**Original Research Article**

# Clinical profile and follow-up of HIV infection in pediatric age group beyond 18 months up to 13 years at tertiary level hospital

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## Abstract

**Background:** An increasing number of HIV infected children have been reported as spread of HIV in adults are showing increasing trend in India. We reported the clinical manifestation, laboratory parameters and follow up of these children.

**Aim:** To study the clinical profile follow up of paediatric patients admitted with HIV in the age gruop18 months to 13 years for a period of 1 year.

**Materials and methods:** This Prospective study was conducted at tertiary care centre at Gandhi Hospital in association with ART centre, Ganhi Hospital, Secunderabad over a period of one year (January 2013 - December 2013). Over 100 consecutive patients suspected and later confirmed by TRIDOT & HIV EIA COOMB were included in the study after obtaining written consent from guardian of the patients. A detailed history, thorough clinical examination and laboratory investigations were carried out. ART & ATT therapy were given according to guidelines and followed up.

**Results:** Of the 100 cases, 55 were males and 45 were females. Immunization status of these children included 20%completely immunised, 52% partially immunized and unknown in 28. Clinical manifestation like, anemia was seen in 95 cases, 91 cases had PEM with 47.25% were in gr 4, PGL (38), fever (36), respiratory (28), diarrhoea (15). Less commonly seen were CNS and chronic

ottorhea. Most common opportunistic infections were tuberculosis (16) and candidiasis (16) with giardiasis (3) and herpes zoster (2). Of the 100 cases enrolled, 11 were lost to follow up and 3cases died. Mean weight gain after 6 months 1.6 SD and 2.8 SD at 12 months. On laboratory investigations 95 cases had Hb <2SD, 21 had mantoux positive (>5 mm), abnormal chest X-ray in 23 cases.

**Conclusion:** Most children were in the age group of 1-5 years with mean age of presentation of 5.5 years. Mild bias towards male patients is noted. Perinatal mode is the only mode of transmission, no other modes noted. Most of the children presented to us in a partially immunized status and others' status was not known. Common presentations - PEM, anemia, skin manifestations, nutritional deficiencies, prolonged fever, systemic manifestations – PGL; respiratory infections like pneumonia, TB; chronic diarrhoea. CNS manifestations were uncommon and renal problems, malignancies were not noted in our study. Amongst opportunistic infections, TB involving various organs and candidiasis were seen in maximum number of patients. Our study concluded that administration of nevirapine based ART regimes for HIV-1 infected children is feasible in resource limited settings. There was improvement in growth parameters with the use of this therapy and prevention of deterioration in immune status.

## Key words

Pediatric HIV, PEM - Protein energy malnutrition, TRIDOT & HIV EIA COOMB, ART therapy.

## Introduction

HIV poses the greatest public health crisis in the world today and it is the 4th leading cause of mortality. It is responsible for >7.7% mortality in children under 5 years and >19% in infants. Estimated number of children under the age of 15 years living with this virus globally is 2.3 million as of 2005. HIV is increasingly affecting the health and welfare of children and undermining hard won gains in child survival. Children differ from adult HIV in that they have high rates of viral replication, very high viral load, high rates of CD4 destruction, viral mutation, faster rates of disease progression and good immunological response to ART. In the light of this trend, various authors have reported their experience regarding HIV infection in India. Most of these studies have reported on the presenting manifestation with little information on the follow up. We report the clinical manifestation, laboratory parameters and follow up of these children.

## Materials and methods

This prospective study was conducted at a tertiary care center at Gandhi Hospital, Secunderabad. All HIV suspected children referred from different hospitals like District Hospital, Area Hospital, PHC's, private practitioners were tested and those found positive were enrolled and studied for a period of one year.

Children more than 18 months and below 13 years were included.

Children less than 18 months were excluded from the study because of unavailability viral diagnostic techniques in resource of poor settings. Children above13years were excluded because treatment guidelines are similar to that of adults. HIV negative children were excluded.

Written consent was obtained from the guardians of the suspected patients for testing of HIV status by Coomb Aid. Those found positive were confirmed by Tridot and HIV EIA COOMB. Hundred consecutive patients diagnosed to be HIV positive were included in the study. HIV infection was considered as a possibility in children admitted with symptoms of protein energy malnutrition, chronic diarrhea, prolonged unexplained fever, chronic otorrhoea, persistent generalised lymphadenopathy, recurrent systemic infections and septicaemia.

A detailed history including HIV status of the parents and siblings, presence or absence of tuberculosis, probable mode of transmission, immunization status and general and systemic specific clinical presentations, WHO staging, CDC adherence, toxicity, outcome were noted in a proforma designed for the purpose. A thorough clinical examination was carried out for nutritional status, presence of opportunistic infections, skin manifestations etc. Blood investigations included complete hemogram, liver and renal function tests, X-ray chest examination, sputum examination and ultrasonography examination of the abdomen were carried out for patients included in the study as per the requirement. Special investigations like CT scan brain, MRI scan brain, lumbar puncture and endoscopic procedures were carried out only if indicated on clinical grounds.

**Base line evaluation**

A base line CD4 count was performed in all cases by flow cytometry with a fully automated two-laser Becton Dickinson FACS calibre flow cytometer.

Probable tuberculosis was diagnosed based on Revised National Tuberculosis Control Program (RNTCP) protocol and Anti-Tuberculous Therapy (ATT) was started according to the RNTCP guidelines. Each child was classified according to WHO clinical staging as well as the CDC immunological staging.

**Treatment**

Anti-retroviral therapy (ART) was initiated for all the HIV infected children according to World Health Organisation (WHO) guidelines for resource limited settings (2005) which states that If a child is confirmed to have HIV disease and is in

- WHO Stage IV disease - Treat all children irrespective of CD4 count.
- WHO Stage III disease- Treat all children irrespective of CD4 count, in children aged over 18 months treat guided by CD4 where available
- WHO Stage II disease- Treat CD4 guided or
- WHO Stage I disease- Treat only guided by CD4; where CD4 is not available children should not be initiated on ART.

Depending on CD4 count, ART can be started as follows:

- 11 months: if CD4 < 1500cells/mm3 (<25%)
- 12-35 months: if CD4< 750cells/mm3 (<20%)
- 36-59 months: if CD4< 350cells/mm3 (<15%)
- 5 years: follow adult guidelines i.e., start ART if CD4 < 350cells/mm3 especially if symptomatic or initiate ART if CD4 < 200 cells/$mm^3$ (10%) irrespective of the clinical status.

First and second line anti-retroviral therapy regimens followed by WHO guidelines as recommended by the National AIDS Control Society (NACO) of India. The first line ART regimen for all the children is d4T+3TC+NVP. The alternative first line combinations are: d4T+3TC+EFV, taken as EFV once per day plus d4T/3TC as BID FDC which was used in children co-infected with tuberculosis and in those who had adverse reactions to Nevirapine. As Zidovudine based regimens were not available for use in children in the ART centres, they were not given to the children in this study.

All children with tuberculosis were given ATT along with ART and the regimen was changed from d4T+3TC+NVP after completion of Co-trimoxazole prophylaxis was given to all children as per NACO guidelines. Adherence to therapy was encouraged by counselling the parents or care givers and the children (in older children) by counsellors at the ART centres, people with AIDS, and by phone calls.

**Monitoring and follow up**

First follow up visit was after 15 days and then at monthly intervals. Thus, seven visits were expected over a period of six months. Six or seven visits were taken as excellent follow up, three to five as good and less than three as poor follow up. The child was screened for opportunistic infections and treated accordingly. WHO clinical staging and immunological staging based on CD4 count was done at every 6month interval. Adherence to interval was also checked at all visits. The child was considered as "lost to follow up" if he/she had missed the treatment for consecutive 3 months.

Lab monitoring included the baseline CD4 T-cell count by flow cytometry (Becton Dickinson) and measurement of haemoglobin, complete blood counts, renal parameters, liver function tests and a chest X-ray. The CD4 T-cell count was obtained at three, six and twelve month intervals. Follow up haemoglobin measurements, blood counts, liver functions tests, lipid profile and other serum chemical analyses were performed if clinically indicated.

## Results

Outcome variables studied included system specific manifestations, opportunistic infections, mode of transmission, weight gain, CD4 count changes, changes in WHO clinical staging, CDC immunological staging, adherence, toxicity, outcome caregiver profile were studied.

100 HIV patients in the age group of 18 months to 13 years were enrolled in our study for a period of 1 year. 57% children in the age group of 1.5 to 5years, 37% of age group 6 to 9 years and 6% in the age group of 10-13 years. Mean age of presentation is 5.5 years. There were 55 males, 45 females in the study with a sex ratio of 1.2:1 with a male predominance. Immunization status of these patients included- 20% completely immunized, 52% partially immunized and status was known for 28%. Perinatal mode is the only mode of transmission; no other modes of transmission were not noted in our study. Amongst 100 deliveries, 40 were normal vaginal deliveries, 19 were instrumental, 24 were by emergency C-section and 17 by elective C-section, showing that the incidence of HIV is more in vaginal and instrumental deliveries and more with emergency C-section than with elective C-section. 46% children were exclusively breast feeding, the other 42% were feed by artificial feeds and the rest 12% by mixed feeds (**Table – 1**).

Of the 100 cases studied, 91 cases were found to have PEM. 47.25% are in Grade III, 27.65% in Grade II, 13% in Grade I and 12.08% in Grade IV. This high incidence of PEM is probably due to poor socio-economic status, poor nutrition, lack of parental care, decreased immunity leading to recurrent infections, opportunistic infections and due to the disease process itself (**Table – 2**).

Anaemia (95%) is the most common presentation and the others being PEM (91%), PGL (38%), fever more than one month (36%). Next common being respiratory (28%), skin manifestations (16%), diarrhoea (15%), less commonly seen are CNS manifestations and chronic Otto rhea. Par otitis, renal, cardiovascular cases and malignancies were not recorded in our cases.

Of the 100 positive HIV cases, most common opportunistic infections were Candidiasis, TB (23%) and the next being Giardiasis and Herpes Zoster. Of 23 cases of TB, 16 had pulmonary TB, 3 had TB lymphadenitis, 4 had abdominal TB. Everything received ATT as per RNTCP guidelines. Along with ATT, all have received ART but Afovirsen was substituted for Evirating. After completion of ATT, the child was put on Nevirapine based regimen (**Table – 3**).

Of the 100 cases enrolled, 11cases were lost to follow up and 3cases died. The cause of death in the above cases being Progressive Multifocal Leukoencephalopathy, Fungal Meninges-encephalitis and Severe Bronchopneumonia with Grade IV PEM.

**Table – 1:** Demographic profile of HIV infected children.

| **AGE OF PRESENTATION** | | | | |
|---|---|---|---|---|
| **AGE GROUP (years)** | | **NO OF CHILDREN** | | **PERCENTAGE** |
| 1.5-5 | | 57 | | 57 |
| 6-9 | | 37 | | 37 |
| 10-13 | | 06 | | 06 |
| **SEX DISTRIBUTION OF HIV POSITIVE CHILDREN** | | | | |
| **SEX** | | **NO OF CASES** | | **PERCENTAGE** |
| **MALES** | | 55 | | 55 |
| **FEMALES** | | 45 | | 45 |
| **IMMUNIZATION OF HIV POSITIVE PATIENTS** | | | | |
| **IMMUNIZATION STATUS** | | **NO OF PATIENTS** | | **PERCENTAGE** |
| **COMPLETE** | | 20 | | 20 |
| **PARTIAL** | | 52 | | 52 |
| **NOT KNOWN** | | 28 | | 28 |
| **MODES OF TRANSMISSION OF HIV INFECTION** | | | | |
| **MODES** | | **NO OF PATIENTS** | | **PERCENTAGE** |
| **PERINATAL** | | 100 | | 100 |
| **BLOOD TRANSFUSION** | | NIL | | -- |
| **SEXUAL** | | NIL | | -- |
| **NOT KNOWN** | | NIL | | -- |
| **MODE OF DELIVERY** | | | | |
| **TOTAL NO OF DELIVERIES** | **NORMAL VAGINAL DELIVERY** | **INSTRUMENTAL DELIVERY** | **EMERGENCY CAESAREAN SECTION** | **ELECTIVE CAESAREAN SECTION** |
| 100 | 40 | 19 | 24 | 17 |
| **FEEDING PATTERN** | | | | |
| **BREAST FEEDING** | | **ARTIFICIAL FEEDING** | | **MIXED** |
| 46 | | 42 | | 12 |

The mean weight gain of the remaining 86 children was recorded after 6months and at 12months indicating that the weight gain was significant after a long duration (**Table – 4**). Our study showed an improvement in WHO Clinical Staging as well as CDC imunological Staging in children followed up for 6months and 12months, which were statistically significant. The improvement in immunological parameters is more when compared with clinical parameters. Among the 100 HIV positive patients, 95% had haemoglobin less then 2SD. 21% mantoux test positive (>5mm induration is taken as positive). Chest X-ray was abnormal in 23 patients. It was suggestive of Bacterial Pneumonia in 6 and hilar adenopathy in 18. Stool on microscopy showed 13%cases involving Salmonella, Campylobacter and Protozoal infections like Isopora, Cryptospora, Microscpora and Cyclospora (**Table – 5**).

## Discussion

Paediatric HIV has been an increasing trend and is posing a major health issue in developing and developed nations. This staggering increase could be contributed by both increased spread of the disease and an increasing awareness among health personnel to the diagnosis. The Paediatric department of All India Institute of Medical Science, New Delhi, has also reported an increasing trend in the number of children with HIV [18].

**Table – 2:** Clinical manifestations HIV infected children.

| CLINICAL MANIFESTATIONS | | |
|---|---|---|
| S.NO | **PEM GRADING** | TOTAL= 91 CASES |
| 1. | I | 12 |
| | II | 25 |
| | III | 43 |
| | IV | 11 |
| 2. | **SKIN MANIFESTATIONS** | TOTAL= 16 CASES |
| | Pyoderma | 05 |
| | Scabies | 02 |
| | Herpes Zoster | 02 |
| | Seborrheic Dermatitis | 01 |
| | TaeniaCorporis | 02 |
| | Taenia Capitis | 01 |
| | TaeniaUnguium | 02 |
| | Molluscumcontagosium | 01 |
| 3. | **FEVER MORE THAN ONE MONTH** | 36 |
| 4. | **CHRONIC OTORRHOEA** | 04 |
| 5. | **PGL** | 38 |
| 6. | **GIT** | TOTAL= 24CASES |
| | Diarrheal | 15 |
| | a) Bacteria<br>Salmonella<br>Campylobacter | 2<br>1<br>1 |
| | b) Giardia | 3 |
| | c)Viral | 2 |
| | d)Protozoa<br>Isospora<br>Cyclospora<br>Microspora<br>Cryptospora | 8<br>5<br>1<br>1<br>1 |
| | Hepatomegaly | 5 |
| | Abdominal TB | 4 |
| 7. | **RESPIRATORY SYSTEM** | TOTAL= 28CASES |
| | Pulmonary TB | 16 |
| | Bacterial Pneumonia | 6 |
| | TB Lymphadenitis | 3 |
| | Sinusitis | 2 |
| | Bronchiectasis | 1 |
| | PCP | 0 |
| | LIP | 0 |
| 8. | **ASYMPTOMATIC** | 26 |
| 9. | **CNS** | TOTAL= 3CASES |
| | HIV Encephalopathy | 2 |
| | Fungal Meningoencephalitis | 1 |
| 10. | **HEMATOLOGICAL**<br>Anaemia | <br>95 |
| 11. | **ACUTE ULCERATIVE GINNGIVOSTOMATITIS** | 1 |
| 12. | **SEPTIC ARTHRITIS** | 1 |

**Table – 3:** incidence opportunistic infections in HIV children.

| **OPPORTUNISTIC INFECTIONS** TOTAL= 37CASES | | |
|---|---|---|
| 1. | Candidiasis<br>Oral<br>Oesophageal | 16<br>14<br>02 |
| 2. | Tuberculosis | 16 |
| 3. | Herpes Zoster | 02 |
| 4. | PCP | 0 |
| 5. | Giardiasis | 03 |

**Table – 4:** Observation during follow up of HIV infected children.

| **WEIGHT GAIN** | | | |
|---|---|---|---|
| | **Mean weight in kg** | **Standard deviation** | **Mean weight gain in kg** |
| **At the start of therapy** | 15.5 | | |
| **After 6months** | 17.1 | 6.5 | 1.6 |
| **At 12months** | 18.3 | 6.7 | 2.8 |
| **WHO CLINICAL STAGING** | | | |
| **Stage** | **WHO staging before ART** | **After 6months** | **At 12months** |
| **I** | 21 | 63 | 78 |
| **II** | 08 | 09 | 01 |
| **III** | 42 | 14 | 07 |
| **IV** | 17 | 0 | 0 |
| | | *p value*= 0.0061 | *p value*= 0.0014 |
| **CDC IMMUNOLOGICAL STAGING** | | | |
| **Stage** | **CDC staging before ART** | **After 6months** | **At 12months** |
| **I** | 20 | 27 | 71 |
| **II** | 07 | 49 | 13 |
| **III** | 59 | 10 | 02 |
| | | *p* value= 0.001 | *p value*= 0.0061 |

**Table – 5:** Laboratory investigations in HIV positive children.

| **INVESTIGATION** | **NO OF PATIENTS** | **PERCENTAGE (%)** |
|---|---|---|
| **Haemoglobin%** | 95 | 95 |
| **Blood Culture** | 03 | 03 |
| **Urine R/M** | -- | -- |
| **Stool R/M** | 13 | 13 |
| **LFT** | -- | -- |
| **RFT** | -- | -- |
| **Mantoux** | 21 | 21 |
| **Ultrasound Abdomen** | 4 | 04 |
| **Chest X-ray** | 23 | 23 |

Most of the paediatric patients acquire infection by vertical transmission. Our findings revealed 100% vertical transmission and none as sexual or blood transmission. The result might be due to the age group being up to 13 years. Also due to lack of parental support we were unable to know mode of acquiring infection in some. The incidence of intravenous drug abuse is very low in our country in spite of the huge adolescent population.

The study of Merchnat, et al. supports our observation of maximum number of cases in the age group of 1-15years. The mean age of presentation is 5.5years. In their study of 285 HIV positive patients from 1994-2000, they reported the maximum number of cases in the same age group. Similar results were observed in study from Cambodia [25] and two Indian studies from Delhi [26, 27]; Dhurat, et al. in whose study the median age of onset was 3.2years have drawn similar inferences. This preponderance of symptomatic cases in the 1-5 years' age group can be due to the acquisition of infection at birth in most of the cases (**Table – 6**).

The mode of acquisition may be responsible for the short incubation period of 3months to 2years in paediatric patients compared to 3months to 6 years in adults.

Sex Ratio: The sex ratio is 1.2:1 in our study was comparable to a study of 98 HIV positive by Maniar et al (1986-1988) where it was 2:1. Similar results were noted in a study from Cambodia 1.1:1[25]. In a study from Malaysia, 1.3:1. The marginal male predominance may retain the gender bias prevailing in the Indian society although a similar ratio was obtained in a foreign study by Tavo, et al. [14] as per **Table – 7**.

**Table - 6:** Modes of transmission of HIV infection.

| **STUDY** | **Perinatal transmission %** | **Blood product %** | **Drug abuse %** | **Sexual %** | **Unknown** |
|---|---|---|---|---|---|
| Merchant, et al. (=285) [22] | 86.67 | 11.57 | - | 0 | 1.75 |
| Durant, et al. [27] (n=55) | 74.5 | 23.52 | - | 0.01 | 0.01 |
| Mullan, et al. (n=112) | 70.53 | 13 | - | - | 16.3 |
| USA-CDC 1999 (n=2000) | 96 | 10 | - | - | - |
| Present Study | 100 | - | - | - | - |

**Table - 7:** Comparison of sex ratio.

| PARAMETER | Present study | Bart Janessen, et al. [25] Cambodia | Petdachai, et al. [28] Thailand | S.A. Natu and S.R. Daga, et al. [29], Pune | Rakesh Lodha, et al. [18], Delhi | S.K. Khanna, et al. [29] Pune |
|---|---|---|---|---|---|---|
| MEAN AGE OF PRESENTATION | 5.5 years | 6years and 9months | 7years | 6years 8months | 5years 8months | 6years |
| MALE: FEMALE | 1.2:1 | 1.2:1 | 1.4:1 | 1.3:1 | 5.5:1 | 1.1:1 |

**Other studies**

The pattern of HIV disease expression and progression differ among HIV infected children and adult Infected children have varied and wide spectrum of clinical signs and symptoms as reported in literature [15, 16]. As seen, failure to thrive is a common manifestation in children with HIV infection across the globe. In

developing countries, it is slightly higher in incidence as compared to developed nations probably reflecting the other causes of malnutrition like poor socio economic status and illiteracy etc. However, developed nations also show significant figures.

Coming to the immunization status in our studies, 20% cases were completely immunized, 52% were partially immunised and 28% status not known. The above values suggest the need for counselling regarding vaccination. Among 200 parents tested, 100% positivity was seen in mothers and 98% in fathers. Among parental deaths, we recorded 22 cases of mothers, 12 cases of fathers and both 34 cases. The above statistics suggest to us to emphasize counselling to care givers like orphanages, relatives, grandparents regarding adherence, follow up, attending to medical problems in children who lost both their parents and who are under their care.

Infants who acquired HIV peri-natally have birth weight and height percentiles comparable to uninfected ones [17] but may develop post-natal growth retardation. Chronic diarrhoea, opportunistic infections and HIV infection per se may be responsible for PEM. Therefore, nutritional intervention should be instituted early in the care plan of these children along with ART and other medical treatments.

Chronic fever, lymphadenopathy and chronic diarrhoea were common features seen in almost all studies including ours. In an Italian and an African study PGL was as high as 91% of their patients. Amongst Indian reports a high incidence of 86% of PGL has been reported by Lodha, et al. [18]. Most others, including the present study should report a range of 30-40% in the incidence of PGL. In any case PGL should raise suspicion of HIV infection. Chronic diarrhoea, seen in almost all studies is more common in African studies than its Indian and Italian counterparts (15-27%). Our study revealed incidence of 15%. These differences could be due to higher incidence of diarrhoea seen in developing nations due to poor socio-economic conditions, overcrowding, malnutrition etc. However, chronic diarrhoea is common globally among HIV infected children (**Table – 8**). There are large variations in the percentage of children having neurological manifestations from as high as 58% in one Italian study to none reported in an Indian study. In our study it is 3%.

Thus it is obvious that FTT, PGL, chronic fever and chronic diarrhoea, pulmonary tuberculosis, bronchopneumonia was most commonly seen in HIV positive patients, CNS manifestations are less and CVS manifestations are absent.

Although reported in literature, malignancies are not reported in India, conducted by Merchant, et al. [22], Dhurat, et al. [27], Lodha, et al. [ 18], Mullan, et al. and our present study also which shows that it is rare in paediatric patients.

**Opportunistic infections**

Tuberculosis has emerged as a major infectious complication of HIV infection in developing countries with a high incidence of 67% in one Indian study. Our study has a lower incidence of 23% compared to other Indian studies. Under diagnosis is possible due to difficulty in establishing proven disease and absence of symptoms. In such patients, a strong family history and X-ray findings form the mainstay of diagnosis. Considering the high sero-prevalance of HIV infection in tuberculosis in children as reported from Mumbai [24] and Zambia [29], tuberculosis should be regarded as a sentinel illness for HIV infection and screening for the disease in all cases of disseminated tuberculosis is recommended. A study from Prechomklao Hospital, Petchur, Thailand showed 25% had tuberculosis and they all accounted for the deaths in their study (**Table – 9**).

Candida albicans, a fungal pathogen is another common opportunistic infection in all studies. The present study has slightly higher incidence as compared to other Indian studies. Some African studies have shown an incidence as high as 55%.

**Table - 8:** Clinical manifestation depicting comparison with other studies.

| CLINICAL FEATURES | INDIAN STUDIES | | | | WESTERN STUDIES | | | A CHILD STUDIES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Merchant, et al. (n=285) | Dhurat, et al. (n=55) | Lodha, et al. (n=22) | Mulan, et al. (n=112) | Tavo, et al. (n=1887) | Italian Register | HIV infected 1994 | Rassanda (n=107) | Zairne (n=201) | Zimbabwe (n=190) | Uganda (n=155) | Nigeria (n=63) | **Present study** |
| **FAILURE TO THRIVE** | 44.56 | 48.6 | 100 | 65 | 49.9 | 49 | 78 | 89 | 97 | 54 | 80 | 50.8 | **91%** |
| **CHRONIC FEVER** | 12.63 | - | - | 48 | 443 | 42 | 71 | 58 | 85 | NA | 71 | 50.8 | **36%** |
| **PERSISTENT GENERALISED LNPATHY** | 23.5 | 35.1 | 86.3 | 32 | 78 | 91 | 58 | 91 | 24 | 65 | 31 | 58.7 | **38%** |
| **CHRONIC RECURRENT DIARRHEA** | 15.1 | 27.2 | 45.5 | 57 | 30.9 | 31 | 50 | 83 | 62 | 25 | 66 | 38 | **15%** |
| **RECURRENT PERSISTENT PNEUMONIA** | 8.4 | 24.3 | 86.3 | 45 | NA | NA | NA | 70 | 61 | 47 | 49 | 31 | **6%** |
| **HEPATO-SPLENOMEGALY** | 28.8 | 67.5 | NA | NA | NA | NA | NA | NA | NA | - | - | - | **5%** |
| **HEPATOMEGALY** | 81.8 | NA | 51.9 | NA | 86.8 | 84 | 83 | 66 | 52 | 37 | NA | 19 | **14%** |
| **SPLENOMEGALY** | NA | NA | 63.6 | NA | 73.5 | 75 | 76 | NA | NA | NA | NA | NA | **-** |
| **NEUROLOGICAL** | 13 | No cases | NA | 37 | 23.8 | 11 | 58 | NA | 18 | NA | 3 | 9.5 | **3%** |
| **CARDIO-VASCULAR** | No cases | No cases | No cases | 2 | NA | NA | NA | NA | NA | NA | NA | NA | - |
| **MALIGNANCIES** | None | None | None | None | None | None | None | None | None | None | None | None | **None** |

A low incidence of Pneumocystis carinii Pneumonia (PCP) has been reported amongst African, Caribbean and Indian children [21]. However, anecdotal reports have been established from India with a presumptive diagnosis of PCP with HIV. Whether the apparent difference in the occurrence of PCP is reflected by difficulties in establishing the diagnostic difference in disease susceptibilities, or a geographic variation in the prevalence of the organism, needs to be explored.

In all, diagnostic facilities being scarce and expensive, Indian studies may be under reporting the presence of opportunistic infections.

Our study shows that a statistically significant weight gain can be achieved after initiation of ART at 12months. The mean weight increased from base line of 15.5 to 17kg after 6months which was statistically not significant. The mean weight increased from base line of 15.5 to 18.3 after 12months of ART which was statistically significant. In a similar study from S.A. Natu and S.R.., Darga, et al. from the Department pf Paediatrics, B.J. Medical College and Sasson General Hospital, Pune the mean weight increased from 15.2 to 16.8 (gain of 1.6kg) after 6months of therapy. In another study presented in IntConf AIDS.2002 July 7-12$^{th}$ [ 9] there was a rise of 1.7kg of weight from the baseline after

6months of therapy. A study by Nachman SA, Lindsey JC, Moye J. Stanley KE, Johnson GM, Krogstad PA, et al. published in Paediatric Infectious Diseases (2005) Vol II Page 132 to 135 showed a statistically significant improvement in the nutritional status after starting ART in HIV infected children (**Table – 10**).

**Table - 9:** Opportunistic infection comparative difference.

| **Opportunistic Infections** | Indian studies | | | | African studies | | | | Western studies | Present study n=30 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Merchant, et al. (n=285) | Lodha, et al. (n=22) | Dhurat, et al. (n=550 | Mullan | Rwanda | Zimbabwe | Uganda | Nigeria | Tavo, et al. | |
| **Tuberculosis** | 29.47 | 59.167.5 | 67.5 | - | - | - | - | - | 2 | 16% |
| **Candidiasis** | 14.73 | 36.4 | 35.1 | NA | 40 | 18 | 55 | 19 | - | 16% |
| **Pneumocystis carniti** | 3.88 | NA | 2 | NA | - | - | - | - | 57 | - |
| **Herpes Zoster** | - | 2 | 5.4 | NA | - | - | - | - | 8 | 2% |

**Table - 10:** Comparison of response to ART therapy.

| Parameter | Bart Janssen, et al. [3] | Petdachaieta [6] | S.A. Natu and S.R. Daga, et al., [4] | Rakesh Lodha, et al., [5] | S.K. Khanna, et al. [9] | Present study |
|---|---|---|---|---|---|---|
| Mean weight gain after 6months | -- | -- | 1.6kg | 1.5kg | 1.7kg | 1.7kg |
| Mean rise in CD4 count after 6months | 390 | 10% | 277 | 125 | 15% | 302 |
| Adverse effects | 4% | -- | 8% | 7% | -- | 15% |
| Death rate | 6.1% | 9% | -- | 3% | -- | 3% |

The mean rise in CD4 count after 6 and 12 months of initiation of therapy was statistically significant. Similar results were observed in the study from S.A.Natu and S.R.Daga et al from Department of Paediatrics, B.J.Medical College and Sassoon General Hospital, Pune with rise of 277 cells after 6 months. In a study done by Bart Janssen et al in Cambodia, the rise was 390 cells/ml (**Table – 11**).

Statistically significant improvement was observed in the WHO clinical stage and CDC immunological stage after starting ART. Similar results were observed in the study from S.A. Natu and S.R. Daga et al from the Department of Paediatrics, B.J. Medical College and Sassoon General Hospital, Pune. The profile of care givers was also included in the study because it affects the adherence to treatment which is crucial for the success of ART. Less than 1/3$^{rd}$ children have both their parents alive and those who lost their parents are cared by grandparents (15) and orphanage (19) and the rest 30 have got at least 1 parent alive.

**Table - 11:** Laboratory investigations in HIV positive children [14, 22].

| INVESTIGATIONS | Merchant, et al. | Dhurat, et al. | Present study | Tavo, et al. (N=1887) |
|---|---|---|---|---|
| **X-ray** | -- | -- | -- | |
| **Pulmonary tuberculosis** | 12 | 10.2 | **23** | |
| **Bacterial pneumonia** | 16 | -- | **3%** | |
| **Pneumocystis carinii** | 3.88 | -- | -- | NA |
| **Mantoux test** | Neg | Neg | **21%** | NA |
| **Haemoglobin < 10** | 36 | NA | **95%** | -- |
| **Thrombocytopenia** | None | None | **None** | 16.2 |
| **Leucopenia** | None | None | **None** | 3.7 |
| **Blood culture** | 14 | 8 | **3** | NA |
| **CT/MRI** | -- | -- | -- | -- |
| **Cortical Atrophy** | 3 | NA | -- | |
| **Basal ganglia calcification** | 1 | NA | -- | 23.8 |
| **Colour Doppler** | None | NA | -- | 6.5 |
| **Stool R/M** | 18 | 25 | **13** | 22 |
| **CXR** | 21 | 18 | **24** | 20 |

Incidence of adverse effects particularly rash to Nevirapine and gastro intestinal side effects were slightly more when compared to other side effects. Even then the ARV medications were well tolerated as indicated by good adherence and clinical improvement.

We investigated our patients with a battery of tests to detect symptomatic as well as asymptomatic infections and organ involvement. Comparison of our results with that of other studies in from observation. It is evident that among 23 patients with tuberculosis 20 cases had radiological evidence of pulmonary tuberculosis. Thus suggesting X-ray to be a sensitive investigation modality in diagnosing pulmonary tuberculosis in HIV positive patients.

Even though the survival analysis was not done in our study, there is significant elevation in clinical parameters and low death rates (3%) which was significantly lower than death rates without ART (18%) [2] when cases were followed up for a period of one year.

## Conclusion

Perinatal mode is the only mode of transmission, no other modes noted. Most of the children presented to us in a partially immunized status and others' status was not known, indicating the need to stress on immunization.

34 children lost both their parents and 30 are under the care of a single parent requiring care of orphanage and grandparents. The care takers need counselling for attending for a medical problem, adherence to ART, and regular follow up is to be stressed.

Among the siblings (294), 54 were tested and 28 were found positive. Older siblings were negative for antibodies while younger ones for positive, indicating probable time of infection of mother. The high HIV positivity rate among siblings should warn us regarding an urgent need to counsel the parents.

TB is one the most common association with HIV. The need for adherence to ART and ATT are to be emphasized. Those cases with TB and HIV which were lost to follow up reported

subsequently with disseminated kochs in further visits.

The rapid and effective large scale introduction of ART I developing countries like India provides evidence in the international support to make ART available to patients with AIDS worldwide.

Availability of studies on effectiveness of 3 drug regimen (2NRTI+1NNRTI) for children is of crucial importance for are source limited setting. The effectiveness is commonly judged by CD4 counts and viral load assays. Viral loads were not assessing because of financial constraints. Only 15cases got drug associated adverse effects in this study. Hence lab testing wherever there are signs/symptoms of adverse events seems justifiable. Our study has significant number of defaulters (11%) which is alarming and needs intervention regarding program orientation.

The sense of wellbeing in child played a major role in ensuring adherence to therapy and follow up. Medical adherence is fundamental to successful ART as drug resistance is alarmingly getting common these days.

Our study concludes that administration of Nevirapine based ART regimens for HIV1 infected children is feasible in resource limited settings. There is improvement in growth parameter with the use of this therapy and prevention of deterioration in immune status. We are long way from winning a battle against this malady.

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