

Knowledge, perceptions and practices of HIV-infected mothers regarding HIV and infant feeding

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Objectives: The objective of this study was to determine the knowledge, perceptions and practices of HIV-infected mothers regarding human immunodeficiency virus (HIV) and infant feeding.

Design: A cross-sectional study design was applied.

Setting: The study was undertaken at a regional hospital in Bloemfontein.

Subjects: A total of 100 mother–infant pairs that were still in hospital after the delivery of the baby were included. All mothers were HIV-infected.

Outcome measures: Sociodemographic information, medical history, and knowledge, perceptions and practices related to infant feeding in the context of HIV were noted.

Results: The median age of mothers was 31 years, and most mothers reported anti-retroviral therapy (ART) use (93.0%). The median CD4 cell count was 383 cells/mm³, and median haemoglobin level was 11.4 g/dl. Most mothers planned to breastfeed their infant(s) (70.0%). A large percentage of the mothers reported that they did not know or were not aware of the fact that HIV can be transmitted to an infant via breastfeeding (43.0%). Only half of the mothers had been shown how to either breastfeed or formula feed by healthcare staff (depending on their choice).

Conclusion: The knowledge, perceptions and practices related to infant feeding were inadequate in mothers included in this study. Providing scientifically based, unbiased information is fundamental during counselling on infant feeding to ensure the success of prevention of mother-to-child transmission (PMTCT) programmes. If women feel confident in their acquired knowledge, they are more likely to be self-empowered and make informed decisions related to infant feeding.

Keywords: HIV; infant feeding; knowledge; perceptions; practices; South Africa

Introduction

Globally, approximately 36.7 million people were living with the human immune-deficiency virus (HIV) at the end of 2016, and during that year, 1 million people died from HIV-related causes. Most new infections occur in the African region, with 25.6 million people being HIV-infected.¹ Women aged 15 to 49 years have the highest HIV prevalence rate,² which highlights the importance of the primary prevention of HIV infection in women and the subsequent prevention of mother-to-child transmission (PMTCT).

The first recognised case of mother-to-child transmission (MTCT) of HIV via breastfeeding occurred in 1983 in Australia.³ Globally a 58.0% decline in new HIV infections in children was observed between 2000 and 2014, mainly due to improvements in anti-retroviral treatment programmes. A recent systematic review focusing on HIV-infected breastfeeding women found a pooled postnatal transmission rate of 1.1% at six months of age. This was observed in women who were reported to be on anti-retroviral therapy (ART) from early pregnancy. At 12 months of age this rate increased to 3.0%, and to 4.1% at 18 months.⁴ Without intervention, the risk of MTCT ranges between 20.0% and 45.0%.⁵ Mother-to-child transmission of HIV during the first six months of life is lower in infants who are exclusively breastfed, compared with infants who receive mixed feeding.⁶ Avoiding breastfeeding will completely eliminate the risk of postpartum HIV infection, but carries different, yet dangerous risks. Although replacement feeds, such as formula milks, may safely and effectively be used in ideal circumstances,⁷ in resource-poor settings the incorrect and unhygienic

use of replacement feeds can significantly increase the risk of infections and diarrhoea.⁸

The World Health Organization (WHO) states that women can only consider formula feeding if certain conditions are met. The well-known 'AFASS' (acceptable, feasible, affordable, sustainable and safe) criteria were previously used to assess the possibility of formula feeding safely. The assessment of each woman's individual situation is unfortunately not as simple as these five words might suggest, and the WHO has since modified the wording of the AFASS criteria to make it more understandable.⁹ The amended criteria include statements related to the circumstances of the mother (e.g. her access to safe water and healthcare) instead of using single words. In resource-poor circumstances it is unlikely that women will meet these criteria and in such cases the WHO recommends exclusive breastfeeding as infant feeding choice.⁹

When the choice of infant feeding mode is considered, lack of knowledge as well as high-risk infant feeding practices have exacerbated the HIV dilemma. In view of the major impact of infant feeding practices on morbidity and mortality of babies, the main aim of this study was to investigate the knowledge, perceptions and practices related to infant feeding of HIV-infected women who have recently delivered a baby. Information of this nature can contribute to improving PMTC intervention programmes.

Methods

A descriptive cross-sectional study was undertaken in HIV-infected mothers in the post-natal ward of a regional hospital

in Bloemfontein. This hospital is not now, nor was it at the time of data collection in 2012, accredited as Mother–Baby Friendly.

Population and sample selection

HIV-infected women in the post-natal ward who had recently given birth comprised the study population. On average, 300 mothers gave birth at this hospital each month. Of these mothers, approximately 70 mothers were HIV-infected. All HIV-infected women (≥ 18 years of age) who gave written informed consent were eligible to participate. A convenience sampling method was used.

Data collection

Approval for the study was obtained from the Ethics Committee of the Faculty of Health Sciences at the University of the Free State (ECUFS 140/2011), the Chief Executive Officer of the hospital as well as the matron of the maternity wards. At the time of data collection, approval was not required from the Department of Health (DoH). A representative from the DOH served on the Ethics Committee of the Faculty of Health Sciences. The information document and informed consent form were available in English, Afrikaans and Sesotho. Confidentiality of the information was maintained by using codes in data analysis and results. Data were collected in 2012.

Measurements

An interviewer-administered questionnaire was used to obtain the necessary information from the mothers. One researcher interviewed all participants using an interpreter when needed. The questionnaires included the following: sociodemographic information; medical history and reported health; and knowledge, perceptions and practices regarding HIV and infant feeding. Most questions were developed based on the WHO Guidelines on HIV and Infant Feeding. At the time the study was conducted, the 2010 WHO guidelines were relevant.¹⁰ Some of the medical history information was obtained from the patient files, which included CD4 count and haemoglobin level.

Pilot study

A pilot study was undertaken on a sample of five women who met the inclusion criteria before the main survey in order to determine whether questions were easily understood. The amount of time needed to complete each questionnaire was also determined. After the pilot study, no amendments were made to the questionnaires and thus the results obtained during the pilot study were included in the main study.

Statistical analysis

Descriptive statistics, namely frequencies and percentages for categorical data and medians and ranges for numerical data, were calculated. Associations between categorical variables (2×2 tables) were calculated and described by means of 95% confidence intervals for differences in percentages.

All analyses were performed by the Department of Biostatistics at the University of the Free State.

Results

A total of 100 mothers were interviewed. Three of the mothers had twins, and the total number of infants was thus 103.

Sociodemographic information

On the day of the interview, the median age of the mothers was 31.0 years (18.3–43.6 years). Most participants spoke Sesotho (78.0%) and had never been married (54.0%). Most women

were unemployed (56.0%), while 22.0% earned a full-time wage. Some 18% of women either had no formal schooling, or had only completed school to grade 7.

Formal housing (houses built with bricks) was the most frequent type of dwelling, with 84.0% living in such housing. Only 28.0% of the mothers had a bathroom inside their house, and 73.0% had a toilet outside. Less than half of the households (46.0%) had running water inside the house, while 83.0% had electricity.

Medical history

Disabilities such as having difficulty walking, seeing, hearing, reading and speaking were not prevalent. The most prevalent diagnoses, other than HIV, were hypertension (26.0%), current or previous tuberculosis (10.0%), pre-eclampsia (8.0%), constipation (4.0%) and pregnancy-induced hypertension (3.0%).

Caesarean sections were performed on 71.0% of the mothers, while 29.0% had vaginal deliveries. A large percentage of mothers had given birth to a total of two live children (38.4%), 31.3% had one child, and 23.2% had three children. Pre-natal CD4 counts were available for 80.0% of mothers, with a median value of 383 cells/mm³ (27–1023 cells/mm³). Recent haemoglobin values were available for 75.0% of the mothers. The median value was 11.4 g/dl (4.5–14.6 g/dl).

In total, 70% of the mothers expressed an intention to breast-feed, whilst 30.0% of mothers expressed an intention to formula feed their infants. At the time of the interviews, no participants planned to give mixed feeding.

Knowledge, perceptions and practices related to HIV and infant feeding

The results related to responses of mothers regarding risk of transmission of HIV are presented in Table 1.

The median age of the infant up to which an HIV-infected mother should give only breast milk was indicated at 6.0 months (range 4–24 months). The median age of the infant up to which an HIV-infected mother can breastfeed was also indicated as 6.0 months (range 3–24 months).

Knowledge, perceptions and practices related to the WHO Guidelines on HIV and Infant Feeding

Questions and responses related to the knowledge, perceptions and practices of mothers related to the WHO

Table 1: Responses of mothers regarding risk of transmission of HIV

Question	n	%
Is there a chance that HIV can pass through the breast milk to the baby (on ARVs or not)?		
Yes	57	57.0
No	37	37.0
Don't know	6	6.0
Can an HIV-infected woman breastfeed her baby?		
Yes	85	85.0
No	10	10.0
Don't know	5	5.0
Between 0 and 6 months, is it safe to breastfeed and give other foods or liquids when the mother is HIV-infected?		
Yes	14	14.0
No	80	80.0
Don't know	6	6.0

Table 2: Knowledge, perceptions and practices of mothers related to the WHO Principles regarding HIV and infant feeding

Question	n	%
Which of the following babies has a higher chance of getting sick and dying when the mother is HIV-infected?		
Breastfed baby	3	3.0
Formula-fed baby	7	7.0
Baby fed with animal milks	83	83.0
Don't know	7	7.0
Which of the following babies has a higher chance of getting sick and dying when the mother is HIV un-infected?		
Breastfed baby	3	3.0
Formula-fed baby	10	10.0
Baby fed with animal milks	81	81.0
I don't know	6	6.0
Did you have easy access to HIV testing when you were pregnant?		
Yes	98	98.0
No	2	2.0
Did you have easy access to ARVs when you were pregnant?		
Yes	96	96.0
No	4	4.0
Did you receive counselling from a healthcare professional regarding what you should feed your baby?		
Yes	92	92.0
No	8	8.0
Can an HIV-infected mother still breastfeed even if ARVs are not available?		
Yes	17	17.0
No	32	32.0
Don't know	51	51.0
If you chose breastfeeding (n = 70), did a professional explain how to breastfeed correctly?		
Yes	35	50.0
No	35	50.0
Cannot remember	0	0.0
Did the professional explain what exclusive breastfeeding is?		
Yes	25	25.0
No	64	64.0
Cannot remember	11	11.0
If you chose formula feeding (n = 30), did a professional explain how to formula feed correctly?		
Yes	14	46.7
No	16	53.3
Cannot remember	0	0.0

principles regarding HIV and infant feeding¹⁰ are presented in Table 2.

Table 3 shows results related to the counselling that the mothers reported receiving from a healthcare professional. Most mothers were correctly told that HIV-infected women who planned to breastfeed should give only breast milk for a period of 6.0 months after birth, and the age at which they were told they should wean their infants was also 6.0 months.

Results related to the knowledge, perceptions and practices of mothers in relation to the WHO recommendations¹⁰ regarding HIV and infant feeding are presented in Table 4.

The median age at which the mothers planned to stop exclusively breastfeeding or formula feeding was 6 months (range: 3 to 36 months).

Table 3: Counselling mothers received from a healthcare professional

Question	n	%
Did he/she tell you that there is a chance that your baby might get HIV via breastfeeding? (n = 93)		
Yes	54	58.7
No	24	26.1
Cannot remember	15	16.3
Did the healthcare worker tell you what the benefits of breastfeeding are? (n = 92)		
Yes	74	80.4
No	14	15.2
Cannot remember	4	4.4
Did the professional explain to you that if you breastfeed you and/or your baby must take ARVs to minimise the risk of HIV transmission through breastfeeding? (n = 94)		
Yes	83	90.2
No	7	7.6
Cannot remember	4	2.2
Did the professional tell you that if you breastfeed you should only give breast milk for the first couple of months, nothing else? (n = 92)		
Yes	89	96.7
No	0	0.0
Cannot remember	3	3.3
Did the healthcare professional tell you that your baby has a high risk of getting sick and dying if you formula feed incorrectly? (n = 92)		
Yes	57	62.0
No	26	28.3
Cannot remember	9	9.8
Was the information you received during counselling enough to make an informed decision that suits your situation? (n = 92)		
Yes	75	81.5
No	17	18.5

Associations between infant feeding choice and knowledge regarding HIV transmission via breastfeeding and age and educational level

Neither age nor educational level was significantly associated with the decision of whether to formula-feed or breastfeed. A statistically significant association was found between a higher educational level of mothers and knowledge that HIV can be transmitted via breastfeeding (Table 5).

Discussion

According to Statistics South Africa (StatsSA), the Free State province is home to 5.1% of the total population of South Africa,¹¹ and HIV prevalence among women aged 15–49 years in South Africa in 2016 was estimated at 21.2%.¹²

Wouters *et al.*¹³ determined the sociodemographic information of the population accessing public-sector ART treatment in the Free State districts (75.4% were female) and found that 80.7% of the patients did not work for payment in kind. In the current study, two-thirds of the mothers did not work for payment, which indicates a slightly better earning potential in this group. Most of the mothers in the current study lived in formal housing, which compared well with the respondents in the study by Wouters *et al.*¹³ in the Free State, where 77.7% of ART patients lived in formal housing.

The prevalence of hypertension among HIV-infected mothers in this study (26.0%) was similar to that of a Brazilian study (25.6%),

Table 4: Knowledge, perceptions and practices of mothers related to the WHO Recommendations regarding HIV and infant feeding

Question	n	%
When you stop giving breast milk, what will you mainly give your baby to drink? (n = 69)		
Expressed, heat-treated breast milk	0	0.0
Formula milk	39	56.5
Cow's milk	16	23.2
Other animal milk	0	0
No milk	6	8.7
Other (mostly do not know)	8	11.6
Explain all the steps involved in preparing formula milk (if formula feeding) (n = 30)		
Don't know	9	30.0
Incomplete or incorrect answer	4	13.3
Partially complete explanation	12	40.0
Complete or correct explanation	5	16.7
If the baby does not finish all of the milk, what will you mostly do with the leftover milk? (if formula feeding) (n = 30)		
Throw it away	5	16.7
Let it stand on the table, floor or outside and feed it to the baby during the next feed	8	26.7
Put it in the fridge and feed it to the baby during the next feed	15	50.0
Give it to older children to drink	1	3.3
Other	1	3.3
Are you aware that you can feed your baby expressed, heat-treated breast milk (heat-treatment inactivates HIV)?		
Yes	22	22.0
No	78	78.0
What is your attitude towards heat-treating expressed breast milk for your baby?		
It's a good idea	22	22.0
It's a bad idea	25	25.0
It's a good idea but too much work	13	13.0
Don't know	37	37.0
Other (mostly that it is not natural)	3	3.0
If the baby is HIV-infected, what is the best feeding choice?		
Breast milk	78	78.0
Formula milk	9	9.0
Other animal milks	2	2.0
Don't know	11	11.0

which reported that 14.8% of HIV-infected Brazilian respondents (male and female) were on anti-hypertensive medication,¹⁴ while 14.9% of the current respondents used these medications to control hypertension at home. The burden of non-communicable diseases (NCDs) is increasing worldwide, and regions such as those in Africa are expected to show a 20.0% increase in cases by the year 2020.¹⁵ The scaling up of ARTs in sub-Saharan Africa has increased the life expectancy of HIV-infected individuals with a resultant larger cohort suffering from NCDs, such as hypertension.¹⁶

Most of the mothers delivered their infants via Caesarean section. Caesarean section can reduce the risk of HIV transmission to the infant. A recent systematic review concluded that this advantage of reduced risk of MTCT per Caesarean section should be weighed against the increased risk of complications for these women. The authors further suggested that a

planned vaginal delivery could be a safe option if ART is used, the mother is full term and her viral load is low.¹⁷

The mothers' median CD4 count value was 383 cells/mm³ (27–1023 cells/mm³). This median value falls within the 'mild immunosuppression' stage according to the WHO immunological staging.¹⁸ Most mothers with available recent haemoglobin (Hb) counts fell in the non-anaemia category for pregnant women (>11 g/dl) according to the WHO staging for anaemia, with the entire group having a median haemoglobin level of 11.4 g/dl (4.5–14.6 g/dl).¹⁹ A third of mothers, however, had a haemoglobin count below the non-anaemia cut-off value of 11 g/dl. Anaemia prevalence was lower than in a study conducted in Kenya among pregnant HIV-infected women, where the prevalence of any grade of anaemia (Hb < 9.4 g/dl) was 61.8%.²⁰ Anaemia is the most common haematological anomaly encountered in HIV-infected patients, and has been identified as a risk factor for earlier mortality in patients with acquired immune deficiency disorder (AIDS).²¹

Almost all of the mothers reported that they had easy access to HIV testing and ARVs while pregnant, which is a positive finding. Two-thirds of the mothers planned to breastfeed their infants while one-third opted for formula feeding. This concurs with a recent Zambian study, in which 26.0% of the HIV-infected mothers chose to formula feed their infants.²² In a similar study in the Democratic Republic of the Congo, 79.2% of HIV-infected mothers planned to breastfeed their infants.²³ Mothers regarded animal milks as the least healthy infant feeding choice for young infants irrespective of a mother's HIV status. Unmodified cow's milk, used as a breast milk substitute, can increase the risk of developing an iron deficiency in children younger than a year.²⁴

Almost half of the mothers in the current study were unaware that there is a chance that HIV can pass to the infant via breastfeeding. Nacro *et al.*²⁵ reported that 28.0% of their study population in Burkina Faso were aware of this mode of MTCT. This information could influence compliance with ART and exclusive breastfeeding, which could significantly minimise the risk of MTCT. It is paramount that HIV-infected mothers understand all of the benefits and risks of both breastfeeding and formula feeding before a choice is made. Nevertheless, most mothers agreed that an HIV-infected mother can indeed breastfeed, and most mothers knew that mixed feeding is not a safe infant feeding option in the first six months.

The median age until which an HIV-infected mother should breastfeed exclusively was reported as six months. A large percentage of mothers were not aware of the age up to which an HIV-infected mother can breastfeed (exclusively plus non-exclusively after weaning) as they also indicated a median age of six months for this question. The 2010 WHO guidelines, relevant at the time of data collection,¹⁰ state that HIV-infected mothers who do not meet the AFASS criteria should breastfeed exclusively for six months, introduce complementary foods, and then breastfeed up to one year of age. They should then only stop once a nutritionally adequate diet without breast milk can be provided.⁹ The updated 2016 WHO guidelines state that 'Mothers living with HIV should breastfeed for at least 12 months and may continue breastfeeding for up to 24 months or longer (similar to the general population) while being fully supported for ART adherence'.⁹ It was evident that the mothers included in the current study were not aware that breastfeeding can continue for more than six months, and

Table 5: Associations between infant feeding choice and knowledge regarding HIV transmission via breastfeeding and age and educational level

Factor	<i>n</i>	Breastfeeding	Formula feeding
Age:			
≤ 30 years	47	34 (72.3%)*	13 (27.7%)
> 30 years	52	35 (67.3%)*	17 (32.7%)
CI [-13.0%; 22.3%]			
Educational level:			
≤ Grade 7*	18	15 (83.3%)*	3 (16.7%)
Grade 8–10	32	23 (71.9%)	9 (28.1%)
≥ Grade 11*	50	32 (64.0%)*	18 (36.0%)
CI [-6.2%; 36.9%]			
	<i>n</i>	Aware that HIV can pass via BF	Unaware that HIV can pass via BF
Age:			
≤ 30 years	47	24 (51.1%)*	23 (48.9%)
> 30 years	52	33 (63.5%)*	19 (36.5%)
CI [-30.5%; 6.9%]			
Educational level:			
≤ Grade 7*	18	7 (38.9%)*	11 (61.1%)
Grade 8–10	32	16 (50.0%)	16 (50.0%)
≥ Grade 11*	50	34 (68.0%)*	16 (32.0%)
‡CI [-50.8%; -2.7%]			

*Indicates which options were used for associations.

‡Statistically significant difference.

efforts should be made to educate HIV-infected women regarding the duration of breastfeeding. It is also recommended that the local clinic and hospital nurses' knowledge and counselling skills be evaluated, and necessary training regarding infant feeding options be provided, to aid in improving the feeding choices made by mothers.

It is crucial that all HIV-infected women receive infant feeding counselling before their children are born, but eight of the mothers (8.0%) reported that they had not received this counselling, possibly because they did not attend ante-natal visits. Continuous follow-up counselling sessions are the cornerstones of successful infant feeding and in ensuring the health of the infant.

Only half of the breastfeeding mothers were counselled on the foundations of successful breastfeeding, such as how to position and attach the infant. Additionally only about half of the mothers who chose formula feeding were informed of the correct way in which formula milk must be prepared and provided. Poor knowledge related to this can lead to unnecessary morbidity and mortality because the risks of infection and malnutrition are increased.⁸

Most of the mothers felt that they understood the counselling that they received, and that they received sufficient information to make a decision that would suit their situation. However, it might be a case of 'you don't know what you don't know', suggesting that even if the mothers felt that they had in fact received enough information, they might not even be aware of all of the information they had not received. Buskens and Jaffe²⁶ explored the experiences and views of both healthcare workers who counsel HIV-infected women, and the mothers themselves in South Africa, Swaziland and Namibia. Many of the mothers felt that more in-depth counselling as well as several counselling sessions would have been helpful. Later, some mothers expressed regret regarding the infant feeding choice that they had hastily made. Desclaux and Alfieri²⁷

investigated infant feeding counselling for HIV-infected women in Burkina Faso, Cambodia and Cameroon. Most of the women who were interviewed in all three countries did not show a high level of comprehension regarding certain issues. When the researchers observed these counselling sessions, it was found that the healthcare workers oversimplified the health messages and did not include sufficient precise information. For instance, the explanation that the healthcare workers gave regarding HIV transmission risks via breastfeeding were given without using statistics to explain the risks that are involved. Regardless of the setting, HIV-infected women have a right to unbiased, scientifically based information in order for them to make informed decisions.

A large percentage (83%.0) of mothers were not informed about the fact that HIV-infected mothers can still breastfeed if ARVs are not available. Even though this is not a desirable practice, one of the WHO principles states: 'When antiretroviral drugs are not (immediately) available, breastfeeding may still provide infants born to HIV-infected mothers with a greater chance of HIV-free survival.' However, mothers should be counselled on safe breastfeeding practices and the possibility of heat-treating expressed breast milk during this period to decrease risk of transmission.⁹ When mothers were questioned regarding heat-treating expressed breast milk, few were aware of this option and most were unsure how they felt about it. This feeding mode was evidently quite foreign to this study population. Even if this infant feeding option may not be practical or chosen by many HIV-infected mothers, these mothers should be informed about all of the possible feeding options.

Older mothers were more likely to be aware of the fact that that HIV can be transmitted via breastfeeding than the younger group; however, the difference was not statistically significant. In an ideal setting, all mothers, irrespective of age, will be sufficiently informed about the mechanisms of MTCT. Ankunda and Asiimwe²⁸ also found that women in Uganda, although HIV-uninfected, in the older age group had more knowledge of

HIV than the respondents in the younger age group. In the current study, mothers with a higher educational level were more knowledgeable regarding the fact that HIV can be transmitted via breastfeeding. Belachew and Jirra²⁹ also found a significant association between a higher educational level of mothers and better knowledge related to HIV and infant feeding in an Ethiopian study.

Conclusion and recommendations

It can be concluded that women in the current study were not as well informed regarding HIV and infant feeding issues as would be anticipated. Although data were obtained from a single site and can thus not be generalised to other areas, the results indicate a need for interventions to improve knowledge.

The basic principles in a PMTCT programme regarding infant feeding need to be consistently applied by healthcare workers in order to effectively prevent MTCT. Healthcare workers often report having limited time and resources to adequately counsel their patients. If policy-makers are made aware of the importance and impact of good-quality counselling, it is hoped that more resources will be allocated to support the prevention of MTCT.

Providing scientifically based, unbiased information is fundamental during infant feeding counselling sessions and public health education to ensure the success of PMTCT programmes in any setting. Strategies which would ensure that all pregnant women attend ante-natal visits should be developed and implemented. The design of updated, interactive and culturally sensitive educational materials could also contribute to the successful implementation of PMTCT programmes and should urgently receive attention. Women should be empowered during counselling sessions, and durable educational materials should be available to send home with them. As recommended by other researchers investigating infant feeding knowledge among women with and without HIV in Johannesburg, South Africa,²⁹ we also propose that high-quality counselling, which provides accurate information on infant feeding both before and after birth, is paramount.

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