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Original Research Article

Seroprevalence of human immuno-deficiency virus infection in babies born to HIV positive women

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ABSTRACT

Background: Parent to child transmission (PTCT) is a major route of human immuno-deficiency virus (HIV) infection in children. PTCT contributes to about 4% of HIV infections in India. Prevention of parent to child transmission (PPTCT) of HIV involved testing of all pregnant women for HIV status, administration of antiretroviral therapy (ART) to HIV positive pregnant women, antiretroviral (ARV) prophylaxis to their infants and safe obstetric and infant feeding practices. Purpose of the study was finding out the mother to child transmission rates in our institution and whether we have been able to achieve the World Health Organization (WHO) target.
Methods: This was a descriptive retrospective cohort study conducted in the Department of Obstetrics and Gynaecology, Government Medical College, Kozhikode, Kerala, India. Data of HIV positive mothers and infants born to them was collected using records.
Results: Out of the 60 pregnancies, we had 23 new cases (40.3%) and 34 mothers (59.6%) known HIV positives becoming pregnant. 39.5% had taken ART for <24 weeks and 60.4% had taken ART for >24 weeks. There were 48 live births. At 6 weeks, 3 babies had tested positive by HIV total nucleic acid (TNA) polymerase chain reaction (PCR). One out of these expired at 1 week of diagnosis.
Conclusions: Poor maternal adherence to ART, unsuppressed viral load, lack of ART during pregnancy, lack of ARV prophylaxis for the infant, poor antenatal visits were associated with HIV infections among children born to HIV positive mothers.

Keywords: Human immuno-deficiency virus, Parent to child transmission of HIV, Antiretroviral therapy

INTRODUCTION

As per India human immuno-deficiency virus (HIV) estimation report 2020, national adult HIV prevalence was estimated 0.22% in 2020. Prevalence of 0.54% in 2000-2001, had decreased to 0.33% in 2010. Even with this low prevalence, India has the third highest burden of HIV in the world with an estimated 23.19 lakh in 2020.[1-3] As a signatory to the United Nations (UN) declaration, India is committed to achieving the "end of acquired immune deficiency syndrome (AIDS) as a public health threat" by 2030.[3,4] Parent to child transmission (PTCT) is a major route for transmission of new HIV infections in children. PTCT contributes to about 4% of HIV infections in India. Children born to HIV positive mothers acquire HIV infection from their mothers, either during pregnancy, labor/delivery or through breastfeeding which is largely preventable.

The prevention of mother to child transmission (PPTCT) programme involved testing of all pregnant women for HIV status, administration of antiretroviral therapy (ART) to HIV positive pregnant women and ARV prophylaxis to their infants and safe obstetric and infant feeding practices

to prevent mother to child transmission.[5,6] We have integrated counselling and testing centres (ICTC) acting as care and support services for HIV positive women to prevent PTCT of HIV. There has been a 55% decline of annual new infections among children between 2010 and 2020. The final MTCT rate in 2020 was found to be at 27.4%, coming down from 40% in 2010 against a target of 5%.

According to the recent NACO guidelines, preferred drug regime in pregnant and breastfeeding women with HIV is the TLD regime – tenofovir (300 mg) + lamivudine (300 mg) + dolutegravir (50 mg). TDF + 3TC + DTG is given once daily. ART reduces the maternal viral load and loads the foetus with ARVs that prevent the transmitted virions from replicating.[5,6] Risk of HIV transmission from mother to child in babies born to mothers who are not on ART and breast feeding was 30-45%, which could be reduced to 1-2% by starting triple drug ART and no breast feeding.[5,6]

Counselling on adherence to ART throughout the period of pregnancy is needed. Viral load testing of all HIV positive pregnant women should be done during 32-36 weeks of pregnancy (regardless of duration of ART). Once the babies are born, HIV-exposed infants are categorized as the following.

Low risk

Infants born to mothers with suppressed viral load.

High risk

Born to HIV-positive mother not on ART, maternal viral load not done after 32 weeks of pregnancy, maternal viral load not suppressed after 32 weeks of pregnancy, and mother newly identified as HIV positive within 6 weeks of delivery.

ARV prophylaxis is advised to the infant based on the risk of HIV transmission.

Early infant diagnosis of HIV

Maternal HIV antibodies transferred passively to the infant usually persist for nearly 9–12 months in the infant, sometimes upto 18 months. Thus, children born to HIV-infected mothers will test positive for HIV antibodies regardless of their own infection status.

NACO recommends the use of total nucleic acid (TNA) polymerase chain reaction (PCR) test that detects HIV pro-viral DNA and RNA on a dried blood sample (DBS) from the infant for diagnosis of HIV-1 infection. This test has a sensitivity of 99% and specificity of 98%.

Rationale for the study

Rationale for the study was to find out the mother to child transmission rates of HIV infection in our institution and whether we have been able to achieve the WHO target of 5%.

Primary objective

Primary objective was to determine the seroprevalence of HIV infection in babies born to HIV positive mothers.

Secondary objectives

Secondary objectives were: to analyse the risk factors affecting the seroprevalence, and to study the socio demographic factors in HIV positive mothers.

METHODS

This was a descriptive retrospective cohort study conducted in the Department of Obstetrics and Gynaecology, Government Medical College, Kozhikode, Kerala, India, for a period of 10 years, from January 2013 to December 2022. All HIV positive pregnant women were enrolled at the PPTCT clinic of our hospital. They were tested for CD4 count and started on ART.

Viral load testing was done during 32 to 36 weeks of pregnancy (regardless of duration of ART). After delivery, ARV prophylaxis was advised to the infant based on the risk of HIV transmission. Single-drug ARV prophylaxis, nevirapine (NVP) was advised in infants with low risk for HIV transmission from birth for 6 weeks (regardless of type of feeding). This was extended to 12 weeks if duration of ART was less than 24 weeks.[6]

Dual-drug ARV prophylaxis (NVP and zidovudine) was advised in infants with high risk for HIV transmission, the duration of which depends on the type of feeding (for 6 weeks if on exclusive replacement feeding (ERF) and 12 weeks if on exclusive breastfeeding (EBF)). Babies were initiated on cotrimoxazole prophylaxis at 6 weeks till 18 months.

The HIV exposed infant was tested for HIV TNA PCR at 6 weeks and if DBS sample was positive for HIV, then a repeat DBS sample was tested for HIV TNA PCR. If two DBS samples were positive, baby was declared as HIV positive and initiated on lifelong ART. If the test was negative at 6 weeks, an antibody testing was done at 6, 12 and at 18 months. If any test turned positive, baby was retested with TNA PCR.[3]

Data of the analysed variables was collected by going through the records for 10 years from January 2013 to December 2022. A semi structured data collection proforma was made by adapting the national HIV exposed infant follow-up form to compile the required information. Informed consent was obtained from the record personnel at ICTC, and hospital superintendent. Data was collected by the record reviewer using a checklist of antenatal and exposed infant follow-up tools. The investigators collected

the data and followed the process of data quality during data collection.

Inclusion criteria

All HIV infected pregnant women who reported to the medical college, Kozhikode ICTC for antenatal care and underwent delivery or termination of pregnancy/miscarriage from this department were included. Women delivered at the institution, later diagnosed to be HIV positive in the postnatal period were also included.

Exclusion criteria

All infants exposed to HIV during pregnancy/ breastfeeding who did not have confirmation tests until the end of data collection were not included. Mothers who delivered outside and then registered at ICTC; Kozhikode were also not included.

Data analysis

Data was coded, summarized and analysed using statistical software statistical package for the social sciences (SPSS). Variables are presented as frequency and percentages. To identify association between variables, Chi square test/Fischer's exact test was used as appropriate. Strength of association was estimated using odds ratio. For all the statistical tests, a two-sided probability of $p<0.05$ was considered for statistical significance. All p values were derived with a 95% confidence interval.

RESULTS

There was a total of 60 pregnancies, including a study population of 57 HIV positive women. 3 of them conceived twice during the study period.

As shown in Table 1, 26 patients (45.6%) were in the age group of 21-30 years. 6 patients (10.5%) aged less than 20 years and 2 patients (2.5%) were above 40 years. 59 HIV positive women were antenatal at the time of enrolment into the study and 1 woman was identified to be HIV positive in the postnatal period.

56.1% women had completed secondary level of schooling. 24.5% (n=14) were graduates. Only 4 women (7%) were illiterate and 7 women (12.2%) had completed primary schooling.

75% (n=43) were housewives and 14.03% (n=8) employed.

22 (64.7%) had acquired the infection from spouses.

Coming to the duration of ART intake, 19 (39.5%) had taken ART for <24 weeks and 60.4% (n=29) had taken ART for >24 weeks.

Table 1: Maternal characteristics.

Characteristics	Number	%
Age (years)		
<20	6	10.5
21–30	26	45.6
31–40	23	40.3
>40	2	3.5
Educational status		
Illiterate	4	7
Primary	7	12.2
Secondary	32	56.1
Graduate	14	24.5
Gestational age at presentation (weeks)		
<13	27	45.7
13–26	20	33.8
26–36	8	13.5
>36	4	6.7
Order of pregnancy		
Primi	30	50
Second	19	31.6
Third	7	11.6
Fourth	2	3.3
Grand multi	2	3.2
Recent detection	23	40.3%
Known HIV +ve	34	59.6%

Out of the 57 women, we had 23 new cases (40.3%) and 34 (59.6%) were already known cases. As shown in Table 2, out of 34 known HIV positive women becoming pregnant, 70.5% (n=24) had HIV positive spouses and 9.4% (n=10) were married to HIV negative men. Considering the mode of transmission in these 34 women, 11 (32.3%) had contracted the infection by PTCT from their mothers. Of these 11 women, all were on ART since birth. There were 10 live births in this group, 7 chose for EBF and 3 had ERF, all babies tested negative for HIV in this group.

Nearly 50% of women were primigravidae. 31.6% were gravida 2 and 11.6% gravida 3. There were 2 grand multiparas.

45.7% women (n=27) registered in the first trimester and 33.8% (n=20) between 13-26 weeks and 13.5% (n=8) at 26-36 weeks, and only 4 patients (6.7%) had their diagnosis and registration at ICTC after 36 weeks.

Considering obstetric outcomes of the 60 pregnancies, 48 were (80%) live births. 7 (11.6%) had MTP done and 8.3% (n=5) had spontaneous miscarriage. 28 women (58.3%) had a normal vaginal term delivery and 20 (41.6%) underwent caesarean section for obstetric indications.

All 48 babies (100%) received nevirapine prophylaxis for 6 weeks. 8 babies received prophylaxis for 12 weeks. Cotrimoxazole prophylaxis was taken by 100% of the infants from 6 weeks to 18 months. 28 babies (58.3%) had

EBF and 20 babies was on ERF (41.6%). None had mixed feeding practices.

Table 2: Maternal characteristics in already HIV infected women (n=34).

Characteristics	Number
HIV status of husband	
Positive	24
Negative	10
Mode of transmission	
MTCT	11
Prev. husband	6
Husband	16
Other contacts	1

Infant outcomes

As shown in Table 3, there were 48 live births out of 60 pregnancies. 45 babies were tested HIV negative.

Table 3: Obstetric outcomes.

Obstetric outcomes	N	Percentage
Live births	48	80
MTP	7	11.6
Abortion	5	8.3
Normal labour	28	58.30
LSCS	20	41.60
Duration of ART in mother (weeks)		
<24	19	39.5
>24	29	60.4
Feeding practices		
EBF	28	
ERF	20	
HIV status in infants		
Positive	3	6.20
Negative	45	93.70
Infant outcomes		
Expired (HIV + infant)	1	
Lost to follow up	1	
Alive	46	

At 6 weeks, 3 babies had tested positive by HIV TNA PCR. Of this 1 baby expired at 1 week of diagnosis. The other 2 babies were started on ART and repeat testing was done at 18 months where they tested negative for antibody. Since this was a discordant result, both babies were subjected to TNA PCR at 18 months and result came as positive, hence they were continued on ART.

Statistical analysis of risk factors revealed that duration of ART and CD4 count were significantly associated with HIV infection ($p<0.05$).

Patients with duration of ART intake <24 weeks (OR=12.5) and CD4 count <350 (OR=9.25) were more likely to have babies infected with HIV.

DISCUSSION

The objective of the study was to estimate the prevalence and related variables of HIV infection in infants born to HIV positive women. In our study, the prevalence of HIV infection among infants born to HIV positive mothers was 6.2% (3 out of 48 live births). This finding was similar to studies conducted in West Gojjam 6.1%, Awasa 4.16% and Gondar, Ethiopia 5.5%.[7-9] Ukraine showed 1.6% and France 1.5%.[10,11] The disparity could be attributed to the high coverage of PPTCT interventions in high income countries versus limited access, lack of awareness, and poor service quality in resource limited African countries. Our finding is markedly lower than those of studies in Jima 17% and Nigeria 34.4%.[12,13] The route of HIV infection from mother to child is during pregnancy period, delivery period and breastfeeding period. It is believed that about 2/3rd are infected during pregnancy and delivery and about 1/3rd are infected during breastfeeding.

According to a study by Tirineh et al, the infants who received mixed breast feeding were at more than 5 times higher risk than those who received only breast feeding.[14] This could be due to the fact that such infants may develop diarrheal disease and intestinal mucosal lacerations that results in viral transmission. None of our mothers used mixed feeding practices. We did not find any significant association between educational status and HIV transmission, but Tirineh et al study showed a 1.36 times stronger association of MTCT of HIV among infants of uneducated mothers compared with those of educated mothers.[14] This could be because as a mother's educational level increases, so does her understanding of MTCT.

HIV exposed infants born from mothers whose CD4 count ≤350 is almost 2.7 times more infected by HIV than infants born from mothers' CD4 count >350. This is due to higher viral load.[15] This study showed that HIV positivity in infants was seen in those with maternal CD4+ cells less than 350/mm and irregular adherence to ART which leads to probably increased viral load in the mother that may expose the fetus for HIV transmission.

In our study there were three babies who were tested to be HIV positive. First baby presented at 6 weeks to pediatrics department with symptoms suggestive of HIV infection. The baby was tested and found to be HIV positive, the parents were then retested and found to be positive. This baby expired in 1 week. In the second case, mother was a late seroconverted. She tested negative for HIV in the antenatal period. Her husband had to undergo a surgery when she was 8 months pregnant, and he tested positive for HIV. The patient's sample was then sent for PCR which showed a positive result. She was put on ART at 38 weeks, delivered at 39 weeks and baby was put on ERF, baby tested positive at 6 weeks. In third case, the mother was a known HIV positive, who presented at 25 weeks of pregnancy, was started on ART, but was non-compliant with ART.

CONCLUSION

The prevalence of HIV positive infants born to HIV positive mothers in this study was lower than African countries, but more than European countries. Poor maternal adherence to ART, unsuppressed viral load, lack of ART during pregnancy, lack of ARV prophylaxis for the infant, poor ANC visits are associated with high seroprevalence.

Recommendations

Promoting early introduction of ART, ARV prophylaxis for infants, adherence to ANC and promoting safe feeding practices will help us achieve EMTCT by 2030 as per NACO policy.

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