Preventive Effect of Breast Feeding on infectious Disease

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Introduction

The primary physiological function of breast feeding is to provide natural nourishment for the human infant, but among breast feeding's several secondary functions, protection against infection is the most important. In non-industrialised countries, breast feeding may mean the difference between life and death (Cunningham 1991) but also in industrialised countries, the protective effect of breast feeding against infection is of significant benefit to the infant (Howie et al, 1990).

The evidence to support the protective effects of breast feeding against infection came from a number of sources and these are now summarised.

Breast Feeding and Infant Mortality

Early studies from Western countries identified the dangers of artificial milks for babies by describing the risks of increased mortality associated with their use (Newsholme, 1906). Following the improvements in milk quality and in the treatment of infantile gastroenteritis, mortality rates in developed countries have dramatically improved.

Epidemiological studies from non-industrialised countries, however, consistently show increased infant mortality associated with artificial feeding. For example, Victora et al (1987) showed odds ratios for diarrhoeal mortality in Brazil of 14.2 for totally weaned and 4.2 for partially weaned infants compared with infants being fed on breast milk alone. Studies from Chile (Plank and Milanesi, 1973), Rwanda (Lepage et al, 1981) and elsewhere (Jason et al, 1984) provide overwhelming evidence to substantiate that breast feeding reduces mortality due to infection in developing countries.

Breast Feeding and Gastrointestinal Infection

As with mortality as an outcome, there is very strong evidence to show that breast feeding prevents against the incidence of non-fatal gastro-enteritis in non-industrialised countries. In a recent review of infective morbidity before 1 year of age (Chien & Howie, 1998) nine comparative studies from non-industrialised countries were published between 1966 and January 1998. In all of these studies, a strong protective effect against infantile diarrhoeal disease was described. Although the methodology of some of these studies could be criticised (see below) the size of the reported effects was so large that it is clear that they could not have occurred by chance. The very strong protective effect of breast feeding against gastrointestinal infection in developing countries almost certainly reflects the avoidances of infected water as well as the natural protective effects of breast milk.

A substantial number of studies have also been performed in industrialised countries to investigate the protective effects of breast feeding. Bauchner et al (1986) carried out a critical analysis of these studies and showed that nearly all of them had important methodological weaknesses such as failure to define outcome variables clearly, or to describe exactly what regimes of infant feeding were being compared. In addition, many studies did not allow for confounding variables, such as the social status of the family, which could influence the conclusions significantly.

In their updated review of the literature, Chien and Howie (1998) found a total of seventeen studies comparing breast fed with artificially fed infants. Of these seventeen studies, nine (53%) reported a statistically significant protective effect of breast feeding against gastrointestinal infections; of the remainder, most showed a non-significant shift in the direction of protection and none showed a significantly higher risk of infection in breast fed babies. Of the four studies which met the important methodological criteria, three (Fergusson et al, 1978; Eaton Evans and Dugdale, 1987 and Howie et al, 1990) showed clear protective effects. A number of studies have looked at the effects of breast feeding on specific infections such as Salmonella (Frank et al, 1980) enterovirus (Jenista et al, 1984) and rotavirus (Duffy et al, 1986). The outcome event for these studies was identification of the particular organism in the infants' stools. These studies have generally shown reduced colonisation in breast fed babies although some of the findings fall short of statistical significance, possibly because of small sample size. Taken together, these data show that, despite the inconsistent results, breast feeding protects against gastrointestinal infection in industrialised countries. What is less clear, however, is the size of this effect and a valuable exercise would be a quantitative systematic review to estimate this (Chien and Howie, 1998).

Breast Feeding and Respiratory Infection

Nearly all of the studies which have addressed the question of the protective effect of breast feeding against respiratory infection have come from industrialised countries. In their literature review, Chien and Howie (1998) found seventeen comparative studies, including some which considered acute otitis media as well.

The definition of respiratory illness varied among the studies with some considering lower respiratory tract infection only and others taking both upper and lower respiratory infections into account. Several of these studies had the same methodological weaknesses as those studying gastrointestinal infection. Taking all of the studies together, however, eight of the seventeen (47%) demonstrated a beneficial effect of breast feeding against respiratory infection on the basis of clinical evidence.

Two studies looked at the effect of breast feeding on haemophilus influenzal type b infection in Alaskan Eskimos (Lum et al, 1982) and in Atlanta, USA (Cochi et al, 1986) and both reported that breast fed infants had significantly lower rates of infection.

As with gastrointestinal infection, the totality of evidence points to a significant protective effect of breast feeding against respiratory infection but, because of the inconsistency of the results, the exact extent of the protection is difficult to quantify.

It is of interest, however, to note that a study which followed infants up to seven years of age found that babies who were breast fed for at least the first four months of age were having significantly fewer episodes of respiratory infection into childhood (Wilson et al, 1998). This suggests that the protective benefits of breast feeding may not be confined to the period of breast feeding itself.

Mechanisms of Protection

Human milk is a very complex fluid with a wide variety of antibodies, proteins, cells and other constituents. It is almost certain that several mechanisms combine to offer protection to the baby against infection. Human milk contains very high levels of secretory IgA and this protects the mucous membranes of infants gut and respiratory tract (Hanson et al, 1996). Several other factors may be involved such as bacteriocidal enzymes, lactoferrin and macrophages (Howie et al, 1990). More recently, it has been shown that lactadherin in breast milk may play a key role in protecting babies against rotavirus infection (Newburg et al, 1998). It is likely that continuing research will clarify the complex mechanisms involved in the natural protection of babies against infection by breast milk.

Breast Feeding and Infection - Global Significance

The World Health Organisation (WHO) estimates that 1.5 million deaths a year could be prevented by breast feeding protection (WHO, 1993). A recent systematic

review (Golding et al, 1997) showed that, in a low income country, with a postneonatal mortality of 90 per 1000 children, artificial feeding at 6 months would produce an excess of postneonatal deaths ranging from 13% to 59% if the artificial feeding reached 10% or 100% respectively. As discussed above the benefits of breast feeding are not confined to low income countries but also cause much protection against morbidity in developed countries as well. These figures serve to emphasise the importance of protecting and promoting breast feeding in all parts of the world.

The WHO's international code of marketing of breast milk substitutes is a concerted effort among governments to ensure that the valuable resource of breast feeding is used to the maximum extent. No opportunity should be missed to promote this extremely important message (Costello and Saach dev, 1998).

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