



Original Research Article

DOI: <http://dx.doi.org/10.22192/ijcrms.2017.03.02.005>

Impact of prevention of mother to child transmission (PMTCT) of HIV on positivity rate in Kafanchan, Nigeria

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Abstract

HIV pandemic is one of the most serious health crises the world faces today. Paediatric HIV is a leading cause of morbidity and mortality worldwide as about 700,000 children become newly infected with HIV annually through vertical transmission. Majority of vertical transmission of HIV occur either during pregnancy, delivery or why the infants are being breast-feeding. MTCT can be reduced by use of antiretroviral drugs in women during pregnancy and labour and to the infant in the first 6 weeks of life combined. This study assessed the impact of PMTCT programme on infant HIV positivity rate in Kafanchan, Kaduna state. This was a retrospective review of 276 DNA PCR tests performed for 276 infants (144 females and 132 males) seen at the HIV-exposed infant clinic of General Hospital Kafanchan from December 2009 to December 2011. The babies were those whose mothers received PMTCT interventions as well as those whose mothers had no PMTCT intervention but were discovered to be HIV positive during labour and therefore the mothers and babies received intervention just before and immediately after delivery or discovered when the children or mothers came for immunization or routine medical check-up/follow-up. The mothers of all participating infants completed an interviewer-administered questionnaire which collected information regarding demographics, CD4 testing, ARVs adherence and type of infant feeding. The information from the mothers was cross-checked from their medical records and that of their children. The study found an MTCT rate of 9.1%. This means that the odds of a child being born HIV positive with PMTCT intervention are 9.1%. Four (1.6%) of babies of mothers that reported good adherence had positive PCR results while 244 (98.4%) had HIV negative infants. In contrast, of the 12 mothers that reported poor adherence 10 (83.3%) had positive infants while 2 (16.7%) had HIV negative children. 24 (9.5%) of the infants exclusively breastfed had positive PCR test results while 228 (90.5%) had negative PCR test results. For those formula fed, 1 (4.3%) had a positive PCR result and 22 (95.7%) had negative PCR results. The only child given mixed feeding had a negative result. Furthermore, mothers with CD4 levels greater than 350 cells had 13 (8.5%) HIV positive infants compared to 140 (91.5%) HIV negative infants while those with CD4 levels less than 350 cells had 12 (10.8%) HIV positive children compared to 111 (90.2%) HIV negative children.

The low rate of MTCT in this study shows the effectiveness of PMTCT interventions. Therefore efforts should be intensified to ensure more access to PMTCT services/interventions for HIV positive pregnant women.

Keywords: Impact, Prevention of Mother to Child Transmission (PMTCT), HIV/AIDS, Positivity rate ,Kafanchan

Introduction

Human immunodeficiency virus (HIV) is the agent that causes acquired immunodeficiency syndrome (AIDS) which attacks and damages the body's immune system, thereby impairing the capacity of the body to fight infectious organisms (Alexander, Mirjam and Kiaus, 2010). HIV is a major health problem worldwide. There were about 36.7 million people living with HIV worldwide as at 2015, with 2.1 million new infections and 6.5 million of the 36.7 million living in Western and Central Africa. Also, there were 1.1 million AIDS-related deaths globally in 2015 (Global AIDS Update, 2016).

HIV continues to have a significant impact on children. More than 90% of HIV infections in children is due to mother-to-child transmission (MTCT), which is a situation where women living with HIV infection give birth to infants infected with HIV (UNAIDS, 2006). MTCT can occur during pregnancy, during labour and delivery or via breast feeding. In the absence of antiretroviral treatment, vertical transmission is about 25% (Coovadia, 2004). However, where combination antiretroviral drug treatment is available and with complete avoidance of breast feeding or exclusive breastfeeding for the first 6 months, this risk can be reduced to as low as 1%, hence the importance of PMTCT (Coovadia, 2004; Coovadia & Bland, 2007).

The immunologic (CD4) and virologic (viral load) levels of the mother influence the risk of HIV transmission. Low CD4 levels increases the risk of MTCT while high levels are associated with a lower risk of MTCT. This is because low CD4 levels are associated with more advanced disease, and sicker mothers are more likely to transmit the virus than HIV-infected mothers who are still clinically healthy. Delivery is also associated with increased risk of HIV transmission, with a long duration of ruptured membranes increasing the risk further as the baby

is exposed to secretions in the maternal genital tract, which contain HIV (Jones *et al.*, 2003).

Another risk factor for MTCT is breastfeeding. The risk of transmitting HIV infection during breastfeeding depends on the clinical stage, CD4 level and conditions of the breast (e.g. mastitis or maternal nipple lesions) of the mother, HIV seroconversion of the mother during breastfeeding. This is so because they lead to increased levels of HIV in breast milk (Kuhn & Abrams, 2009; Shapiro and Ogwu, 2009). Breastfeeding-based MTCT is also promoted by failure of the infant to receive post-natal antiretrovirals, mixing of breastfeeding with other non-breast milk liquids or solids and the presence of oral or oesophageal Candidiasis which cause the inflammation of the infant's gastrointestinal mucosal barrier (Gaillard *et al.*, 2004).

Objectives of the Study

1. To determine the percent of HIV-infected children born to HIV-positive mothers
2. To determine the effect of mothers' ART adherence on infant positivity rate
3. To determine the effect of breastfeeding on transmission of HIV to infants born to HIV-positive mothers.
4. To determine the effect of mothers' CD4 level on infant positivity rate

Methods

This was a retrospective review of 276 DNA PCR tests performed for 276 infants (144 females and 132 males) seen at the HIV-exposed infant clinic of General Hospital Kafanchan from December 2009 to December 2011. The clinic attends to babies whose mothers received PMTCT interventions (Group 1) as well as those whose mothers had no PMTCT intervention but were discovered to be HIV positive during labour and

therefore the mothers and babies received intervention just before and immediately after delivery or discovered when the children or mothers came for immunization or routine medical check-up/follow-up (Group 2). The mothers of all participating infants completed an interviewer-administered questionnaire which collected information regarding demographics, CD4 testing, ARVs adherence and type of infant feeding. The information from the mothers were

cross-checked from their medical records and that of their children.

Data were entered and analyzed using statistical package for social science (SPSS).

Results

Table 1 shows that of the 276 infants studied 260 (94.2%) belonged to group 1 and 16 (5.8%) belonged to group 2.

Table 1: The type of intervention received by Mothers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nothing	16	5.8	5.8	5.8
	HAART	122	44.2	44.2	50.0
	AZT	5	1.8	1.8	51.8
	AZT +3TC	126	45.7	45.7	97.5
	Nevirapine	7	2.5	2.5	100.0
	Total	276	100.0	100.0	

Table 2 presents the sex of the infants involved in the study. Of the 276 infants studied, 144 (52.2%) were females while 132 (47.8 %) were males.

Table 4.2: Sex of the infants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	132	47.8	47.8	47.8
	Female	144	52.2	52.2	100.0
	Total	276	100.0	100.0	

Also, of the 276 infants, 251 (90.9%) were HIV negative and 25 (9.1%) were HIV positive according to the PCR results (Table 3) with

MTCT rate of 9.1%. This means that the odds of a child being born HIV positive with PMTCT intervention is 9.1%.

Table 3: Determination of the percentage of HIV-infected children born to HIV-positive mothers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Positive	25	9.1	9.1	9.1
	Negative	251	90.9	90.9	100.0
	Total	276	100.0	100.0	

The result (Table 1) shows that 260 (94.2%) of the mothers had received one form of medication or the other for PMTCT intervention. Of the 260 mothers who received intervention 248 (95.4%) of the mothers reported good adherence to their medications while 12 (4.6%) reported poor adherence (Table 4). Also, of the 248 mothers that

reported good adherence the infant of 4 (1.6%) had positive PCR results while 244 (98.4%) had HIV negative infants. In contrast, of the 12 mothers that reported poor adherence 10 (83.3%) had positive infants while 2 (16.7%) had HIV negative children.

Table 4: Mother’s Adherence to PMTCT medications

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Poor	12	4.6	4.6	4.6
Good	248	95.4	95.4	100.0
Total	260	100.0	100.0	

Table 5: Determination of the effect of mothers’ ART adherence on infant positivity rate

		What is PCR test result?		Total
		Positive	Negative	Positive
Mother's Adherence	Poor	10	2	12
	Good	4	244	248
Total		14	246	260

Table 6: Cross Tabulation of Mothers’ Intervention with PCR Test Results

		What is PCR test result?		Total
		Positive	Negative	Positive
What is mother's intervention?	Nothing	1	15	16
	HAART	10	112	122
	AZT	0	5	5
	AZT +3TC	12	114	126
	Nevirapine	0	7	7
Total		25	251	276

Two hundred and fifty-two (252) mothers (91.3%) reported exclusive breastfeeding, 23 (8.3%) exclusive formula feeding, and 1 (0.4%) mixed-feeding. From table 4.8 below, 24 (9.5%) of the infants exclusively breastfed had positive

PCR test results while 228 (90.5%) had negative PCR test results. For those formula fed, 1 (4.3%) had a positive PCR result and 22 (95.7%) had negative PCR results. The only child given mixed feeding had a negative result.

Table 7: Infant Feeding Option

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Exclusive Breastfeeding	252	91.3	91.3	91.3
Exclusive Formula	23	8.3	8.3	99.6
Mixed feeding	1	0.4	.4	100.0
Total	276	100.0	100.0	

Table 8: Determination of the effect of breastfeeding on transmission of HIV to infants born to HIV-positive mothers.

		What is PCR test result?		Total
		Positive	Negative	Positive
What is the feeding option of the baby?	Exclusive Breastfeeding	24	228	252
	Exclusive Formula feeding	1	22	23
	Mixed Feeding	0	1	1
Total		25	251	276

Also, two hundred and seventy-six (276) of the mothers 153 (55.4%) had CD4 level greater than 350 and hence not qualified for HAART and 123

(44.6%) had CD4 level less than 350 cells which qualified them for HAART.

Table 9: Mothers' CD4 Level

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Greater than 350	153	55.4	55.4	55.4
Less than 350	123	44.6	44.6	100.0
Total	276	100.0	100.0	

Table 10: Determination of the effect of mothers' CD4 level on infant positivity rate

		What is PCR test result?		Total
		Positive	Negative	Positive
What is mother's CD4?	Greater than 250	13	140	153
	Less than 250	12	111	123
Total		25	251	276

When the CD4 results of the mothers was cross tabulated with the PCR results of the infants (Table 10) shows those with CD4 levels greater than 350 cells had 13 (8.5%) HIV positive infants compared to 140 (91.5%) HIV negative infants while those with CD4 levels less than 350 cells had 12 (10.8%) HIV positive children compared to 111 (90.2%) HIV negative children.

Discussion

The effectiveness of antiretroviral drugs for PMTCT has been well documented in developed countries. In non-breastfed infants, the use of highly active antiretroviral therapy (HAART) has reduced the rate of perinatal HIV transmission to less than 2%.

On the percent of HIV-infected children born to HIV-positive mothers, this study found that 25 children (9.1%) of the 276 children born to 276 HIV-positive mothers were positive. This is higher those reported in studies by Ivers *et al.* (2005) and Hoffman *et al.* (2010) where they reported a HIV transmission rate of 2% and 4.9% respectively among children tested but lower than that reported in a study by Audu *et al.* (2004) on 68 children born to HIV infected mothers in Benin and Lagos with a transmission rate of 22%. The 22% transmission rate recorded in the study by Audu *et al.* (2004) is close to the range of 25 to 35% that has been reported in several developed and a few developing countries.

Conclusions

The low MTCT rates in this study show that PMTCT interventions are effective. More efforts should be devoted to ensuring more HIV positive pregnant women have access to PMTCT services.

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How to cite this article:

Omo-Emmanuel , Ughweroghene Kingston, Ochei, Kingsley Chinedum, Osuala, Eunice Ogonna, Obeagu, Emmanuel Ifeanyi and Onwuasoanya, Uche Francisca. (2017). Impact of prevention of mother to child transmission (PMTCT) of HIV on positivity rate in Kafanchan, Nigeria. *Int. J. Curr. Res. Med. Sci.* 3(2): 28-34.

DOI: <http://dx.doi.org/10.22192/ijcrms.2017.03.02.005>