

**Infant feeding practices before implementing alternatives to prolonged breastfeeding  
to reduce HIV transmission through breastmilk in Abidjan, Côte d'Ivoire**

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Running title: Infant feeding practices in Abidjan, Côte d'Ivoire

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**SUMMARY**

The aim of this study was to describe baseline infant feeding practices in women of unknown HIV status in Abidjan, Côte d'Ivoire, before the implementation of infant feeding interventions aimed at the prevention of mother-to-child transmission of HIV through breastmilk. We conducted a cross-sectional survey in March 2000 among 225 mothers attending community-run health facilities with their own child for either immunization or weighting. All but two children had ever been breastfed, of whom 94% were still being breastfed at six months of age. Exclusive breastfeeding was not practiced in this population since all women had given water to their child, starting in median one day after birth. Moreover, 20% of the mothers had introduced infant formula in median three weeks after delivery. This study provides useful information for planning purposes in this urban African population, where exclusive breastfeeding is rare and the use of infant formula relatively common.

**Keywords:** Africa, infant feeding, HIV-1, mother-to-child transmission

## INTRODUCTION

In sub-Saharan Africa, 55% of adults infected with human immunodeficiency virus (HIV) are women, all of child-bearing age (1). If they become pregnant, these women may transmit HIV to their infant during pregnancy, delivery or through breastmilk (2, 3). Several nutritional interventions aimed at modifying infant feeding practices to prevent breastmilk transmission of HIV are conceivable (4).

In year 2000, we launched a study evaluating interventions to prevent mother-to-child transmission of HIV (PMTCT) in Abidjan, Côte d'Ivoire (5, 6). Within this study, we planned to propose to HIV-infected pregnant women to either formula-feed from birth, or to shorten the duration of breastfeeding to four months of age, in making it exclusive as long as possible. No existing data presented baseline infant feeding practices among women attending community-run health facilities in Abidjan before the implementation of these PMTCT nutritional interventions. But these information were necessary to adapt the messages to the context and reinforce the formation in the community-run health facilities participating in this project.

The objective of this cross-sectional study was to describe in an urban African setting baseline infant feeding practices among post-partum mothers of unknown HIV-status attending health facilities with their own child.

## POPULATION AND METHODS

This cross-sectional study was conducted during March 2000 within four community-run health facilities (Sagbé, Anonkoua-Kouté, Niangon-Sud, Port-Bouët) located in Abobo and Yopougon, the two most densely populated districts of Abidjan. Every working day, the first four post-partum women attending each of these health-care facilities for either immunization or weighting of their own child were systematically asked to participate to the study.

Infant feeding practices were described as defined by the World Health Organisation to facilitate the comparability of results between studies (table 1).

Mother's socio-demographic characteristics and infant feeding practices from birth were collected by trained health-care workers through standardized questionnaires. Mothers were asked if their child had ever been given breastmilk and/or artificial milk. The ages of introduction and cessation of commonly used fluids or foods were also collected.

## RESULTS

The 246 mothers included in the study were equally distributed between the sites (table 2). Overall, these women were comparable between sites except concerning their education level. Information on infant feeding practices was collected for 91% of the women (n=225). The median age of the children was 6.3 months (IQR: 3.5-9.6) and did not differ according to the sex or the study site (figure 1).

Among the 225 children included, 44 (20%) had ever received infant formula, two of them having never been breastfed. Infant formula was usually given through a bottle (93%) and prepared with boiled water (72%).

All but two children (99%) had received breastmilk, of whom 94% were still breastfed at six months of age. Breastfeeding had been initiated in median within 12 hours after delivery (IQR: 10-24). Overall, 7% of the children had ever been breastfed by someone else than the mother. At the time of the study, breastfeeding had been completely ceased in 13 (6%) children. Their median age at complete cessation of breastfeeding was 17 months (IQR: 6-24).

The ages of introduction and cessation of commonly used liquids and foods are listed in table 3 and 4, as well as the proportion of children that had never been given them at the time of the study. All children had received water from their first day of life, and once it was given, it never stopped. One third of the children had received herbal tea, mainly during the very first months of life, and 81% had received fruit-juice. Infant formula was introduced around the third week of life in 20% of the children. As shown in table 4, the introduction of the complementary foods began in median at four months of age (IQR: 3-5).

## DISCUSSION

This study provides a precise overview of the current infant feeding practices in Abidjan. First, we confirm previous studies underlying that breastfeeding is widely practiced and usually prolonged in this population (10). Second, breastfeeding was not exclusive but predominant or mixed. Third, 20% of the women surveyed had introduced infant formula in median three weeks after delivery. These women did not exclusively artificial fed but gave simultaneous both breastmilk and infant formula to their children.

We consider this study is representative of the mothers attending community-run health facilities for either immunization or weighting of their child. Women were included on no other selection criteria than arriving in the first at these health facilities, which may introduce a sampling bias. But registers hold by health-care workers provided us information on the characteristics of all attendees, which did not differ from the women included in our study. As this study was cross-sectional, a maternal recall bias could have impaired the estimation of the ages of introduction of the liquids and foods (11, 12). Nevertheless, the distribution of the ages of the children allows us to describe infant feeding practices from neonates to toddlers, which contributes to minimize this bias.

Around 11% of pregnant women attending these same health centres were found to be HIV infected (13). In the absence of any intervention, rate of mother-to-child transmission of HIV (MTCT) is about 30% in this breastfeeding population (10). Efficacy of short regimens of antiretroviral to prevent peri-partum MTCT is significantly reduced over time by the risk of HIV transmission through breastfeeding (14). There is thus an urgent need to evaluate interventions aimed at preventing breastmilk transmission of HIV. Precise information on baseline infant feeding habits is required to interpret cautiously the effects of these interventions. Yet, there is a lack of documentation on infant feeding practices in resource-

constrained countries (15, 16). This description was therefore useful in the current context of the HIV epidemic in an urban African settings such as Abidjan to tailor appropriate PMTCT postnatal interventions.

Given these results, shortening the duration of breastfeeding and planning to wean children from four months of age appears conceivable in this population accustomed to introduce complementary foods around this age. Independently of the context of HIV, formula feeding is familiar in this urban environment, which may facilitate its implementation and reduce the risks of stigmatization linked to its use. Lastly, our study adds to the growing body of knowledge that exclusive breastfeeding is rarely practiced unless there is a consistency of messages providing to mothers the necessary support (17, 18). As a conclusion, emphasis should be made toward health-care workers on the promotion of exclusive breastfeeding, especially when PMTCT nutritional interventions are planned to be implemented.

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## APPENDIX

### **Composition of the ANRS 1201/1202 Ditrane Plus Study Group**

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### **Ethical permissions**

The ANRS 1201/1202 Ditrane Plus study was granted ethical permission in Côte d'Ivoire from the ethical committee of the National AIDS Control Programme, and in France from the institutional review board of the ANRS.

**REFERENCES**

1. Dabis F, Ekpini ER. HIV-1/AIDS and maternal and child health in Africa. *Lancet* 2002;359(9323):2097-104.
2. De Cock KM, Fowler MG, Mercier E, de Vincenzi I, Saba J, Hoff E, et al. Prevention of mother-to-child HIV transmission in resource-poor countries: translating research into policy and practice. *Jama* 2000;283(9):1175-82.
3. Nicoll A, Newell ML, Peckham C, Luo C, Savage F. Infant feeding and HIV-1 infection. *Aids* 2000;14 Suppl 3:S57-74.
4. Rollins N, Meda N, Becquet R, Coutoudis A, Humphrey J, Jeffrey B, et al. Preventing postnatal transmission of HIV-1 through breast-feeding: modifying infant feeding practices. *J Acquir Immune Defic Syndr* 2004;35(2):188-195.
5. Becquet R, Bequet L, Ekouevi DK, Viho I, Toure H, Dabis F, et al. Mortality in breastfed and formula-fed children born to HIV-infected women in a PMTCT project in Abidjan (Côte d'Ivoire), Ditrane Plus ANRS 1202. Oral communication N°63. The 2nd IAS Conference on HIV Pathogenesis and Treatment, Paris, France. *Antiviral Therapy* 2003;8(suppl. 1):S200.
6. Dabis F, Bequet L, Rouet F, Ekouevi DK, Viho I, Horo A, et al. Effectiveness of short course regimen of zidovudine + lamivudine and peripartum nevirapine to prevent peripartum HIV-1 mother-to-child transmission. The ANRS 1201 Ditrane Plus study, Abidjan, Côte d'Ivoire. Oral communication N°219. The 2nd IAS Conference on HIV Pathogenesis and Treatment, Paris, France. *Antiviral Therapy* 2003;8(suppl. 1):S236.
7. WHO. Indicators for assessing breast-feeding practices : report of an informal meeting. WHO/CDD/SER/91.14. Geneva: World Health Organisation; 1991.

8. WHO, UNICEF. Breastfeeding counselling, a training course. WHO/CDR/93.5 - UNICEF/NUT/93.3. Geneva & New York: WHO, UNICEF; 1993.
9. WHO, UNICEF, UNAIDS. HIV and infant feeding: a review of HIV transmission through breastmilk. Geneva: World Health Organisation; 1998.
10. Leroy V, Karon JM, Alioum A, Ekpini ER, Meda N, Greenberg AE, et al. Twenty-four month efficacy of a maternal short-course zidovudine regimen to prevent mother-to-child transmission of HIV-1 in West Africa. *Aids* 2002;16(4):631-41.
11. Piwoz EG, Creed de Kanashiro H, Lopez de Romana G, Black RE, Brown KH. Potential for misclassification of infants' usual feeding practices using 24-hour dietary assessment methods. *J Nutr* 1995;125(1):57-65.
12. Bland RM, Rollins NC, Solarsh G, Van den Broeck J, Coovadia HM. Maternal recall of exclusive breast feeding duration. *Arch Dis Child* 2003;88(9):778-83.
13. Ekouevi DK, Leroy V, Viho A, Bequet L, Horo A, Rouet F, et al. Acceptability and uptake of a package to prevent mother-to-child transmission using rapid HIV testing in Abidjan, Cote d'Ivoire. *Aids* 2004;18(4):697-700.
14. Leroy V, Karon JM, Alioum A, Ekpini ER, Van De Perre P, Greenberg AE, et al. Postnatal transmission of HIV-1 after a maternal short-course zidovudine peripartum regimen in West Africa. *Aids* 2003;17(10):1493-1501.
15. Ramakrishnan U. Nutrition and low birth weight: from research to practice. *Am J Clin Nutr* 2004;79(1):17-21.
16. Deen JL, Funk M, Guevara VC, Saloojee H, Doe JY, Palmer A, et al. Implementation of WHO guidelines on management of severe malnutrition in hospitals in Africa. *Bull World Health Organ* 2003;81(4):237-43.
17. Bland RM, Rollins NC, Coutsooudis A, Coovadia HM. Breastfeeding practices in an area of high HIV prevalence in rural South Africa. *Acta Paediat* 2002;91(6):704-711.

18. Poggensee G, Schulze K, Moneta I, Mbezi P, Baryomunsi C, Harms G. Infant feeding practices in western Tanzania and Uganda: implications for infant feeding recommendations for HIV-infected mothers. *Trop Med Int Health* 2004;9(4):477-85.

## **LEGENDS FOR FIGURES**

### **Table 1**

World Health Organization infant feeding definitions

### **Table 2**

Socio-demographic characteristics of 246 mothers according to the community-run health facilities sites, March 2000, Abidjan, Côte d'Ivoire

### **Table 3**

Ages of introduction and cessation of commonly used liquids in 225 children from four community-run health facilities, March 2000, Abidjan, Côte d'Ivoire

### **Table 4**

Ages of introduction and cessation of commonly used foods in 225 children from four community-run health facilities, March 2000, Abidjan, Côte d'Ivoire

### **Figure 1**

Distribution of the 225 children according to their age, March 2000, Abidjan, Côte d'Ivoire

**Table 1**

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<b>Infant feeding practice</b>	<b>Definition</b>
Exclusive breastfeeding	Giving a child no other food or drink, including no water, in addition to breastfeeding with the exception of medicines, vitamin drops or syrups, and mineral supplements (7)
Predominant breastfeeding	Breastfeeding a child but also giving small amounts of water or water based drinks. Neither food-based fluid nor solid food are allowed under this definition (7)
Artificial feeding	Feeding a child on artificial feeds (including infant formula and powdered animal milk), and not breastfeeding at all (8)
Mixed feeding	Breastfeeding a child while giving non-human milk such as infant formula or food-based fluid or solid food (9)

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**Table 2**

	District of Abobo		District of Yopougon		Total
	Anonkoua-Kouté N = 60	Sagbé N= 60	Port-Bouët N= 65	Niangon N= 61	
<b>Age</b> (median, IQR)	25 (21-29)	25 (20-29)	25 (21-29)	25 (22-29)	25 (21-29)
<b>Education</b> (%)					
No schooling	30	53	21	42	37
Primary school	65	37	61	43	51
Secondary school or higher	5	10	18	15	12
<b>Lifestyle</b> (%)					
Lives with her partner	77	68	72	77	74
<i>With her family</i>	0	0	10	6	4
<i>With her family-in-law</i>	10	15	15	15	14
Does not live with her partner	23	32	28	23	26
<i>With her family</i>	18	27	23	14	20
<i>With her family-in-law</i>	2	2	5	1	2
<b>Gainfully employed</b> (%)	42	52	57	49	50
<b>History of life-born children</b> (median, IQR)	2 (1-3)	2 (1-3)	2 (1-3)	2 (1-3)	2 (1-3)

\* : p=0.02

Table 3

Liquid	Already given						Never given	
	Introduction		Still given		Cessation		N (%)	Current age <sup>1</sup>
	N (%)	Age <sup>1</sup>	N (%)	Current age <sup>1</sup>	N (%)	Age <sup>1</sup>		
<b>Breastmilk</b>	223 (99)	<i>1d (1d-1d)</i>	210 (94)	6 (3-9)	13 (6)	17 (6-24)	2 (1)	#2: 6
<b>Infant formula</b>	44 (20)	<i>18d (1d-60d)</i>	24 (55)	4 (2-8)	20 (45)	3 (1-5)	181 (80)	6 (4-10)
<b>Water</b>	225 (100)	<i>1d (1d-2d)</i>	225 (100)	6 (4-10)	0	-	0	-
<b>Glucose water</b>	16 (7)	<i>1d (1d-6d)</i>	4 (25)	#3: 4 ; #1: 6	12 (75)	<i>5d (3d-42d)</i>	209 (93)	6 (4-10)
<b>Herbal tea</b>	86 (38)	<i>15d (7d-30d)</i>	22 (26)	3 (2-9)	64 (74)	2 (1-3)	139 (62)	6 (3-9)
<b>Fruit juice</b>	144 (81)	<i>45d (7d-120d)</i>	128 (89)	8 (4-10)	16 (11)	<i>40d (9d-110d)</i>	81 (36)	4 (3-8)

<sup>1</sup> : median age (IQR) in months or in days if specified (d, italic) ; #i : i children concerned by the age specified

**Table 4**

Liquid	Already given						Never given	
	Introduction		Still given		Cessation		N (%)	Current age <sup>1</sup>
	N (%)	Age <sup>1</sup>	N (%)	Current age <sup>1</sup>	N (%)	Age <sup>1</sup>		
<b>Artificial milk</b> <sup>2</sup>	95 (42)	4 (3-5)	70 (74)	8 (6-10)	25 (26)	7 (5-8)	130 (58)	4 (2-9)
<b>Baby food #1</b> <sup>3</sup>	114 (51)	4 (3-5)	81 (71)	8 (5-10)	33 (29)	6 (5-8)	111 (49)	4 (2-8)
<b>Baby food #2</b> <sup>4</sup>	28 (12)	4 (3-5)	19 (68)	7 (5-9)	9 (32)	6 (5-8)	197 (88)	5 (3-9)
<b>Rice</b>	79 (35)	8 (7-11)	79 (100)	10 (9-15)	0	-	146 (65)	4 (3-6)
<b>Fruit, vegetable</b>	48 (21)	6 (5-8)	46 (98)	9 (8-12)	2	#2: 9	177 (79)	5 (3-9)
<b>Meat, fish</b>	92 (41)	7 (6-9)	92 (100)	10 (9-14)	0	-	133 (59)	4 (2-5)
<b>Egg</b>	89 (40)	7 (5-9)	86 (97)	10 (8-14)	3	#3: 6	136 (60)	4 (2-6)

<sup>1</sup> : median age (IQR) in months ; #i : i children concerned by the age specified

<sup>2</sup> : powdered animal milk (different from infant formula) used to prepare the baby food

<sup>3</sup> : baby food made of flour (wheat, corn...) usually bought in the markets

<sup>4</sup> : baby food made of vitamin-enriched flour provided in community-run health facilities

**Figure 1**

