

# Feeding Options and Antiretroviral Prophylaxis among Exposed Infants in Bida, North Central Nigeria

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**Abstract Background:** Breastfeeding is a major health promoting factor in infants and children in developing countries, but the risk of mother-to-child transmission (MTCT) of HIV by this route is challenging traditional and health policies in low resource countries. **Aims:** The aim of the study is to determine the effect of feeding options and infant antiretroviral prophylaxis on transmission of HIV in Bida North Central Nigeria. **Patients and methods:** we reviewed a total of Four hundred and fourteen (414) HIV exposed infants whose dried blood spot (DBS) samples were taken for DNA PCR test between May 2011 and July 2013 and whose parents are on antiretroviral therapy and for whom a complete set of records were available. **Results:** The most prevalent feeding option was mixed feeding 250(60.4%) followed by exclusive breastfeeding 84(20.3%) and exclusive formula feeding 80(19.3%). The HIV transmission rate is higher among mixed feeding 17.6% followed by exclusive breastfeeding 7.1% and exclusive formula feeding 5.0%. HIV transmission rate of 6.0% was observed for infants that were on antiretroviral prophylaxis and 43.6% for infants who were not on antiretroviral prophylaxis. **Conclusion:** The study shows the benefits of exclusive formula feeding and the intake of antiretroviral prophylaxis in reducing HIV transmission through breastfeeding.

**Keywords:** antiretroviral prophylaxis, HIV, breast-fed, infants

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## 1. Introduction

Mother-to-child transmission (MTCT) of HIV is one of the biggest challenges of the HIV/AIDS pandemic especially in resource constrained settings [1,2]. Africa has the highest burden of the disease accounting for about 90 percent of paediatric HIV infections [3]. More than 90% of the world's 2.3 million children living with HIV get infected through vertical transmission [4,5]. Nigeria is responsible for 30 percent of the global burden of MTCT of HIV, and is one of the 22 focus countries of the Global Plan to Eliminate MTCT. Though the Government of Nigeria is intensifying prevention of mother to child transmission (PMTCT) program to achieve this goal, evidence on the effectiveness of PMTCT interventions or their bottlenecks remains limited [6].

Breastfeeding is an integral part of a woman's motherhood and it is estimated that HIV transmission through breast-milk results in 200,000 HIV new cases yearly [7,8]. It has already been reported that HIV can be transmitted through breastfeeding [7,8,9]. In resource-poor setting, it is difficult for mothers not to breastfeed their babies and one study has shown that mortality and morbidity rates were similar for both formula-fed and breastfed infants [10]. Because of the stigma associated with HIV infection, most women choose to breastfeed to avoid the risk of revealing their HIV status. Many care givers are faced with these problems as conflicting reports exist on the benefits of exclusive breastfeeding, mixed feeding and formula feeding [11,12,13]. A number of practices have been recommended by various researchers to reduce post-natal HIV transmission [7,13]. The latest (2013) WHO guidelines on treatment and infant-feeding, state that mothers known to be HIV-infected should

exclusively breastfeed their infants for the first 6 months of life, introducing appropriate complementary foods thereafter, and continue breastfeeding for the first 12 months of life [14]. In the absence of any antiretroviral prophylaxis for either the mother or the infant, the risk of HIV transmission from mother to infant is 30 to 45% for breastfeeding infants and 15 to 30% for infants who are not breastfed [15]. Globally, up to 40% of HIV infections in infants have resulted from breastfeeding [16]. The risk of HIV transmission is highest in the first few months of breastfeeding [17,18,19]. In South- South Nigeria, over 80% of the exposed babies screened for HIV were breastfed [20]. In Zambia about 84% of HIV exposed infants whose records were reviewed had ever been breastfed [21].

Breastfeeding is a major health promoting factor in infants and children in developing countries, but the risk of MTCT of HIV by this route is challenging traditional and health policies in low resource countries. Regardless of intervention, the transmission rates for babies aged six weeks to six months who had mixed feeding was 25.6% whereas the transmission rates for those who were exclusively breastfed was 11.8% [20]. Evidence-based research suggests that antiretroviral (ARV) drugs given to pregnant women and their newborn babies reduce the risk of mother-to-child transmission [22,23,24].

The study was therefore designed to evaluate the effect of feeding options and infant antiretroviral prophylaxis on prevalence of HIV among exposed infants in Bida North Central Nigeria.

## 2. Patients and Methods

### 2.1. Study Area

This study was carried out in Federal Medical Centre Bida, North Central, Niger State, Nigeria. The hospital is a tertiary hospital with a referral status and is one of the site for Institute of Human Virology, Nigeria (IHVN) and the President Emergency Plan For AIDS Relief (PEPFAR) HIV/ AIDS intervention program in the country. HIV testing, treatment and monitoring are rendered at no cost.

#### 2.1.1. Study Design and Population

This was a retrospective study, which subject population comprised all prenatally HIV exposed children aged less or equal to six weeks to 6 months who had DBS samples taken for a DNA polymerase chain reaction (PCR) test between May 2011 and July 2013, whose parents are on antiretroviral therapy and for whom a complete set of records were available.

#### 2.1.2. Collection and Processing of Samples

A drop of blood from finger prick of each infant was placed on sterile Whatman No 903 filter paper and allowed to dry as dried blood spot. The DBS collected from each infant were tested for HIV using a qualitative DNA polymerase chain reaction (PCR) (AMPLICOR ® HIV-1 DNA test version 1.5, Roche).

#### 2.1.3. Statistical Analysis

The data analysis was performed by using statistical software SPSS for windows version 20.0.

## 3. Result

Table 1 shows prevalence feeding option among exposed infants. Out of 414 HIV exposed infants, the most prevalent feeding option was mixed feeding 250 (60.4%), followed by exclusive breastfeeding 84 (20.3%), and exclusive formula feeding 80 (19.3%).

**Table 1. Prevalence of Feeding Options among exposed infants**

Feeding Options	Frequency	Percentage
Mixed Feeding	250	60.4%
Exclusive formula feeding	80	19.3%
Exclusive Breastfeeding	84	20.3%
Total	414	100.0%

Table 2 shows the effect of feeding option on the prevalence of HIV using PCR. Mixed feeding had the highest HIV transmission rate with 44 (17.6%), followed by exclusive breastfeeding 6 (7.1%), while exclusive formula feeding had the lowest HIV transmission rate of 4 (5.0%).

**Table 2. Effect of feeding option on the prevalence of HIV using PCR among exposed infants**

Feeding option	No Tested	PCR	
		No Positive	percentage positive
Mixed feeding	250.0	44.0	17.6%
Exclusive breastfeeding	84.0	6.0	7.1%
Exclusive formula feeding	80.0	4.0	5.0%

Table 3 shows the effect of antiretroviral prophylaxis on prevalence of HIV using PCR among exposed infants. Out of 336 infants that were on antiretroviral prophylaxis 20 (6.0%) were PCR- positive, while out of 78 that were not on ARV prophylaxis 34 (43.6%) turned out PCR- positive.

**Table 3. Effect of anti retroviral prophylaxis on prevalence of HIV among exposed infants**

Anti retroviral prophylaxis use	Number of exposed infants	Number Positive	Percentage positive
Yes	336.0	20.0	6.0%
No	78.0	34.0	43.6%
Total	414.0	54.0	13.0%

*P value* (<.005).

## 4. Discussion

Breastfeeding is a major health promoting factor in infants and children in developing countries, but the risk of mother to child transmission of HIV by this route is challenging traditional and health policy. Because of the stigma associated with HIV infection, most women choose to breastfeed to avoid the risk of revealing their HIV status. Moreover many care givers are faced with problem as conflicting reports that exist on the benefit of exclusive breastfeeding, mixed feeding and exclusive formula feeding. The high prevalence of mixed feeding in this study is similar to the report from South-South, Nigeria by Anoje *et al* 2012 who reported that mixed feeding has the most prevalent feeding option followed by exclusive breastfeeding and exclusive formula feeding [20] but contrary to Digsu and Berihun in 2013 and Torpey *et*

al, (2011) who both reported exclusive breastfeeding as the most prevalent feeding options.[25,21]. While Ugochukwu and Kalu (2009) in Anambra south eastern Nigeria reported exclusive formula feeding as the most prevalent feeding option [26]. The high prevalence may be as a result of poor access to proper feeding counselling support and the influence of family members of culturally and socially accepted feeding method. Therefore accurate information, clear infant feeding guidance and ongoing support by healthcare workers and family members will help HIV positive mothers succeed with their chosen strategies. We also observed in this study that HIV transmission rate is higher among mixed feeding. This study is similar to Ugochukwu and Kalu (2009), [26] and Anoje *et al.*(2012) [20] who reported mixed feeding as having the highest HIV transmission rate of (68%), and (25.6%) respectively, while Digsu and Berihun in 2013 reported mixed feeding as important predictor in which the risk of MTCT was about four times higher as compared to exclusive breastfed [25]. The HIV transmission rate of 17.6% observed in mixed feeding is higher, compared to HIV transmission rate of 7.1% and 5.0% in exclusive breastfeeding and exclusive formula feeding respectively. The high HIV transmission may be because of irritation cause by formula feeding to the lining of the baby stomach, making it easier for HIV in the breast milk to get in and cause infection. The difference between HIV transmission rate in exclusive breastfeeding and exclusive formula feeding is not statistically significant.  $P=0.053$ . The higher HIV transmission rate observed in mixed feeding compared with those who were on exclusively breastfeeding and exclusive formula feeding suggests that exclusive breastfeeding and exclusive formula feeding are better than mixed feeding as a feeding option for HIV exposed infants but exclusive formula feeding is safer.

However a number of studies have indicated an increase risk of infant morbidity and mortality associated with exclusive formula feeding [9,27]. Inability to afford infant formula and poor condition for preparation of formula feeding has been suggested as possible reason for the high morbidity and mortality among formula-fed infants. Therefore exclusive breastfeeding may be a better feeding option and beneficial in reducing mother to child transmission of HIV infection. It is important to note that infectious diseases and malnutrition are the primary causes of death during infancy and artificial feeding substantially increases children risk of illness and death [8].

In addition our analysis showed that the HIV transmission rate of 6.0% was observed for infants that were on antiretroviral prophylaxis and 43.6% for infants who were not on antiretroviral prophylaxis. The high prevalence of HIV transmission observed among infants not on antiretroviral prophylaxis was statistically significant  $P<.001$ . This shows a beneficiary effect of antiretroviral prophylaxis in infants whose parents are on antiretroviral therapy. This finding is consistent with related study in Zambia by Seringer *et al* (2005) who reported 6.5% transmission rate of HIV where both mother and baby received antiretroviral (ARV) therapy [28]. Similarly a study in South Africa by Mnyani *et al* (2009) recorded an overall transmission rate of 5.8% where both mother and baby received some ARV for

prevention of mother to child transmission [29]. Likewise in South-South Nigeria Anoje *et al* 2012 reported 4.8% transmission rate of HIV infection where both mother and baby received intervention [20]. Perhaps in feature study, effect of prolong usage of antiretroviral prophylaxis on prevalence of HIV should be looked into in infants whose mother are on antiretroviral therapy.

## 5. Conclusion

The findings of this study showed that appropriate intake of antiretroviral prophylaxis by exposed infants whose mother are on antiretroviral therapy are of critical importance in reducing transmission of HIV. It further revealed that mixed feeding is the most prevalent feeding practice and with the highest transmission rate of HIV in this part of the world. Therefore, there is need for accurate information, clear infant feeding guidance and ongoing support by healthcare workers and family members to in accordance with WHO guideline among HIV positive mothers in Bida, North Central Nigeria.

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## References

- [1] De Cock KM, Fowler MG, Mercier E, et al. Prevention of mother-to-child HIV transmission in resource-poor countries: translating research into policy and practice. *JAMA* 2000; 283:1175-1182.
- [2] Sperling RS, Shapiro DE, Coombs RW, et al. Maternal viral load, zidovudine treatment, and the risk of transmission of human immunodeficiency virus type 1 from mother to infant. *Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. N Engl J Med* 1996; 335:1621-1629.
- [3] UNAIDS: 2010 Report on the Global AIDS Epidemic. Geneva: UNAIDS; 2010.
- [4] UNAIDS/WHO. AIDS Epidemic Update. December 2008. Geneva: UNAIDS; 2008.
- [5] UNICEF. State of the World's Children 2008. New York: UNICEF; 2008.
- [6] UNAIDS: Unified Budget Results and Accountability Framework (UBRAF) 2012-2015.
- [7] Gray GE, Saloojee H. Breast-feeding, antiretroviral prophylaxis, and HIV. *New Engl J Med* 2008; 359 (2): 189-191.
- [8] Coutoudis, A. Breast-feeding and HIV transmission. *Nutr Res Rev* 2001; 14:191-206.
- [9] Phadke MA, Gadgil B, Bharucha KE, et al. Replacement-fed infants born to HIV- infected mothers in India have a high early postpartum rate of hospitalization. *J Nutrition* 2003; 133: 3153-3157.
- [10] Mbari-Ngacha D, Nduati R, John G, et al. Morbidity and mortality in breast-fed and formula-fed infants of HIV-1 infected women. A randomized clinical trial. *JAMA* 2001; 286: 2413-2420.
- [11] Iliff PJ, Piwoz EG, Tavengwa NV, et al. Early exclusive breast-feeding reduces the risk of postnatal HIV-1 transmission and increases HIV-free survival. *AIDS* 2005; 19 (7): 641-652.
- [12] Coovadia HM, Rollins NC, Bland RM. Mother to child transmission of HIV-1 infection during exclusive breast-feeding in the first 6 months of life: an intervention cohort study. *Lancet* 2007; 369 (9567): 1107-1116.

- [13] Kuhn L, Sinkala M, Kankasa C, et al. High uptake of Exclusive Breast-feeding and Reduced Early post-natal HIV Transmission. *Plos One* 2007; 2 (12): e1363.
- [14] WHO (2013, June) 'Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: Recommendations for a public health approach
- [15] Lehman DA, Farquhar C. Biological mechanisms of vertical human immunodeficiency virus (HIV-1) transmission. *Rev Med Virol.* 2007;17: 381-403.
- [16] World Health Organization. HIV Transmission through Breastfeeding. WHO Geneva 2007. [World Health Organization].
- [17] Van de Perre P, Simonon A, Msellati P, et al. Postnatal transmission of human immunodeficiency virus type 1 from mother to infant. A prospective cohort study in Kigali, Rwanda. *N Engl J Med.* 1991;325:593-8.
- [18] Rousseau CM, Nduati RW, Richardson BA, John-Stewart GC, Mbori-Ngacha DA, Kreiss JK, Overbaugh J. Association of levels of HIV-1-infected breast milk cells and risk of mother-to-child transmission. *J Infect Dis.* 2004;190:1880-8.
- [19] Koulinska IN, Villamor E, Chaplin B, Msamanga G, Fawzi W, Renjifo B, Essex M. Transmission of cell-free and cell-associated HIV-1 through breast-feeding. *J Acquir Immune Defic Syndr.* 2006;41:93-9.
- [20] Anoje C, Aiyenigba B, Suzuki C, Badru T, Akpoigbe K, Odo M, et al. Reducing mother-to-child transmission of HIV: findings from an early infant diagnosis program in south-south region of Nigeria. *BMC Public Health* 2012, 12:184.
- [21] Torpey K, Kabaso M, Weaver MA, et al.: Infant Feeding Options, Other Non-chemo prophylactic Factors and Mother-to-Child Transmission of HIV in Zambia. *J Int Assoc Physicians AIDS Care (Chic)* 2011, in press.
- [22] The Petra Study Team: Efficacy of three short-course regimens of zidovudine and lamivudine in preventing early and late transmission of HIV-1 from mother to child in Tanzania, South Africa, and Uganda (Petra study): a randomised, double-blind, placebo-controlled trial. *Lancet* 2002; 359(9313):1178-1186.
- [23] Lallemand M, Jourdain G, Le Coeu S, et al. Single-dose perinatal Nevirapine plus standard zidovudine to prevent mother-to-child transmission of HIV-1 in Thailand. *N Engl J Med* 2004; 351:217-228.
- [24] Guay LA, Musoke P, Fleming T, et al.: Intrapartum and neonatal single-dose Nevirapine compared with Zidovudine for prevention of mother-to-child transmission of HIV-1 in Kampala, Uganda: HIVNET 012 randomised trial. *Lancet* 1999; 354:795-802.
- [25] Digsu Negese Koye and Berihun Megabiaw Zeleke. Mother-to-child transmission of HIV and its predictors among HIV – exposed infants at a PMTCT clinic in north west Ethiopia. *BMC Public Health* 2013; 13:398.
- [26] Ugochukwu EF and Kalu SO. Early Infant Diagnosis of HIV Infection in South eastern Nigeria; Prevalence of HIV Infection Among HIV-Exposed Babies. *WAJM* 2010; Vol.29, No1.
- [27] WHO Collaboration Study Team on the Role of Breast feeding on the prevention of infant mortality. Effect of breast feeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. *Lancet* 2000; 355:451-455.
- [28] Stringer JS, Sinkala M, Maclean CC, Levy J, Kankasa C, Degroot A, et al. Effectiveness of a city-wide program to prevent mother-to-child HIV transmission in Lusaka, Zambia. *AIDS* 2005; 19:1309-1315.
- [29] Mnyani C, McIntyre J, Struthers H, et al.: Reducing PMTCT in practice: results from a successful model of a PMTCT program in a high prevalence HIV urban setting. In Abstract #TUPEC048. Presented at: 5th IAS Conference on HIV Pathogenesis, Treatment and Prevention. Cape Town, South Africa; 2009.