

Trends in the Seroprevalence of Human Immunodeficiency Virus Infection in Pregnant Women Attending a Tertiary Care Center in Navi Mumbai, Western India

Pai Chitra^{1*}, Kadam Nitin², Singh Amit³, Kar Harapriya³, Urhekar Ananth³ and Mohanty Nimain²

¹Department of Microbiology, American University of Antigua College of Medicine, Antigua

²Department of Pediatrics, M.G.M. Hospital, Kalamboli, Navi Mumbai, India

³Department of Microbiology, M.G.M. Medical College, Navi Mumbai, India

Abstract

Expanding HIV testing and counselling among pregnant women is critical for identifying those in need of follow-up care and subsequent interventions. Data from PPTCT centers provide invaluable inputs for estimating the seroprevalence of HIV among pregnant women within a region of the state. A retrospective analysis was carried out to look at the trends in the seroprevalence over a ten years period and overall effectiveness of the PPTCT program. At the M.G.M. Hospital in Kalamboli, Navi Mumbai, Maharashtra in India, women registered at the antenatal clinic of the hospital and consenting to undergo testing after counselling were tested for HIV seropositivity. Three different HIV antibody detection tests were used as per the National AIDS Control Organization (NACO) guidelines. Out of a total of 27256 women who had registered, 26516 (97.3%) underwent counselling and all of these agreed to undergo testing. Most women that underwent counselling and testing for HIV were in the second trimester of their pregnancy. Maximum women (66%) who agreed for counselling and HIV testing belonged to the age group of 21-30 years. Majority of the women counseled (82%) were aware of HIV and AIDS. 89% of the women who were positive for HIV belonged to the age group of 21-30 years. Overall seropositivity for the ten years was 0.6%. The HIV seropositivity decay rate of -0.351 ($p < 0.0006$, 95% CI: -0.499 to -0.203) shows significant downward trend among pregnant women in Navi Mumbai over the last decade. The trend analysis of the data in our study suggests that if the PPTCT program is implemented effectively, the prevalence of new seropositive women could be halved in as little as two years.

Keywords: Antenatal attendees; HIV seropositivity; PPTCT program; Trend analysis; HIV counselling; HIV testing

Introduction

The recent UNAIDS Prevention gap report emphasizes that new HIV infections have fallen by 6% since 2010. New HIV infections among children have significantly decreased by 70% since 2001 and by 50% decrease since 2010. The numbers of children becoming newly infected with HIV however, remains unacceptably high with about 150 000 [110 000–190 000] infected in 2015 [1].

The current prevalence of HIV in India is estimated to be 0.35% as per the Global AIDS Response Progress Reporting 2015 by National AIDS Control Organization (NACO), India [2]. Although this prevalence rate is considered low, we need to be cognizant of the fact that India has a large population pool of one billion plus. Hence a mere 0.1 per cent increase in the prevalence rate will raise the number of persons living with HIV by over half a million [3]. A trend analysis of India's HIV epidemic currently shows that the epidemic is slowing down with a 19% decline in new HIV infections (130,000 in 2013), and a 38% decline in AIDS-related deaths between 2005 and 2013. Despite this, 51% of deaths in Asia are in India [4].

Most HIV infections in India are acquired through heterosexual transmission while perinatal transmission contributes towards 4% of the infection load. It is an established fact that about 90 per cent of HIV infections in infants and in children below 15 years of age are acquired from their mothers during pregnancy, delivery or breastfeeding. The WHO states that without any intervention, between 15 percent and 45 percent of babies born to HIV-positive mothers are likely to become infected. Hence, expanding HIV testing and counselling among pregnant women is critical for identifying those in need of follow-up care and subsequent interventions [4].

India is committed towards achieving the global target of "Elimination of new HIV infection among children". The Prevention of Parent to Child Transmission of HIV/AIDS (PPTCT) program launched in 2002 has undergone considerable expansion and offers counselling, voluntary and confidential screening in addition to interventions to block the transmission of HIV from the mother to the child. To date, there are more than 15,000 sites offering PPTCT services [5]. Data from such PPTCT centers provide invaluable inputs for estimating the seroprevalence of HIV among pregnant women within a region of the state. This information would be helpful in the effective implementation of AIDS control programs.

There have been several reports of HIV seroprevalence among pregnant women from the Government hospitals and institutes in the state of Maharashtra in India. However information from private hospitals of Navi Mumbai has been scanty. To the best of our knowledge, there aren't any studies from Navi Mumbai that have reported the seroprevalence over a ten years period. Hence we felt the need for this retrospective analysis to look at the trends in seroprevalence and overall effectiveness of the PPTCT program.

***Corresponding author:** Chitra Pai, Professor of Microbiology and Associate Dean of Research, American University of Antigua College of Medicine, Antigua, University Park, Jabberwock Beach Road, St. John's, Antigua, Tel: 1-268-7249430; E-mail: chitrapai67@gmail.com

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Methods

A retrospective study was carried out at the Antenatal Clinic and Voluntary Counselling and Testing Center at M.G.M. Hospital, Kalamboli and the Department of Microbiology of the affiliated medical college. The aim was to assess the trends in the seroprevalence of HIV infections among the antenatal clinic attendees, over a ten years period from January 2006 to December 2015.

The study population consisted of all women registered at the antenatal clinic of the hospital. The study was carried out following approval from the Institutional Ethics Review Board. Counselling services were provided by a professional counsellor as per NACO guidelines [6]. This included demographic details, detailed history, information about high- risk behaviors and contraceptive practices. They were also provided information about various aspects of HIV including the modes of transmission, the importance of antenatal screening for HIV, care during pregnancy, prevention and treatment options.

From the antenatal attendees that agreed to undergo HIV screening, informed consent were taken. 5 ml of blood samples were collected from each case and in sterile vacutainers, allowed clotting and serum was separated by low speed centrifugation at room temperature. The samples were tested immediately or within 48 hours of collection. The NACO standard protocol for serological testing of serum samples for HIV antibodies was followed. Antibodies to HIV (1 and 2) were tested initially with COMBAIDS (Span Diagnostics Ltd, Surat, India). If positive, they were further tested by two different rapid tests, i.e., SD BIOLINE HIV-1/2 3.0 Rapid Test [Standard Diagnostics, Inc. Korea] and PAREEKSHAK HIV 1/2 Rapid Test Kit (TRISPOT) [Bhat Bio-Tech India (P) Ltd.]. The samples were considered positive when found reactive by all the three different methods.

Positive test results were disclosed only after post-test counselling of the cases.

Results

Out of a total of 27256 women who had registered for attending the Antenatal Care clinic, 26516 (97.3%) underwent counselling and all of these agreed to undergo testing (Figures 1-6).

The seropositivity prevalence values by year were analyzed using a General Linear Model of regression after natural logarithmic transformation of the prevalence percentages. The model's R-squared value is 0.79, representing a moderately good fit to the actual data. The HIV seropositivity decay rate of -0.351 ($p < 0.0006$, 95% CI: -0.499 to

Distribution of women counselled and tested for HIV, by trimester, 2006-2015

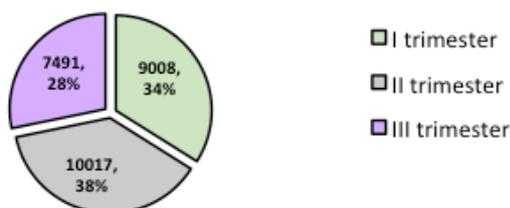


Figure 1: Trimester-wise distribution of women who underwent counselling and testing for HIV, 2006-2015.

Maximum women that underwent counseling and testing for HIV were in the second trimester of their pregnancy

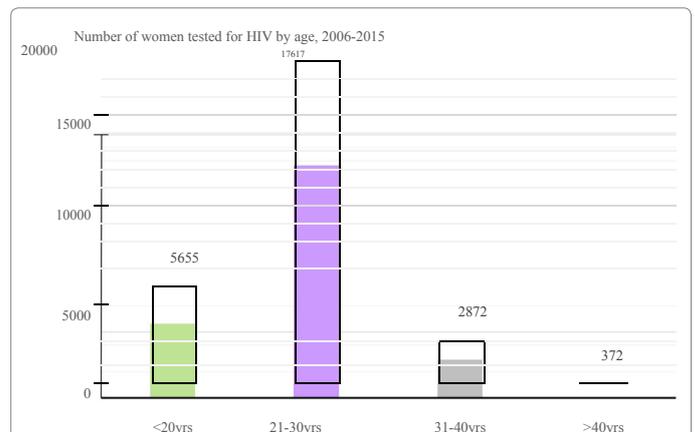


Figure 2: Age-wise distribution of women who underwent testing for HIV between 2006-2015.

Maximum women (66%) who agreed for counselling and HIV testing belonged to the age group of 21-30 years

Status of awareness regarding HIV/AIDS among women attending the ANC, 2006-2015

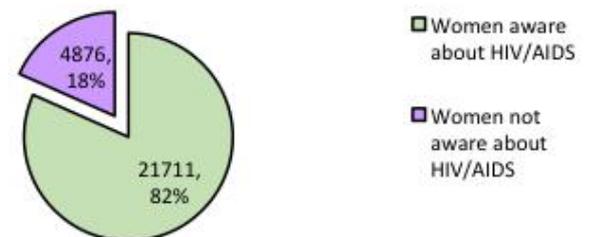


Figure 3: Status of HIV-awareness among the women attending the antenatal clinic, between 2006-2015.

Majority of the women counselled (82%) were aware of HIV and AIDS

Distribution of the women who tested positive for HIV by age group, 2006-2015

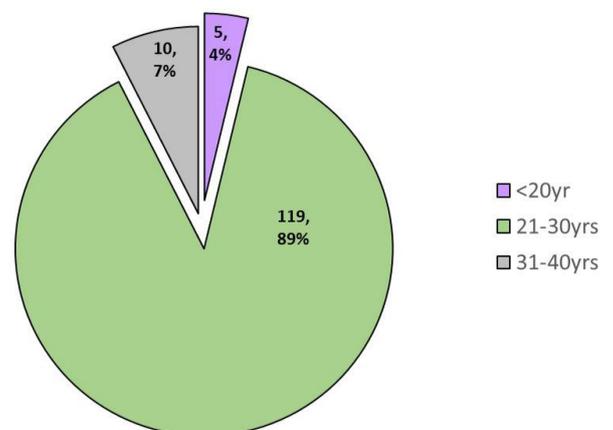
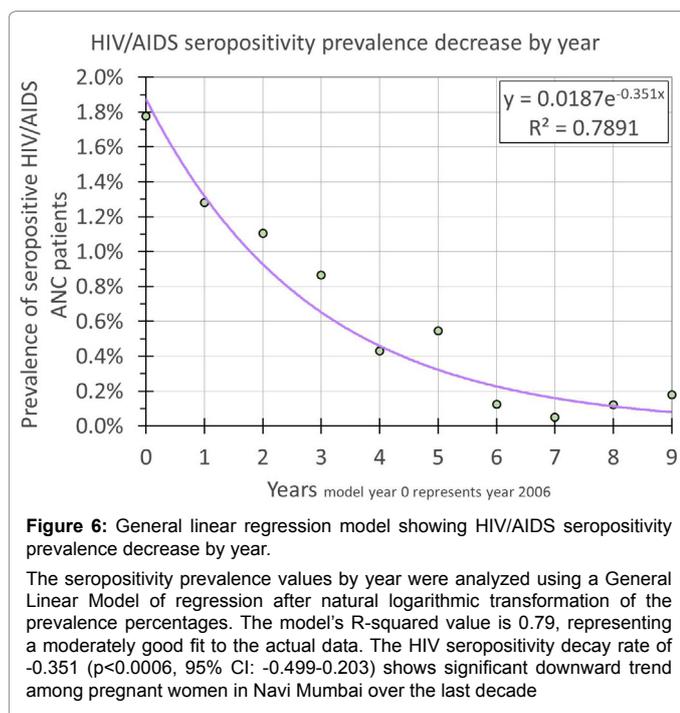
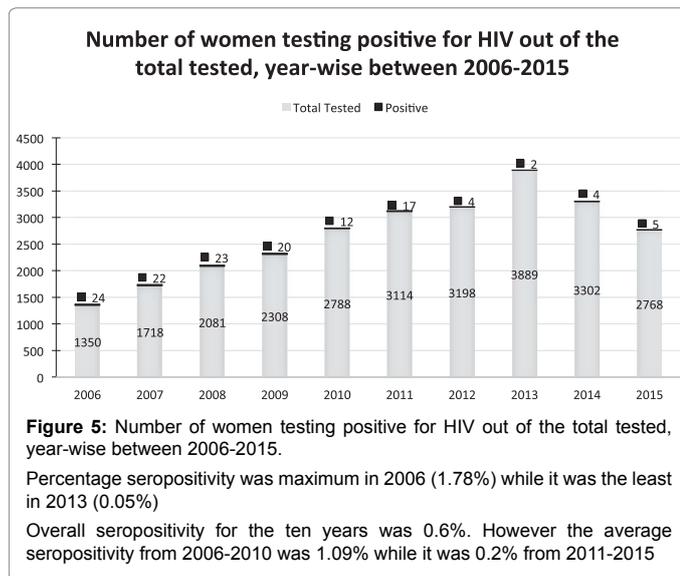


Figure 4: Numbers and percentages of women who tested positive for HIV by age group, between 2006-2015.

89% of the women who were positive for HIV belonged to the age group of 21-30 years. Only 4% of the HIV positive women were less than 20 years of age while 7% belonged to older age groups of 31-40 years



-0.203) shows significant downward trend among pregnant women in Navi Mumbai over the last decade.

Discussion

The PPTCT program, a nation-wide program is aimed towards blocking the transmission of HIV from the parent to the child. Our center for Integrated Counselling and Voluntary Testing is an example of implementation of this program made available to selected private facilities in India. We carried out a ten-year analysis of the data collected at our center, to monitor the changing trends in our region of the state of Maharashtra in India. It is now widely accepted that the data from such centers are invaluable in determining the HIV prevalence and trends in a given population.

Sgaier et al. and Kumar et al. and have recommended the use of PPTCT data in place of the annual HIV sentinel surveillance data for determining HIV prevalence and trends in the Indian context [7,8]. The reasons for this include higher coverage and participation especially due to the Opt-out approach. This has brought down the refusal for testing to less than 1%. Countries like Uganda and Thailand too have replaced their unlinked anonymous testing data with MTCT (Mother to Child Transmission) data for surveillance due to higher coverage and participation [5].

Our hospital caters to a good mix of urban as well as rural population in Navi Mumbai which is a satellite city of the city of Mumbai, adjoining the Raigad district of the western state of Maharashtra in India. Pregnant women are regularly registered for antenatal care and are routinely offered HIV counselling and testing services using the opt-out strategy. If tested positive, the HIV positive mothers and the babies receive antiretroviral drugs as per the PPTCT guidelines.

In our study, the percentage of women who agreed to undergo counselling was high (26516 out of 27256, 97.3%). There was a significant increase by 51% in the numbers of pregnant women (n=6089) who underwent testing in the last two years of this study (2014 and 2015) as compared to the numbers that underwent testing in the first two years of the study (n=3114) in 2006 and 2007.

This significant increase in the number of women who agreed to undergo testing is a positive sign of general public awareness and a faith on the interventional measures implemented by the PPTCT program. Moreover, as it is a cost-free program with an opt-out approach, several women have benefitted from this.

Of the women who underwent counselling, all agreed to undergo testing. This observation compared well with those of Chaudhuri et al. from West Bengal state and Parameshwari et al. from Tamil Nadu state who reported 96% and 100% acceptance of HIV testing, respectively, among the antenatal women [9,10]. These percentages are much higher than the findings of other authors such as Dash et al. from Odisha state (83.85%), Kulkarni et al. from Maharashtra state (43.13%) and Joshi et al. from Gujarat state (83%) [11-13]. Joshi et al. who reported data from three different places in the state of Gujarat, noted that in some places like Rajkot, only half (57.5%) of the women registered for antenatal care were actually tested for HIV [13].

These variations in the percentages of women who undergo testing in different regions and states of India highlights the fact that though the PPTCT is a government driven interventional program, it is important to monitor the quality of counselling, availability of testing services and efficient channels of reporting in order to ensure the effectiveness of this program. Apart from considering factors directly associated with the implementation of the PPTCT program, other factors like differences in the literacy rates of the populations targeted in each of these studies could also be a cause for variances. Our data did not analyze the levels of literacy of the women attending the antenatal clinic and this should be considered for future studies. It is highly likely that the levels of literacy correlate directly with the acceptance to undergo counselling and testing. Parameshwari et al. noted that the reason for the 100% acceptance for voluntary testing in their study was attributable to cultural factors such as high regard of rural women for health care workers and their advice [9]. Also group dynamics play a role with more women within a group opting for testing when they see other group members agreeing to undergo testing.

In a study reported by Kwapong et al. from Ghana in 2014, 24% of pregnant women had not undergone HIV testing and the main reasons

cited for this gap were health staff-client relationship, forceful testing for HIV, long waiting period and the fear of stigma and issues of confidentiality, if tested to be positive [14]. Olugbenga-Bello from Nigeria in a recent report stated that though the level of awareness regarding PPTCT program is high among the women (91.4%), a significant portion (71.27%) of the study population had poor attitudes towards PMTCT of HIV [15].

In our study the percentage awareness regarding HIV/AIDS among the pregnant women during the period 2006-2011 was 64%. This rose to 82% by 2015. This shows a rising trend in the level of awareness of HIV/AIDS.

Majority of the women (89%) who tested positive in our study belonged to the age group of 21-30 years. A higher positivity among the younger age groups concurs with the findings of Gupta et al. (41.9% in the 20-24 years age group), Sarkate et al. (50.61% in the 25-30 years age group), Parameshwari et al. (100% in the less than 40 years age group) and Dash et al. (41.86% among the 25-29 years age group) [3,5,9,10]. However, Gupta et al. also reported a higher positivity in the 30-34 years age group compared to our study (25.8% versus 7%) [3]. Cherinet et al. from Ethiopia also describe the highest HIV positivity among women of the 25-44 years age group [16]. Based on the common findings of maximum prevalence in the younger age groups, it is obvious that a heightened awareness among women in the active child bearing age group is required such that they avail the PPTCT testing services early during pregnancy. In India the average age of marriage among the women is 23.5 years [17]. This therefore explains the reason for most women of 21-30 years age group to attend antenatal clinics.

In our study, the HIV seropositivity decay rate of -0.351 ($p < 0.0006$, 95% CI: -0.499 to -0.203) shows significant downward trend among pregnant women in Navi Mumbai over the last decade. This data suggests that if similar programs are established in other localities, the prevalence of new seropositive women could be halved in as little as two years (95% CI 1.4 to 3.4 years).

As per the National AIDS Control Organization (NACO) National progress report of 2015, the overall HIV prevalence among ANC clinic attendees in India, considered a proxy for prevalence among the general population, is currently low at 0.35% (90% CI: 0.33%-0.37%) [2]. In our study the average prevalence rate over ten years was 0.6%. This, apparently makes it is higher than the national average of 0.3%. However, if we take into consideration the average over the last five years, it is 0.2% and hence, less than the national average. Our study is unique as there aren't many studies in India that have compared the trends of HIV seroprevalence over a vast period of ten years. In comparison with our study, other studies from the state of Maharashtra, such as those of Sarkate et al. and Kulkarni et al. have reported higher positivity rates of 0.76% and 0.88% respectively [5,11]. These rates were higher than the national prevalence rate of 0.35%. Joshi et al. from Gujarat state of India reported a low seroprevalence of 0.35% in a study from 2005-2008 [13]. These variations in different studies from various states of India may be reflective of the different time periods during which they were conducted.

The fact that Navi Mumbai is a satellite city of Mumbai in India, one of the most populous cities in the world, makes it highly vulnerable to the influx of migrant populations from throughout the country. The M.G.M. Medical Hospital at Kalamboli, Navi Mumbai, is a tertiary care center and caters mostly to the socioeconomically low and middle-income groups that have lower levels of literacy. Despite these factors, there has been a downward trend in the seroprevalence of HIV among the pregnant women attending the center. This low prevalence rate of

HIV is also reflective of the overall scenario of HIV in the region. As observed by Sgaier et al. the data of the PPTCT program can be used in place of the annual HIV sentinel surveillance data for determining HIV prevalence and trends in a region [7]. The advantages of using such data have been determined to be large sample sizes, lower levels of selection biases at the facility and participant level (as HIV test acceptance levels are high), routine data collection, and low additional cost for data collection. Thus in the context of these factors, the PPTCT program has a very important role besides educating the masses and employing interventions to keep the prevalence of HIV low among the pregnant women. Data from this program helps assess the trends of HIV among pregnant women and can also be reflective of the trend in HIV prevalence in populations at large.

The PPTCT program implemented at the M.G.M. Medical Hospital at Kalamboli is heading in a positive direction in terms of the success in counselling, educating the masses and making available interventions that can block the transmission of HIV, free of cost. The trend analysis of the data in our study suggests that if similar programs are established in other localities, the prevalence of new seropositive women could be halved in as little as two years (95% CI 1.4 to 3.4 years). The trends of seroprevalence need to be constantly monitored such that any changes in the acceptance levels of counselling or testing as well as availability of resources can be addressed for ensuring the smooth implementation of the program.

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