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MATERNAL KNOWLEDGE ON MOTHER-TO-CHILD TRANSMISSION OF HIV AND BREASTMILK ALTERNATIVES FOR HIV POSITIVE MOTHERS IN HOMA BAY DISTRICT HOSPITAL, KENYA
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A.M. OMWEGA, T.J. OGUTA and J.K. SEHMI

ABSTRACT

Background: **Mother- to- Child Transmission (MTCT) of HIV is a relatively new concept in rural populations and despite the huge amount of work that has been done on the HIV/AIDS, there still remains a dearth of information in knowledge of mothers on this concept especially in areas related to appropriate feeding methods for infants born to mothers infected with the virus.**
Objectives: **To determine maternal knowledge on MTCT of HIV in the rural setting and to examine viable breastmilk alternatives for mothers who would be HIV positive.**
Design: **A cross- sectional study, supported by an observational study.**
Setting: **A rural district community and Homa-Bay District Hospital in South Western Kenya.**
Subjects: **One hundred and twelve non-tested mothers having infants aged 0-12 months in the community and a sub-group (10%) of HIV positive mothers from the District Hospital.**
Results: **Maternal knowledge on MTCT of HIV was as low as 8.9% in the study area. The MTCT knowledge was found to influence the alternative feeding choice as mentioned by the non-tested mothers (p = 0.001; OR = l.41; 95%CI, 1.04-3.86). Those with high MTCT knowledge tended to be more receptive and considered feeding alternatives other than cowmilk like expressed breastmilk (p = 0.l 5), formula (p = 0.036; OR = 2.44; 95%CI, 1.66-6.04) and milk from milk bank (p = 0.0l5; OR = l.34; 95%CI, 1.13-5.50) than their counterparts with low MTCT knowledge. Cowmilk, formula and wet-nursing were the three feeding alternatives that were viable with varying socio-cultural, economic and/or nutritional constraints.**
Conclusion: **Maternal MTCT knowledge influences the choice of alternative infant feeding option but not breastfeeding practices. Cowmilk is the most common, socio-culturally acceptable and accessible breastmilk alternative in this community. It is recommended that in order to improve MTCT knowledge, health education and nutrition counselling be intensified in PMTCT programmes, VCT centers and ANC clinics. Concurrently, effort should be made to increase the supply of cowmilk within the community so as to make it more readily available and affordable.**

INTRODUCTION

In Kenya, the national HIV prevalence estimated from women participating in sentinel surveillance is estimated at 9.4%. Over 2.5 million people are infected with HIV and about 220,000 of these are children (1). In children, 90% of HIV transmission is as a result of mother- to- child transmission during

pregnancy, delivery or breastfeeding (2). Mother- to-child transmission (MTCT) rates vary considerably with between 25% and 45% among primarily breastfed populations of sub-Saharan Africa (3). Studies from Kenya estimate the rate at 20-44% (4, 5). About 30% of women going for antenatal care in Kenya are diagnosed HIV positive in sentinel screening (5) and given that nearly one million babies are born annually (6), over 300,000 babies are at risk of contracting the virus every year.

Breastmilk contributes about 15% risk of HIV transmission, 16-32% in Kenya (5). Therefore, it may be preferable to replace breastmilk for mothers who are infected especially if the only consideration were to prevent HIV from infecting the child through breastmilk. Such mothers are usually advised not to breastfeed. The use of infant formula is widely recommended to HIV infected mothers in industrialised countries, however, for infected mothers living in poor conditions in developing countries, it is important to consider the risks related to not breastfeeding and suitability of the alternative feeding methods (7). Some infant feeding methods have been suggested and seem to have merit in theory but not much has been done to determine their practical feasibility especially in the African rural settings.

This paper presents the results of a study on the maternal knowledge on MTCT of HIV and what would be viable breastmilk alternatives for infants born to HIV positive mothers. It also considers the sociocultural, health, technological and economic conditions surrounding the choice of such practices among the rural inhabitants of Homa-Bay District, South Western Kenya.

MATERIALS AND METHODS

Study population: The study population included non-tested mothers with infants aged 0-12 months in Homa-Bay District and sub sample of HIV positive mothers with children aged 0-2 years old. The district is inhabited by the Luo ethnic group and is one of the Kenyan districts with the highest (24%) HIV prevalence (1). A number of socioeconomic factors are thought to contribute in the rapid spread of HIV / AIDS in this community among them being the culture of widow inheritance, absence of circumcision practice, polygamy, migrant fishing, after-burial ceremonies and belief in cultural curse *(chira).*

Study design: This was mainly an exploratory cross sectional study among mothers of the reproductive age. This design is appropriate for generating data on the current knowledge of MTCT of HIV and the practices related to alternative infant feeding.

Inclusion criteria: Women of unknown HIV status with infants aged 0-12 months were recruited for the general study with a sub-group of HIV positive women with children aged up to two years recruited for the observational study.

Exclusion criteria: Women who did not have children or whose children were more than the above stated ages were excluded. Those that were so ill to participate in the interviews were also excluded from the study.

Ethical issues: Permission to carry out the study was obtained sequentially from the Government through the Ministry of Education, District Commissioner, District Medical Officer of Health and the Matron of Homa-Bay District Hospital. Informed consent was obtained from the mothers to participate in the study after explaining to them the objectives of the study and all the information collected on each individual was held in confidence, concealing the identity of the subjects.

Sampling and sample size: Sampling was purposive, clustered and consecutive. Homa-Bay district was purposively selected because of its high HIV prevalence and MTCT rate and by virtue of it being one of the three pilot districts / sites for a national programme on Prevention of Mother-to-Child Transmission (PMTCT) of HIV. The pilot study was carried out by Network of AIDS Research of Eastern & Southern Africa (NARESA) in collaboration with UNICEF and National AIDS & STD Control Programme (NASCOP) of Kenya. Two divisions, Nyarongi and Riana, were then purposively selected because they have the highest infant mortality rates in the district (9). The divisions were then clustered into 25 villages randomly selected. Mothers with infants aged 0-12 months who gave informed consent were then consecutively recruited for the study within a period of two months until the predetermined number required was attained.

Sample size calculation was based on the HIV prevalence (30%) among antenatal women in

sentinel screening in the district (1). Choosing a power of 90% and 2-tailed levels of significance of 5% and allowing attrition rate of 10%, at least 89 subjects were required for the study from the method and formula by Fisher *et al* (9). An adequate number of non-tested 112 women were finally involved in the study in addition to a sub-sample of 11 (10%) HIV positive mothers.

Data collection techniques: The study applied both quantitative (Questionnaires) and qualitative research tools (Key informant interviews, Observation, Focus Group Discussions (FGD) and Case Studies) for data collection to ensure good quality of data. A semi-structured questionnaire was administered on 112 mothers. Four FGD sessions were conducted with participation of eight members in each group with a total of 16 women and 16 men. The women participants were aged 18-45 years while their male counterparts were between 20-54 years old. FGD allowed verification of information obtained from questionnaires and exploration of factors that are difficult to obtain by questionnaires. Five experienced and / or elderly women aged 45-75 years participated in key-informant interviews on areas related to traditional and contemporary alternative feeding practices. Eleven HIV-positive mothers were observed and monitored using an observation study guide on the actual infant feeding alternatives that they opted for while four mothers participated as case studies. The four cases included those who had infants but were using different exemplary feeding methods for one reason or another. Two of them were HIV positive of which one opted for formula and the other continued breastfeeding. The remaining two were non-tested and one used cowmilk while the other was a wet-nurse.

Determination of MTCT knowledge index: Six questions were used for scoring to develop MTCT knowledge index. The aspects of MTCT studied were whether children can get HIV / AIDS, timing of the MTCT-during pregnancy, delivery and breastfeeding and whether MTCT was preventable.

A response was considered valid if it provided the correct answer known (i.e. if it was a "Yes" response).

Two points were given for every valid response and zero for invalid responses. A total score was calculated out of 12 points and used as MTCT knowledge indicator. The respondent's overall knowledge on MTCT of HIV was then rated on a scale of 0-12 and the respondent graded using four cut-off points as:

1 = No knowledge at all (0 points)
2 = Low MTCT knowledge (2-4 points)
3 = Average MTCT knowledge (6-8 points)
4 = High MTCT knowledge (10-12 points)

The ultimate knowledge of the population was taken at the number who provided valid responses (got 12 points) for all the six questions.

Data analysis: Information obtained from the questionnaires were checked, verified and entered into a computer. Data entry, cleaning and analysis were done using EPI-INFO word processing database software. Analysis involved cross tabulations, Odds ratios, frequencies of individual variables and their associations. Confidence intervals (95%) were obtained using categorical variables and the Pearson Chi- square tests were performed to check the statistical significance for the various hypothesized variables.

Information obtained from FGD and Key Informant Interviews that were scribed in field notebooks and those recorded in electromagnetic tapes (cassettes) were verified, transcribed and descriptive analysis made.

RESULTS

Knowledge on MTCT of HIV: Maternal knowledge on MTCT of HIV in the study population was very low (8.9%, n = 10) but higher (63.6%, n = 7) among the HIV-positive sub group (Table 1). In general, 35.7% had high MTCT knowledge, 45.5% were average while 5.4% had poor MTCT knowledge. Fifteen (13.5%) of the respondents had no knowledge of MTCT at all. There is especially low knowledge on the timing of MTCT of HIV (Table 2). Majority (72.7%) believed that any HIV infected mother will automatically infect her baby right in the womb and that this is not preventable.

The MTCT knowledge was found to influence the alternative feeding choice (Table 3) as mentioned by the non-tested mothers (p = 0.00l; OR = 1.41; 95% CI, 1.04-3.86). Those with high MTCT knowledge tended to be more receptive and considered feeding

alternatives other than cowmilk like expressed breastmilk, formula (p = 0.036; OR = 2.44; 95% CI, 1.66-6.04) and milk from milk bank (p = 0.0l5; OR = l.34; 95% CI, 1.13-5.50) than their counterparts with low MTCT knowledge. The MTCT knowledgeable mothers also understood and viewed with empathy (p=0.031) rather than social rejection a woman who could not breastfeed her baby.

Breastmilk alternatives: Cowmilk was the most familiar / common and acceptable breastmilk alternative in the community (Table 4) mentioned by a large majority (95.5%). However, for many (64.3%) who did not produce their own milk, getting the recommended 750 ml (for an infant of about 5 kg) of cowmilk at Kshs 15 (US$ 0.2) per day was still considered expensive. In a community where majority of the women has an average monthly income of less than Kshs 1500 (US$ 21) (8), this would imply spending as much as 45% on one item, the baby food.

Formula: Majority 106 (88.4%) said that commercial infant formula was good as a breastmilk alternative in the sense that it was hygienic and prepared to suit the baby's nutritional needs, but decried the price. A few of these (17.7%) thought the formulas being expensive would even expire on the shelves before they are bought. Even in a case where the baby was formula fed, exclusivity was not attained.
Wet-nursing: Many respondents (79.5%) said that the elderly women in the community (those who have reached menopause) readily accept wet-nursing as ideal for an orphaned baby (usually their grandchildren or step children), but the young and middle aged women seem reluctant to endorse it as a suitable practice, taking into account the HIV / AIDS factor and suggest such children can be well cared for in children's homes.

Powdered milk: Was accepted as a possible breastmilk alternative by many (75.9%) though none of the respondents reported using it.

The use of goat milk, and expressed breastmilk was rare and was infrequently mentioned by 13.4% and 12.5% of the respondents. The idea of expressing and / or heating breastmilk and milk banks was strange and unacceptable to the community and the concept was met with disbelief. Several reasons were given for this including that it is not normal to milk the human (32.1%), breastmilk can not be expressed to produce enough to satisfy the baby (25%), milking would make the breasts painful (17.7%), and that breastmilk is so volatile that on heating would all evaporate (13.4%).

Table 5 shows analysis of the viability factors of the different breastmilk / feeding alternatives.

Case studies: The four case studies gave practical feeding alternatives opted for by different mothers under different conditions (Table 6).

Table l

MTCT Knowledge among the two study groups in percentage

MTCT knowledge	General population (HIV status not known) (n = 112)	Observation (HIV-positive) study group (n = 11)
No knowledge at all	13.4	
Poor / low knowledge	5.4	9.1
Average knowledge	45.5	27.3
High knowledge	35.7	63.6
Total	100	100
Ultimate knowledge	8.9	63.6

Table 2

Knowledge of the mothers on the timing and prevention of MTCT

MTCT Timing and Prevention	Response: General population (n = 112) Yes (%)	No (%)	Don't know (%)	Sub-group (n = 11) Yes (%)	No %	Don't know (%)
Pregnancy	77.7	5.4	17.0	90.9	0	9.1
Delivery	42.0	29.5	28.6	81.8	0	18.2
Breastfeeding	56.3	17.9	25.9	81.8	0	18.2
Preventable?	27.7	31.3	41.4	81.8	0	18.2

Table 3

MTCT knowledge and breastmilk alternatives as mentioned by non tested mothers

	Number of respondents: MTCT knowledge None	Poor	Average	High	Analysis: P-values	OR (95% CI)
Breastmilk alternative					0.001	1.41 (1.04 – 3.86)
Wet-nursing	14	4	42	30	Not significant	Not significant
Expressed heated breastmilk	0	1	5	7	Not significant	Not significant
Formula	12	5	45	38	0.036	2.44 (1.66 – 6.04)
Breastmilk from milk bank	1	0	5	7	0.015	1.34 (1.13 – 5.50)
Cowmilk	14	6	50	39	Not significant	Not significant
Goatmilk	0	2	4	7	Not significant	Not significant
Dried powder milk	13	4	40	29	Not significant	Not significant

Table 4

Breastmilk alternatives as mentioned by the respondents

Feeding option	Response (n = 112) Yes (%)	No (%)	Don't know (%)	Total (%)
Wet-nursing	79.5	17.7	2.7	100
Expressed, heat-treated breastmilk	12.5	60.7	26.8	100
Formula	88.4	5.4	6.3	100
Breastmilk from milk bank	12.5	55.4	32.1	100
Cow milk	95.5	2.7	1.8	100
Goat milk	13.4	61.6	25	100
Dried milk powder	75.9	11.6	12.5	100

Table 5

Viability of various breastmilk alternatives in the study area

1 US$ ~ 70 KShs

Viability factors	Breastmilk Alternatives: Cowmilk	Wet-nursing	Formula
Socio-cultural	• Most familiar / acceptable • Highly valued food for both adults and children • Practice of tending cows for milk in return is common	• Traditionally practiced / acceptable • Women who successfully wetnurse are held in high esteem • All the social benefits of breastfeeding are retained	• Culturally little accepted • Many regard formula to belong to the rich, others believe they may be unsafe or cannot feed a healthy growing baby • Acceptable to the HIV positive
Economic	• More readily available / accessible • Costs KShs 15 per 750m1 bottle (i.e 450 / - a month and 2700 / - for 6 months) • More than half of the respondents produced or purchased the product	• The cost is not quantifiable • Wet-nurses are regarded as committed volunteers in a cultural context and receive no payment • However, time and resources spent by the wet-nurse obviously have some economic bearing on her life	• Require minimal time for preparation & cooking • Cost is beyond the reach of the community • 500g Lactogen or Nan costs KShs 450 (i.e 2700 / -, a month and 16,200 / - for 6 months)
Nutritional	• Cowmilk provide most of the nutrients required by the baby for the first 6 months but is deficient in iron, zinc, Vitamins A, C and Folic acid • Supplementation is required for the deficient nutrients • Has comparatively low digestibility	• Ideal for the baby and could be the best replacement for breast-feeding • Sufficiently provides all the nutrients required by the baby for the first 6 months • Has perfect digestibility	• If appropriately fortified or punctuated with adequate supplementation of deficient nutrients, can provide all the required nutrients • Has improved digestibility
Technical	• Home prepared by boiling and dilution and require no technical skills • Ordinary kitchen utensils are sufficient and firewood is used as source of fuel	• Does not require any technology • Lactation is sensational and the milk does not require treatment	• Mixing and feeding require some skills that should be given by health workers for those who cannot read instructions
Constraints	• Mothers had poor knowledge on dilution • Forfeit the social benefits of breastfeeding • Must be supplemented for deficient nutrients	• Cultural norms associated with abstinence or cleansing after a sexual interaction involving the surrogate mother • Risk of transmission from either the wet-nurse or the baby • Does not apply for a baby whose mother is alive and healthy-looking	• The cost is far much beyond the income of the majority of the population in this community
Overall viability	• Most viable	• May be viable only in non-tested populations especially for orphans of close blood relations	• Not economically viable

Table 6

Case studies

Characteristics	Cases			
	Case I	Case II	Case III	Case IV
Socio-economic profile	• Aged 21 • Married, polygamous family • Primary education • Peasant farmer with annual income of about Ksh. 12,000 • Given birth 3 times and has lost 2, last born, a boy was 3 weeks old	• Aged 27 • Married, monogamous • Secondary education • Runs a business with annual income of more than Ksh. 60,000 • Given birth 4 times all alive. Last born 5 years old. Surrogate daughter is 2 months	• Aged 21 • Married, monogamous • Primary education • Runs retail business with annual income of about Ksh. 15,000 • Given birth once, first born, a boy aged one month	• Aged 34 • Married, monogamous • No formal education • House wife with annual family income of about Ksh. 24,000 • Given birth 11 times and has lost 4, last born, a boy was 2 months old.
Feeding choice	• Cow milk, due to breast infections • Baby has never been breastfed • Milk is donated by grandmother • Milk is boiled and diluted with a pre- boiled water • Dilution ratio is 1:1 • Fed on demand using a spoon • Left- over taken by the mother	• Wet-nursing, mother died after delivery • Has to bathe and take a cleansing herbal concoction before she can breastfeed the surrogate daughter • Introduced cow milk after growth faltering • Milk is bought, boiled and diluted with pre-boiled water • Dilution ratio is 1:1 • Baby fed 8 times a day using a cup	• Breastfeeding • Fear not to breastfeed for possible stigmatisation by community and hostility from the spouse • Breastfeed on demand • Good attachment, but suckling is not effective • Complements with cow milk due to growth faltering • Milk is bought, boiled and diluted with a pre-boiled water	• Infant formula • Opted for an advice from the hospital • Formula is donated by the hospital freely • Feed reconstituted with a pre-boiled water and fed on demand using a cup • Occasionally boiled water is given to the baby • A few times the baby has suckled from his mother while she is asleep • Left- over taken by the mother
Feeding choice		• Left- over taken by other children	• Dilution ratio is 1:1 • Milk is fed 3 times a day using a cup • Left- over taken by the mother	
Health / environmental conditions	• Mother non-tested for HIV • Mother is sickling and suffers breast infections • Delivered under a TBA, birth weight not established • Baby looks healthy, but has not received any immunization • Latrine available, but mother does not wash her hands regularly • Drinking water fetched from a borehole which is not treated	• Surrogate mother non-tested for HIV • Mother is well and healthy • Baby has episodes of diarrhoea and slow growth • From a BWT of 2.7 kg, the baby weighs 4.1 kg after 6 weeks • Mother maintains high sanitary and hygienic conditions	• Mother is sero-positive for HIV and counselled • Mother looks healthy and positive • Baby withdrawn and wasted • From a BWT of 2.9 kg, the baby weighs down to 2.7 kg after 6 weeks • Baby has thrush in the mouth • Mother maintains high sanitary and hygienic conditions	• Mother is sero-positive for HIV and counselled • Both look healthy and positive • Baby has normal growth • Mother maintains high sanitary and hygienic conditions
MTCT knowledge	• Has some knowledge about MTCT but does not know it is preventable • Accepts wet-nursing, formula, cow milk and milk powder as possible feeding alternatives	• Has high knowledge about MTCT-timing of transmission and prevention • Accepts wet-nursing, formula, cow milk and milk powder as possible feeding alternatives	• Has high knowledge about MTCT-timing of transmission and prevention • Accepts formula, cow milk, milk powder and expressed / heat treated breast milk powder as possible feeding alternatives	• Has high knowledge about MTCT-timing of transmission and prevention • Accepts formula, cow milk and milk powder as possible feeding alternatives

DISCUSSION

Knowledge on MTCT of HIV: Although knowledge of HIV / AIDS in the province (99.8%) is very high (10), knowledge on MTCT of HIV at the time this study was conducted, had not hitherto been documented. Data from this study indicates that most of the respondents knew AIDS as a killer disease with no known cure and which is distinct from the cultural curse, *chira,* with which it has been confused before. The data also indicated that knowledge on MTCT among the study population was very poor (8.9%) echoing the general trend among rural women in the country (1). As in other studies, this is perhaps a reflection of inadequate counselling services as was the case among Malawian women (11). But perhaps of greater concern is that this data suggests that MTCT knowledge though influencing acceptance of feeding alternatives (p=0.001) had no significant effect on the breastfeeding practices like initiation, frequency, and duration of breastfeeding. This is in agreement with other studies from the region (12, 13) and a reflection of how entrenched the norm of breastfeeding is in Kenyan rural settings and the fact that most of the members of the population do not know their sero-status to influence actual change in breastfeeding behaviour. On the other hand, MTCT knowledge had a negative correlation (p=0.007) with the time when complementary feeding is introduced. The data suggests that those with high MTCT knowledge prematurely introduce complementary feeds. However, it is worth noting that this could possibly be a consequence of education level of the mother since MTCT knowledgeable mothers happened also to be better educated (p=0.04) hence more likely to have better incomes.

Viable breastmilk alternatives: In order to find out the most viable breastmilk alternative in the study area, four aspects, commonly referred to as AFASS conditions, of the feeding option were considered, that is, acceptability (socio-culturally), feasible (ease of preparation), affordable (economically), sustainable (availability and accessibility) and safe (Table 5). Cowmilk meets almost all the AFASS conditions and is the most common and acceptable breastmilk alternative in the community. This was followed by wet-nursing (by close relatives) and formula respectively, but formula is ranked second if it is provided free or subsidized. However, for those who do not produce their own milk, getting the recommended 750 ml (for a 5 kg baby) of cowmilk on average at Kshs. 15 per day is still a financial challenge.

In conclusion, the data from this study indicates that:

(i) MTCT knowledge among the mothers in the study area is very low, despite the high awareness about HIV / AIDS.
(ii) Cowmilk, is the most viable breastmilk alternative in the area of study.
(iii) Wet-nursing is a viable breastmilk alternative at family level but should be only among the tested HIV-negative wet-nurses who are able to maintain status by practicing safe sex.

We recommend that:

(i) MTCT knowledge should be improved by intensifying health education and nutrition counselling in the PMTCT programme, VCT centers and ANC clinics.
(ii) The supply of breastmilk alternatives that are acceptable, feasible, affordable, sustainable and safe such as cowmilk in this community needs to be improved through complimentary interventions by other, non-health stakeholders in the community.

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