Original Article

A Review of Prevention of Mother-to-Child Transmission of Human Immunodeficiency Virus (HIV) Outcomes at the University of Medical Sciences Teaching Hospital, Ondo

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ABSTRACT

Mother-to-child transmission (MTCT) of HIV is the primary route of infection in the pediatric age group, with Nigeria contributing significantly to new pediatric HIV cases. Despite over two decades of a national Prevention of Mother-to-Child Transmission (PMTCT) program, Nigeria remains a major contributor to the global pediatric HIV burden. Effective PMTCT requires comprehensive interventions including antenatal HIV testing, maternal antiretroviral therapy (ART), infant prophylaxis, and early infant diagnosis. However, systemic challenges limit optimal program outcomes. This study reviews PMTCT outcomes at the University of Medical Sciences Teaching Hospital, Ondo, Nigeria. A retrospective review of PMTCT cases was conducted, analyzing data from infants born to HIV-positive mothers. Maternal and infant characteristics, antiretroviral prophylaxis, mode of delivery, duration of maternal ART, and early infant diagnosis results were examined. Data were analyzed using SPSS version 25 and presented through frequencies, percentages, and chi-square statistics. Among 97 HIV-exposed infants, 53.6% were female with a mean birth weight of 3.02 ± 0.35 kg. Majority of mothers were aged 31–40 years (49.5%), married (65.7%), and had secondary education (58.6%). Infant prophylaxis was primarily Nevirapine only (82.8%) or Zidovudine/Nevirapine combination (16.2%). Vaginal delivery accounted for 88.9% of births. Maternal highly active ART (HAART) had been administered for over two years in 59.6% of cases. Early infant diagnosis using DNA PCR indicated a 95.9% HIV-negative rate. Spousal HIV positivity was 22.2%, with 9.1% unknown. The University of Medical Sciences Teaching Hospital's PMTCT program demonstrates a high HIV-free survival rate among exposed infants, reflecting effective prophylaxis and sustained maternal ART adherence. Continued efforts should focus on overcoming systemic barriers, enhancing male partner involvement, and strengthening postnatal follow-up to further improve outcomes.

Keywords: Antiretroviral therapy, Early infant diagnosis, HIV, Mother-to-child transmission, PMTCT

INTRODUCTION

Globally in the year 2023, an estimated 39.9 million people were living with the Human Immunodeficiency Virus (HIV). Of this population, children aged 0 – 14 years accounted for about 1.4 million.[1]Children can be infected with the virus via several means which includes mother to child transmission (MTCT), unprotected sexual intercourse, blood transfusion and sharing of non-sterile sharps.[1] The MTCT remains the commonest route of the infection in the Paediatric age group.[2, 3] Prevention of mother-to-child transmission (PMTCT) of HIV is a critical component of global efforts to eliminate Paediatric HIV, particularly in

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high-burden countries such as Nigeria.[3] Despite a national PMTCT program dating back over two decades, Nigeria continues to lag behind as one of the largest contributors to the global Paediatric HIV burden. While other countries are experiencing decline, Nigeria accounted for approximately 15% of new HIV infections among children worldwide in 2021.[4]

The PMTCT cascade consisting of antenatal HIV testing, maternal antiretroviral therapy (ART), infant prophylaxis, and early infant diagnosis; these are critical in ensuring HIV-free survival. Nevertheless, suboptimal implementation due to several multifaceted systemic barriers including inadequate health infrastructure, inconsistent drug supply, sociocultural resistance, and low male partner involvement continue to predispose to poor outcomes.[5] The world health organization (WHO) PMTCT cascade outlines a series of sequential steps, ranging from antenatal care attendance to infant HIV testing, providing measurable milestones to assess service delivery.[4, 25] A longitudinal analysis of PMTCT outcome in Anambra state, southeastern Nigeria in 2021, reported a significant reduction in HIV transmission over a 14-year period, with 81.2% of exposed infants testing HIV-negative at 18 months.[6] The study demonstrated the efficacy of structured PMTCT programs in tertiary healthcare setting, when ART adherence is monitored and support services are integrated. Mixed feeding was found to have negatively impacted MTCT rates. In contrast, another study[7] in Abuja, north-central Nigeria, in 2018, demonstrated lower ART uptake among eligible women mostly due to gaps in counseling and linkage to care. This shows that even within tertiary systems, PMTCT implementation varies. This highlights the importance of program coordination and human resource capacity in sustaining adherence and retention. In 2015, a study[8] carried out in Makurdi, Benue state, assessed early infant feeding practices among HIV-exposed infants and found that exclusive breastfeeding under ART cover resulted in a 96% HIV-free survival rate. This finding is similar to that done in 2021,[6, 25, 26] and reiterates the WHO recommendation on breastfeeding with maternal ART. Nonetheless, this study[8] lacked a comparative arm to evaluate the relative risk associated with mixed feeding or replacement feeding, which would have made the findings more robust, especially in terms of guiding policy formulation and implementation.

An analysis of the national programmatic data from 2015 to 2020, done in 2022, observed regional disparities in ART uptake during pregnancy, with the Northern states lagging significantly behind the South.[9] The finding highlighted the influence of geographical, sociocultural/ethnic, and policy enforcement differences on service delivery.

A study[10] done in Ethiopia, in 2021, found a 10% mortality and 8% loss to follow-up among HIV-exposed infants post-Option B+ guidelines implementation. Their findings raise legitimate concerns about the sustainability of PMTCT outcomes not just at the level of intervention delivery, but also of postnatal tracking systems.In Kenya, in 2017, a review of the national data, found that MTCT rates dropped from 15% in 2010 to 8% in 2015. This correlated with increased levels of maternal ART initiation.[11] In addition, they identified challenges with early infant diagnosis and low male partner involvement as barriers to optimal PMTCT.

A Brazilian study[12] in 2018, assessed PMTCT outcomes and found out that ART initiation before the third trimester played a significantly positive role in reducing the MTCT risk by 50%. This is in tandem with a study in 2012,[13] in India, where retention in PMTCT programs was strongly influenced by the integration of services and health worker availability. However, these studies lacked detailed qualitative components to explore in-details the sociocultural determinants of service uptake. Predisposing factors such as low female autonomy, stigma, and lack of male involvement persist as structural barriers. Also lack of perceived need often in asymptomatic pregnant women, as highlighted in the 2022 study,[9] hence a need for behavioral and attitudinal change interventions.

Nigeria's National Agency for the Control of AIDS (NACA) has acknowledged that there remain sizeable gaps in PMTCT delivery, citing coverage stagnation at around 33%, despite policy frameworks such as the 2021–2025 National HIV Strategic Framework.[14, 15] In 2023, a study reported

that only 31% of the children in need of ART in Nigeria were receiving it.[15,25,26]

WHO's consolidated guidelines recommend lifelong ART for pregnant women and place an understandable emphasis on service integration and task-shifting to ameliorate human resource deficits.[4] Likewise, the UNAIDS has continued to advocate for community-level interventions including partner testing as part of the elimination agenda.[16,26]

This study aims to provide a review of PMTCT cases seen at the University of Medical Sciences Teaching Hospital, Ondo, Nigeria. The objectives are to evaluate the maternal antiretroviral status, maternal antiretroviral therapy, infant prophylaxis and infant outcome. By identifying gaps in care and opportunities for improvement, this study seeks to provide valuable insights for optimizing PMTCT protocols in Nigeria. Given the ongoing concerted effort to achieve HIV free infant survival, findings from this study may help in the development of targeted strategies in the care of HIV exposed infant.

MATERIALS AND METHODS

Study design

This study was a retrospective hospital-based review conducted at the University of Medical Sciences Teaching Hospital Complex, Ondo, Nigeria. The study reviewed medical records of pregnant women who were retroviral screening positive. Data were collected on patient demographics, prophylaxis interventions, and outcomes. The retrospective design allowed for a comprehensive analysis of the hospital's preventive protocol, helping to identify gaps in care and potential areas for improvement.

Study setting

The study was conducted at the University of Medical Sciences Teaching Hospital Ondo, a tertiary-level healthcare institution that serves as a referral center for patients with various medical conditions. The hospital is one of the major centers in southwestern Nigeria that provides specialized care for management of retroviral disease individuals and exposed infant. Additionally, the hospital provides supportive services such as laboratory investigations, and consultations with specialists. Given the significant burden of HIV in the region, this healthcare facility was deemed an appropriate setting for conducting the study.

Study population and eligibility criteria

The study population consisted of all patients diagnosed with HIV who received medical care at the University of Medical Sciences Teaching Hospital Complex during the study period. To ensure data reliability, only cases with complete medical records, including demographic details, maternal antiretroviral intervention, infant prophylaxis documentation, were considered eligible for inclusion. Cases were excluded if records were incomplete. The inclusion of only well-documented cases ensured that the data analysis was based on high-quality, verifiable clinical information, thus enhancing the study's validity and reliability.

Sample size determination

The sample size for this study was determined using Cochran's formula for sample size estimation in cross-sectional studies. The basis for sample size estimation, used a prevalence of 2.46%, in a study,[17]where both mother and child adhere to PMTCT protocol. A 95% confidence level was chosen to ensure statistical reliability, corresponding to a standard normal deviate of 1.96.[18] The margin of error was set at 5% to balance precision and feasibility.

However, since this was a hospital-based study with a finite population of patients receiving care at the University of Medical Sciences Teaching Hospital, an adjustment using the finite population correction formula was applied. The hospital records indicated that approximately 100 to 150 pregnant women with HIV were managed during the study period. Incorporating this information into the sample size adjustment reduced the estimated minimum required sample size to 30. To ensure robustness, accommodate potential missing or incomplete data, and enhance the generalizability of findings, the final sample size was rounded up to a minimum of 40 patients.

However, given the retrospective nature of the study, all available and eligible cases within the study period were included in the analysis to maximize

data utilization. This approach strengthened the validity of the findings by increasing statistical power and reducing the risk of selection bias.

Data collection and variables

Data were extracted from patient medical records using a structured data collection form. The information collected included demographic characteristics such as age, gender, HIV status, maternal occupation, and educational background. Clinical data were recorded, including first and second dry blood stain test, infant prophylaxis.

The primary outcomes assessed included the stability of patients on follow-up, the presence of complications, loss to follow-up, and mortality. Outcomes were categorized based on whether patients remained clinically stable, developed complications requiring further intervention, or were lost to follow-up. Mortality data were reviewed to assess the leading causes of death in the studied population.

Data analysis

Data analysis was conducted using IBM SPSS Statistics (version 25.0, IBM Corp, Armonk, NY, USA). Descriptive statistics were used to summarize patient demographics, management patterns, and outcomes. Categorical variables were expressed as frequencies and percentages, while continuous variables were assessed for normality and summarized using means with standard deviations for normally distributed data or medians with interquartile ranges for skewed distributions. The significance threshold was set at a p-value of less than 0.05 for all statistical tests.

Ethical considerations

Ethical approval for the study was obtained from the Ethics Review Committee of the University of Medical Sciences Teaching Hospital Complex, Ondo. Given the retrospective nature of the study, informed consent was not required from patients. However, patient confidentiality was strictly maintained by anonymizing all identifying information during data collection and analysis.

RESULTS

Sociodemographic characteristics of the participants

A total of 99 mother-infant pairs were enrolled during the study period. The infants had a female to male ratio of 1.16:1, with a mean birth weight of 3.02 ± 0.35kg.The mother were mainly within the age bracket of 31 – 40 years (49.5%). The highest level of education for most mothers was secondary level of education (58.6%), about seven had no formal education. Majority (65.7%) were married. (Table 1)

MTCT prevention and outcome

All the mothers received HAART during the pregnancy period. Majority (59.6%) were on treatment for more than two years. Most of the babies (88.9%) were delivered via spontaneous vaginal delivery and about 35.4% were booked in the study center. While, 82.8% of the infants received only Nevirapine, 16.2% got a combination of Zidovudine and Nevirapine.

Of the 99 babies tested at 6 weeks, 4 (4.1%) tested positive while 95 (95.9%) tested negative. On further analysis of the 4 babies that tested positive, one baby did not receive prophylaxis, the remaining 3 had only Nevirapine. They were all delivered via spontaneous vaginal delivery. (Table 2)

Table 1: Sociodemographic characteristics of the participants

Variables	Frequency	Percent
Gender of infants		
Male	45	46.4
Female	52	53.6
Mean weight 3.02 ± 0.35kg		
Maternal age groups (years)		
< 20	9	9.1
21 – 30	29	29.3
31 – 40	49	49.5
> 40	12	12.1
Marital status		
Single	14	14.1
Married	65	65.7
Divorced	18	18.2
Widowed	2	2.0
Level of education		
None	7	7.1
Primary	14	14.1
Secondary	58	58.6
Tertiary	20	20.2
Occupation		
Unemployed	22	22.2
Employed	26	26.3
Self employed	51	51.5

Table 2: MTCT prevention and outcome

Variables	Frequency	Percentage
Result of initial DNA PCR		
Positive	4	4.1
Negative	93	95.9
Prophylaxis received		
None	1	1.0
Nevirapine only	82	82.8
Zidovudine/Nevirapine combination	16	16.2
Mode of delivery		
Vaginal	88	88.9
Caesarean section	11	11.1
Duration of Maternal HAART treatment		
< 1 year	19	19.2
1 – 2 years	21	21.2
> 2 years	59	59.6
Spouse with HIV		
Positive	22	22.2
Negative	69	69.7
Unknown	9	9.1

DISCUSSION

The mother to child transmission rate from this study was 4.1%, similar to that gotten in Senegal.[19] This is lower than 6.3%,[20] and 8.2%[21]gotten in the same geopolitical region and 6.9% in Kenya.[11] It is however higher than values reported in Anambra,[6]Abuja and Nasarawa,[22] and Zambia.[23] The difference in these rates may depend on the level of adherence to the WHO guidelines in the prevention of mother to child transmission.[4,25]

There seem to be a relative advantage of exposed infants delivered via caesarean section when compared to those delivered via vaginal delivery in this study. Universal precautions and safety are usually followed during invasive surgical operations. Also, it is believed that risk of mother to child transmission of HIV is reduced in operative delivery.[24, 25, 26] This was however, not the case in another study,[20] where no comparative advantage regarding the mode of delivery was found.

We observed from the study that the babies who tested positive were delivered to mother who received HAART. Also of the 4 HIV positive infants, 3 were given Nevirapine prophylaxis. The possible explanation for this occurrence may include late initiation of maternal treatment, non-adherence to treatment, drug resistance, and out of stock.

Majority of the study participants (69.7%) were in sero-discordant relationships, while the HIV status of about 9.1% of the fathers was unknown. This still highlights the fear of stigmatization from the society, thus limiting access to support for HIV-positive mothers and their exposed babies. In a bid to conceal their HIV status from their husbands and relatives, most mothers practice mixed feeding, and are usually noncompliant with the infant prophylaxis, their drugs usage and clinic follow up.

CONCLUSION

The mother to child transmission in the HIV infant is high, considering the WHO focus of achieving an HIV free generation by 2030 through eliminating mother to child transmission. Administration of HAART to mothers before pregnancy and adequate infant prophylaxis for the first 6 weeks of life is essential in reducing HIV transmission from mothers to their children..

Recommendations

1. There is need for more advocacy and implementation of policies on prevention, considering the high mother-to-child transmission from the study.
2. Adequate counselling and support should be provided for sero-discordant couple to help reduce stigmatization and acceptance of preventive measures.

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