

PREVALENCE OF HIV AMONG EXPOSED INFANTS IN UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY, EDO STATE, NIGERIA.

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ABSTRACT

Prevention of mother to child transmission of HIV has been found to be the pathway to prevent and reduce new infections, ensure childhood survival and achieve all the millennium development goals and in particular, goals 4, 5 and 6. The experience of University of Benin Teaching Hospital (UBTH), Edo state using highly active antiretroviral therapy is reported. This study determined the Prevalence of HIV among HIV exposed children of mothers who had PMTCT at UBTH and factors affecting HIV prevalence/ transmission pre and post natally. It was carried out using a total population retrospective study of 298 mother/babies pairs attended to at the prevention of mother to child transmission of HIV (PMTCT) programme of UBTH who had highly active antiretroviral therapy (HAART). The HIV status of the babies was determined by deoxyribonucleic acid polymerase chain reaction (DNA PCR).

The male-female ratio was 1.4:1. 58.4% of mothers started antiretroviral therapy (ART) prior to pregnancy and of those who commenced during ANC, 38.7% of mothers commenced ART at and beyond 28 weeks gestation. 64.8% of mothers came to deliver at UBTH while 7.0% delivered at home. Of the 193 mother/babies pairs who adhered to our protocol, the prevalence was 2.1%. The babies who had mixed feeding had significantly higher prevalence than the exclusively breastfed and the exclusively formula fed. Among the HIV infected babies, only 1 (1.9%) was delivered via caesarian section. The HIV prevalence of the UBTH PMTCT centre has remained low with the use of HAART regimen. Post natal HIV infection was much reduced, as low as 1% among those delivered via caesarian section. Mothers who had been on ART for long durations especially those commencing ART before pregnancy tended to have very low chances of infecting their infants. PMTCT and its benefits in curtailing new infections should be continuously emphasized and scaled up as far as the rural areas via PHC system

INTRODUCTION

The HIV/AIDS pandemic has remained a major public health crisis in the world today. Since its discovery in 1981, more than twenty five million people have died

of AIDS¹. The global pandemic of human immunodeficiency virus (HIV) infection continues to spread, with about five million newly HIV-infected individuals annually¹. About 33.4 million people were living with HIV/AIDS in 2008, of which 15.7 million were women and 2.1 million children¹. The year 2008 saw 2 million deaths from AIDS, despite recent improvements in access to antiretroviral treatment¹.

Sub-Saharan Africa has continued to bear the greatest burden of the HIV and AIDS

KEY WORDS: HAART, HIV, mother to child, transmission, UBTH.

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epidemic, with about 80% of all people living with HIV/AIDS residing in this region¹. Over the decades, the epidemic, once dominated by infected males has become progressively feminized and in Sub-Saharan Africa, approximately 57% of adults living with HIV are women².

Since the first case of AIDS was reported in a thirteen year old girl in Nigeria in 1986, the epidemic has continued to rise at an alarming rate, with national HIV seroprevalence rate (among women attending ante natal care services at sentinel survey sites) of 1.8% in 1991, 4.5% in 1996, 5.4% in 1999, 5.8% in 2001, a drop to 5.0% in 2003, 4.4% in 2005, a slight increase to 4.6% in 2008⁷ and 4.1% in 2010.

Among young ante-natal care (ANC) persons, the highest prevalence rate was among age group 20 to 24 years for the year ended 2006 (a critical productive age group) and has reduced slightly from 4.3% in 2006 to 4.2% in 2008^{2,7}. Currently, the age group with highest prevalence (year ended 2008) is within ages 25 to 29 years, with 5.6% prevalence rate⁷.

With an estimated three million Nigerians living with HIV, with 305,080 new infections in adults and 74,520 in children, largely acquired through maternal-to-child transmission, it is thus critical that the PMTCT programmes must function at the highest level of efficiency⁸.

This is especially so being the quickest and delicate precursor for preventable, continuum of new infections and it is the unit of HIV care and support services where remarkable success in terms of curbing infection spread (the use of anti-

retroviral drugs to prevent new infections occurring from infected mothers to exposed foetuses), has been achieved.

The global impact of the HIV/AIDS pandemic is especially severe in resource-constrained settings and results in the following, negative impact on economic development, overwhelmed healthcare system, decreasing life expectancy in many countries, deteriorating child survival rates and increasing number of orphans⁹. On its effects on the family, these will include, transfer of infection, burden of nursing care, impoverishment, impairment of children's training, schooling, and rights, death of the generation of parents and creation of orphans. It is thus very important to determine on a regular basis if PMTCT is succeeding based on successive reductions of infants who turn out HIV infected, hence the need for this study.

MATERIALS AND METHODS

This study was carried out in University of Benin Teaching Hospital (UBTH), Benin City, Edo State, Nigeria. This was a retrospective prevalence study carried out among HIV-exposed infants who were brought for early infant diagnosis within the period of January to December, 2009 by their HIV infected mothers at the well-baby and growth-monitoring clinic of the paediatric HIV unit of the Consultant Out-Patient Department, UBTH. All infants who were brought in for early infant diagnosis were enrolled into the study.

Only mothers who registered for antenatal care services were enrolled into this study. These mothers had pre and post-test

counselling and were confirmed HIV infected. These mothers were on anti-retroviral drugs either before or during pregnancy. All HIV infected mothers who never had any PMTCT interventions at all for their HIV-exposed infants. In calculating the effective HIV prevalence, only mother-children pairs who met the full PMTCT criteria would be used.

The minimum sample size for the study was calculated using a formula for sample size determination in a prevalence study¹⁹.
 $n = Z^2pq/d^2$

A total population survey was done and 298 respondents (mother-baby pairs) were recruited into the study.

The tools for data collection were questionnaire and laboratory analysis of blood samples collected from HIV-exposed babies recruited into this study.

A structured, researcher administered questionnaire was used to address research questions directed at mothers as they come to the clinic with their babies for early infant diagnosis. It's a one and half paged questionnaire made up of two sections of seven questions, mothers CD4 count and infant's DNA-PCR results.

Blood samples were then collected from infants of the interviewed mothers. Sample collection was done either by the doctor administering the questionnaire or other medical personnel (nursing officer or laboratory technician) attached to the early-infant-diagnosis clinic. Samples were sent to the laboratory for a full DNA-PCR qualitative analysis.

Data was collated, coded and entered into a spreadsheet and analyzed using the software, Statistical Package for Scientific Solutions version 16.0. From these data, frequency tables, charts and cross tables are drawn for easy interpretation of results and chi-squared test of association are computed at 95% confidence interval.

Permission was sought from the Focal Person Paediatrics HIV- Unit, UBTH and the Research and Ethics Committee of UBTH. Verbal informed consent was obtained from our respondents. Respondents benefitted from one-on-one health education on healthy living, growth monitoring, infant feeding options, immunization and the results of DNA-PCR analysis.

Some mothers were reluctant to give information due to the sensitive nature of the study but this was overcome by ensuring privacy during interview sessions and assuring mothers of the highest level of confidentiality. Another limitation was the unavailability of all the mothers' CD4 counts. A significant number of mothers could not trace or make available their immunochemistry results containing their CD4 count due to logistic factors affecting the laboratory unit

RESULTS

A total of 298 children participated in the study. A higher proportion of the children 232 (77.9%) were brought for early infant diagnosis within the first 3 months of life. Mean age was 13.6 ± 12.7 weeks. Their ages ranged from 1 week to 72 weeks.

The mother to child HIV transmission/prevalence in this study was 2.1% as

shown in table 2. This 2.1% prevalence applies to those mother-baby pairs (193) that met the full PMTCT protocol which includes delivering at UBTH.

Sixteen (6.5%) of the HIV positive children were delivered through SVD, while 1 (1.9%) was delivered through CS. This was not statistically significant (table 1).

The transmission/prevalence rate for the mother-infant pairs that strictly adhered to the PMTCT protocol was 2.1%. There is no statistical association between place of delivery and HIV transmission (table 2).

Majority 14 (82.4%) of the HIV positive infant's mothers commenced ART drugs during the pregnancy. And this was statistically significant (table 3).

Majority 13 (92.9%) of the HIV positive infants were delivered to mothers who started ART drugs early in pregnancy (<28weeks). And this was statistically significant (table 4).

Eight (72.7%) of positive infants, were born to mothers with CD4 count greater than 250. This was however, not statistically significant (table 5).

TABLE 1: MODE OF DELIVERY OF CHILDREN AND HIV TRANSMISSION

Mode of delivery	Children's DNA- PCo results		Total (%F
	Positive (%F	kegative (%F	
SsD	N6 (6.5F	23M (93.5F	246 (N
CS	N (N.9F	5N (98.NF	52 (NMM.I
Total	N7 (5.7F	28N (94.3F	298 (NI

Fischer's exact = 1.675, df = 1, p = 0.323

TABLE 2: PLACE OF DELIVERY OF CHILDREN AND HIV TRANSMISSION

Place of delivery	Children's DNA-PCR results		
	Positive (%)	Negative (%)	Total (%)
UBTH	4 (2)	189 (97.9)	193 (100)
Outside UBTH	13 (12.4)	92 (87.6)	105 (100)
Total	17 (14.5)	281 (85.5)	298 (100)

X² = 359; df = 1; p = 0.05

TABLE 3: TIME OF COMMENCEMENT OF ART DRUGS BY MOTHERS AND HIV TRANSMISSION

Time of commencement	Children's DNA– PCR results		Total
	Positive (%)	Negative (
Before Pregnancy	3 (17.6)	170 (60.5)	173
During pregnancy	14 (82.4)	111 (39.5)	125
Total	17 (100.0)	281 (100.0)	298

$X^2 = 12.088$, $df = 1$, $p = 0.001$

TABLE 4: TIME OF COMMENCEMENT OF ART DRUGS DURING PREGNANCY AND HIV TRANSMISSION

Gestation	Children's DNA– PCR results		Total (%)
	Positive (%)	Negative (
<28weeks	13 (92.9)	64 (57.7)	77 (61.6)
≥28weeks	1 (7.1)	47 (42.3)	48 (38.4)
Total	14 (100.0)	111 (100.0)	125 (100.0)

$X^2 = 6.512$, $df = 1$, $p = 0.011$

TABLE 5: MOTHER'S CD4 COUNT AND HIV TRANSMISSION

Mother's CD4 count	Children's DNA-PCo results		Total (%F)
	Positive (%F)	negative (N)	
<250	3 (27.3F)	39 (N8.8F)	42 (N10.2F)
≥250	8 (72.7F)	68 (N16.2F)	76 (N19.2F)
Total	11 (NMM.MF)	107 (N25.0F)	118 (N29.8F)

Fischer's exact = 0.477, df = 1, p = 0.447

DISCUSSION

The mother to child HIV transmission/prevalence in this study was 2.1% (figure 1). This 2.1% prevalence applies to those mother-baby pairs (193) that met the full PMTCT protocol which includes delivering at UBTH. The overall prevalence as long as mother had ante natal and PMTCT services with UBTH (irrespective of place of delivery) was 5.7%, this is much lower than the 11.11% overall HIV prevalence obtained in a previous study done at same facility in 2007 among 317 mother-baby pairs⁶. The higher overall prevalence is probably due to the larger number of respondents in the previous study.

The effective HIV prevalence (of mother-baby pairs meeting all PMTCT protocol and criteria) of 2.1% for the year 2009 is an improvement from a previous work done at the same site in 2007 which had HIV

prevalence of 2.46%⁶. There is a slight reduction in HIV prevalence, this may be due to the fact that more mother-baby pairs met the criteria in 2007 (227 respondent pairs as against 193 in this 2009 study).

The quality of care, protocol/guidelines and standard of service delivery (in line with national PMTCT guidelines) has been maintained and remained the same over the years thus the main explanation for this reduction will be fewer respondent pairs this year (2009) and better education and enlightenment (especially during group health education sessions at adult ART clinic, ANC clinic and HIV-support group meetings) of women of reproductive age group on the benefits and hope with PMTCT and the need to know their status and commence ART on time if confirmed to be HIV infected.

The HIV prevalence in this study is much

lower than the 9.1% achieved in a study done in Maiduguri, Nigeria²⁴. In this study only about 30% of the mothers had HAART regimen during ante-partum period and babies only received single dose (SD)-nevirapine instead of the recommended SD-NVP with AZT plus 3TC for 6 weeks. These factors could have increased the chances of post-natal HIV transmission. In this UBTH study, all (100%) mothers had some form of ART prophylaxis during pregnancy, a considerable number had been on HAART even before achieving conception and 235 (78.9%) children had ART (HAART)-prophylaxis (SD-NVP+AZT+3TC for 6weeks) this will considerably prevent postnatal HIV transmission.

In comparison to a similar study done in South eastern Nigeria, 7 (3.6%) of 192 mother-baby pairs who had received requisite prophylactic anti-retroviral were PCR-positive, this is much higher than the 2.1% among 193 mother-baby pairs achieved in our study¹⁸. Though it is not clear from the South eastern study why they have a much higher prevalence in spite of almost same sample size (with this UBTH study) and meeting most PMTCT requisite criteria, various factors could have influenced this, like mode of delivery, skill of obstetric personnel, personnel's know-how on PMTCT guidelines etc. In 23 (8.7%) PCR positive babies, their mothers received HAART but the babies had no 6weeks ART prophylaxis; compared to the 5.7% obtained in the UBTH study, this is high. The problem on mothers not being able to access ART prophylaxis for their babies as we can see from all the above results so far is causing an overall increase

in the post natal HIV transmission in both studies.

This problem was significantly reduced at the UBTH, centre of our study, by ensuring mothers deliver as much as possible at UBTH by making delivery free irrespective of mode of delivery, thus ensuring the infant actually commences its ART prophylaxis before mother is discharged home. Some mothers for fear of unforeseen, spontaneous labour and long distance of their homes from UBTH are given their infant's ART prior labour/delivery to take home (in the event of outside UBTH delivery) while some were counselled to report to the facility within 72 hours of delivery³. The higher overall prevalence of 8.7% in the South eastern study and 5.7% in this study are due to preventable factors such as non-availability of funds, proximity from facility, timing of spontaneous labour and fear of stigmatisation.

A study done in Cape Town, South Africa, had HIV prevalence of 5.1%. This was a cumulative retrospective done over a period of 7years, resulting in this high 5.1% prevalence compared to 2.1% in our UBTH study. Two hundred and sixty-five mothers (72%) commenced ART before pregnancy and median gestational age at presentation was 28 weeks¹⁵. This South African study had a higher proportion of mothers commencing ART before pregnancy (72% compared to our UBTH study with 58.4% of mothers on ART before pregnancy) reason being a cumulative 7 year retrospective study. Each additional week on ART reduced the transmission rate by 20% and there was no HIV transmission

among mothers who received ART for greater than 8 weeks duration¹⁵. This is similar to the Mulago, Uganda study having prevalence as low as 1.7% after mothers had been on HAART for long durations, as in this UBTH study having a prevalence of 2.2% after having HAART for at least 8 weeks duration⁸. All the above findings would be better appreciated if baseline maternal viral load was done for these mothers, but this of course is not possible in resource limited settings of Sub-Saharan Africa. CD4 counts even though available occasionally can be a challenge to retrieve for logistic challenges and constraints in the laboratory and records units. In this study, only 218 mothers had CD4 counts available. Of the 17 HIV infected babies, 11 of their mothers had CD4 counts available, and of this, 8 (72.7%) had CD4 counts greater than 250 cells/mm³. However, this was not statistically significant (i.e CD4 counts greater than 250 cells/mm³ does not reduce likelihood of HIV transmission to HIV exposed infants). It would be expected that a lower proportion of mothers with CD4 counts greater than 250 cells/mm³ should have HIV infected babies since the higher the CD4 count, the lower the viral load and thus the less likelihood of transmitting HIV to exposed infants. Majority, 176 (80.7%) who had HIV negative babies had CD4 counts greater than 250 cells/mm³. This is possibly so since higher CD4 counts denotes reducing viral loads and thus reducing chances of HIV transmission. The prospect of shorter duration of maternal and neonatal therapy is being envisaged to reduce the cost of treatment while enhancing adherence to therapy in a resource poor setting⁴. This though, will

likely keep HIV prevalence high since shorter ART duration keeps viral loads high and post natal HIV transmission risks high.

In this study, only 6 children (2.0%) were exclusively breastfed. A high proportion, 271 children (90.9%) were exclusively formula-fed similar to a Haitian study where almost 90% of the mothers in the study preferred and practiced exclusively formula feeding¹⁸. Twenty one (7.0%) babies were mixed-fed. Of the 6 that were exclusively breastfed, none were infected with HIV. However 11 (64.7%) of the HIV infected were actually mixed-fed and 6 (35.3%), formula fed exclusively (mixed feeding increases post natal HIV transmission risks and has the highest HIV prevalence among feeding practices of mothers). This is in sharp contrast to most other programs where exclusive breastfeeding is the practice (for less than 6 months duration) is the practice. In South eastern Nigerian study, exclusive breastfeeding rate was 35.5%. In these babies five (18.5%) were infected, while 288 (75%) of babies were exclusive formula fed, out of which 11 (4.8%) were infected. Forty-seven (15.5%) of the babies were mixed-fed, and 32 (68.0%) of them were infected¹⁸. These are similar to this UBTH study with high HIV prevalence among mixed fed children of 64.7%. Mixed feeding has the tendency to increase post natal HIV transmission. This was very common in the UBTH facility when there was free supply of infant formula by the Federal Government of Nigeria to most tertiary health institutions in the country. In this UBTH study, of the 17 HIV infected babies, 16 (94.1%) were delivered via spontaneous vertex delivery while only 1 (0.1%) was delivered via elective caesarean section. It would appear though that

caesarean section considerably reduced post natal HIV transmission, but in this study, there was no statistical significance between HIV transmission and mode of delivery. Of the 193 mothers who delivered in UBTH, only 4 of the 17 HIV infected babies were delivered at UBTH, others delivered outside UBTH but of the 21 children delivered at home, none had HIV infection. Majority 13 (76.5%) of the HIV infected were delivered outside UBTH (private clinics, churches) and this was statistically significant (place of delivery and HIV transmission). This statistical association was no more if the home deliveries are merged with all others who delivered outside UBTH. In a Haitian study, 165 (25.5%) of the 650 pregnant, HIV-positive women were lost to follow-up. Reasons noted were the following: 74 of the women opted to deliver in rural areas, 32 delivered prior to expected date, 27 did not return for fear of being abandoned or stigmatized, 29 could not be located, and 4 died of AIDS before delivery. The final analyses included only 348 mother-infant pairs⁷. These losses (similar to those highlighted in this study) can be curbed with the current on-going scale up of PMTCT services nationally and internationally. This will better achieved its goal if measures are put in place to ensure thorough integration with the maternal and child health services of the Primary Health Care system (PHC).

CONCLUSION

The HIV prevalence of the PMTCT centre of University of Benin Teaching Hospital, Edo State was 2.1% for the year 2009. This is an improvement on the previous study done at same facility in 2007 and most studies around the world. Post natal HIV infection was found to be much reduced as low as less than 1% among those who had

elective caesarean section.

Mothers who had been on HAART for long durations especially those who commenced HAART before pregnancy tended to have very low chances of infecting their infants with HIV. A significant proportion of the children with post natal HIV infection were delivered outside UBTH. PMTCT and its benefit in curtailing the tide of new infections be continually emphasized and this message should be carried as far as the rural and sub urban areas with the aim of scale up and provision of PMTCT services

The present standards and quality of services should be maintained to help ensure that we continually maintain very low HIV prevalence as the years go by. The Federal Government and the corporate industry must fully key into HIV/ PMTCT support services with the aim of ensuring the current structures and systems do not collapse.

All PMTCT centres in tertiary and secondary facilities should try to create linkages primary health centres, midwives, private clinics and maternities and even the homes of these mothers with the use of social services units of these hospitals.

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