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## PMTCT Programme reduced vertical transmission of HIV in Abuja, Nigeria

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**Abstract:** *Objective:* To determine the rate of mother to child transmission of HIV following the introduction of PMTCT program in Abuja.

*Method:* A prospective study of 355 seropositive mothers and their newborns was conducted at the National Hospital Abuja and Asokoro District Hospital Abuja over a 12 months' period following ethical approval. Using DNA PCR the HIV status of all the exposed babies delivered over the period was determined by taking their peripheral blood at 6 weeks of age. This was repeated 6 weeks post cessation of breast feeding for breastfed babies.. Furthermore, the babies were categorized based on the extent of participation of their mothers in the

PMTCT programme and the transmission rates obtained were compared.

*Result:* An overall HIV vertical transmission rate of 6.4% (23/359) was found. A lower rate of 1.6% (5/311) was obtained for those whose mothers fully accessed PMTCT programme as opposed to 15.0% (3/20) for those whose mothers had incomplete participation and 53.6%(15/28) for those whose mothers did not participate.

*Conclusion:* Full participation in PMTCT programme significantly reduced mother to child transmission of HIV.

**Keywords:** Paediatric HIV/ AIDS, MTCT, PMTCT, DNA-PCR, Abuja, Nigeria

### Introduction

Human Immunodeficiency Virus (HIV)/Acquired immunodeficiency syndrome (AIDS) is a significant threat to the health of families worldwide. Paediatric AIDS has become the cause of increasing childhood morbidity and mortality<sup>1</sup>. Women of child bearing age in Africa are particularly vulnerable to HIV infection and this has led to an increase in paediatric HIV through mother to child transmission of HIV<sup>2</sup>.

Mother to child transmission, (MTCT) also referred to as vertical transmission, is the predominant mode of acquisition of HIV in children and can be reduced by the PMTCT programme. In Nigeria the risk of MTCT is high because of the high prevalence of HIV among women of reproductive age (4.8%), high fertility rate (5.6%), prolonged breast feeding associated with mixed feeding and poor access to effective interventions aimed at preventing MTCT.<sup>3</sup>

Prior to the use of antiretroviral therapy, the rate of MTCT of HIV in developed countries was 15-30%<sup>4</sup> while it was about 45% in resource limited countries, including Nigeria<sup>5</sup> This difference was attributed to breast feeding which increased the risk of MTCT by 5%

-20%<sup>6</sup>. However, with some preventive interventions, a lower rate of 16.2% was reported in Jos<sup>7</sup> and 6.8% in Abuja<sup>8</sup>

Prevention of mother-to-child (PMTCT) of HIV programme as a tool for reducing paediatric burden of HIV infection became a reality in 1994 when the result of the Paediatric Clinical Trial Group (PACTG) protocol 076<sup>9</sup> in the United States showed that maternal ARVs, optimal obstetric practice, appropriate infant feeding option and infant ARVs could reduce the rate of transmission from mother to child by two-thirds.<sup>9</sup> Implementation of the PMTCT programme in Nigeria commenced in July 2002 in six sites and had scaled up to six hundred and forty (640) sites<sup>10</sup> across the six geo-political zones by 2008. It has been integrated into routine antenatal services offered in the country. There is however paucity of data on the formal evaluation of the outcome of the PMTCT programme and contributory factors to MTCT in Abuja Municipal Area Council. There is a need to assess the extent of participation of HIV positive mothers in PMTCT program in Abuja and the outcome of these interventions. The information from this study will be useful in making recommendation that may guide in further development of policy guidelines for the

PMTCT program in the Federal Capital Territory in particular and Nigeria as a whole. This will hopefully reduce the burden of paediatric HIV infection and AIDS in the population and reduce the rate of child morbidity and mortality.

## Subjects and Methods

A prospective study was undertaken in the National Hospital Abuja and Asokoro District Hospital both located in Abuja municipal Area council from July 2009 to July 2010. Ethical approval was obtained from the ethical boards of both hospitals and the study was conducted in accordance with the declaration of Helsinki. The subjects were the HIV positive mothers and their subsequent infants (inborns) delivered at the study centres. On enrolment, after obtaining an informed consent, the Biodata of mother including (age, marital status, religion, social class and husbands' HIV status) were obtained at 36 weeks gestation. At delivery relevant information relating to the baby such as (sex, mode of delivery, birth weight, mode of feeding, use of post exposure ART prophylaxis) were also obtained and documented.

Inborn babies were seen at 6 weeks of age on appointment for 1<sup>st</sup> clinic visit at the paediatric outpatient clinics (POPD) of the study centres. Dried Blood Specimen (DBS) were taken from the exposed babies for DNA-PCR test and 4 weeks appointment given for a 2<sup>nd</sup> clinic visit during which time the result of the test was disclosed to the mother/ parents and those who were on breast milk substitute who tested negative to DNA-PCR test were discharged to well babies' clinic. Those who tested positive were referred to paediatric HIV clinic for treatment. However, those who tested negative and were still breast feeding were given appointment for a 3<sup>rd</sup> clinic visit to repeat DNA-PCR test 6 weeks post cessation of breastfeeding and 4<sup>th</sup> clinic appointment was given for disclosure of the results and referral appropriately.

For the out born babies referred to the study centres, recruitment was done at the POPD clinic at age 6-12 weeks and the clinic visits scheduled as those of the inborns.

The PMTCT protocol adopted for this study was in accordance with the National Guideline on PMTCT which consisted of HIV counseling and testing, maternal ARVs, modified obstetric practice, appropriate infant feeding option and neonatal ARV prophylaxis at the time in which this study was conducted.

The subjects were eventually categorized into three groups based on the extent of the participation of the mothers in the PMTCT protocol. Those who were recruited from the ANC and followed up to the point of diagnosis were categorized as total, those who missed any stage of the protocol were categorized as partial and

those who had no interventions were categorized as nil. Data were analyzed using the SPSS 18 and P value < 0.05 was taken as significant

## Results

### General Characteristics of the mothers

A total of 355 HIV positive mothers and their newborns were recruited. There were four sets of twin resulting in a total of 359 babies. Of the 355 HIV positive mothers, 121(37.2%) were delivered at the National Hospital Abuja, 80(22.5%) at Asokoro District Hospital and 154 (43.4%) were referred from other hospitals. Table 1 summarizes the background information of the mothers. Their mean age was 27 years.

**Table 1:** General and obstetric characteristics of the mothers

Characteristics	number (%)
<i>Age</i>	
<20	2 (0.5)
20-34	201(56.6)
>35	152 (42.8)
<i>Marital Status</i>	
Married	342 (96.2)
Separated	5 (1.4)
Single	5(1.4)
Widow	3(0.9)
<i>Socio-economic status</i>	
Upper	59(16.6)
Middle	234(65.9)
Lower	62(17.5)
<i>Parity</i>	
1	118 (33.2)
2	114(32.1)
3	77 (21.7)
4	46(13)
<i>Mode of delivery</i>	
SVD	219(61.7)
ELCS	116 (32.7)
EMCS	20 (5.6)
<i>PROM</i>	
Yes	48 (20.8)
No	183(79)
<i>Place of Delivery</i>	
NHA	130 (36.6)
ADH	78(22.0)
Others	147(41.4)

### General Characteristics of Babies

Of the 359 babies, 199(55.4%) were males while 160 (44.6%) were females giving a male to female ratio of 1.2:1 as shown in Table 2. Three hundred and forty-six were born term (96.4%) while 13(3.6%) were preterm. There were four sets of twins one pair was conceived by in-vitro fertilization. Three hundred and twenty-six babies had sufficiently satisfactory conditions to be discharged to their mothers but 33(9.2%) required hospitalization. The reason for the hospitalization were prematurity in 13(39.4%), neonatal jaundice 8(24.2%), neonatal sepsis 7(21.2%) and perinatal asphyxia 5(15.2%).

Variables	n (%)
<i>Sex</i>	
Male	199 (55.4)
Female	160 (44.6)
<i>Gestational age (wk)</i>	
Term (37- 42))	346 (96.4)
Preterm (< 37)	13(3.6)
<i>Mode of feeding</i>	
BMS	254(70.8)
EBF	93(25.9)
Mixed	12(3.3)

#### *Rate of mother to child transmission of HIV*

At six weeks of age, all the 359 babies had PCR DNA test. 22(6.1%) were positive (8 from BMS group, 14 from breast feeding group) while 337(93.9%) were negative (246 from BMS group, 91from breast feeding group). A second DNA PCR test was conducted for 91 infants that were exclusively breast fed or had mixed feeding, who tested negative to the first test. One child additionally was identified as being HIV positive among this group of infants who received mixed feeding. Therefore, the total number of HIV infected children was 23 giving a mother to child transmission rate of (23/339) 6.4% as displayed in table 3.

DNA –PCR Result	n(%)
Negative	336(93.5)
Positive	23(6.5)*
Total	359(100)

\*95% CI = 5.47% - 6.52%

#### *Relationship between participation in the PMTCT package and rate of vertical transmission of HIV*

There was a significant association between participation in all the interventions involved in the preventive package and HIV transmission. The rate of HIV transmission from mother to child was low (1.6%) for the mothers who participated fully in the programme from the prenatal period to delivery, compared to those who participated partially (15.0%) or did not participate at all (53.6%) as seen in Table 4.

Participation in PMTCT	DNA-PCR		Total
	Negative	Positive	
Full	306(98.4%)	5(1.6%)*	311(100%)
Partial	17(85.0%)	3 (15.0%)	20 (100%)
Nil	13(46.4%)	15(53.6%)	28(100%)

Fishers Exact <sup>2</sup> for 2 by 3 table = 85.884, p < 0.001

\* 95% CI = 1.58% - 1.62%

#### **Discussion**

This rate of MTCT was lower than those reported in previous study in Nigeria.<sup>5</sup> Though the study was similarly hospital based, the higher rate of transmission can be attributed to the difference in the levels of interven-

tions and the circumstances under which the study was conducted. For instance, Odaibo et al<sup>5</sup> found a transmission rate of 45 % in Ibadan, from a study on MTCT rate in Nigeria among HIV infected pregnant women before ARV intervention. None of the positive mothers had any preventive intervention.

However, a higher rate of transmission of 70.4 % and 68.3 % respectively were reported in university of Benin Teaching Hospital<sup>11</sup> and Abuja<sup>8</sup> during the era of PMTCT programme. This was attributed to late detection of HIV in pregnancy and lack of full participation in the preventive interventions. Sadoh et al<sup>11</sup> in Benin reported 70.4% and 8.4% respectively in the non-PMTCT cohorts group who discovered their positive HIV status after delivery and had partial intervention and the PMTCT cohorts group who were diagnosed from prenatal period and had full preventive intervention respectively. This is closely related to the transmission rates of 68.6% and 6.7% respectively obtained for those with no participation and those with full participation, reported by Okechukwu et al<sup>8</sup> in Gwagwalada Abuja.

It is noteworthy that the overall rates of transmission quoted in the previous studies for those that were diagnosed early and had full participation in PMTCT<sup>8,11</sup>, are close to the overall rate of 6.4% obtained in this study. This, therefore clearly suggests a positive impact of the current intervention on PMTCT.

On further analysis, the rate of 1.6% of MTCT found in this study for those who fully participated in the PMTCT programme was significantly lower (p < 0.001). This is comparable to < 2%<sup>12</sup> reported in the industrialized countries where their PMTCT package involves HIV counseling and testing, antiretroviral prophylaxis, routine elective caesarian section and complete avoidance of breastfeeding. However in the current study elective caesarian section was not a routine neither was breast feeding completely avoided. This suggests an important role of ARVS.

#### **Conclusions**

The rate of mother to child transmission of HIV in Abuja Municipal Area Council especially among those who fully participated in the PMTCT programme was less than 2%. This is close to what obtains in the industrialized countries, despite some differences in the line of interventions. Therefore, full participation in the PMTCT programme is the major key for the reduction of mother to child transmission to a negligible level.

#### **Author's contribution**

Oyesakin AB: conceived, designed, conducted and analysed the data and also wrote the manuscript.

Oniyangi O and Audu LI: designed, and wrote the manuscript.

Ogunfowokan O: designed, analysed and wrote the manuscript.

**Conflict of interest:** None

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