

# Pediatric HIV Infection

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## ABSTRACT

Acquired immunodeficiency syndrome (AIDS) is caused by human immunodeficiency virus (HIV). The pathologic hallmark of AIDS is severe immunosuppression; HIV infected infants and children suffer considerable morbidity and mortality. In addition to the catastrophic medical consequences, HIV infected infants and children along with their families suffer tremendous psychological upheaval owing to this chronic, often devastating illness. Because of the complexity and vast clinical spectrum of HIV infection, this article is limited to a general review of the pediatric HIV manifestations and management.

**Keywords:** Pediatric HIV/AIDS, Immunodeficiency, Anti-Retroviral agents.

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## INTRODUCTION

Children of today are the youth of tomorrow. Human immunodeficiency virus (HIV) affects this very precious generation and bear grave consequences to our future, our nation, the continent and the world at large. It will adversely impact the health statistics, economic growth and above all the morale of nations. The main thrust areas include the newborn component of prevention of parent to child transmission (PPTCT), follow-up of the HIV exposed infant, counseling mothers to decide the right infant feeding choices, and appropriate diagnosis of infected children. There is also need to focus on adolescents and HIV, especially with regard to primary prevention of HIV among teens by providing them with life skills, family right education and right messages on prevention of HIV.

## Review

HIV is increasingly affecting the health and welfare of children and undermining hard won gains in child survival in some of the highly affected countries. The roll out of pediatric HIV care and treatment is faced with 3 challenges: Lack of appropriate pediatric formulations, delayed infant HIV diagnosis and lack of skills of health professionals to manage cases.<sup>3</sup>

Children differ from adults in that they have high rates of viral replication, very high HIV-1 viral load, high rates of CD4 cell destruction, viral mutation, faster rate of disease progression and good immunologic response to anti retroviral treatment (ART).<sup>1</sup> Clinical symptoms vary widely

between infants, children and adolescents; most are asymptomatic at birth and do not have any abnormal findings. The diagnosis of HIV infection in an infant or child requires an integrated system of clinical, programmatic and laboratory services which are continuously monitored for quality and outcome. It is of critical importance to identify HIV exposure, establish a definitive diagnosis and institute treatment at the earliest in children <2 years as they can rapidly deteriorate and die.<sup>1,2</sup>

HIV infection by maternal transmission is increasing in the world due to the increase in infected women who are not receiving appropriate antiretroviral therapy. Factors which contribute to the poor prognosis of Mother To Child Transmission (MTCT) of HIV include: Immaturity of newborns immune system and more so if they are premature or the infection occurs intrauterine and lack of immunologic memory, thus, each contact with any infectious agent will lead to an immune response that will as a consequence give rise to a viral replication and shedding, thereby infecting new CD4 cells. Viral load is always higher than in infected adults and is more difficult to control.<sup>2</sup>

Maternal HIV antibodies can be passed to the child and last for up to 18 months, so HIV antibody testing does not reliably indicate HIV children less than 18 months of age. Positive HIV testing in this time period can indicate exposure to HIV or HIV infection in the child and where possible should be followed up with a viral test.<sup>4</sup>

Children are at higher risk of acquiring HIV by breastfeeding from HIV infected mothers. Children at any age are at risk of acquiring HIV during the entire time they are breast fed. Negative HIV antibody testing in a child who stopped breastfeeding at least 6 weeks prior to the test usually indicates that the child is not HIV infected. In young children normal CD4 counts are higher, age-dependent and more variable than in adults. For children under 5 years of age, it is best to use CD4%, rather than absolute count.<sup>5</sup>

## Diagnosis

According to WHO staging system HIV in children can be diagnosed and categorized in different steps of clinical stages which are as follows:

- Stage 1: Asymptomatic  
Generalized lymphadenopathy
- Stage 2: Chronic diarrhea >30 days without other cause  
Severe persistent candidiasis  
Failure to thrive

- Persistent fever >30 days
- Recurrent meningitis
- Bacterial (non-TB) pneumonia, abscess
- Stage 3: AIDS defining opportunistic infections
- Severe failure to thrive ('wasting')
- Progressive encephalopathy
- Malignancy
- Recurrent septicemia or meningitis.

Available research confirms that for infants acquiring HIV before or around delivery, disease progression occurs rapidly in first few months of life and often leads to death. The diagnosis of HIV infection in the exposed infants is difficult because routine screening tests like rapid test, ELISA will only detect the presence of maternal antibodies. Hence, these tests are useful in children >18 months. For children <18 months DNA-PCR (polymerase chain reaction) using dried blood spots (DBS) which detects viral DNA should be done.<sup>6</sup> Infants and children with confirmed HIV infection need a baseline CD4 testing and repeat every 6 months or earlier if clinically indicated. Immunoglobulin (Ig) levels and when possible, lymphocyte activation markers, complete the picture in each patient and aid the decision of the best antiretroviral therapy.<sup>1,2,4</sup>

Various studies have highlighted the utility of HIV core p24 antigen dipstick assay for detection in adults and pediatric screening, prediction of disease progression and monitoring the effectiveness of ART. It diagnoses HIV in infant plasma samples with minimal operator input. It uses a visual carbon based reporter label functionalized with antibodies against HIV p24 antigen and a heat shock pretreatment step incorporated into the assay to disrupt immune complexes. It has given the sensitivity of >90% and specificity of 99% which indicates that this assay is suitable for further development to meet infant diagnostic need in affected countries.<sup>9</sup>

## Treatment

Effective management of HIV in children is essential for affected children. With the advent of ART, HIV has become a chronic manageable disease from what was considered as a fatal disease. However, ART is very expensive. Thus, to ensure effective management of HIV infected children, it is essential that ART drugs are made available and are affordable. Most of the ARVs in children have to be prescribed as mg/kg body weight or mg/body surface area and doses need to be adjusted as the child grows older.<sup>10</sup>

Decision making process for initiation of ART in infants and children depends on clinical and immunological assessment. If available, using the results of CD4 count is

valuable in deciding the need for ART in less ill children. First line ART recommended in children is zidovudine (AZT) + Lamivudine (3TC) + Nevirapine (NVP)/Efavirenz (EFV) or Stavudine (d4T) + Lamivudine (3TC) + Nevirapine (NVP)/Efavirenz (EFV).<sup>7,8</sup>

EFV is recommended in HIV and TB coinfection. It should not be used below 3 years and in adolescent girls. AZT + d4T should not be used together. AZT is not recommended in anemic children. Recommendations for initiating ART in HIV infected infants and children depend upon clinical stage and availability of immunological markers. In the context where lack of proper awareness regarding HIV/AIDS has led to a lot of social discrimination, psychological support is very important for HIV affected children and their families. Moreover many of these children are becoming orphans having lost both the parents to the disease and require lot of economical and psychological support.<sup>7,10</sup>

HIV infected children are more susceptible to diseases caused by infectious agents and are more likely to develop severe complications when compared to immune competent children. Thus it becomes imperative to immunize them against all vaccine preventable diseases. HIV infected infants and children can safely receive most childhood vaccines although effective response depends upon degree of immune suppression. National AIDS Control Organization (NACO) recommends routine immunization to all HIV exposed infants and children.

## CONCLUSION

Current HIV scenario in children in the world is grim. Effective PPTCT programs, good diagnostic facilities and accessible as well as affordable ART are the need for the hour.

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