could not demonstrate any unusual organisms in our patients.

Chronic/recurrent diarrhea has been seen in 15 to 43% cases in various studies (5,7,12).

Generalized lymphadenopathy was seen in 24% of our patients and may have been the result of viral infections (such as Epstein-Barr virus or cytomegalovirus), opportunistic infections, and mycobacterial infections apart from being caused by the HIV infection (9). Persistent generalized lymphadenopathy has been seen in 23.5% of cases by Merchant et al. (5).

We encountered tuberculosis in 19 cases (45%). Tuberculosis in various forms—pulmonary and extrapulmonary—has been reported commonly in HIV-infected children (4,5,7,12,13). One cannot depend on the Mantoux (tuberculin) test as it may be falsely negative in patients with HIV (12). Only four of eight children diagnosed to have tuberculosis had positive Mantoux test in the study by Daga et al. (12). Only three patients had positive Mantoux test in our study. As in other studies, lack of culture facilities have made it difficult for us to study the presence of atypical mycobacteria and resistance pattern in HIV-infected children (5). Merchant et al. reported 84 cases (29.4%) with tuberculosis in a cohort of 285 cases; of whom 48 had pulmonary lesions, 21 had disseminated tuberculosis, 8 had tubercular lymphadenopathy and 7 had neurotuberculosis (5). Dhurat et al. have reported pulmonary tuberculosis in 16 cases, 9 extrapulmonary (of whom 4 had pulmonary tuberculosis as well; extrapulmonary sites: abdominal-4, neurotuberculosis-2 and lymphadenopathy-3 cases) (4). A similar spectrum of tubercular manifestations was seen in our study as well.

Dermatological manifestations were common in our study. As noted from the present series, most skin lesions are secondary to infections (9). Of the various noninfectious conditions (seborrheic dermatitis, atopic dermatitis, eczema, psoriasis, drug eruptions, and skin lesions associated with nutritional deficiencies), we encountered eczema and manifestations of nutritional deficiency (4,9). Skin lesions including herpes zoster (19 cases), chronic nonspecific dermatitis (20 cases), scabies (18 cases), pyoderma (15 cases), molluscum contagiosum (3 cases) and chronic paronychia (2 cases) have been reported by Merchant et al. (5). Similarly, Dhurat et al. have reported seborrheic dermatitis (6 cases), chicken pox (4 cases; hemorrhagic in 2 cases) and herpes zoster (2 cases) (4).

Anemia was seen in 52% of cases in our study. The causes may include bone marrow changes consistent with anemia of chronic disorders, nutritional deficiency (folic acid or vitamin B<sub>12</sub>), adverse effects of medications and peripheral destruction of erythrocytes (9). Anemia has been noted in symptomatic patients in the study by Dhurat et al. (4) (32%) and Merchant et al. (5). As in some other studies, we did not encounter thrombocytopenia (4,5).

HIV-encephalopathy has been reported in up to 21% of cases with HIV infection (9). Merchant et al. had 13 cases

with HIV-encephalopathy in their series (5). Six of our patients (14%) had HIV-encephalopathy. The neuroimaging features (cerebral atrophy, infarction, calcification) were also consistent with the diagnosis of encephalopathy in these patients. Clinical and neuroimaging features of HIV-encephalopathy were similar to the studies reported earlier (5,14). Presence of HIV-encephalopathy is associated with poor outcome for survival (5,14).

Cardiomyopathy was seen in two cases in the present study. The incidence of cardiomyopathy has been shown to be 3.8/100 person-years in the first 6 months of life and 9.0/100 person-years after 6 months (9). Cardiomyopathy may be seen in up to 30% of those with encephalopathy (9). One child had both, i.e., cardiomyopathy and encephalopathy. Cardiomyopathy may be caused by immune-mediated disease, primary HIV disease, other concurrent infections (viral, bacterial, or fungal), and drug-induced disease (9). Lymphoid interstitial pneumonia was seen in only one patient in our study while *Pneumocystis carinii* pneumonia (PCP) was present in four cases. Merchant et al. have reported 11 cases of PCP (5). Non-PCP pneumonia and lower respiratory infections have also been noted commonly in HIV-infected children (4,5).

Somatic growth has shown to be affected in patients with HIV infection (9). Twenty-six children (62%) in our series had severe malnutrition (grade III/IV) and 12 others (29%) had mild malnutrition (grade I/II). This may be caused by various factors such as poor nutrition, neglect, poverty, repeated infections, etc. Malnutrition has been reported to be the most common manifestation in HIV-infected children (4,5,7). Chronic lung disease and chronic hypertrophic parotitis reported in earlier studies were not encountered in our study (4,5,9). Immunological studies (CD4/CD8 counts) were not possible in most of the patients in the present study.

As in some of the previous studies, we did not have patients with renal manifestations and malignancies that have been reported in the literature (4,5,9). Mortality has been variably reported to be 10.5% (5), 25.4% (4) and 35.7% (12) in various studies. Six of our patients (14%) died in the initial admission period itself. These differences in figures may reflect the differences in the clinical manifestations, early versus late presentations, duration of follow-up, presence of opportunistic infections, availability of ancillary and supportive care, etc. at various centers.

Nonspecific findings like hepatosplenomegaly, lymphadenopathy, failure to thrive, diarrhea and recurrent fever are often the presenting features in HIV infected patients (3,4,9,13). We wish to emphasize that patients with HIV infection mainly present with co-morbid infections (including diarrhea and tuberculosis) in our country (4,5,7). As stated in previous studies, we wish to re-emphasize that HIV infection should be suspected in patients with malnutrition, chronic diarrhea, recurrent respiratory infections, disseminated tuberculosis and severe infections (3–5,7). These infections are also seen in HIV-negative patients requiring

**Table 8.** Comparison of clinical profile of pediatric HIV infection (non-Indian studies)

Demographic data/ clinical feature	Our study n = 42	van Gend et al. (15)	Bedri et al. (16)	Spira et al. (17)	Italian Registry (18)	
Place and year of publication	India 2004	South Africa 2003	Ethiopia 2001	Rwanda 1999	Italy 1994	
					LTS	STS
Total number of cases	50 (42 symptomatic)	69	77	54	154	120
Males	31 (62%)	37 (53.62%)	38 (49.35%)	–	–	55 (45.83%)
Females	19 (38%)	32 (46.37%)	39 (50.64%)	–	–	65 (54.16%)
Mean age at presentation or onset of symptoms and range	57 months (1 month to 12 years)	21.8 months	3.8 years (15 months to 12 years)	8.9 months	–	–
Recurrent/chronic diarrhea	15 (35.71%)	6/64 (9.37%)	21 (27.27%)	23 (42.59%)	47 (30.51%)	60 (50%)
Otitis media/chronic otorrhea	12 (28.57%)	–	17 (22.07%)	–	–	–
Tuberculosis (TB)	19 (45.23%)	–	Disseminated TB-28 (36.36%); Pulmonary TB-19 (24.67%)	–	–	–
Recurrent/persistent lower respiratory infection	8 (19.4%)	–	–	–	–	–
PCP	4 (9.52%)	–	11 (14.28%)	–	9 (5.84%)	53 (44.16%)
Severe PEM (IAP classification grades III & IV)/ failure to thrive	26 (61.90%)	23/ 67 (34.32%)	17 (22.07%)	45 (83.33%)	76 (49.35%)	93 (77.5%)
Dermatological manifestations	33 (78.57%)	–	–	25 (46.29%)	–	–
Hepatomegaly	22 (52.38%)	48/ 68 (70.58%)	–	28 (51.85%)	130 (84.41%)	99 (82.5%)
Splenomegaly	–	29/ 69 (42.02%)	–	21 (38.88%)	116 (75.32%)	91 (75.83%)
Generalized lymphadenopathy	10 (23.8%)	43/ 69 (62.31%)	–	39 (72.22%)	140 (90.90%)	70 (58.33%)
HIV encephalopathy/ CNS involvement	6 (14.28%)	–	–	–	17 (11.03%)	69 (57.5%)
Fever	21 (50%)	9/ 62 (14.51%)	–	11 (20.37%)	64 (41.55%)	85 (70.83%)
Death	6 (14.28%)	12/ 69 (17.39%)	16 (20.77%)	28 (51.85)	–	–
Age at death	50–70 months	–	–	Median 13.4 months	–	–
Causes of death	05-HIV encephalopathy; 01-Pyogenic meningitis	–	–	09-Pulmonary infection; 08-Diarrhea	–	–

PCP = *Pneumocystis carinii* pneumonia; PEM = protein-energy malnutrition; IAP = Indian Academy of Pediatrics; CNS = central nervous system; LTS = long-term survivors (Italian Registry); STS = short-term survivors (Italian Registry).  
Figures in parentheses indicate percentages.

hospitalization (7). Nevertheless, a high index of suspicion would help in early and appropriate diagnosis (4). Clinically directed selective screening in patients admitted with severe malnutrition, serious pyogenic infections, disseminated tuberculosis, chronic diarrhea and oral candidiasis can have a role in diagnosis of HIV infection in a resource-poor setting (7).

Table 8 compares the clinical manifestations in our study with those seen in studies from Africa and other parts of the world. Mean age of presentation in our study was higher than that reported in other non-Indian studies (15–17). *Pneumocystis carinii* pneumonia was less common in our study (16,18). CNS involvement was more common in the short-term survivors in the Italian registry (57.5%) (18). Death rate in our study was similar to that reported by Bedri et al. (16) and van Gend et al. (15).

Lack of prolonged follow-up was the main drawback of our study. Also, the occurrence of various clinical manifesta-

tions and opportunistic infections may be skewed as we studied only the patients who were admitted to the hospital and not those followed on an outpatient basis during the study period. Knowledge of the clinical profile of HIV-infected children is likely to help in better understanding of the disease and appropriate management.

In conclusion, perinatal mode of transmission is the most common mode of acquiring HIV infection in children. More than 60% patients have severe protein-energy malnutrition. Gastrointestinal and respiratory system manifestations are common. Tuberculosis and candidiasis are the most common opportunistic infections in HIV-infected children.

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