



Mother to child transmission of HIV infection and its pre-disposing factors among exposed infants on care at Taraba State Specialist Hospital, Jalingo, North-East Nigeria

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ABSTRACT

Background: Mother to child transmission remains a persistent source of HIV acquisition. This can occur in utero, antepartum and post-partum. PMTCT strategies and interventions include the use of antiretroviral agents (ARVs) for mother and infant, caesarian section before onset of labor and delivery and avoidance of breast feeding. **Objective:** To ascertain M-T-C-T prevalence of HIV and evaluate the efficacy of the different PMTCT interventions on HIV status of exposed infants. **Materials and Methods:** Early infant diagnosis laboratory records of 151 exposed infants who had HIV RNA PCR test from January 2016- July 2017 were retrieved. Data on antiretroviral regime for mother and infant, sex of infant, infant feeding practice for the first three months and HIV RNA PCR result were analyzed. **Result:** Of the 151 subjects analyzed, 16 (10.6%) were positive for HIV RNA. Infants on prophylaxis had a lower transmission rate of 8.8% when compared to the 28.6% recorded for infants that were not given ARV. Mixed fed infants recorded the highest transmission rate of 16.1%. When mother and infant received ARV transmission rate was 8.3%, but when none received ARV, transmission rate rose to 50%. **Conclusion:** The transmission rate recorded in this study is alarming especially when mother and child pair did not receive any form of ARV. Thus, there is need for antiretroviral coverage expansion, better access to PMTCT centers and programs and increased child birth education for HIV positive women and health-care providers.

INTRODUCTION

The Human Immuno-deficiency virus pandemic is one of the most devastating epidemics in recorded history [1]. Global estimates put the figure of those living with HIV/AIDS to be around 42 million with 75% of these persons living in sub-Saharan Africa [2]. While horizontal transmission is recording a gradual reduction, vertical (mother-to-child-transmission) seems to be a persistent source of HIV acquisition. W.H.O has estimated that close to 600,000 children are infected yearly with the AIDS virus via M-T-C-T with majority of the cases occurring in low-income countries [3].

Mother-to-child transmission of the AIDS virus, is responsible for 90% of HIV infection in children [4]. Incidence of M-T-C-T

without interventions is about 25-45% (5-10% during pregnancy, 15-20% during delivery and 5-10% during breast feeding) [5]. M-T-C-T of HIV occurs via three mechanisms: In utero (micro-transfusion of viremic maternal blood across the placenta resulting from breakdown of placenta integrity), Intrapartum (contact of infant mucosal membranes with HIV in maternal blood and secretions during the process of birth) and Post-partum (viral acquisition from breast milk) [6].

Studies on the use of ARVs to interrupt HIV transmission were initiated in early 1990s in the United States and other resource-rich countries. Coupled with the avoidance of breast feeding and good access to comprehensive HIV and pregnancy care services, these interventions have significantly reduced perinatal transmission in resource-rich settings to 1-2% [7]. Although

substantial barriers exist in resource-limited settings, introduction of ARVs for perinatal transmission prevention has reduced M-T-C-T rates from 570,000 in 2003 to an estimated 110,000 in 2015 within the 21 Global Plan Priority Countries in sub-Saharan Africa [8].

Irrespective of the presence or absence of preventive interventions, M-T-C-T is associated with certain risk factors. These risk factors includes maternal plasma and breast milk viral load, maternal CD4 cell count, maternal immunologic status, clinical stage of the disease, maternal mastitis, duration of labor and infant feeding practice [9] [10] [11] [12].

Currently, there are more than 1,216 PMTCT service centers across Nigeria [13]. Strategies employed at these centers to reduce M-T-C-T rates of HIV includes the use of ARVs (mother and infant), advocacy for caesarian section before the onset of labor or rupture of membranes, avoidance of breast feeding and procedures such as amniocentesis, chorionic villi sampling, external vision and membrane stripping. Child-birth education for both mothers and health-care providers has also been introduced [14] [15]. Early infant diagnosis (EID) programs can be used to evaluate the prevalence rate of M-T-C-T as well as the impact of its different interventions in M-T-C-T prevention. This study evaluates the transmission rate of the AIDS virus via M-T-C-T and the effect of the different PMTCT intervention on the outcome of infants HIV status.

MATERIALS AND METHODS

This is a retrospective study conducted at Taraba State

Specialist Hospital Jalingo, a tertiary health-care facility that also serves as a referral center for other parts of Taraba, Adamawa and Benue State. Jalingo is the capital city of Taraba state with an estimated population of 118,000 persons.

The early infant diagnosis laboratory register of all blood samples (Dried Blood Spot) collected from January 2016- July 2017 were reviewed. All exposed infants within the study duration were eligible for the study and only those with incomplete data were excluded from the study.

All dried blood spots (DBS) collected during the study duration were sent to the Early Infant Diagnosis (EID) laboratory at Federal Medical Center Jalingo for processing via HIV RNA PCR. Relevant data such as sex of infant, ARV regime for mother and child, infant feeding practice and HIV RNA result were retrieved and analyzed using SPSS 23. Results were presented in simple frequency and percentage while statistical significance was assayed for using Pearson's Chi-square and Fisher's exact test.

A total of 157 infants EID laboratory results were retrieved. Six of them were not eligible for the study as their data were incomplete. The data of 151 infants were reviewed and analyzed.

RESULT

151 infants born to HIV positive mothers were evaluated for M-T-C-T of HIV. A total of 128 (84.3%) of the mothers were on HAART before and during pregnancy (Regime 3), 11 (7.3%) did not receive any ARV (Regime 4), 4 (2.6%) received single dose

Table 1 : Characteristics of the studied population

Characteristics	Frequency	Percentage
Mother's drug regime		
Regime 1	4	2.6
Regime 2	8	5.3
Regime 3	128	84.3
Regime 4	11	7.3
Infant's drug regime		
Received nevirapine	137	90.7
None	14	9.3
Sex of infant		
Male	79	52.3
Female	72	47.7
Feeding practice of infant		
Exclusive breast feeding	113	74.8
Commercial formula	7	4.6
Mixed feeding	31	20.5
Mother/child pair drug regime		
Mother and child	132	87.4
Only mother	8	5.3
Only child	5	3.3
None	6	4.0

Table 2 : Total number of infants screen for HIV RNA and the outcome

HIV RNA	Frequency	Percentage
Positive	16	10.6
Negative	135	89.4
Total	151	100

Table 3 : Mother and Infant drug regime and HIV RNA status

Characteristics	HIV RNA Positive	Percentage Positive	HIV RNA Negative	Percentage Negative	P-value
Mother's drug regime					0.179
Regime 1	0	0.0	4	100.0	
Regime 2	1	12.5	7	87.5	
Regime 3	11	8.6	117	91.4	
Regime 4	4	36.4	7	63.6	
Infant's drug regime					0.070
Received nevirapine	12	8.8	125	91.2	
None	4	28.6	10	71.4	
Sex of infant					0.297
Male	6	7.6	73	92.4	
Female	10	13.9	62	86.1	
Infant feeding practice					0.692
Exclusive breast feeding	11	9.7	102	90.3	
Commercial formula	0	0.0	7	100.0	
Mixed feeding	5	16.1	26	83.9	
Mother/child pair drug regime					0.084
Mother and child received ARV	11	8.3	121	91.7	
Only mother received ARV	1	12.5	7	87.5	
Only child received ARV	1	20.0	4	80.0	
None received ARV	3	50.0	3	50.0	

nevirapine + Zidovudine+ Lamivudine in labor and Zidovudine and Lamivudine for another 7 days (Regime 1) while 8 (5.3%) received Regime 2 (Zidovudine during pregnancy + Regime 1). Seventy-nine (52.3%) of the infants were males, 137 (90.7%) received nevirapine while 113 (74.8%) were exclusively breast fed. ARV regime for mother and child pair revealed that 132 mother and child pair (87.4%) had ARV while 6 (4.0%) did not receive ARV. Table 1 summarizes the characteristics of the studied population.

Of the 151 infants screened for HIV RNA, 16 (10.6%) were positive while 135 (89.4%) were negative. Table II.

M-T-C-T of HIV based on mother's drug regime, infant's drug

regime, sex of infant and mother/child pair drug regime gave varying figures but none had statistical significance at a confidence limit of 95% using Pearson's Chi-square and Fisher's exact test with p-values < 0.05 regarded as been significant (Table III).

DISCUSSION

The transmission rate of 10.6% recorded in this study is in consonant with the report of Ogunbosi et al., (2011) [1] who reported 10.0% for Ibadan, Nigeria and 9.9% recorded by Chama et al., (2007) for Maiduguri [16]. While South Africa recorded a lower transmission rate of 6.2% [17], higher figures have been reported for other African countries such as Zambia (12.2%) [18]

and Ethiopia 15.7% [12]. The high prevalence of 10.6% recorded in this study and similar prevalence in other low-income countries may be attributed to reduced availability of PMTCT services, poor awareness of these centers and their strategies, low compliance rate to PMTCT interventions as well as economic and cultural issues.

Children born to mothers on short course ARV (regime 1 and 2) gave prevalence rates of 0% and 12.5% respectively while those born to mothers on long term HAART (regime 3) had a prevalence of 8.6%. This indicates that short ARVs are as effective as HAART with just slight variations. Chukwumeka et al., (2014) [19] gave a similar report. The similarity observed between long term HAART and short term ARV courses may be attributed to the fact that 70% of M-T-C-T occurs during labor and delivery. Thus, reducing maternal viral load during this period is crucial to M-T-C-T prevention.

Children born to mothers on regime 4 (did not receive ARV) and infants that did not receive ARV gave a prevalence of 36% and 28.6% respectively. This finding highlights the importance of ARV usage in M-T-C-T prevention a fact supported by several studies [1][12][19].

Whether the sex of infant is a predisposing factor for M-T-C-T remains debatable. However, female infants had higher HIV infection than their male counterpart (13.9%: 7.6%). This report is in consonance with Adejuyigbe et al., (2003) [20] and Oniyanyi et al., (2006) [21] but in contrast to other reports [22][23].

Infant feeding based prevalence gave its highest prevalence of 16.1% for infants on mixed feeding. Several studies have also reported mixed feeding as an independent predictor of HIV transmission. [24] [25]. Irritation of infant's immature gastrointestinal tract resulting from commercial formula consumption may encourage or facilitate HIV particle entry from maternal breastmilk into the infant's blood stream. This may be responsible for the association between mixed feeding and HIV acquisition.

Evaluating the efficacy of mother and infant pair drug regime gave a striking pattern of prevalence. When both (mother and child) received ARV, M-T-C-T rate was 8.3%. The transmission rate rose to 12.5% when only the mother received ARV, 20.0% when only the child took ARV and 50% when both pair did not receive ARV. A similar progressive pattern of transmission rate was also reported by Chukwumeka et al., (2014) [19]. This finding reflects the importance of the use of ARV for M-T-C-T prevention. The Variation observed between when only mother and only child was on ARV (12.5%; 20.0%) could be as a result of the lower maternal viral load achieved with maternal ARV.

CONCLUSION

The prevalence of 10.6% recorded in this study is considerably high but the 50% recorded when there was no ARV intervention is alarming. Thus, increase in PMTCT centers, programs and strategies is recommended. Prospective cohort studies that seek to evaluate M-T-C-T rates in relation to delivery place and style, maternal immunologic status and clinical stage, maternal plasma and breast milk viral load as well as maternal CD4 cell count is also recommended.

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