

# Flash-heating breast milk is feasible in Dar es Salaam. Tanzania

Sera Young<sup>1</sup>, Caroline Chantry<sup>1</sup>, Monica Ngonyani<sup>2</sup>, Kiersten Israel-Ballard<sup>3</sup>, Deborah Ash<sup>2</sup>, Margaret Nyambo<sup>2</sup>



<sup>1</sup> Pediatrics, University of California, Davis, Sacramento, CA, <sup>2</sup> University Research Company, Dar es Salaam, Tanzania, <sup>3</sup>PATH, Seattle, WA

#### Abstract number LB 443 (UPDATED)

WHO recommends HIV+ mothers exclusively breastfeed (EBF) for 6 mos unless replacement feeding is acceptable, feasible, affordable, sustainable and safe, After 6 mos, adequate replacement foods are often unavailable and are immunologically inferior. Heat-treating breast milk is currently recommended by WHO as an infant feeding option for PMTCT of HIV but its feasibility has not been evaluated. Flash-heating (FH) is a simple method for home pasteurizing breast milk that inactivates HIV while preserving milk's nutritional and anti-infective properties. Our objective is to determine the feasibility of FH once complementary foods are introduced. In this ongoing, longitudinal study. community health workers (CHWs) in Dar es Salaam, Tanzania, visit 100 HIV(+) mothers weekly from 2-9 mos postpartum and counsel on FH if infant is HIV(-) at introduction of complementary foods. Mothers are surveyed weekly about infant health and feeding practices and unheated and heated milk samples are collected biweekly. 31/61 (50.8%) mothers with HIV(-) infants have chosen FH. Mean frequency of manual expression is 3.6 times daily (range 1-7). Mean daily milk volume is 504 mL (range 10-1200mL). 23/73 unheated milk samples contained pathogens; all FH samples are bacteriologically negative. 50% of FH mothers have disclosed their HIV status to their spouse; CHWs observed that stigma may be an obstacle to FH for some women. These data suggest that FH is a simple method for reducing MTCT of HIV that women can successfully use during times of high risk to potentially improve their infant's health and diet. FH may be most successful among women who have disclosed their status. Based on this feasibility data an efficacy study of FH on infant health outcomes is warranted

#### Background

#### Risk of malnutrition and HIV infection is higher during mixed feeding

WHO recommends HIV+ mothers exclusively breastfeed (EBF) for 6 mos unless replacement feeding is acceptable, feasible, affordable, sustainable and safe [1]. Risk of mother-to-child HIV transmission is low during exclusive breastfeeding but increases during mixed feeding [2,3]. Abrupt cessation of breastfeeding is problematic because adequate replacement foods are often unavailable and are immunologically inferior, and thus leads to poor growth and increased morbidities [4]. Furthermore, breast milk viral loads increase during abrupt cessation of breastfeeding, increasing transmission risk [5].

#### Flash-heating: a low-tech process for home pasteurization

Heat-treating breast milk is currently recommended by WHO as an infant feeding option for PMTCT of HIV but its feasibility has not been evaluated. Flash-heating (FH) is a simple method for home pasteurizing breast milk that inactivates HIV while preserving milk's nutritional and anti-infective



Step 1: Breast milk is expressed into a glass jar.



Step 3: Baby is cup fed the cooled Flash-heated

### Study objectives

To determine the feasibility of Flash-heating breast milk (FH) once complementary foods are introduced. Specific objectives are to:

- 1. Describe uptake of FH
- 2. Determine if FH protocol is correctly followed
- 3. Test bacteriological safety of FH milk
- 4. Understand women's experiences with FH and identify factors that facilitate or hinder Flash-heating

#### Methods

#### Prospective, longitudinal study

In this ongoing, prospective, longitudinal feasibility study in Dar es Salaam, Tanzania, 93 HIV(+) mothers were visited weekly in their home by community health workers (CHWs) from 2 until 9 months postpartum. Mothers were counseled on the option and technique of FH if the infant was HIV(-) when tested at 5 mos. Participants were surveyed weekly about feeding practices and experiences. Among women who chose to FH, the technique was observed prior to implementation and biweekly thereafter. Milk sample collection

Unheated and Flash-heated milk samples were collected biweekly from all women who had chosen to Flash-heat their milk. Bacteriological safety was determined by measuring Staphylococcus aureus and Escherichia coli and total bacterial counts.

#### In-depth interviews about experiences with FH

To date, in-depth interviews have been conducted both with participants who chose to FH (n=17) and with women who chose not to FH (n=2).



Clinic assistant in Dar es Salaam

## Results (1)

Data has been collected on FH experiences and protocol adherence during 53 FH episodes with 20 women.

#### 1. Uptake of FH protocol:

31/61 (50.8%) HIV+ mothers with HIV-negative infants have initiated FH

#### **Duration of FH:**

- •Of the 20 women who have stopped FH, the mean duration was 59.0 + 48.5 days (range 1-210).
- •Of the 11 women who continue to FH, mean duration is 62.5 ± 56.7 days. It is of note that four women with infants > 9 mos continue to FH.

#### Breast milk expression, FH, and cup feeding:

- ullet Mean frequency of manual expression across all 53 FH episodes is 3.6  $\pm$ 1.7 times
- •Mean daily milk volume across all 53 FH episodes is 504 mL (range 10-1200 mL). In 52/53 episodes, mothers expressed from both breasts.
- •79% of experiences were described as "comfortable". 19% as "uncomfortable" and 2% as "painful"
- •Mothers heated milk using kerosene (56%), charcoal (41%) and firewood (9%)
- •Mean time for fire preparation and water boiling 22 ±10.4 mins (range 11-35). Infants drank all cup-fed milk in 46/52 episodes.

#### 2. Adherence to protocol

- In 53/53 (100%) episodes, mothers washed their hands with soap before the procedure
- In 49/53 (92%) episodes, mothers washed utensils with water, in 37/53 (70%) episodes soap was used, and in 27/53 (51%) episodes, utensils were boiled
- In 51/53 (96%) episodes, pan was filled with correct level of water

#### Natakiwa kufahamu nini?



#### Jinsi ya kukamua maziwa ya mama









# Results (2)

Flash-heating brochures distributed to study participants

#### 3. Bacteriological safety of FH milk

- 23/73 (32%) of unheated milk samples contained pathogens
- 0/73 (0%) of FH samples had bacterial growth

#### 4. Women's experiences with FH

•18/20 women (90%) hid FH from neighbors; 9/20 women (45%) hid FH from husbands •Of the women who were observed FH, 3 explained that it was because of a breast infection

#### Stated advantages of Flash-heating:

- Health of child: "I am trying hard so that my child will not be infected with HIV"
- Cost: "I prefer expressing my breast milk because I don't have money to buy other

#### Stated barriers to Flash-heating:

- Stigma: "This method is difficult because I don't want neighbors to know my secret [HIV]" "No one knows my condition, so what can I say when they see me doing this?" · Lack of permission to Flash-heat: "My husband forbids me"
- Disbelief in efficacy: "To tell you the truth, I don't really believe that this can work"
- Time constraints: "I have many responsibilities"
- Small amount of milk expressed: "The milk that comes out is not enough"

#### Conclusions and recommendations

- These data suggest that some women can successfully FH their breast milk in order. to avoid MTCT during times of high risk
- Women are capable of correctly following most aspects of the FH protocol.
- Flash-heated breast milk samples were bacteriologically negative.
- . FH may be most successful among women who have supportive family members and whe believe in the efficacy of the Flash-heating method.
- · Based on this feasibility data an efficacy study of FH on infant health outcomes is

# References

1. World Health Organization (2007) HIV transmission through breastfeeding: 2007 Update. Geneva: WHO. Iliff, P. J., Piwoz, E. G., Tavengwa, N. V., et al. (2005). Early exclusive breastfeeding reduces the risk of postnatal HIV-1 transmission and increases HIV-free survival. AIDS, 19(7), 699-708.

transmission and increases HIV-free survival. AIDS, 19(7), 6997–908.

3. Coutsouds, A. Dabis, F., Favav., W. et al. (2004). Education stransmission of HIV-1 in breast-fed children: an individual patient data meta-analysis. J. Inf. Dis., 189(12), 2154-2166.

4. Künn. L., Alfordyandi, G. M., Sinklau, et al. (2008). Effects of early, abrupt weaning on HIV-free survival of children in Zambia. NEJM, 399(2), 130-141.5.

NEJM, 399(2), 130-141.5.

Thea, D. M., Alforvandi, G. M., Sinklausa, C., et al. (2006). Post-weaning breast milk HIV-1 viral load, blood prolactin levels and

breast milk volume. AIDS, 20(11), 1539-1547

Dreast milk Volume. Auto., 20(11), 1939-1947.
6. Israel-Ballard, K., Chantry, C., Dewey, K., et al. (2005). Viral, nutritional, and bacterial safety of flash-heated and pretoria pasteurized breast milk to prevent mother-to-child transmission of HIV in resource-poor countries: a pilot study. J Acquir Immune Defic Syndr, 40(2), 175-181.

We gratefully acknowledge funding for this study from NIH (R01HD057602) and the Thrasher Research Fund.