RESEARCH ARTICLE

Exclusive Breastfeeding in Infants of HIV-Positive Mothers: Do the Pros Outweigh the Cons? A Literature Review

Mary Attalla, McMaster University

ABSTRACT

Current guidelines in many developed countries urge women who are HIV-positive to formula feed (FF) and neglect to consider the possibility of breastfeeding (BF). This paper emphasizes the benefits of exclusive breastfeeding (EBF) on infant and maternal health and well-being. Many studies emphasize the importance of EBF in reducing infant mortality compared to mixed-breastfeeding (MBF) or FF. Further studies concluded that when HIV-positive mothers are on antiretroviral therapies (ART), the chance of mother-to-child transmission (MTCT) is minimal (approximately 1%). This paper provides insight for policy-makers in developed countries to promote change in BF guidelines for all women, reduce MTCT of HIV, and allow women to choose their feeding preferences.

INTRODUCTION

HIV rates have been increasing in many underdeveloped countries, affecting the health of 37.9 million people globally [1]. Specifically, children exhibit a global prevalence of 1.8 million in 2019 [1], most commonly caused by MTCT, which occur during pregnancy, birth, or breastfeeding [2].

EBF refers to BF alone, where "no other liquids or solids are given–not even water–with the exception of oral rehydration solution, drops/syrups of vitamins, minerals or medicines" [3]. United Nations Children's Fund (UNICEF) and World Health Organization (WHO) recommend that mothers living with well-controlled HIV through ART should EBF for the first six months of life [4]. Similarly, U.K. guidelines allow HIV-positive mothers with an undetectable viral load (VL) to choose to BF their infants [5]. However,both Canada and the United States strongly advise against BF in infants with HIV-positive mothers [6,7]. This discrepancy is partly attributed to contradicting evidence regarding MTCT through BF [6,7]. This study aims to review the literature regarding the safety and benefits of EBF in HIV-positive mothers while minimizing the change of MTCT to guide policy change for high-income countries, particularly Canada.

METHODOLOGY

A review was completed based on the following search terms: "exclusive breastfeeding", "HIV transmission", "pediatric HIV", "antiretroviral therapy", "breastmilk", "formula feeding", "viral load". CINAHL, Pubmed, Global Health, NIH and BMC Medicine were used to gather research.

A total of 1025 studies were reviewed. Inclusion criteria for primary research articles were HIV positive mothers, compare infant breastfeeding versus FF/MBF for at least the first four months of the infant's life, and written in English. The exclusion criteria consisted of commentaries, editorials, letters, conference abstracts, theses, and gray literature. The search process uncovered 20 peer-reviewed articles

published between 1999 to 2015 and conducted in Zambia, Zimbabwe, Kenya, Uganda, Tanzania, South Africa, Philippines, Botswana, and the Republic of Malawi.

RESULTS

Of the 20 studies, 10 supported EBF for at least the first four months of the infant's life, which reduces the risk of HIV infection by 50% [8,9], reduces MTCT [10], and reduces infant mortality in both HIV-positive and HIV-negative mothers [11,12]. Infants who EBF were less likely to be infected compared to MBF infants (p=0.018) [13]. Monthly increase in EBF was found to reduce infant mortality by 49% in the first six months of the infant's life [14] and a 15% reduction in HIV transmission in the first five years of life. In comparison to MBF, EBF reduced post-natal transmission by 61% [9]. FF is associated with a six-time increase in risk of infant mortality [15], and MBF was associated with postnatal HIV transmission independent of maternal HIV plasma load [16]. In a study with 118 HIV-exposed infants, no MTCT was observed, and 93% were BF [17]. At three months of age, 24.1% of MBF infants were infected with HIV relative to 14.6% EBF infants [10].

Three studies evaluated the effects of Cluster of Differentiation 4 (CD4) + cell counts and VLs on HIV transmission. Women with CD4+ cell counts <200 cells per µL were five times more likely to transmit HIV compared to women with CD4 counts >500 cells per µL [9]. In fact, at 24 months: (1) HIV transmission rate was 4.3% higher in mothers with CD4+ count <500 cell/ml compared to those with CD4+ >500cell/ml [18], and (2) HIV transmission were 5.7% higher in infants whose mother's VL was >10,000 copies/ml [18,19].

One of three studies discussing ARTs concluded that 1% of women who received Highly Active Antiretroviral Therapy (HAART) had a detectable VL, while 30% of women who receive ART had an undetectable VL [19]. Maternal HAART provided protective factors against antenatal and postnatal HIV transmission [17]. In another study, prophylactic Zidovudine results were similar to 18 months HIV-free survival rates in both FF and EBF [20].

Two studies found women who did not EBF their infants had increased breast pathology (IBP), such as abscess, mastitis, and breast problems [21]. Non-EBF was found to significantly IBP [21]. In another study, elevated VL was found to be a significant risk factor for developing mastitis and transmitting the infection [16].

DISCUSSION

Exclusive Breastfeeding and MTCT of HIV

The literature review supports WHO's recommendation [1] that EBF reduces infant mortality and the risk of hospitalization for mothers. FF, MBF, or BF for less than six months was associated with an increased risk of infant mortality compared to EBF in HIV-positive mothers who received antiretroviral prophylaxis [13,15,17]. EBF was associated with reduced postnatal HIV MTCT, while MBF was associated with postnatal transmission of HIV [13,16]. EBF was shown to reduce chances of infants acquiring HIV through breast milk by 50%, with evidence indicating a four-fold increase in postnatal transmission of HIV when solid foods were introduced before three months [8,9].

Another study concluded that prolonged lactation beyond four months was not associated with increased mortality, further demonstrating that EBF does not significantly contribute to infant mortality [22]. Collectively, evidence from the literature suggests that EBF in well-controlled HIV+ mothers does not increase MTCT and offers significant protective factors against morbidity and mortality of the infant relative to MBF/FF [23]. One study found that all mothers who transmitted HIV to their infants post-partum had a plasma VL >1000 copies/ml and poor adherence to cART [24]. Maternal VL was found to be significant in the transmission of HIV; transmission is more likely in infants whose mother's VL was >10,000 copies/ml [18]. The study results validate the WHO's recommendation to EBF for the first six months of the infant's life regardless of HIV status [25].

Efficacy of ART

One study demonstrated that both FF and BF (with prophylactic Zidovudine) gave similar 18 months

HIV-free survival rates, indicating that not all ART prophylaxes were sufficient in preventing infection. Alternatively, there was strong evidence indicating that maternal HAART provided protective factors against antenatal and postnatal HIV transmission [17,19], specifically reducing MTCT to 1% [19] . Majority of the studies showed sufficient evidence for the use of ART, particularly HAART, in preventing MTCT of HIV, strongly suggesting that BF HIV-positive mothers should be receiving ARTs. Given that prophylactic measures are key to significantly reduce MTCT, it is imperative that HIV-positive mothers have low and well-controlled VL prior to BF [19].

Maternal Health

EBF was not associated with increased maternal mortality or morbidity and is likely protective against breast pathologies, such as mastitis [8,12,21]. Furthermore, the probability of death from acquiring HIV was highest among infants living in impoverished areas whose mothers discontinued breastfeeding early [25].

CONCLUSION

WHO and UNICEF recognize that EBF by HIV positive mothers with a well-controlled low VL is a low-costing, sustainable practice that should be conducted in developing countries because it has been demonstrated to lower the risk of HIV transmission and infant mortality rates [4,8]. However, guidelines of many higher-income countries, including the US and Canada, continue to strongly recommend against EBF in HIV positive mothers [6,7]. The high mortality rates noted in the non-EBF infants could be attributed to unclean water in developing countries. Although several studies confirmed the efficacy of ART in preventing MTCT of HIV, the long-term effects of ART remain unknown. Future studies should investigate the safety of EBF in HIV-positive mothers with a low VL in high-income countries to develop valid and reliable evidence-based guidelines.

REFERENCES

1. World Health Organization. Latest HIV estimates and updates on HIV policies uptake. [Internet]. July 2020. Available from: https://www.who.int/hiv/data/2019_global_summary_web_v2.pdf

2. Torpey K, Mandala J, Kasonde P, Bryan-Mofya G, Bweupe M, Mukundu J, Zimba C, Mwale C, Lumano H, Welsh M. Analysis of HIV early infant diagnosis data to estimate rates of perinatal HIV transmission in Zambia. PloS One. 2012 Aug 17;7(8):e42859.

3. World Health Organization. Infant feeding for the prevention of mother-to-child transmission of HIV. 2019. Available from: https://www.who.int/elena/titles/hiv_infant_feeding/

4. United Nations International Children's Fund. HIV and Nutrition. 2016. Retrieved from: https://www.unicef.org/nutrition/index_HIV.html
5. NHS. HIV and breastfeeding your baby information on infant feeding. Brighton and Sussex University Hospitals, NHS Trust. 2018. Available from: https://www.bsuh.nhs.uk/wp-content/uploads/sites/5/2016/09/HIV-and-breastfeeding-you r-baby.pdf

6. Government of Canada. Breastfeeding in Canada [Internet]. 2020. Available from: https://www.canada.ca/en/public-health/services/publications/healthy-living/maternity-newborn-care-guidelines-chapter-6.html

7. Centers for Disease Control and Prevention. Human Immunodeficiency Virus. 2020. Available from: https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/maternal-or-infa nt-illnesses/hiv.html#:~:text=In%20the%20United%20States%2C%20to,pregnancy%2C %20birth%2C%20or%20breastfeeding

8. Kuhn L, Sinkala M, Kankasa C, Semrau K, Kasonde P, Scott N, Mwiya M, Vwalika C, Walter J, Tsai WY, Aldrovandi GM. High uptake of exclusive breastfeeding and reduced early post-natal HIV transmission. PloS One. 2007 Dec 26;2(12):e1363.

9. Iliff PJ, Piwoz EG, Tavengwa NV, Zunguza CD, Marinda ET, Nathoo KJ, Moulton LH, Ward BJ, Humphrey JH, ZVITAMBO Study Group. Early exclusive breastfeeding reduces the risk of postnatal HIV-1 transmission and increases HIV-free survival. AIDS. 2005 Apr 29;19(7):699-708.

10. Coutsoudis A, Pillay K, Spooner E, Kuhn L, Coovadia HM, South African Vitamin A Study Group. Influence of infant-feeding patterns on early mother-to-child transmission of HIV-1 in Durban, South Africa: a prospective cohort study. The Lancet. 1999 Aug 7;354(9177):471-6.

11. Rollins NC, Ndirangu J, Bland RM, Coutsoudis A, Coovadia HM, Newell ML. Exclusive breastfeeding, diarrhoeal morbidity and all-cause mortality in infants of HIV-infected and HIV uninfected mothers: an intervention cohort study in KwaZulu Natal, South Africa. PloS One. 2013 Dec 2;8(12):e81307.

12. Taha TE, Kumwenda NI, Hoover DR, Kafulafula G, Fiscus SA, Nkhoma C, Chen S, Broadhead RL. The impact of breastfeeding on the health of HIV-positive mothers and their children in sub-Saharan Africa. Bulletin of the World Health Organization. 2006 Jul 10;84:546-54.

13. Coovadia HM, Rollins NC, Bland RM, Little K, Coutsoudis A, Bennish ML, Newell ML. Mother-to-child transmission of HIV-1 infection during exclusive breastfeeding in the first 6 months of life: an intervention cohort study. The Lancet. 2007 Mar 31;369(9567):1107-16.

14. Natchu UC, Liu E, Duggan C, Msamanga G, Peterson K, Aboud S, Spiegelman D, Fawzi WW. Exclusive breastfeeding reduces risk of mortality in infants up to 6 mo of age born to HIV-positive Tanzanian women. The American Journal of Clinical Nutrition. 2012 Nov 1;96(5):1071-8.

15. Kagaayi J, Gray RH, Brahmbhatt H, Kigozi G, Nalugoda F, Wabwire-Mangen F, Serwadda D, Sewankambo N, Ddungu V, Ssebagala D, Sekasanvu J. Survival of infants born to HIV-positive mothers, by feeding modality, in Rakai, Uganda. PLoS One. 2008 Dec 9;3(12):e3877.

16. Lunney KM, Iliff P, Mutasa K, Ntozini R, Magder LS, Moulton LH, Humphrey JH. Associations between breast milk viral load, mastitis, exclusive breast-feeding, and postnatal transmission of HIV. Clinical Infectious Diseases. 2010 Mar 1;50(5):762-9.

17. Homsy J, Moore D, Barasa A, Were W, Likicho C, Waiswa B, Downing R, Malamba S, Tappero J, Mermin J. Breastfeeding, mother-to-child HIV transmission, and mortality among infants born to HIV-Infected women on highly active antiretroviral therapy in rural Uganda. Journal of Acquired Immune Deficiency Syndromes. 2010 Jan 1;53(1):28-35.

18. Thomas TK, Masaba R, Borkowf CB, Ndivo R, Zeh C, Misore A, Otieno J, Jamieson D, Thigpen MC, Bulterys M, Slutsker L. Triple-antiretroviral prophylaxis to prevent mother-to-child HIV transmission through breastfeeding—the Kisumu Breastfeeding Study, Kenya: a clinical trial. PLoS Med. 2011 Mar 29;8(3):e1001015.

19. European Collaborative Study. Mother-to-child transmission of HIV infection in the era of highly active antiretroviral therapy. Clinical Infectious Diseases. 2005 Feb 1;40(3):458-65.

20. Thior I, Lockman S, Smeaton LM, Shapiro RL, Wester C, Heymann SJ, Gilbert PB, Stevens L, Peter T, Kim S, Van Widenfelt E. Breastfeeding plus infant zidovudine prophylaxis for 6 months vs formula feeding plus infant zidovudine for 1 month to reduce mother-to-child HIV transmission in Botswana: a randomized trial: the Mashi Study. JAMA. 2006 Aug 16;296(7):794-805.

21. Semrau K, Kuhn L, Brooks DR, Cabral H, Sinkala M, Kankasa C, Thea DM, Aldrovandi GM. Exclusive breastfeeding, maternal HIV disease, and the risk of clinical breast pathology in HIV-infected, breastfeeding women. American Journal of Obstetrics and Gynecology. 2011 Oct 1;205(4):344-e1.

22. Kuhn L, Kasonde P, Sinkala M, Kankasa C, Semrau K, Vwalika C, Tsai WY, Aldrovandi GM, Thea DM. Prolonged breast-feeding and mortality up to two years post-partum among HIV-positive women in Zambia. AIDS (London, England). 2005 Oct 14;19(15):1677.

23. Atashili J, Kalilani L, Seksaria V, Sickbert-Bennett EE. Potential impact of infant feeding recommendations on mortality and HIV-infection in children born to HIV-infected mothers in Africa: a simulation. BMC Infectious Diseases. 2008 Dec;8(1):1-3.

24. Ngoma MS, Misir A, Mutale W, Rampakakis E, Sampalis JS, Elong A, Chisele S, Mwale A, Mwansa JK, Mumba S, Chandwe M. Efficacy of WHO recommendation for continued breastfeeding and maternal cART for prevention of perinatal and postnatal HIV transmission in Zambia. Journal of the International AIDS Society. 2015 Jan;18(1):19352.

25. Goga AE, Doherty T, Jackson DJ, Sanders D, Colvin M, Chopra M, Kuhn L. Infant feeding practices at routine PMTCT sites, South Africa: results of a prospective observational study amongst HIV exposed and unexposed infants-birth to 9 months. International Breastfeeding Journal. 2012 Apr;7(1):1-1.