Breastfeeding and HIV infection: a global perspective

Each day more than 1600 children worldwide become infected with the human immunodeficiency virus (HIV), mostly because they are born to an HIV-infected mother. Mother-to-child transmission of HIV can occur before, during or after delivery. In the absence of specific interventions about 25–35% of children at risk are infected, reducing to less than 15% without breastfeeding. With prophylactic antiretroviral therapy and elective caesarean section the risk can be further reduced to below 2% (European Collaborative Study, 1999).

TRANSMISSION VIA BREASTFEEDING

Breastfeeding is an important route of transmission. Where a mother acquires HIV infection after delivery, during the breastfeeding period, the risk of transmission through breastfeeding is about 30% (Dunn et al, 1992). In established infection, the additional risk of transmission through breastfeeding, over and above the intrauterine and intrapartum contribution, is estimated to be between 7 and 22% (Dunn et al, 1992).

These estimates agree with those from prospective studies (in Europe, South Africa and Brazil), and from a recently concluded trial showing approximately double overall transmission rates associated with breastfeeding. About 5% of breastfed children who show no evidence of being infected at 3 months of age, become infected before the age of 15 months, accounting for about half of all those who become infected through breastfeeding.

HOW DOES INFECTION OCCUR?

HIV-1 can be detected in breast milk by virus culture, but it is unknown whether infection takes place through cell-free HIV or through HIV-infected cells. Cell-free virus could penetrate the mucosal lining of the gastrointestinal tract of infants by infecting cells, or by direct entry into the bloodstream via mucosal breaches. It is unclear whether damage to the intestinal tract of the infant, caused for example by the early introduction of other foods, could increase its permeability and thus result in increased rates of acquisition of infection for the infant.

Limited information is available regarding risk factors for transmission through breastfeeding. If a mother has high levels of virus in her blood, she may also have a high viral load in breastmilk with probably a higher transmission risk (Semba et al, 1999). In 75 breastmilk samples from HIV-infected women in Nairobi, Kenya, HIV-1 RNA (cell-free virus) was detected in 29 (39%). Overall the levels of cell-free virus were low, and only just detectable in 16 (55%) of the 29 samples. The prevalence of RNA was higher in mature milk than in colostrum. HIV DNA levels in breastmilk were associated with maternal blood vitamin A levels. Women with the lowest vitamin A levels had the highest DNA levels and the lowest CD4 counts, suggesting advanced HIV disease. Breast health could also be associated with vertical transmission risk.

NUTRITIONAL ISSUES

When infants born to HIV-infected mothers can be ensured uninterrupted access to nutritionally adequate breastmilk substitutes that are safely prepared and fed to them, they are at less risk of illness and death if they are not breastfed. However, when these conditions are not met, in particular when infectious diseases and malnutrition are common causes of infant mortality, artificial feeding substantially increases children's risk of illness and death.

Early cessation of breastfeeding rather than prolonged breastfeeding has been suggested to reduce the risk of acquisition of infection (Kuhn and Stein, 1997; Leroy et al, 1998). However, few data are available to confirm whether it is possible to breastfeed in such a way as to minimize the risk while maximizing the benefits.

Information from a study in Durban (Coutsoudis et al, 1999) suggests that, taking infection status at 3 months of age only, with truly exclusive breastfeeding for a limited period it may be possible to reduce the risk of transmission to levels similar to that in a formula-fed group. More work needs to be done to confirm their finding of the increased risk of mixed feeding, and to investigate the acceptability and feasibility for mothers to change their breastfeeding habits to fully exclusive breastfeeding, which is currently rare. By providing support and counselling the prevalence of breast problems can also be reduced.

INTERVENTIONS

Postnatal transmission through breastfeeding poses a dilemma for the application of interventions to reduce vertical transmission, which, partly through practical necessity, currently target the late intrauterine and intrapartum periods. Their application in populations where breastfeeding is the norm poses still unanswered questions.

A short regimen of peripartum zidovudine reduces the risk of transmission by about 35%, and the effect of this prophylaxis is maintained throughout the first 6 months of life, even with breastfeeding (Dabis et al, 1999).

In a recently published trial from Uganda, one dose of nevirapine during labour and one dose on day 2 or 3 after

birth was similarly associated with a significant reduction in acquisition of infection assessed at 14 weeks in breastfed infants (Guay et al, 1999). Protocols are being developed to investigate in a randomized trial the effectiveness of antiretroviral therapy to breastfed infants of HIV-infected mothers. HM

Marie-Louise Newell

Reader in Epidemiology

Department of Epidemiology and Public Health

Institute of Child Health

London WC1N 1EH

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KEY POINTS

- The risk of mother-to-child transmission of human immunodeficiency virus (HIV)-1 is about 25–35%. This risk can be reduced to less than 2% with antiretroviral therapy, elective caesarean section and refraining from breastfeeding.
- Breastfeeding poses a significant additional risk of vertical transmission of HIV-1.
- Risk factors for breastfeeding transmission are likely to include maternal viral load in milk, breast health and intensity of feeding.
- Where safe, feasible and affordable, women known to be HIV-infected should be advised not to breastfeed.
- Antiretroviral therapy in the peripartum period reduces the risk of vertical transmission by about 35% in breastfeeding populations.

Commentary

Marie-Louise Newell has provided a excellent summary of what we know now on the transmission of HIV through breastfeeding. The reality and implications has posed an uncomfortable dilemma for those who promote breastfeeding in the best interests of child and maternal health.

At first there was a hope that transmission was confined to when mothers acquired HIV during breastfeeding (Ziegler et al, 1985). This was not the case and eventually the 'breast is best' policy had to accommodate that where a mother is known to be HIV infected, and the risks associated with artificial (formula) feeding could be minimized, she should be advised not to breastfeed. Such UK guidance was established in 1992 and updated in September this year (Expert Advisory Group on AIDS, 1999).

Internationally this policy will have most difficulty in middle-income developing countries with substantial HIV prevalence (e.g. South Africa and India) where artificial feeding is feasible and the risks and benefits of HIV-infected mothers feeding formula to their infants may be finely balanced (Nicoll et al, 1995). One of the difficulties is that research on the hazards of artificial feeding on all child mortality at a population level has been neglected of late.

However, in the UK and Europe it is important not to get the HIV issue out of proportion. Only around 300 HIV-infected women give birth annually out of a total of 720 000 in the UK, so the advice to feed artificially is only relevant for at most one mother in 2400 (Communicable Disease Surveillance Centre et al, 1999). For the other women and their babies breast does remain best and it is artificial feeding that poses the greatest avoidable health risks. Hospital policies and staff training are a key to enabling women to breastfeed successfully. A formal cost–benefit analysis is overdue for the UK; however, interventions that promote exclusive breastfeeding such as UNICEF UK's Baby Friendly Hospital Initiative will surely reduce hospital costs from paediatric admissions with respiratory syncytial virus, rotavirus gastroenteritis and bacterial infections (Nicoll et al, 1995; Department of Health, 1996; Radford et al, 1998).

Angus Nicoll

Head, PHLS HIV and STD Centre

Communicable Disease Surveillance Centre

London NW9 5EQ

Elizabeth McGregor

Lactation Consultant

Newbury, Berks

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