

# Morbidity profile of HIV-exposed formula-fed infants at 6 weeks of age in a resource-constrained tertiary hospital in Jos, Nigeria

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## Abstract

**Background:** Despite the benefits of breastfeeding as against the risk of formula feeding to HIV-exposed infants and proficient counseling to HIV seropositive mothers, some may still opt for breast milk substitutes. Knowledge of common morbidities could help first contact physicians anticipate and plan for their care, especially in the context of a family.

**Objective:** To determine the most common morbidities associated with HIV-exposed formula-fed infants on antiretroviral (ARV) prophylaxis.

**Materials and Methods:** A total of 65 HIV-exposed infants born to HIV seropositive women on highly active ARV therapy were consecutively recruited and followed up in a cohort from birth to 6 weeks of age.

**Results:** The babies had varying range of morbidities. Rate of vertical transmission was observed to be 1.5% whereas that of infant mortality was 0% at 6 weeks of age; no morbidity was observed in 26 (40.0%) infants. However, 27 (41.53%) infants had respiratory tract infection, 3 (4.62%) had diarrhea, 3 (4.62%) had ophthalmia neonatorum, and another 3 (4.62%) had malaria. No infant in the study was found to have more than one disease symptom. The cumulative frequency of infants that were sick at 6 weeks of age was 39 (60.0%) whereas the mortality rate at 6 weeks of age in the study was 0% despite varying morbidities.

**Conclusion:** Upper respiratory tract infection, ophthalmia neonatorum, and diarrhea were found to be the most common morbidities associated with HIV-exposed formula-fed infants on ARV prophylaxis.

**KEY WORDS:** HIV-exposed infants, formula-feeding, morbidity, resource-constrained, family

## Introduction

Randomized control trials as well as the World Health Organization support the practice of breast-feeding with antiretroviral (ARV) therapy to the mother as a safer option for human immunodeficiency virus (HIV)-exposed infants, especially in developing world.<sup>[1,2]</sup> This practice of breast-feeding is well taken by African mothers more so that it is traditionally and culturally acceptable feeding option for infants in the subregion.<sup>[3]</sup> The uptake of breast-feeding practice among HIV-seropositive mothers is further heightened as they receive adequate counseling on infant feeding options well

before delivery. Despite this, however, a few of these prospective mothers would still prefer to formula-feed their babies after delivery notwithstanding cultural stigmatization, risk to their babies, and the proven benefits of breast-feeding. This may in part be because breast-feeding still remains a potential source of postnatal transmission of HIV from mother to child.<sup>[1,4]</sup> The question therefore remains, what is the risk in terms of morbidity for HIV-exposed infants that are formula-fed if their respective mothers choose to despite the benefits of breast-feeding and counsel? If they decide to formula-feed, how anticipatory are first contact clinicians (e.g., family physicians) to handling the health challenges of these infants, especially as the care of these infants more or less affects family dynamics? This is particularly important because family physicians in the developing world practice in resource-constrained settings most of the time. The air around attempts at getting solutions to these questions is the thrust of this manuscript.

Generally, respiratory tract infections and diarrhea are commonly documented causes of mortality in HIV-exposed infants.<sup>[5-7]</sup> When HIV-exposed infants on formula feeds and

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those on breast milk were compared in some studies, it was clear that severe adverse events among the two groups were similar though formula-fed infants were observed to have a slightly increased risk of diarrhea and acute respiratory disease than breast-fed infants and also required more frequent hospital care.<sup>[8,9]</sup>

**Materials and Methods**

This cohort study was carried out in the Prevention of Mother to Child Transmission clinic of Plateau State Specialist Hospital, Jos, Nigeria, where 65 consecutive seropositive pregnant women were recruited who met the inclusion criteria. The inclusion criteria included HIV-seropositive pregnant women on highly active antiretroviral therapy (HAART) for at least 3 months and infants on ARV prophylaxis [nevirapine/zidovudine (NVP/ZDV) regimen] for 6 weeks and also exclusively on formula-feed for at least 6 weeks. Those excluded were women with multiple gestation, smokers or drug addicts (e.g., cocaine, marijuana, and nicotine), and women who had other comorbid medical conditions (e.g., sickle cell anemia, heart diseases, endocrinopathies, and cancers). Others were women with advanced disease (CD4 count was less than 200 cells/mm<sup>3</sup>), who missed HAART for a week or more, and those who had prolonged/obstructed labor or assisted delivery. After delivery, their babies were followed up weekly while they received

ARV prophylaxis (NVP/ZDV) for 6 weeks and were on exclusive breast milk substitutes (formula feeds). The babies were clinically reviewed on weekly basis for any morbidity by the senior registrar or/and by the consultant family physician, and morbidities were recorded. Impromptu clinical reviews were done outside of the clinic days and were recorded accordingly. The babies were tested by polymerase chain reaction/deoxyribonucleic acid (PCR-DNA) at 6 weeks of age.

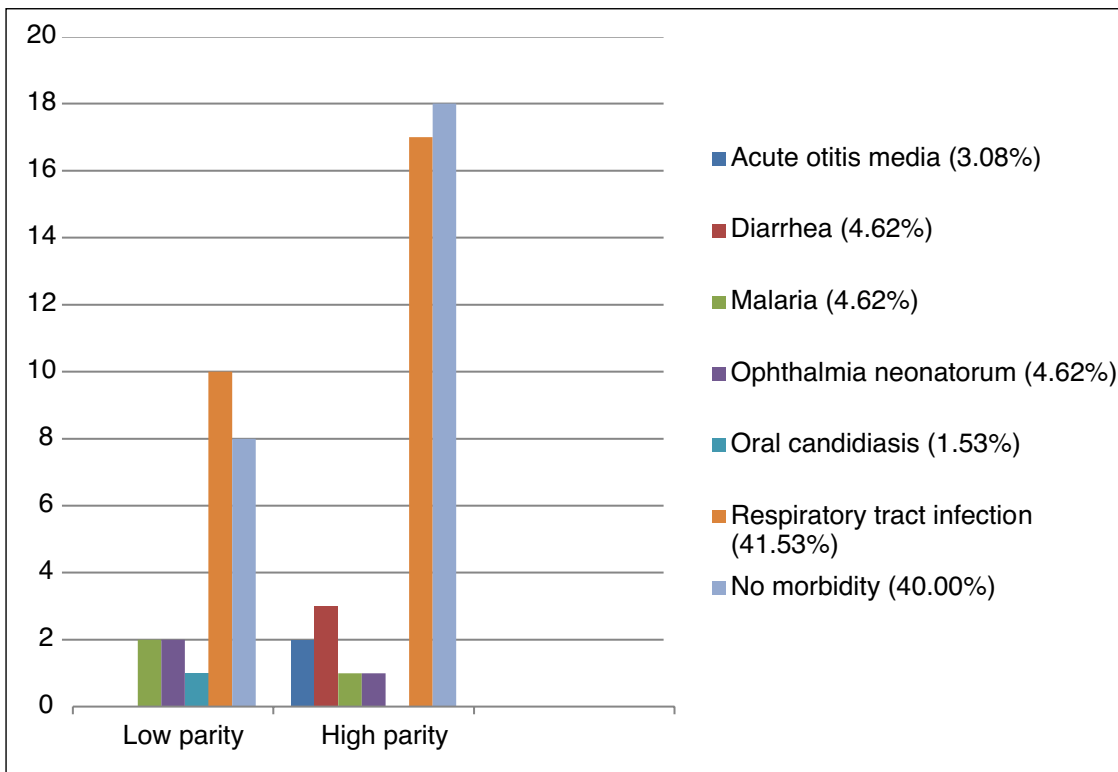
Ethical clearance was obtained from the hospital ethics committee and a written informed consent was also obtained from the mothers. Data were analyzed using Epi Info software, version 3.3.2 (CDC, Atlanta, Georgia, USA).

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**Table 1:** Baby’s morbidity profile at 6 weeks of age

| Type of morbidity           | Frequency | Percent |
|-----------------------------|-----------|---------|
| Acute otitis media          | 2         | 3.08    |
| Diarrhea                    | 3         | 4.62    |
| Malaria                     | 3         | 4.62    |
| Ophthalmia neonatorum       | 3         | 4.62    |
| Oral candidiasis            | 1         | 1.53    |
| Respiratory tract infection | 27        | 41.53   |
| No morbidity                | 26        | 40.00   |
| Total                       | 65        | 100.00  |

*n* = 65; Cumulative frequency of sick infants at 6 weeks of age was 39 60.0%.



**Figure 1:** Association between parity of the paired mothers and morbidity profile of their babies. *n* = 65; Most common morbidities were respiratory tract infection, ophthalmia neonatorum and diarrhea were observed more in babies born to mothers of high parity.

## Results

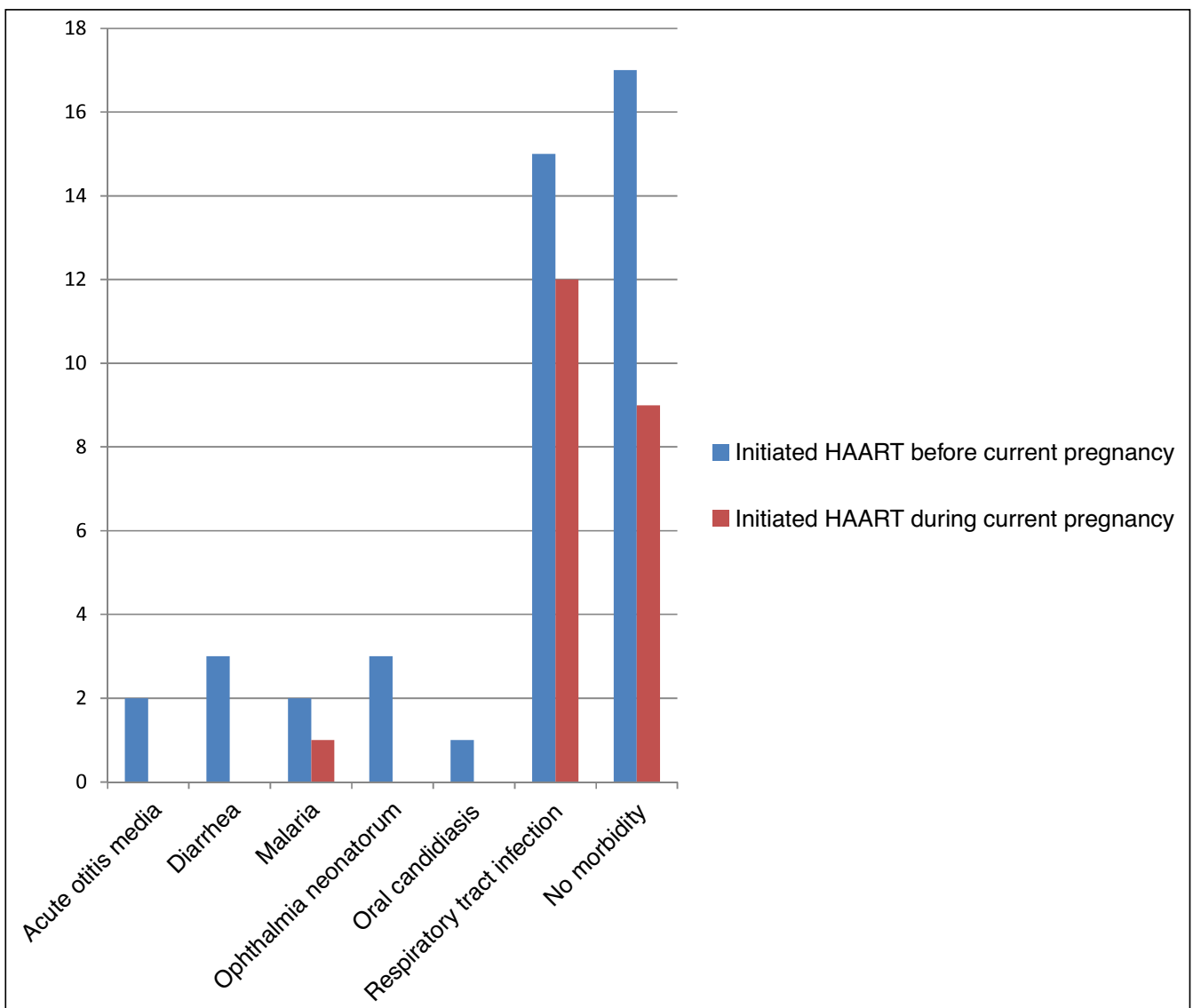
A total of 65 HIV-exposed infants born to HIV-seropositive women on HAART were followed from birth to 6 weeks of age. The women recruited were of varying degrees of parity. Their mean parity was  $2.15 \pm 1.42$  SD. Twenty-three (35.4%) of these women were of low parity (parity of less than two) whereas majority (42; 64.6%) of them were of high parity (parity of two to eight). The highest parity was eight whereas the lowest was a primigravida.

About 48 (73.8%) HIV-positive women were diagnosed before they became pregnant whereas 17 (26.2%) during their current pregnancy.

Paired women who commenced HAART before their current pregnancy of study were 45 (69.2%) whereas those who commenced HAART during their current pregnancy of study were 20 (30.8%).

Twelve (18.5%) of babies born to these HIV-positive mothers on HAART were noticed to have low birth weight whereas majority of them (52; 80.0%) had normal birth weight. Only one (1.5%) of the babies was macrosomic. The mean birth weight was  $2.95 \pm 0.5$  kg.

Transmission of HIV from mother to child was observed in only 1 subject of 65, putting the transmission rate at 1.5%. Mortality rate at 6 weeks of study was 0% despite the varying morbidities.



**Figure 2:** Association between morbidity profile of paired infants and time of initiation of HAART in their mothers.  $n = 65$ ; Mothers who initiated HAART before their current pregnancies (at the time of the study) had more morbidities than those who initiated HAART during the current pregnancy (at the time of the study).

## Discussion

Varying morbidities are associated with HIV-exposed infants. However, some of these infants were not associated with any morbidity. In this study, many of the infants (26; 40.0%) had no morbidity at 6 weeks of age. The high rate of infants without morbidity may be due to the effectiveness of the intervention (HAART) and may be because they were followed up for only 6 weeks. Importantly, results of 64 (98.5%) infants were negative to PCR-DNA at 6 weeks of age, which may also be responsible for this high rate of no morbidity despite that they were born to HIV-seropositive mothers.

The most common morbidities observed in these infants were respiratory tract infection (27; 41.53%), ophthalmia neonatorum (4.62%), diarrhea (3; 4.62%), and malaria (3; 4.62%). The morbidity pattern in this study was in line with that of the study conducted by Becquet et al., which also identified respiratory tract infection and diarrhea as the most common morbidities.<sup>[10]</sup> Similar studies by Nacro et al.<sup>[9]</sup> in Burkina Faso also confirmed respiratory tract infection and diarrhea as the most common morbidities in the studied infants. These most common morbidities showed in this study were seen to be in favor of mothers with high parity. This was however not conclusive because the population of low and high parity was not matched (in terms of their size). In this index study, malaria (3; 4.62%) and ophthalmia neonatorum (4.62%) seems to be included among the most common morbidity after respiratory tract infection. This may be so because the diagnosis of malaria was clinical and not laboratory, and so it could have been misdiagnosed for respiratory tract infection because they have similar early symptoms, especially in infants.

Other morbid conditions observed in these infants were acute otitis media (2; 3.08%), and oral candidiasis (1; 1.53%). The cumulative morbidity was found to be 39 (60.0%). These infants with the reported morbidities were seen and evaluated in the hospital (study site). In this study, the morbidity pattern showed among formula-fed infants and the tendency to present to the hospital for care were also reported in other studies.<sup>[9]</sup>

In this study, majority of the paired infants with varying morbidities were found to be actually delivered by the mothers who initiated HAART before their current pregnancy. This finding was not conclusive because the entire population of the women studied was markedly skewed to initiating HAART before current pregnancy. However, further studies with appropriate methodology will help clear this "clinical fog."

The researcher admits some limitations pointing out that appropriate methodology could be use in further studies in testing the associations or relationships considered in this study for validity.

## Conclusion

Upper respiratory tract infection, ophthalmia neonatorum and diarrhea were found to be the most common morbidities associated with HIV-exposed formula-fed infants on ARV prophylaxis. The study went ahead to identify knowledge

gaps for further research concerning relationship between time of initiation of HAART and morbidity profile, relationship between parity and morbidity profile, and confirming malaria as part of the most common morbidities shown earlier.

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