The Journal of
OBSTETRICS AND GYNECOLOGY of India

J Obstet Gynecol India Vol. 60, No. 3 : May - June 2010 pg 221-224

Original Article

Efficacy of Single Dose Nevirapine in Prevention of Mother to Child Transmission of HIV-1

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Abstract

Objective(s): To evaluate the efficacy of single dose nevirapine in the prevention of mother to child transmission of HIV-1 in 30 HIV-1 infected parturients. *Material and Method(s):* This study was necessary since any study has not been conducted in an Indian population, were usually women are not offered antiretroviral therapy during pregnancy but only peripartum. East Godavari District of Andhra Pradesh, India, has the highest prevalence (2.5%) of HIV-1 positive antenatal women, according to NACO estimations. Therefore, the study was conducted in Lutheran General Hospital, Rajahmundry, East Godavari District, Andhra Pradesh, India, at a 50- bedded hospital offering health care to people living with HIV/AIDS. One year prospective study with 30 primigravidae infected with HIV-1, were planned for elective cesarean section. Single dose 200mg tablet was administered two hours prior to the cesarean section and all babies were given nevirapine syrup 2mg/kg within 72 hours of birth. Babies were tested for HIV-1 at one and two weeks of birth. *Result(s):* All the women were primigravidae. Nineteen babies born to these mothers tested positive for HIV-1 after two weeks, confirming the transmission rate to be 63.33% (95% CI of proportion 45.36% - 78.15%). Thus, the efficacy of single dose nevirapine in preventing mother to child transmission was found to be 36.67%. Neonatal morbidity was more in those babies that were HIV positive. Two neonatal deaths occurred in two weeks and both babies were HIV-1 positive. *Conclusion(s):* Single dose nevirapine is associated with a lower efficacy in preventing mother to child transmission of HIV-1.

Keywords **:** HIV, mother to child transmission, prevention, single dose nevirapne.

Introduction

The rising prevalence of HIV among pregnant women in India is of concern. Prenatal voluntary counseling and HIV testing is critical to prevent mother-to-child transmission of HIV (PMTCT)[1]. HIV/AIDS epidemic has become generalized in low resource settings in India where majority of all maternal-fetal transmission of HIV infection occurs. Global efforts to scale-up PMTCT are underway. However, mechanisms to maximize screening of HIV-1 positive women for nevirapine treatment and other interventions, are not clear.

There is a widening gulf between the effectiveness of interventions for preventing mother-to-child transmission of HIV. Compared with long-course, triple antiretroviral regimens used in Brazil, Europe, and the United States, most developing countries like Sub-Saharan Africa[2] and India use a less effective regimen con-

Paper received on : 25/10/2008 accepted on : 26/12/2009

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sisting of single-dose nevirapine (sdNVP). Furthermore, the documentation of unacceptable levels of resistance following this regimen makes it prudent to review current PMTCT strategies. Not only is it necessary to review the use of sdNVP for PMTCT, but efforts to minimize breast milk transmission of HIV should also be enhanced.

This study was, therefore, undertaken with the aim of evaluating the efficacy of single dose nevirapine in the prevention of mother to child transmission of HIV-1 infection in India.

Material and Method

This study was conducted because in India usually women are not offered antiretroviral therapy during pregnancy but only peripartum. The study was conducted in Lutheran General hospital, Rajahmundry, East Godavari District, Andhra Pradesh, a 50-bedded hospital offering health care to people living with HIV/AIDS. The study design was a one year prospective study with 30 primigravidae infected with HIV-1, planned for elective cesarean section and who had not received any antiretroviral therapy during the antenatal period. All the women were in stage I of the disease, with a viral load between 800–1000 copies/ml and CD4 T cell counts above 500. None of these patients received antiretroviral therapy during the antenatal period, either due to financial constraints or they presented very late to us. Moreover, at our centre antiretroviral drugs are not available to patients free of cost but available at a subsidized rate.

The American College of Obstetrics and Gynecology recommendations were followed to deliver HIV infected parturients. Hence, they were planned for elective cesarean section at 38 weeks of gestation and admitted to the hospital a day prior to the planned surgery. The parturients were kept fasting for six hours prior to surgery. Two hours prior to the surgery all women received single dose of 200mg of Tablet nevirapine orally. Lower segment cesarean section was performed under sub-arachnoid block and all the babies were delivered outside in caul, thus reducing the risk of intrapartum transmission further. After the initial resuscitation, each baby was given a bath immediately before transferring the baby to the mother.

All the babies were put on artificial feeds and breast feeding was totally avoided. They also received single dose of syrup nevirapine 2mg/kg within 72 hours. All the neonates were tested for HIV-1 infection using polymerase chain reaction assay at one week of life and then a second test for the same at two weeks of life. All neonates were also observed for morbidity and mortality.

Data thus obtained was analyzed using appropriate statistical tests and following observations were recorded.

Results and Analysis

This one year prospective study had 30 primigravidae infected with HIV, having viral load between 800–1000 copies/ml and CD4 T cell count above 500. Majority of them were in the age group of 20 -25 years, the youngest being 19 years of age and the eldest 32 years. Hence, the mean age in the study group was 27+2 years. (Table 1)

Table 1
Distribution of HIV positive parturients according to age group

Age in Years	No. of parturients
< 20	1
20 – 25	22
26 – 30	5
31 – 35	2
> 35	Nil

Out of the 30 babies born to these women 19 tested positive for HIV infection at two weeks of life; they were tested for HIV infection by polymerase chain reaction assay at one week of life and then a second test for the same at two weeks of life. Thus, the transmission of HIV in the study group was found to be 63.33% (95% Confidence Interval of proportion [CI] 45.36 – 78.15%). Hence the efficacy of sdNVP in preventing mother to child transmission was 36.67%. (Table 2)

Average birth weight of the babies born to these mothers was found to be 2.5+0.5 kg. Apgar score of all the babies was above seven at one minute. Nineteen (63.33%) babies tested positive for HIV at one and two weeks of life,. 23 (76.67%) babies had physiological jaundice. 5 (16.67%) had acute diarrhea within two

Table 2

Transmission rate of HIV and efficacy of nevirapine in our study

No. of HIV positive particulars	No. of HIV positive neonates	Transmission rate	Efficacy of nevirapine
30	19	63.33% (95%CI 45.36 – 78.15%)	36.67%

Table 3

Distribution according to neonatal morbidity and mortality

Neonatal morbidity and mortality	N = 30	%
Physiological jaundice	23	76.67
Acute diarrheal disease	5	16.67
Oral thrush	3	15.79
Meningitis	1	3.33
Neonatal death	2	6.66
Birth asphyxia	Nil	0

weeks of life out of which one (3.33%) baby died of dehydration. Three (15.79%) had oral thrush in the second week but were treated. One (3.33%) baby who came back to us at two weeks with failure to thrive, suppurative ear discharge and high grade fever; was referred to a tertiary care center where he was diagnosed with cryptococcal meningitis; this baby, however, died after three days of treatment. All these babies who had acute diarrhea, oral thrush and meningitis, tested positive for HIV infection. (Table 3)

Discussion

HIV mother to child transmission (MTCT) can occur antenatally (in-utero), intrapartum (labor & delivery) and postpartum (breast feeding). While 25 to 35% of transmission occurs antenatally, mainly in the later part of pregnancy, 70 to 75% of transmission occurs during labor and delivery[3]. India can expect 75,000 HIV infected neonates to be born every year. Reducing this burden of pediatric morbidity and the prevalence of HIV in the community is important for ensuring that the results of reproductive and child health programs are not nullified swiftly[3].

Earlier, options for preventing MTCT were limited, but now, the emergence of Highly Active Anti-retroviral Therapy (HAART) has revolutionized the field of prevention strategies in mother to child transmission of HIV However, most developing countries like Sub-Saharan Africa[2] and India still use a less effective regimen consisting of single-dose nevirapine due to limited resources. This study was, therefore, undertaken with the aim of evaluating the efficacy of single dose nevirapine in the prevention of mother to child transmission of HIV-1 infection in India, where usually women are not offered antiretroviral therapy during pregnancy but only peripartum.

In our study, out of the 30 babies born to 30 HIV positive parturients, 19 tested positive for HIV infection at two weeks of life. The mother to child transmission rate of HIV was found to be 63.33% (95% CI of proportion 45.36 – 78.15%). Thus, the efficacy of nevirapine was

found to be 36.67%. HIVNET 012 randomized trail reports the efficacy of single dose nevirapine to be 49%[4] thereby pointing out a lower efficacy of single dose nevirapine in the prevention of mother to child transmission of HIV. This lower level of efficacy can be attributed to the emergence of high level of viral resistance to nevirapine[5]. The emergence of resistant virus following nevirapine use is a concern, occurring in up to 60% of the mothers and 50% of the infants following a single dose. Addition of zidovudine and lamivudine for 4-7 days postpartum can reduce the risk of resistance to 10%[5]. In another study, transmission risk was 6.8% (95% CI, 5.2 – 8.9%) among 761 mother-infant pairs that received the complete zidovudine regimen alone, and 3.9% (95% CI, 2.2-6.6%) among 361 mother-infant pairs that received the complete zidovudine regimen combined with other antiretrovirals, usually nevirapine. The overall transmission risk from this cohort, including all antiretroviral prophylaxis combinations, was 10.2%[6].

Average birth weight of the babies born to these mothers was found to be 2.5 + 0.5 kg. Acute diarrheal disease, meningitis, oral thrush was the morbidity observed in the HIV positive babies. There were two neonatal deaths – one due to acute diarrhea and the other due to meningitis, and both the babies tested HIV positive. The study by Johnson et al[7] has reported six neonatal deaths.

Ten years after the first trails demonstrating the efficacy of zidovudine (ZDV) for the prevention of mother-to-child transmission of HIV, different antiretroviral approaches have been validated in resource-limited settings. Remarkable progress has been made in the last four years, with trails demonstrating the efficacy of antiretroviral prophylaxis assessing the efficacy and viral resistance patterns of short-course regimens combining ZDV plus sdNVP. The field efficacy of a short course of ZDV plus lamivudine (3TC), together with sdNVP, has also been recently reported, with 6-week transmission rates below 5% for the first time in Africa in a population in which 40% breast-fed8. The World Health Organization has recently reiterated its recommendations for its use for PMTCT in resource constrained settings within a wide panel of antiretroviral regimens, to allow greater and quicker population coverage[9].

Conclusion

The rising prevalence of HIV among pregnant women in India is of great concern. It should be the endeavor of the care provider to take care of the prospective mother and her unborn child and make pregnancy and labor as safe as possible. The woman should be offered the various intervention strategies available to prevent mother-to-child transmission of HIV.

The use of single dose nevirapine for PMTCT used in resource limited settings is associated with lower efficacy and emergence of higher rates of viral resistance to nevirapine. The efficacy of a short course of ZDV plus lamivudine (3TC), together with sdNVP, has been recently reported, with six weeks transmission rates below 5% to combat the problem of viral resistance to nevirapine.

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