Human immunodeficiency virus and infant feeding

Human immunodeficiency virus (HIV) continues to be a significant health issue both globally and in the UK. Mother-to-child transmission of HIV mainly occurs *in utero* and during delivery but can happen through breastfeeding. Increased attention has been focussed on strategies to prevent mother-to-child transmission of HIV. This article discusses the current World Health Organization (WHO) recommendations and the UK guidelines for infant feeding in HIV-infected mothers.

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Key points

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1. The most appropriate infant feeding option for an HIV-infected mother depends on her individual circumstances, her health service and available support.
2. Anti-retroviral therapy during pregnancy and breastfeeding greatly reduces the risk of HIV transmission but does not eliminate it.
3. Most evidence on HIV and infant feeding comes from studies in the developing world, in particular from African countries.

It is generally accepted that for most babies, breastfeeding is the best way to be fed. It provides all the necessary nutrients needed in the first few months of life, as well as containing antibodies that help protect against common childhood illnesses such as gastroenteritis and respiratory infections[1]. However in the context of HIV, infant feeding becomes complex.

Transmission of HIV from mother to child mainly occurs *in utero* and during delivery, but it may also occur through breastfeeding. HIV is present in breast milk and can be transmitted from mother to child through both free virus and HIV-infected cells present in breast milk. The concentration of the virus may be low, however quantities of milk consumed over time are high and so breastfeeding may present substantial viral exposure and therefore risk to the infant. The risk of transmission varies with the stage of maternal infection, the duration of breastfeeding, the type of breastfeeding (ie exclusive or mixed breastfeeding) and breast pathology. Recent studies support the findings of a meta-analysis carried out in 1992, indicating that when breastfeeding is practised for over two years, there is an additional 14% risk of transmission of HIV through breastfeeding, over and above transmission *in utero* or during delivery[2].

In many developing countries this risk is countered with the risk of dying from diarrhoea, pneumonia or malnutrition if fed with formula milk[3,4]. This is due to deprivation of natural immunity and the protective properties of breast milk and the difficulties with maintaining sterility when preparing formula milk due to a lack of clean water and appropriate facilities. Affordability and availability of formula milk are also of concern. Because of this, the risk of not breastfeeding is thought to outweigh the potential risk of transmission of HIV through breastfeeding and so, in the developing world, breastfeeding continues to be recommended for mothers with HIV[5,6].

In the UK and other high-income countries, the risk of HIV transmission through breastfeeding far outweighs the risk of formula milk feeding and so the universal advice from national health agencies has always been that HIV-positive mothers should avoid breastfeeding altogether. However there are many cultural and social factors that can make this a very difficult choice for a woman. Breastfeeding is for many women a cultural norm and by not breastfeeding the mother may unwillingly reveal her HIV status and, in doing so, become a target for stigma. Since 2006 a great deal of research and experience regarding HIV and infant feeding has accumulated. This evidence has major implications for how HIV-positive women, both overseas and in the UK, might feed their infants and how those in the health profession should counsel and support them.

Epidemiology

HIV continues to be a significant public health issue in the UK. It is associated with significant morbidity, mortality and high treatment costs. There is also still a great deal of stigma attached to the disease.

By the end of 2011, an estimated 96,000 people were living with HIV in the UK and the estimated prevalence of HIV was 1.5 per 1,000[7]. At the end of 2010 there were 1,943 HIV-positive children in the UK as a result of mother-to-child transmission. In 2010/11 less than 1% of infants born to women in the UK with known HIV prior to delivery, acquired the virus in the perinatal period[7]. This has been attributed to:

- effective antenatal screening and counselling
- safe delivery practices
- easy and safe access to breast milk substitutes.

In women complying with the above interventions, on anti-retroviral therapy (ART) and with a viral load of <50 HIV copies/mL plasma at the time of delivery, the transmission rate is 0.1%[8]. In women who are untreated, the transmission risk is thought to be 15-45%[9].

Current recommendations

WHO guidance released in 2007 stated that: "The most appropriate infant feeding option for an HIV-infected mother depends on her individual circumstances, including her health status and the local situation, but should take consideration of the health services available and the counselling and support she is likely to receive"[10]. It also recommended exclusive breastfeeding in the first six months for infants of HIV-infected mothers, where formula feeding was not an acceptable, affordable and safe option. If formula feeding was felt to be an appropriate option in terms of affordability, safety and feasibility then avoidance of all breastfeeding was recommended.

These guidelines were revised in 2010 in light of evidence from studies among women in Africa showing that ART in either the HIV-exposed infant or the HIV-positive mother could significantly reduce the risk of HIV transmission through breastfeeding[11-16]. In the revised guidelines, health authorities were advised to universally recommend one of two feeding options to HIV-positive mothers: either breastfeeding in combination with maternal or infant treatment with anti-retroviral drugs, or complete avoidance of breastfeeding. In those advised to breastfeed, the advice is to exclusively breastfeed for the first six months of life, introducing appropriate complementary foods thereafter and continuing breastfeeding for the first 12 months of life. Breastfeeding should then only stop once a nutritionally adequate and safe diet without breast milk can be provided.

HIV-positive mothers who decide to stop breastfeeding at any time should stop gradually but within one month. Mothers or infants who have been receiving anti-retroviral prophylaxis should continue with their therapy for one week after breastfeeding is fully stopped. Ending breastfeeding abruptly is not advisable[6].

The British HIV Association (BHIVA) and the Children's HIV Association (CHIVA) also released guidance in 2010, more specifically looking at infant feeding in the UK alone. Their guidance emphasised that the WHO guidelines were not generally applicable in the UK and that the long-term effects of exposing infants to ART through breast milk are, as yet, unknown. The guideline stated that: "For these reasons BHIVA/CHIVA continue to recommend that, in the UK, mothers known to be HIV infected, regardless of maternal viral load and ART, refrain from breastfeeding from birth"[8]. However the statement released by BHIVA/CHIVA does recognise that in those women on highly active anti-retroviral therapy (HAART) and with a consistently undetectable viral load, the risk of mother-to-child transmission, although not yet quantified, is likely to be low. Therefore if a mother fulfilling these criteria does decide to breastfeed, this will no longer be grounds for automatic referral to child protection agencies. This is with the caveat that breastfeeding should be exclusive (except during weaning) and should not exceed six months (including the weaning period)[8]. Further guidance can be found from the UK Chief Medical Officers' Expert Advisory Group on AIDS (EAGA) which states: "Under exceptional circumstances and after seeking expert professional advice on reducing the risk of transmission of HIV through breastfeeding, a highly informed and motivated mother might be assisted to breastfeed"[17]. It must be understood, however, that any breastfeeding carries some risk. This risk can probably be reduced by certain measures but not eliminated.

Minimising the risk

Anti-retroviral drugs

As mentioned previously, there is recent evidence to show that ART during pregnancy and breastfeeding greatly reduces the risk of HIV transmission[13,16,18,19]. A study in Rwanda looking at postnatal mother-to-child transmission in breastfeeding with maternal ART compared with formula feeding, found a similar HIV-free survival rate in both groups of about 95% and an overall nine-month cumulative risk of postnatal infection of 0.5% with breastfeeding[14]. Several other studies in Africa, including observational cohort studies and randomised controlled trials (RCTs) have shown HIV transmission rates of 0-3% during breastfeeding for mothers on HAART[11-16]. A South African study suggested that the impact of ART given in the perinatal period could be a major factor in reducing HIV transmission, regardless of the mode of feeding[20].

ART can save lives and also money; it appears to be cost effective across a broad range of healthcare spending[21]. However there must be 100% compliance with treatment and this requires sufficient education and support for mothers as well as easy access to a regular supply of the medication. The woman must also be motivated to comply.

Exclusive feeding

HIV-positive women who choose to breastfeed are currently advised to exclusively breastfeed for the first six months[6]. Exclusive breastfeeding means no additional water, nor formula milk or solids. This is because exclusive breastfeeding is thought to carry a much lower risk of HIV transmission than mixed feeding. There are much data to support this thinking. A study from South Africa found that breastfed infants who also received solids and infants given both formula and breast milk, were more likely to acquire HIV than those that were exclusively breastfed[22]. It also found a cumulative mortality in the first three months of 6% in exclusively breastfed infants, compared with 15% in infants given replacement feeds. Studies from Zimbabwe[23] and Cote d'Ivoire[24] also found higher rates of HIV transmission in mixed feed infants compared with those exclusively breastfed, although in the study from Cote d'Ivoire the difference was not found to be statistically significant. The reason for the increased risk associated with mixed feeding is thought to be due to alterations in gut permeability. Substances other than breast milk may cause an increase in gut permeability, possibly

associated with local inflammation, and this increases the risk of acquisition of the infection for the infant[24].

In practice, encouraging mothers to exclusively breastfeed is not always easy. Even those that have chosen to do this may start to give additional fluids because of the belief that, either rightly or wrongly, they do not have enough breast milk.

In many cultures it is the norm for babies to be given other fluids or even solids from a very young age, in addition to breast milk. There can be much pressure from families to comply with this and refusal can be difficult, especially when a woman does not wish to disclose her HIV status.

Duration of feeding and weaning

The longer an infant breastfeeds from an HIV-positive mother, the more exposure it has to the virus and the greater the chance of acquiring an infection. Nevertheless, this risk needs to be balanced against the benefits that breast milk provides. The BHIVA/CHIVA position statement currently recommends no more than a total of six months' breastfeeding for HIV-positive women in the UK, including the period of weaning[8]. This length of time is viewed as an absolute maximum and switching to formula feeding as soon as possible is advocated, although it is appreciated that this may lead to a short period of mixed feeding. In actual fact, exclusive breastfeeding for extended periods is rarely practised in the UK, with less than 1% of mothers exclusively breastfeeding at six months, even in non-HIV populations[8].

Current WHO guidelines are slightly different, recommending exclusive breastfeeding for the first six months and then mixed feeding for a further six months, in combination with maternal or infant ART[6,25]. This allows gradual weaning as some studies have found that rapid weaning can increase the risk of HIV transmission and mortality[26].

There appears to be conflicting evidence regarding the optimal length of time for exclusive breastfeeding. A study from South Africa looked at breastfed infants who were still HIV negative at six months of age. The study found that those infants who were then started on replacement feeds had better rates of survival than those who continued to be breastfed[27]. However, the authors commented that they did not include the social and environmental circumstances of the mothers who continued to breastfeed in their analysis. It may have been that these mothers chose not to give replacement feeds as to do so would have placed their infants at greater risk of death from non-HIV infections and malnutrition.

Conversely a study from Botswana, which compared breastfeeding with prophylaxis for six months with formula feeding and prophylaxis for one month, found lower mortality rates at seven months of age in the breastfeeding group but comparable HIV-free survival at 18 months of age in both groups[28].

A further study from Cote d'Ivoire educated and supported mothers for replacement feeding. It then found that the infants of HIV-infected mothers who were started on replacement feeds after six months had an equivalent mortality to those that continued to breastfeed[29].

It is noteworthy that each of these studies took place in a developing country where formula feeding itself poses a risk to the infant that is not equivalent in the UK.

Conclusion

HIV and infant feeding continues to be a subject of great debate. Formula feeding remains the only way to avoid vertical transmission of the virus with absolute certainty however, with current interventions, it seems the risk of breastfeeding can be greatly minimised although not eliminated.

Most of the evidence surrounding HIV and infant feeding comes from studies in the developing world, in particular African countries, and may not always be applicable to women and infants in the UK.

In the UK, exclusive feeding with infant formula is strongly recommended for HIV-infected mothers as the problems associated with replacement feeding in developing countries do not exist[30]. However, preventing a mother from breastfeeding her child may expose her to cultural and social stigma and deny the infant the benefits of breastfeeding[31].

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