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Research Article

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ABSTRACT

Background: Low birth weight is an important risk factor for infant morbidity and mortality, especially in Sub-Saharan Africa where HIV prevalence is still high. This review focuses on the birth weight outcome of babies whose mothers are infected with HIV and on ART at University of Maiduguri Teaching Hospital (UMTH), Nigeria.

Methods: A total of 90 mother-baby pairs were studied. Babies birth weights were measured using the bassinet weighing scale and data of HIV mothers that are on ART as part of prevention of mother to child transmission of HIV (PMTCT) at UMTH were obtained from their ANC hospital record.

Results: There were 47 (52.2%) males and 43 (47.8%) females. Most babies 73 (81.1%) had acceptable birth weights. Of the 17 (100 %) babies with LBW, 10 (58.8%) were HIV exposed babies. Association between HIV exposed and non HIV exposed (controls) with birth weight outcome of these babies were not significant ($p = 0.419$).

Conclusion: Majority of babies with LBW were HIV exposed whose mothers are on ART for PMTCT. Effective ART for PMTCT in pregnant mothers during ANC may have made the LBW in our babies of no significance. We therefore recommend ART to HIV pregnant women.

Keywords: Maternal antiretroviral therapy, Birth weights, Babies, University of Maiduguri Teaching Hospital, Nigeria.

INTRODUCTION

Human immunodeficiency virus (HIV) infection constitutes severe health problems especially in sub-saharan and other developing countries of the world. Sub-Saharan Africa is worst hit by the global HIV burden, with 25.4 million people living with the disease (Chigozie, Dochka, and Treasure 2009). Reproductive age women make up half of the total number of adult living with HIV in this region and constitute more than 50% of the world's HIV-infected women (Dabis and Ekpin 2002; WHO 2004). This could be of public health importance because the sub-region has a high fertility rate and many of these women could have pregnancies complicated by HIV (WHO, 2006). Human immunodeficiency virus infection may have severe effects on pregnant women, and could result to low birth weight (LBW) outcomes in babies (Scott, Cumberland, and Shulman 2005). In (2009), Chigozie et al in south-eastern Nigeria reported that LBW in HIV exposed babies, that is, babies whose mothers had HIV possibly was due to intrauterine growth retardation (IUGR) or prematurity. The LBW effect appears to relate to impaired nutrient transport to the foetus because the placenta could also be damaged by HIV. In support of this, Scott et al in Kenya, (2005) documented that immune complex formation in HIV infection could impair placenta transfer of substances in mother-foetal pair, which may lead to IUGR. In contrast, however, some workers argued that the mechanisms by which HIV leads to LBW remain unclear (Castetbon, Ladner, and Leroy 1999).

Previously conducted research has revealed that infant mortality is three times higher for LBW babies than for those of normal weight, and the effect of this triples during the neonatal period (CDC, 1993; Guyatt and Snow, 2001). Antiretroviral therapy (ART) uptake which is now part of Prevention of mother to child transmission of HIV (PMTCT) approach has increased to 6% in Nigeria and up to 17% for the African continent (WHO, 2006). Despite this, extensive literature search on the association of HIV in mothers that are on ART and birth weight outcomes of their babies in Nigeria showed dearth of information due to scarcity of population-based data. The objective of this current study was to assess the birth weight outcome of babies whose mothers are infected with HIV and on ART at University of Maiduguri Teaching Hospital (UMTH), Nigeria.

MATERIAL AND METHODS

Study site: The study was carried out at the Department of Paediatrics and Obstetrics unit of the University of Maiduguri Teaching Hospital (UMTH), Nigeria. The UMTH is a tertiary centre located in North-Eastern Nigeria and a centre of excellence for infectious diseases and immunology. It also serves as a referral site for the six North-Eastern States and neighboring countries of Chad, Cameroon and Niger Republics (Ampofo, and Omotara 1987).

Study design: The study was a hospital-based randomized descriptive comparative study of mother-baby pairs recruited from the labour ward of the UMTH.

Study population: Mother-baby pairs who met the following inclusion criteria were recruited: HIV mothers who are on ART that gave birth at the labour ward of UMTH, babies of these mothers and with informed consent given by the parent. Control subjects for this study included non- HIV mother-baby pairs at birth in UMTH labour ward. Mothers with multiple pregnancies, significant antepartum hemorrhage, preterm, and stillbirth or from whom informed consent was not obtained, were excluded.

Ethical Issues: The study protocol was reviewed and authorised by the Medical Research and Ethics Committee of UMTH. Parents had unlimited liberty to deny consent without any consequences while confidentiality was maintained.

Sample Size and collection of specimens

The minimum sample size was determined using statistical formula that computes 5.4% prevalence for HIV at 95 confidence interval and alpha levels of 0.05 (Naing, Winn, and Rusli 2006; WHO, 2006). This equalled 80; however, 10% of this was added to maximize power. Therefore, the sample size for this study was ninety, which comprises 45 HIV mother-baby pairs and 45 non HIV mother-baby pairs (controls).

Mother-baby pairs were enrolled in this study using the systematic random sampling method where the first of every three mother-baby pairs were picked at the labour ward. Where the first mother-baby pair did not fulfil the inclusion criteria the immediate next mother-baby pair that qualified was selected. On enrolment of the mother-baby pairs, study proforma were administered to the mothers to collect information on their bio-data, pregnancy history and antenatal care (ANC) history. Data of HIV mothers that are on ART as part of prevention of mother to child transmission of HIV (PMTCT) at UMTH were obtained from their ANC hospital record. Babies' birth weights in Kilogram (kg) were measured using the bassinet weighing scale with a sensitivity of 50gms set at zero mark. Babies weighing < 2.5 (kg) were considered LBW and those ≥ 2.5 (kg) were considered to have acceptable birth weights in this study, similar to a publication elsewhere (Guyatt, and Robert 2004).

Data analysis: The data obtained from the study were entered into a computer for statistical analysis using SPSS statistical software version 16, Illinois, Chicago USA. Values were expressed as percentage, mean $\pm$ standard

deviation (SD). Chi-squared (χ^2) test was used as appropriate to determine associations for qualitative variables. A p value < 0.05 was considered significant. Tables were used appropriately for illustrations.

RESULTS

Ninety mother-baby pairs were enrolled into this study, out of which 45 (50%) of the babies had their mothers infected with HIV, thereby making them to be HIV exposed. The remaining 45(50%) babies were controls from non-HIV exposed mothers. Majority of the babies 47 (52.2%) were males table 1. The male to female ratio is 1.09:1.

Table 1. Sex distribution of the babies

Sex	Frequency	Percentage (%)
Male	47	52.2
Female	43	47.8
Total	90	100

All HIV infected mothers during the course of ANC received ART for PMTCT. Mean maternal age was 23.87 ± 5.31 (95% CI, 22.76 – 24.98) year, and the overall mean birth weight of babies was 3.01 ± 0.60 (95% CI, 2.88 – 3.13). Overall mean weight for LBW babies was 2.08 ± 0.35 (95% CI, 1.90 – 2.26) kg and that for HIV exposed babies was 2.23 ± 0.18 (95% CI, 2.09 – 2.36) kg.

Most babies in this study 73 (81.1%) had acceptable birth weights (table 2). Of the 17 (100 %) babies with LBW, 10 (58.8%) were HIV exposed babies. Association between HIV exposed and non- HIV exposed (controls) with birth weight outcome of these babies were insignificant ($p = 0.419$).

Table 2. Birth weight distribution of HIV exposed and non- HIV exposed babies

BW (kg)	HIV exposed babies n (%)	Non HIV exposed n (%)	Total
LBW	10 (11.1)	7 (7.8)	17 (18.9)
ABW	35 (38.9)	38 (42.2)	73 (81.1)
Total	45 (50)	45 (50)	90 (100)

BW= Birth weight LBW= Low birth weight ABW= Acceptable birth weight HIV = Human immunodeficiency virus

DISCUSSION

The proportions of babies with low birth weight in this study were higher in HIV exposed than non- HIV exposed (control) babies, even though this was not significant. Similar observation was made by colleagues in Kenya (Scott et al, 2005). Because all HIV infected mothers in this study were receiving ART as part of PMTCT during ANC, this could have improved their CD4 count and at the same time reduced their viral load burden. As such, the adverse effects of HIV on foetal birth weight may have been curtailed. It was noted in another study that a low proportion of LBW which may be insignificant could occurred among babies born to mothers who did ANC (Chigozie et al, 2009). This finding could suggest the efficacy of chemoprophylaxis, which includes ART in the case of HIV infected mothers that are usually administered during ANC for PMTCT. This approach would lead to the overall improvement of birth weight outcome by reducing LBW prevalence and increasing the median birth weight of babies (Chigozie et al, 2009).

Interestingly, studies conducted in Rwanda and Zimbabwe have revealed that the proportion of LBW is considerably higher among mothers infected with HIV than in those without HIV infection (Castetbon et al 1999; Ticconi, Mapfumo, and Dorrucchi 2003). In yet another study conducted in Kigali, LBW is significantly more frequent in full-term infants born to HIV-positive mothers than to HIV-negative mothers (Leroy, Ladner, and Nyiraziraje 1998). These results underscore the need for ART in HIV infected pregnant mothers for PMTCT during ANC, hoping to improve the birth weight outcome of babies in these mothers.

CONCLUSION

Majority of babies with LBW were HIV exposed whose mothers are on ART for PMTCT. Effective ART for PMTCT in pregnant mothers during ANC may have made the LBW in our babies of no significance. We therefore recommend ART to HIV pregnant women.

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