



Early Breastfeeding Cessation Among HIV-Infected and HIV-Uninfected Women in Western Cape Province, South Africa

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Abstract

As part of the Mother-Infant Health Study, we describe infant feeding practices among HIV-infected and HIV-uninfected mothers over a 12-month period when the Western Cape Province prevention of mother-to-child transmission (PMTCT) program was transitioning from a policy of exclusive formula feeding to one of exclusive breastfeeding. Two hundred pairs of mother and HIV-uninfected infant were included in the analysis, among whom 81 women were HIV uninfected and breastfeeding. Of the 119 HIV-infected mothers, 50 (42%) were breastfeeding and 69 (58%) were formula feeding. HIV-infected mothers predominantly breastfed for 8.14 (7.71–15.86) weeks; HIV-uninfected mothers predominantly breastfed for 8.29 (8.0–16.0) weeks; and HIV-infected mothers predominantly formula fed for 50.29 (36.43–51.43) weeks. A woman's HIV status had no influence on the time to stopping predominant breastfeeding ($P=0.20$). Our findings suggest suboptimal duration of breastfeeding among both HIV-infected and HIV-uninfected mothers. Providing support for all mothers postdelivery, regardless of their HIV status, may improve breastfeeding practices.

Keywords Early breastfeeding cessation · HIV/AIDS · Prevention of mother-to-child transmission

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Introduction

From 2011 to 2013, almost one-third (29.7%) of first-time South African antenatal clinic attendees were HIV infected [1]. The discovery of HIV in breast milk more than 30 years ago [2–4] led to the initial recommendation in 2001 that HIV-infected women residing in low-resource settings avoid breastfeeding their infants [5]. The recommendation was based largely on the experiences of high-income countries [5]. However, the drawback of the recommendation was that most women in low-resource settings could not afford formula [6, 7]. Furthermore, the increased risk of death from malnutrition and illnesses such as diarrhea and respiratory and middle-ear infections due to formula feeding exceeded the benefit of preventing mother-to-child HIV transmission (PMTCT) [6]. Therefore, starting in 2010, breastfeeding among HIV-infected mothers gained support due to its benefits for child health and survival [8–10]. A report that showed a significant postnatal HIV transmission reduction in exclusively breastfed, compared with mixed-fed, infants further strengthened support for breastfeeding by HIV-infected mothers [11]. Subsequent reports showing that combination antiretroviral therapy (cART) given to a

mother, or extended antiretroviral prophylaxis given to an infant, during the mother-to-child-transmission risk period almost eliminated postnatal HIV transmission [12–14]. As a result, the World Health Organization (WHO) changed its infant feeding guidelines for HIV-infected women who live in low-resource settings [15, 16].

The WHO infant feeding guidelines of 2010 say that HIV-infected women receiving cART, irrespective of their HIV disease severity or CD4 cell count, should breastfeed for 1 year. The 2013 WHO guidelines extended the duration of breastfeeding to 2 years or longer [15, 16]. The 2010 South African PMTCT guidelines aligned with the WHO guidelines [17, 18] and were broadly supportive of HIV-infected women breastfeeding their infants; however, women had the choice to either breastfeed or formula feed. The Western Cape Province PMTCT program continued providing subsidized formula milk, with high uptake (> 70%) compared with breastfeeding. Over a 3-year period starting in 2012, the Western Cape PMTCT program changed its policy from exclusive formula feeding to exclusive breastfeeding. During the transition, women could choose either breastfeeding or formula feeding. Health care providers received training in how to counsel HIV-infected women on the importance of breastfeeding. The program's 3-year policy transition was partly informed by the experience of the KwaZulu-Natal PMTCT program, which resulted in increased postnatal HIV transmission after the abrupt withdrawal of subsidized formula milk [19].

Variation in feeding recommendations for HIV-infected women raises practical concerns, including the challenge of balancing the risk for vertical transmission of HIV against the known benefits of breastfeeding and the need to make an immediate decision. Little is known about the infant feeding behaviors of HIV-infected women who are given two feeding choices. The primary objectives of this study were to (1) describe infant feeding choices for HIV-infected women, and (2) compare infant feeding practices of HIV-infected and HIV-uninfected women whose baseline choice was breastfeeding.

Methods

Study Design

The Mother-Infant Health Study was a longitudinal cohort study that examined morbidity among HIV-exposed uninfected infants and HIV-unexposed infants in Western Cape Province, South Africa. The study design and population are described elsewhere [20]. We examined infant feeding practices in this cohort over a 12-month period. Mother-infant pairs were enrolled after birth, starting in July 2012, and followed for 12 months postdelivery at the Family

Clinical Research Unit, Tygerberg Academic Hospital, in Cape Town. The final 12-month study visit was completed in December 2014. The protocol was approved by the Human Research Ethics Committee at Stellenbosch University (ref: S12/03/065) and the Research Ethics Board at University of British Columbia (ref: H12-01181). Participants were provided transportation to and from the clinic and received 100 South African rand (~US\$10) at each study visit to compensate for their time. Mothers provided written consent for study participation.

Study Measurements and Procedures

Baseline sociodemographic characteristics and antenatal and delivery data were obtained by data abstraction from maternity case records and by interviewing the mothers. Mother-infant pairs were followed at 2 weeks and at 2, 4, 6, 9, and 12 months postdelivery. Only HIV-infected mothers and their infants attended the 9-month visit, due to financial constraints. At each visit, research staff administered a questionnaire, based on a WHO standardized instrument [21], that inquired about infant feeding practices during the previous 24 h and during the prior week. Interviews were conducted in the participant's language of choice, either Xhosa, Afrikaans, or English.

Infants were tested for HIV at 6 weeks and at 6 months of age using a DNA polymerase-chain-reaction (PCR) assay, and at 12 months using an enzyme-linked immunosorbent assay (ELISA). A DNA PCR confirmatory test was conducted for infants who had a reactive ELISA result. All testing was conducted at the National Health Laboratory Services at Tygerberg Hospital.

Mothers were counseled on infant feeding by primary-health care nurses and by trained lay counselors at routine, weekly antenatal clinical visits during the first month, and monthly thereafter, until 12 months after delivery [17]. HIV-infected mothers had a choice between exclusive breastfeeding and subsidized exclusive formula feeding. Free formula milk was available until an infant was 6 months of age. ART was given to the mother, or antiretroviral prophylaxis to the infant, depending on the mother's clinical indications. The mother decided on the feeding choice during her interactions with the public PMTCT program. A researcher accepted the mother's choice and recruited her into the appropriate feeding group. Infant feeding counseling was not provided as part of the study.

Clinical Definitions

Predominant breastfeeding was defined as an infant receiving mainly breast milk as well as other liquid or solid foods, but not formula milk. Predominant formula feeding was defined as an infant receiving mainly formula milk and other

liquid or solid foods, but not breast milk [21]. An infant receiving both formula and breast milk at the same time was classified as mixed feeding. An infant receiving other food items, but not breast or formula milk, was classified as such. We defined feeding practices based on the food items that mothers reported giving their infants during the previous 24 h and during the prior week.

Statistical Methods

Infants of HIV-infected mothers who remained HIV-1 negative by PCR assay or ELISA and who returned for the 2-week visit were included in the analysis. Participants who were lost to follow-up were censored at the last study visit. We calculated the duration of predominant breastfeeding separately for HIV-infected and HIV-uninfected mothers who wanted to breastfeed at the 2-week visit. Similarly, we calculated duration of predominant formula feeding for HIV-infected women who wanted to formula feed at the 2-week visit. Analysis of variance was used to compare the distribution of baseline continuous variables. Categorical variables were compared using Pearson Chi square or Fisher exact test. We compared the cumulative probabilities of continuing predominant breastfeeding for HIV-infected and HIV-uninfected mothers using Kaplan–Meier estimation method and log-rank test.

Results

We enrolled 316 mothers and their infants at delivery: 188 HIV-infected mothers and 128 HIV-uninfected mothers. We excluded 5 noneligible infants: 4 HIV-infected and 1 HIV-unexposed receiving formula milk. We analyzed data from 200 mothers (63.3%) and their infants who were confirmed HIV uninfected, and who returned for the 2-week visit; of these, 119 mothers were HIV infected, and 81 were HIV uninfected (Fig. 1). At 2 weeks, 50 (42%, 95% CI 33–51%) of the HIV-infected women chose breastfeeding, and 69 (58%, 95% CI 49–67%) chose formula feeding. All of the HIV-uninfected mothers chose to breastfeed. There was a marginal increase in the number of HIV-infected women who chose exclusive breastfeeding toward the end of study enrollment, but this difference was not statistically significant. About 40% (37 of 93) of the HIV-infected women who were enrolled during the first 12 months chose exclusive breastfeeding, compared with 50% (13 of 26) among the women who were enrolled in the last 6 months of the 18-month enrollment period ($P=0.35$).

As was intended by the study design, sociodemographic characteristics were similar across the groups (Table 1). Birth length was slightly shorter among HIV-exposed infants who were being formula fed, compared with those who were

being breastfed ($P=0.02$). Almost all HIV-exposed infants (99%) were on nevirapine prophylaxis at birth.

Of the participants who returned for the 2-week visit, 116 (58%) completed all study visits (Fig. 1). At 4 months post-delivery, 86% (43 of 50) of HIV-infected mothers reported their adherence to cART as very good or excellent. There was no difference in the duration of breastfeeding for HIV-infected and HIV-uninfected mothers. HIV-infected mothers who were breastfeeding at the 2-week visit predominantly breastfed for 8.14 (7.71–15.86) weeks, and HIV-uninfected mothers predominantly breastfed for 8.29 (8.0–16.0) weeks. Figure 2 displays the proportion of HIV-infected and HIV-uninfected mothers (breastfeeding at enrollment) who continued predominant breastfeeding at follow-up. By approximately 2 months postdelivery, half of the breastfeeding mothers, both HIV-infected and HIV-uninfected, had stopped predominant breastfeeding (Fig. 2). A mother's HIV status had no influence on the time to stopping predominant breastfeeding ($P=0.20$). HIV-infected mothers who were formula feeding at the 2-week visit predominantly did so for 50.29 (36.43–51.43) weeks. Mothers who stopped breastfeeding started either formula feeding or mixed feeding; the number of these mothers varied between visits (Fig. 1).

Discussion

Among this population of HIV-infected mothers in Western Cape Province, South Africa, during a policy transition from formula feeding to breastfeeding, we found that almost half of them chose to breastfeed, and among those who did, many switched early to either formula feeding or mixed feeding. Our findings confirm the discrepancy between the national guidelines and real-life practices. Now that the Western Cape PMTCT program has completely stopped provision of subsidized formula milk and adopted breastfeeding as the default method, it is worth investigating whether its 2-year breastfeeding recommendation is realistic for most women. Our results suggest not.

There are challenges in maximizing uptake and maintaining optimal breastfeeding in a setting where HIV and infant feeding recommendations have rapidly evolved and where, even among the general population, maintenance of breastfeeding is low [10, 22]. The uptake of breastfeeding in our study was similar to that reported in Botswana, where formula feeding by HIV-infected mothers had been supported for about 15 years [23].

The suboptimal breastfeeding practices during a time of transition may reflect health care workers' confusion about how long women with HIV should breastfeed due to global recommendations that are changing rapidly. Breastfeeding remains a cultural norm in most African settings, with stigma attached to other infant feeding methods [24, 25].

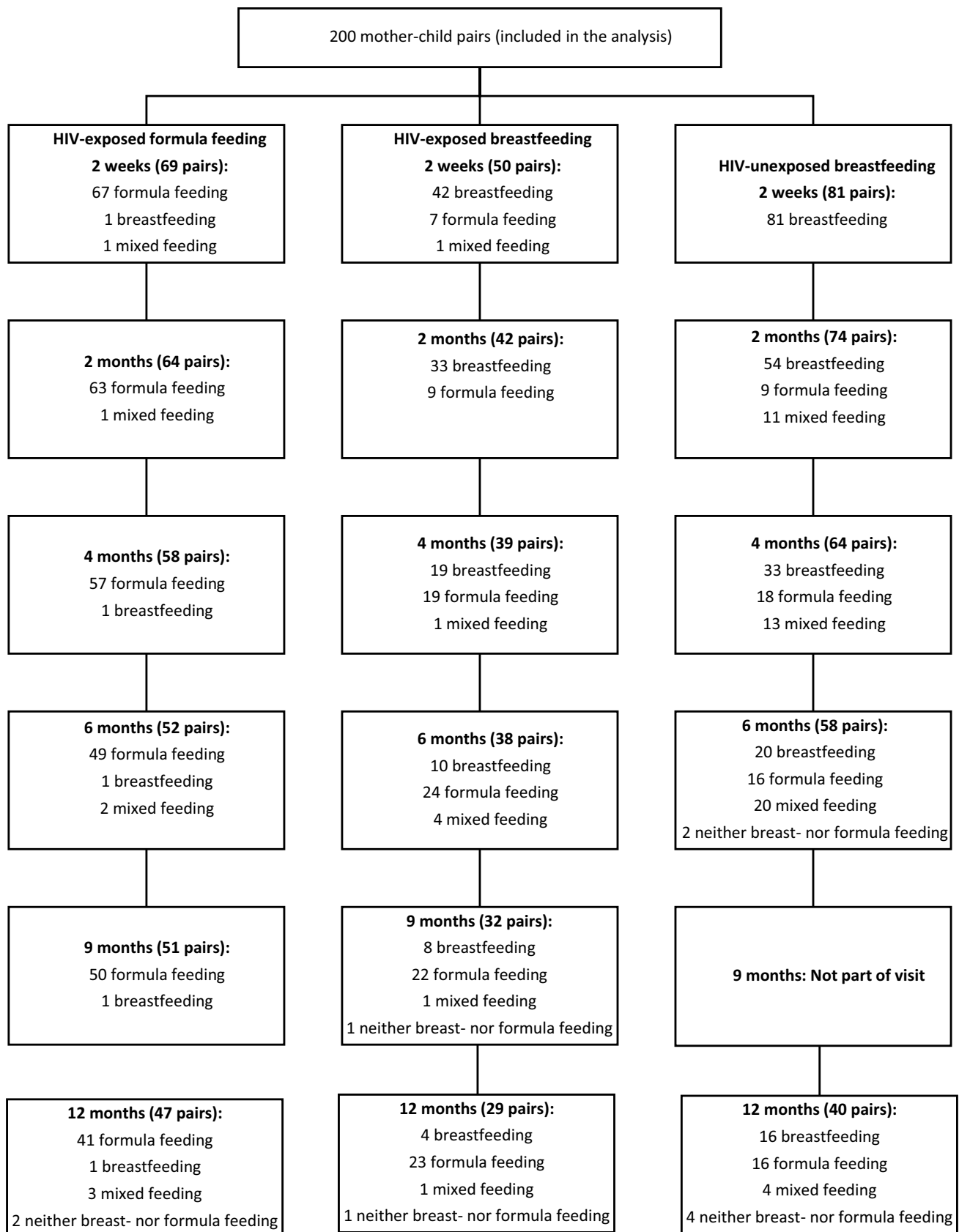


Fig. 1 Flow of study participants and feeding practices at study visit

Table 1 Baseline characteristics of HIV-infected women, HIV-exposed uninfected infants, HIV-uninfected women, and HIV-unexposed infants, stratified by a woman's feeding choice at enrollment

Baseline characteristic	HIV-infected women HIV-uninfected women			P value ^a
	Breastfeeding n = 50 (42%)	Formula feeding n = 69 (58%)	Breastfeeding n = 81	
Women				
Age, years (mean ± SD)	27.99 ± 5.63	28.09 ± 5.16	26.16 ± 5.27	0.04
Racial group				0.82
Black African	44 (88)	63 (91)	73 (90)	
Coloured	6 (12)	6 (9)	8 (10)	
Marital status				0.42
Never married	34 (68)	48 (70)	51 (64)	
Married	14 (28)	17 (24)	28 (35)	
Widowed/divorced	2 (4)	4 (6)	1 (1)	
Education level				0.77
Primary	3 (6)	4 (6)	3 (4)	
Secondary	47 (94)	65 (94)	77 (96)	
ART			–	
Receiving cART	22 (44)	42 (61)		0.07
ARV prophylaxis during pregnancy/delivery	n = 27 25 (93)	n = 27 26 (96)	–	0.80
Smoking during pregnancy		n = 68		
Alcohol during pregnancy	6 (12)	8 (12)	3 (4)	0.11
Piped water available	n = 48 5 (10)	11 (16)	9 (11)	0.58
Flush toilet in home	46 (92)	68 (99)	72 (89)	0.08
Working refrigerator in home	47 (94)	68 (99)	79 (98)	0.26
Working refrigerator in home	35 (70)	52 (75)	62 (77)	0.63
Infants				
Female	27 (54)	34 (49)	44 (54)	0.77
Gestational age at delivery, weeks, mean ± SD	38.4 ± 1.8	38.8 ± 1.6	39.2 ± 1.5	0.06
Birth weight (grams), mean ± SD	3102 ± 396	3144 ± 392	3234 ± 443	0.18
Birth length (cm), mean ± SD	49.1 ± 2.8	48.0 ± 4.3	49.6 ± 3.8	0.02

ART antiretroviral therapy, cART combination antiretroviral therapy, SD standard deviation, n different from sample size for some characteristics due to missing data

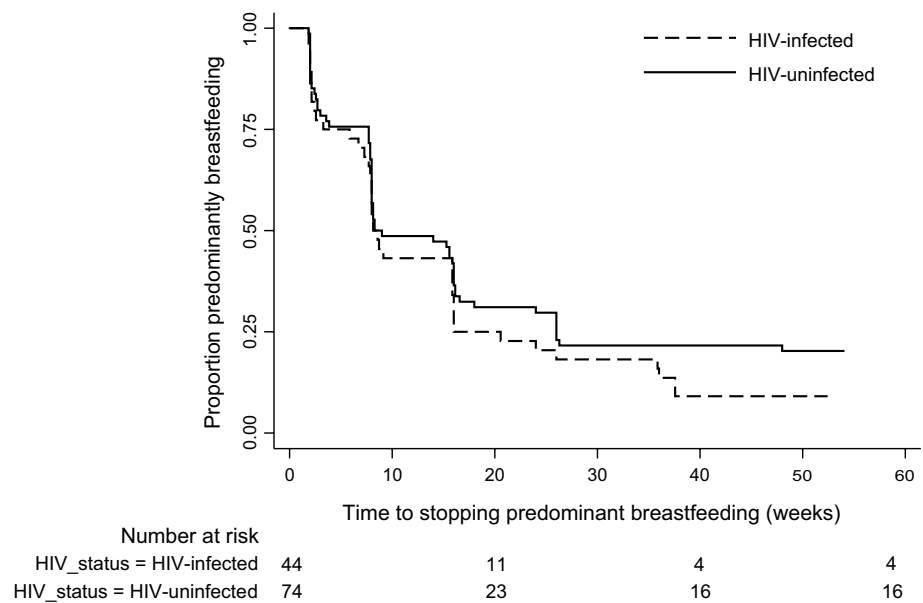
^aBased on Chi square test or Fisher exact test for categorical variables, and ANOVA for continuous variables

However, conflicting opinions about the risk for vertical transmission of HIV remain a barrier to continued breastfeeding [24, 26]. In addition, the underlying suboptimal breastfeeding practices among HIV-uninfected women suggest a lack of support for them as well as challenges associated with behavior change [27–31]. Delay in the uptake of South African infant feeding guidelines has been due partly to differences in the clinical view of (1) those whose mandate is to prevent pediatric HIV infection and who are reluctant to endorse breastfeeding with common suboptimal adherence to ART and (2) those who value the benefits of extended breastfeeding for child survival [32]. PMTCT programs that adopt the WHO breastfeeding

recommendations must invest in the improvement of breastfeeding practices among mothers, both HIV-infected and HIV-uninfected, through follow-up and postdelivery support, especially during a time of policy transition when confusion is common.

Both the Baby Friendly Hospital Initiative [33] and the Integrated Management of Childhood Illness program [34] have been successful in increasing the rate of breastfeeding. Another strategy that has been used to increase breastfeeding uptake and duration is education through peer counselors [35, 36]. Combined individual and group education about breastfeeding have appeared to be superior to individual or group education alone [37].

Fig. 2 Proportion of HIV-infected and HIV-uninfected women who initially chose breastfeeding and continued predominant breastfeeding at follow-up (log-rank test $P=0.20$)



Our findings are subject to several limitations. First, the women in Western Cape Province may not be representative of all South African women or those who reside in the sub-Saharan region, and our findings may not be generalizable beyond this population. Second, the small sample size and high attrition at later follow-up reduces confidence in our estimates and limits our ability to detect differences. Despite the study limitations, our findings suggest suboptimal infant feeding practices among both HIV-infected and HIV-uninfected mothers. Support for all mothers postdelivery, regardless of their HIV status, may improve breastfeeding practices.

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Compliance with Ethical Standards

Conflicts of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants in the study.

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