Studying PPTCT Services, Interventions, Coverage and Utilization in India

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ABSTRACT

Background and Objectives: Risk of vertical transmission (largest source of HIV in children) reduces from 33% to 3% with effective PPTCT interventions. NACP III has got an objective of testing all pregnant women for earliest linkage with PMTCT. Study was carried out to find out PPTCT service coverage, drop-outs, interventions efficacy with other determinants. Materials and Methods: At ICTCs, registered ANCs are counseled and tested for HIV. HIV+ve ANCs are linked to services and followed-up for institutional delivery, sdNVP, nutrition and children testing. HIV+ve ANCs since 2004 subsequently delivered till December 2009 and their exposed children in PPTCT-VSGH constituted study cohort. Results: 29281 ANCs registered, 69.7% were counseled pre-test, 100% of them tested, 94.9% were counseled post-test. 60.5% were detected in 3rd trimester. CD4 testing was carried out in 71.6% HIV+ve ANCs. 81 ANCs were detected HIV+ve inclusive of 11 unregistered cases. 72 pregnancy outcomes reported institutionally, 77.6% were caesarian sections. Out of 59 live births, 56 sdNVP-MB-Pair were given. 88.1% children were traced till 18 months, 76.3% of live births were alive, 40.7% of live births were tested. 1 was found HIV+ve with history of adherence to all prescribed PPTCT guidelines. Conclusions: PMTCT services – counseling and testing should be provided to all ANCs. EDD-based tracking, institutional deliveries, postnatal counseling to be encouraged along with complete MB pair coverage, capacity building of concerned staff regarding delivery of HIV+ve ANCs and exposed children tracking.

Key words: HIV in exposed children, HIV testing of pregnant women, MB pair, PMTCT

INTRODUCTION

Mother to child transmission of HIV (MTCT) is the largest source of HIV infection in children below 15 years of age.[¹] According to NACO, about 30,000 infants are estimated to acquire HIV infection each year.[²]

Infection to newborns is transmitted by mother perinatally; however, considering the role of the male partner in the transmission of infection to a woman, in India it is appropriately termed as parent to child transmission (PTCT).

Gujarat HIV Sentinel Survey (HSS), 2007, covering 9517 antenatal care-seeking women (ANCs), showed the median positivity rate of 0.46% HIV infection among ANCs.[³]

In the absence of intervention, the vertical transmission rate is estimated to be 30–33% which drops down to around 3–5% with effective antenatal, intranatal and postnatal prevention of parent to child transmission of HIV (PPTCT) interventions. Intrapartum Nevirapine (NVP) antiretroviral (ARV) prophylaxis and viral load-based antiretroviral therapy (ART) to ANCs, mode of delivery, and infant feeding are considered to be major determinants for seropositivity in children born to these women.[⁴]

National AIDS Control Programme Phase III (NACP III) has got a long-term objective of testing of 22 million by 2012 inclusive of all ANC testing.[³]

Latter is being done with the purpose of linking seropositive ANCs with ART as soon as possible in order to derive maximum benefit to prevent opportunistic infections and to provide single-dose nevirapine (sdNVP) ARV to both the mother and the baby to prevent vertical transmission.

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In Gujarat, ANC testing is now scaled up to 400 Integrated Counseling and Testing Centers (ICTCs) from 14 in 2005–06 including 289 stand-alone and 111 facility-integrated ICTCs. Estimated annual pregnancies in Gujarat are estimated to be around 14 lakh out of which around 55% deliveries take place in the public sector.[8]

The present study has been carried out with the following objectives:

1. To assess various drop-outs in the PPTCT service uptake in an ICTC in tertiary healthcare facility, owing to its complex service delivery system.
2. To find out the efficacy of these interventions in terms of reducing transmission rates in exposed children.

**MATERIALS AND METHODS**

Pregnant women (PW) registering at various health facilities are given pretest counseling at ICTCs in groups with an average of three women given 20–40 min. each on average. With obtained verbal consent, they are tested for HIV by three compulsory rapid tests, and results whether positive or negative are shared by the ICTC counselor along with individual posttest counseling. The order of using these tests is prefixed by National AIDS Control Organization (NACO) and subsequently by respective State AIDS Control Society (SACS). In the present study, the first kit used from the year 2006 was NACO provided and kits 2 and 3 were procured by Ahmedabad Municipal Corporation AIDS Control Society (AMCACS). Over the study span, used kit 1 ranged from Genedia EIA kit, MicroElisa, Qualisa EIA, Eliscan EIA, HIV ELISA Comb, and CombAids while kit 2 ranged from CombAids, MicroElisa, HIV ASE EIA, HIV Tridot, Retroscreen Rapid, Retroquick and Eliscan EIA. Kit 3 ranged from HIV Tridot, CombAids, Retroquick, and Eliscan EIA.

While seronegative PW are counseled on HIV prevention and risk reduction behavior, HIV seropositive PW are additionally provided psychosocial support on disclosure issues and spousal testing, linkage to TB testing and ART services, importance of institutional delivery and intrapartum sdNVP, postpartum follow-up, and infant feeding.

During the delivery of these seropositive PW, an sdNVP regime of ARV (200 mg tab.) is given to the woman at the onset of labor and NVP syrup (2 mg/kg of body weight) is offered to the babies within 72 h of the birth.[7]

Exposed children are tested at the completion of 18 months through HIV rapid tests for seropositivity confirmation.[7]

In Gujarat, 10 districts fall in category A and B as per the categorization (2006) based on results of surveillance for last 3 years;[9] therefore, the seropositive PW detected since the inception of services (2005) and subsequently delivered till June 2008 in these 10 districts constituted the cohort for study objectives. Babies born to them were followed up till 18 months for the confirmation of their seropositivity status.

Thus, this is an observational type of study with retrospective–prospective design.

**RESULTS**

From 2004 to December 2009, in PPTCT–ICTC at VS General Hospital (VSGH), Ahmedabad, the flow of ANCs tested for HIV along with pre- and posttest counseling, ANCs tested HIV seropositive, and direct-in-labor cases and their pregnancy outcomes along with sdNVP mother–baby (MB) pair coverage were found, as per Figure 1.

All 81 HIV-positive ANCs (HIV+ve ANCs) were married at the time of detection.

Spousal counseling and subsequent HIV testing was successfully carried out in 75 cases (92.6%). Forty-nine (65.3%) couples were found to be concordant couples.

The occupation-wise break-up of HIV+ve spouses turned out to be as per Table 1.

A total of 98.8% of all HIV+ve ANCs belonged to the 18–30 year age group;

35.8% of all HIV+ve ANCs were illiterate and the rest had got at least primary education or more.

Besides that, 77.8% of HIV+ve ANCs belonged to urban Ahmedabad while 13.6% came from other regions of the state and 8.6% were from out of Gujarat.

| Table 1: Occupation-wise break-up of seropositivity results of spouses of HIV+ve ANCs |
|-----------------------------------------|-------------------------------|----------------------|------------------|
| Occupation of spouse (of HIV+ve ANCs)   | Spouse tested (no.) | Detection of HIV+ve spouses (concordant couples) (No.) | HIV+ve spouses (%) |
| Agriculture and unskilled workers       | 54               | 33                  | 61.1             |
| Truck, taxi, auto drivers, and cleaners | 12               | 12                  | 100.0            |
| Industrial and factory workers         | 2                | 1                   | 50.0             |
| Hotel staff                            | 2                | 1                   | 50.0             |
| Service                                | 5                | 2                   | 40.0             |
| Total tested spouses                   | 75               | 49                  | 65.3             |
Nine HIV+ve ANCs reported having any STD, genital ulcer being the commonest (4) followed by painful swollen inguinal glands (2), and warty growth on genitals (2). Three spouses also reported history of these STDs, one in each aforesaid syndrome category.

Active married life varied from 2 to 5 years in case of 45.7% of HIV+ve ANCs while 37% of HIV+ve ANCs had an active married life of 18 months or less.

A total of 60.5% of HIV+ve ANCs were detected first time during their third trimester, 30.9% were detected in their second trimester, and 8.6% in the first trimester; 46.9% of detected HIV+ve ANCs were nulliparous.

CD4 testing of HIV+ve ANCs was carried out in 58 HIV+ve ANCs (71.6%) and 24.1% of such ANCs were found eligible for ART initiation based on the existing criteria; half of these eligible ANCs actually started ART before delivery.

Out of 81 HIV+ve ANCs, 72 pregnancies met with the outcome while 2 ANCs were yet to deliver at the time of data analysis.

The year-wise pregnancy outcome and location-wise breakup of these ANCs was as per Table 2.

sdNVP was given to 64 mothers and 59 babies collectively. Excluding the MTPs and still births, in cases of 59 live births, sdNVP MB pair was given in 56 cases (95%) and 9 of those MB pairs were given in direct-in-labor cases.

Out of 59 live births (exposed children), 95% women chose alternatives of breastfeeding, like formula feeding; 3.4% women opted for exclusive breastfeeding while 1.6% went on with the mixed feeding.
Weight was found to be between 2 and 3 kg in 59.3% of exposed children, followed by 30.5% babies weighing 3 kg or more and 10.2% babies weighing less than 2 kg.

Tracing of exposed children was followed as per Figure 2.

During the tracking time, 7 babies (11.9%) were reported dead (2 within 12 h after birth, 4 within the first month of life, and 1 within the first year of life). All these babies reported to be of low birth weight and MB pair was given in each case.

The HIV+ve child was female, weighing 3.0 kg at birth, was delivered by caesarean section and was not breastfed. She was given formula feeding. The CD4 count of her mother at the time of delivery was 351 and hence ART was not started antenatally; MB pair was given as per the guidelines. The spouse was also found to be HIV+ve.

**DISCUSSION**

In Ahmedabad Municipal Corporation (AMC), PPTCT services are functional in VSGH since 2004. Initially, the services were available at medical colleges/tertiary facilities that are responsible for the urban profile in majority of ANCs.

Seropositivity in ANCs is considered to be a sensitive indicator of epidemic prevalence in the general population. As the HIV pandemic is believed to be of concentrated nature in Gujarat with urban predominance, PPTCT centers like the one in VSGH, over the years, catered one of the maximum testing load and service uptake in the same regard and gradually from other regions of the state and some adjoining states too.

Consecutively, mechanisms involved were complex – liaising among the key service providers like counselors, doctors-on-duty, staff nurses, and laboratory technicians who individually come in contact with the ANCs at different phases of service delivery. The PPTCT center is well established for more than 5 years now and the service uptake in terms of pretest counseling of registered ANCs, testing of every counseled ANC, and subsequent posttest counseling is ever improving since the inception.

Posttest counseling is essential in bondage, follow-up, and institutional delivery. Its quality mainly depends upon skills and motivational levels of the counselor. A gap of 5.1% in testing versus posttest counseling calls for a more stringently followed service delivery mechanism.

Seroprevalence was 0.34% in registered ANCs while it was 1.1% in unregistered direct-in-labor cases. Overall HIV seroprevalence was thus 0.4%. HIV is believed to be concentrated in urban areas; earlier the services also focused only on the urban areas and hence seropositivity reported was 0.4% (more than three-fourths HIV+ve ANCs belonging to urban areas) which has come down gradually and corroborated with the subsequent findings of HIV Sentinel Survey (HSS) in the state.

Out of all 81 HIV+ve ANCs, 13.6% were detected only at the time of delivery which shows the immense need to

| Table 2: Pregnancy outcome and location-wise break-up in the case of HIV+ve ANCs |
|------------------|------------------|------------------|------------------|------------------|
| **Year** | **No. of HIV+ve ANCs detected** | **Pregnancy outcome** | **Location of women with pregnancy outcome** | **Pregnancy outcome** |
| | | **In VSG Hospital** | **Outside VSG Hospital** | **In VSG Hospital** | **Outside VSG Hospital** |
| | | **Live births** | **Still births** | **MTP** | **Live births** | **Still births** | **MTP** |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2004 | 8 | 7 | 5 | 1 | 1 | 0 | 0 | 0 |
| 2005 | 6 | 5 | 4 | 1 | 0 | 0 | 0 | 0 |
| 2006 | 14 | 13 | 7 | 3 | 1 | 2 | 0 | 0 |
| 2007 | 13 | 13 | 9 | 2 | 0 | 2 | 0 | 0 |
| 2008 | 21 | 18 | 15 | 1 | 0 | 2 | 0 | 0 |
| 2009 | 19 | 16 | 12 | 0 | 3 | 1 | 0 | 0 |
| Total | 81 | 72 | 52 | 8 | 5 | 7 | 0 | 0 |
test not only registered ANCs but also the unregistered emergency cases in order to provide prophylactic sdNVP in due time. This also points at the need to identify and plug the gaps in integration with the RCH program to enhance early detection and linkage to care, support, and treatment.

Illiteracy in around two-thirds of the HIV+ve ANCs along with the major age group being 18 to 30 year old is a worrisome scenario. The notion of education-as-the-solution to majority of health problems of the country is applicable here as well. Awareness about safe sex and issues like women empowerment can go a long way in achieving the pertinent MDGs.

Eleven percent of HIV+ve ANCs reported to be suffering from any kind of STD which calls for the concerted efforts in terms of dissemination of health education regarding HIV risk, STIs, and other relevant issues.

Around 82.7% HIV+ve ANCs reporting their active married life of less than 5 years (and 37% with an active married life of only 18 months or less) is a very serious issue when thought about in the context of the regular child-bearing age of a woman of about 30 years. The infected woman throughout her reproductive age will be at risk of transmitting the virus both horizontally and vertically.

The cornerstone of preventing vertical transmission is early ANC registration with immediate HIV testing which should be done in the first trimester. The study found such early registered HIV+ve ANCs to be even less than 10%. The late detection of the seropositive status eventually makes every step of PPTCT services difficult including CD4 testing, ART initiation, nutrition advices, care, follow-up, and timely institutional admission for delivery. This requires special attention from the authorities in terms of developing specific behaviour change communication (BCC) tools and their implementation.

More than half of HIV+ve ANCs had one or more child previously which adds to the existing possible viral pool and again corroborates with the aforementioned needs of conveying right messages about the importance of earliest HIV testing.

ART is initiated on the basis of the CD4 count; the latter must be carried out at the earliest for all newly detected HIV+ve ANCs. In the present cohort, around 70% such seropositive ANCs were tested for CD4 and only half of those who were eligible for ART were actually put on therapy before delivery. Timely antenatal ART initiation can bring about significant risk reduction for the child.

Spousal testing must be done in all HIV+ve ANCs cases; the current study still shows a gap of 7.4% which needs to be addressed as the spouses with the highest seropositivity belonged to occupation groups mainly consisting bridge population category which is effectively responsible for the spread of virus and hence requires a strict policy implementation in terms of spousal testing.

When all HIV+ve ANCs are reportedly married and 34.7% couples are still discordant, proper post-test counseling as well as during the follow-up visits and outreach activities pertaining to safe sex and promotion of condom can go a long way in further prevention of transmission.

While 6.2% seropositive women opted to terminate their pregnancies in the first trimester, 7 HIV+ve ANCs were not reported delivering institutionally which may be a case of delivering domestically or in private sector or loss to follow-up. Institutional delivery is the mainstay of PPTCT services especially for intrapartum ARV interventions and follow-up.

Cesarean section was the predominant mode of delivery in HIV+ve women (77.6%). Elective caesarean actually is the preferred mode which again is possible only by effective antepartum follow-up. Simplicity, low-cost, and efficacy are the reasons why sdNVP prophylaxis as MB pair is widely used in resource-constrained settings of PMTCT globally as well as in India. The coverage of sdNVP to both mother and baby was reported in 95% of live births which ideally should have been 100%. Nevirapine to any of them is considered to be resulting into decreased efficacy. MB pair coverage thus was found to be 69% against detection, which highlights the immense need and channelized efforts to improve HIV+ve institutional deliveries and counseling on early signals of parturition and importance of MB pair [Figure 3]. Nine of these MB pairs were given in direct-in-labor cases (out of total 11) which is a significant achievement considering the emergency conditions.

The year-wise analysis of PPTCT services [Figure 3] indicates the improved rate of institutional deliveries in HIV+ve ANCs. Simultaneously, the rate of MB pair coverage in live births against the detection of HIV+ve ANCs has increased from 62.5% to 68.4%. The MB pair coverage against live births has been around 100% which suggests the preparedness and good quality of counseling at the ICTC.

Maternal antibodies are expected to be present in the
baby at least till 18 months of age; hence, rapid tests detecting antibodies are designated at 18 months.\textsuperscript{[10]} The follow-up of exposed babies is a difficult task even in urban settings considering migration and other social factors. Just like ANCs, drop-out in service utilization was observed among exposed children also. A total of 52 out of 59 exposed children actually had been traced till 18 months (88.1\%) which can be a result only from good follow-up. Seven of those babies died by the time they reached the desired age, so theoretically, there were 45 babies in follow-up.

A total of 24 babies were tested at 18 months and 1 was found to be HIV+ve, seroprevalence being 4.2\%. Parameshwari \textit{et al.} in their study in Tamil Nadu reported 2 infants turning out to be positive out of 46 live births (4.35\%).\textsuperscript{[11]} Measures proposed under PPTCT guidelines were actually followed in this case including adherence to CD4 guidelines for ART, elective caesarean, no breastfeeding, and MB pair. Besides, the child had good birth weight (3 kg). This triggers the question over the limited efficacy of the sdNVP regime. The regime can be further strengthened with administering additional ARV drugs like AZT to both mother and baby and for longer periods.

Around 95\% of HIV+ve mothers delivering live babies choosing formula feeding showed effectiveness of proper counseling. Still, 1.6\% mothers giving mixed feeding is something which can be improved.\textsuperscript{[9]}

Six out of seven exposed children died in the neonatal period and all were low-birth-weight babies receiving the MB pair. This obviates that interventions like sdNVP which are merely directed to reduce the viral load are supplementary and the most important area toward survival remains to be natural immunity. Low birth weight retrospectively leads to issues of maternal malnutrition and antenatal infection which need to be addressed separately and thoroughly.

\textbf{CONCLUSIONS}

In order to improve access and reduce various drop-outs, PPTCT services which are feasible in government hospitals should be made available to all ANCs with necessary awareness campaigns especially in urban areas which consists the major chunk of the population at risk.

Continuous capacity building of counselors and concerned staff and more involvement of PLWHAs to improve quality of services, follow-up of ANCs, and exposed children thus become essential.

Aggressive BCC measures about safe sex, STDs, condom promotion, and safe blood transfusion, especially directed to the newly married and younger couples as well as to the discordant couples can prove vital.

Every ANC visiting the health facility should go for HIV counseling first and then to the doctor in order to improve the access of PPTCT services.

Posttest counseling with apropos EDD-based tracking and follow-up of every seropositive ANC should be ensured. This can be done effectively by outreach workers (ORWs) who should be recruited with due consultation from the national body especially in the centers like VSGH that caters a large chunk of the urban population. The follow-up has been very good so far though minor gaps still can be plugged by line-list-based channelized efforts. ANC testing, counseling gaps, and MB pair coverage, liaisons with existent RCH systems and linkages with other services are strength or weakness indicators of counselors and the system.

CD4 testing is the entry point of any HIV+ve ANC into ART services. The present study is a cohort of more than 4 years and with the advent of a newly functional ART center in the same premise, this gap can be plugged effectively.

Postnatal counseling is comparatively a well-covered area which results in desired feeding practices by HIV+ve ANCs, testing of their spouses, and further follow-up. More PLWHAs and ORWs can be utilized in this.
Low MB pair coverage against the detection of HIV+ve ANCs is an area of concern throughout the country, though the present study shows good progress over the years in that regard.

Positivity in the child despite adherence to all PPTCT guidelines calls for thorough analysis primarily necessitating the need to strengthen the single-drug ARV regime with other ARVs in consideration. This can be carried out on a pilot basis in some areas for feasibility and efficacy check. Though the sdNVP strategy is easy to carry out on large scales, now after 5 years of PPTCT services, it’s imperative to boost the efforts with the introduction of new regimes.

Exposed children with low birth weight are of special concern which calls for extra care in terms of ARV prophylaxis, nutrition, opportunistic infections, and follow-up. All exposed children must be traced with the regular use of the line-lists. A newer system of early infant diagnosis should be encouraged for better utilization.

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