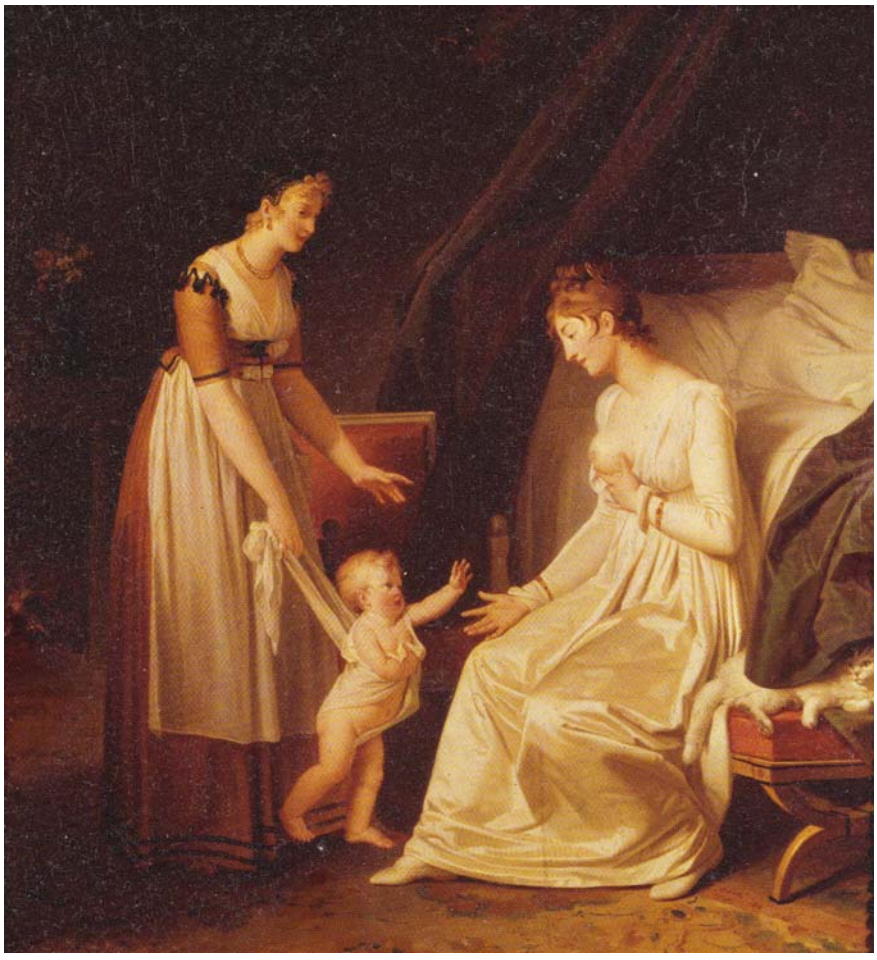
TERMS OF REFERENCE

(a) The extent of the health benefits of breastfeeding



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Is breastfeeding best practice?

www.mja.com.au/public/issues/177_03_050802/mcv10387_fm.pdf

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With our high standards of sanitation and healthcare, how important is breastfeeding?

Any breastfeeding advocate can rattle off a list of the advantages of breastfeeding to infants, their mothers and society. The list of benefits ranges from better emotional attachment to a lower risk of childhood leukaemia or dental malocclusion. However, claims of benefit have been contentious, with many studies failing to demonstrate a clear advantage and some even showing increased risk of a negative health outcome with breastfeeding.

The constituents of human milk suggest that it has evolved to promote infant health and human growth, particularly to protect children from infections and to support the rapid growth of the human brain. Despite advances in science and manufacturing, infant formula will always be a poor copy of human milk. It is improbable that a substitute will ever reproduce the full spectrum of human milk proteins, milk sugars (numbering over 100), live white cells and antibodies programmed by infections in the infant's environment, together with constant variations in milk content to meet the needs of the growing infant.

But does this matter in a developed country such as Australia? Is there justification in the argument that women are being pushed too hard to breastfeed, or is there more to infant nutrition than the provision of clean water and biologically safe artificial feeds? Many studies reporting the effects of breastfeeding, both positive and negative, have major methodological flaws.

Indeed, robust studies are difficult to carry out. Random allocation of study participants to either a "breastfeeding" or an "artificial feeding" group is unethical, especially if we accept the belief that "the epidemiologic evidence is now overwhelming that, even in developed countries, breastfeeding protects against gastrointestinal and (to a lesser extent) respiratory infection, and that the protective effect is enhanced with greater duration and exclusivity of breastfeeding".[1]

So evidence for the effects of breastfeeding must rely largely on observational cohort and case–control studies. Blinding to the intervention group is difficult, except at the analysis level. Moreover, mothers who elect to breastfeed differ from those who don't — the former group are generally better-educated women of higher socioeconomic status, who are more likely to have partners and less likely to smoke. All of these factors are likely to be independently associated with positive health outcomes, so failure to adequately adjust for these confounders generally favours positive breastfeeding outcomes. On the other hand, apparently poorer outcomes may result if mothers preferentially breastfeed more vulnerable infants. Difficulties with defining terms such as "breastfeeding" and "exclusively breastfed", and with defining endpoints such as "atopic disease", also make comparisons between studies difficult.

So, have the roughly 2000 papers on breastfeeding and human milk listed in Medline since the year 2000 helped answer the question of whether or not it matters if a term infant born in a country like Australia is breastfed? I will confine my comments to the three most common health problems in Australian children: infection, obesity, and asthma.

In Australia, there are almost 20,000 hospital admissions a year for acute gastroenteritis in children under five years old. Rotavirus accounts for about half of these episodes and is also one of the most important nosocomial infections in paediatrics. A Belarussian study[2] (involving 17 000 healthy mother–infant pairs intending to breastfeed) showed that, in centres randomly assigned to deliver support for breastfeeding (as outlined by the Baby Friendly Hospital Initiative[3]),there were increases in exclusive and continued breastfeeding and reductions in episodes of gastrointestinal infection.

In an Italian study[4] of infants aged 1-18 months admitted to an infant ward, fewer breastfed infants contracted rotavirus infection (10.6% v 32.4%), and none of these became symptomatic. It has been shown that human milk lactadherin prevents symptoms in breastfed infants infected with rotavirus by binding to the virus and inhibiting its replication.[5]

Obesity is the commonest chronic health problem in Australian children. This has health implications both in and beyond childhood, as about half of obese children become obese adults. The effect of breastfeeding on later overweight/obesity remains contentious. A 2001 review of 18 studies[6] concluded that most studies examining the effects of breastfeeding on later obesity had found an insignificant effect, although two of the studies actually found a positive association between breastfeeding and later body fatness.

Since that review, four large studies[7-10] (involving between 2000 and 14 000 children) have shown a *lower* prevalence of overweight in previously breastfed children, with several showing decreasing risk with longer duration of breastfeeding. The three studies of older children (aged 5–14 years)[8-10] also found a negative association between breastfeeding and obesity (with adjusted odds ratios [ORs] ranging from 0.66 to 0.8). Similar results in these three studies, despite differences in method, suggest that the finding may be robust.

The second most common chronic health problem in Australian children is asthma. A large Western Australian study showed a substantial reduction in risk of childhood asthma, as assessed at six years of age, if exclusive breastfeeding is continued for at least the first four months of life.[11] This was included in a systematic review with meta-analysis of 12 prospective studies,[12] which gave a summary OR of 0.70 (95% CI, 0.60–0.81) for asthma among children who had been breastfed, with a greater effect in children from families with a history of atopy (OR, 0.52; 95% CI, 0.35–0.79).

The studies were mainly of younger children but included children up to 8.4 years. Another prospective study of more than 330 000 children followed to age 24 months supported these findings: breastfeeding of less than nine months' duration was associated with an increased risk of asthma or wheezing, and a dose–response effect was observed with breastfeeding duration.[13]

However, a recent report has suggested that atopic children with asthmatic mothers are more likely to develop asthma in later childhood if they have been exclusively breastfed.[14] There may be interesting possibilities for intervening to further reduce atopy in at-risk families. Mothers of infants who develop atopic sensitisation have a higher intake of saturated fat,[15] and their breast milk is much lower in some long-chain unsaturated fatty acids (which may have antiallergenic properties[16]). Perhaps improving maternal diets and the use of probiotics[17] may reduce the prevalence of atopic disease in their children.

I have selected three childhood conditions for which small changes in prevalence or disease severity would have a major impact on the health of the nation. The US Department of Agriculture, Food and Nutrition chose otitis media, gastroenteritis and necrotising enterocolitis, and estimated that the United States would save a minimum of US$3.6 billion dollars a year if breastfeeding rates increased by 10% at initiation and by 20% at the age of six months.[18]

While we should be careful not to convey to mothers that breastfeeding will make their child a trim, non-atopic, infection-free genius, the balance of the evidence is that breastfeeding is of benefit in many ways. Every healthcare professional in contact with young children and parents should be familiar with their responsibilities under the World Health Organization Code[19] to encourage and promote breastfeeding - for the health of the nation.

References

1. Kramer MS, Kakuma R. *Optimal duration of exclusive breastfeeding [systematic review]*. Cochrane Pregnancy and Childbirth Group of the Cochrane Database of Systematic Reviews. The Cochrane Library. Oxford: Update Software, Issue 2, 2002.
2. Kramer MS, Chalmers B, Hodnett ED, et al, for the PROBIT Study Group. *Promotion of breastfeeding intervention trial (PROBIT): a randomized trial in the Republic of Belarus*. *JAMA* 2001; 285: 413-420.
3. *Baby-friendly hospital initiative*. Available at: <http://www.acmi.org.au>. Follow links to BFHI. Accessed 3 July 2002.
4. Gianino P, Mastretta P, Longo A, et al. *Incidence of nosocomial rotavirus infections, symptomatic and asymptomatic, in breast-fed and non breast-fed infants*. *J Hosp Infect* 2002; 50: 13-17.
5. Newburg DS, Peterson JA, Ruiz-Palacios GM, et al. *Role of human-milk lactadherin in protection against symptomatic rotavirus infection*. *Lancet* 1998; 351: 1160-1164.
6. Butte N. *The role of breastfeeding in obesity*. *Pediatr Clin North Am* 2001; 48(1): 189-198.
7. Hediger ML, Overpeck MD, Kuczmarski RJ, Ruan WJ. *Association between infant breastfeeding and overweight in young children*. *JAMA* 2001; 285: 2453- 2460.
8. Liese AD, Hirsch T, von Mutius E, et al. *Inverse association of overweight and breastfeeding in 9 to 10-year-old children in Germany*. *Int J Obes Relat Metab Disord* 2001; 25: 1644-1650.
9. von Kries R, Koletzko B, Sauerwald T, von Mutius E. *Does breast-feeding protect against childhood obesity? Adv Exp Med Biol* 2000; 478: 29-39.
10. Gillman MW, Rifas-Shiman SL, Camargo CA Jr, et al. *Risk of overweight among adolescents who were breastfed as infants*. *JAMA* 2001; 285: 2461-2467.
11. Oddy WH, Holt PG, Sly PD, et al. *Association between breast-feeding and asthma in 6 year old children: findings of a prospective cohort study*. *BMJ* 1999; 319: 815-819.
12. Gdalevih M, Mimouni D, Mimouni M. *Breast-feeding and the risk of bronchial asthma in childhood: a systematic review with meta-analysis of prospective studies*. *J Pediatr* 2001; 139: 261-266.
13. Dell S, To T. *Breastfeeding and asthma in young children. Findings from a population based study*. *Arch Pediatr Adolesc Med* 2001; 155: 1261-1265.
14. Wright AL, Holberg CJ, Taussig LM, Martinez FD. *Factors influencing the relation of infant feeding to asthma and recurrent wheeze in childhood*. *Thorax* 2001; 56: 192-197.
15. Hoppu U, Kalliomaki, Isolauri E. *Maternal diet rich in saturated fat during breastfeeding is associated with atopic sensitization of the infant*. *Eur J Clin Nutr* 2000; 54: 702-705.
16. Goldman AS. *Association of atopic diseases with breast-feeding: food allergens, fatty acids and evolution*. *J Pediatr* 1999; 134: 5-7.
17. Kalliomake M, Salminen S, Arvilommi H, et al. *Probiotics in primary prevention of atopic disease: a randomised placebo-controlled trial*. *Lancet* 2001; 357: 1076- 079.
18. Weimer J. *The economic benefits of breastfeeding: a review and analysis*. Report No 13. Washington, DC: Food and Rural Economics Division, Economic Research Service, US Department of Agriculture, Food and Nutrition Research. March 2001.
19. *International Code of Marketing of Breast-milk Substitutes*. Article 7. Geneva: World Health Organization, 1981, and subsequent resolutions. Available at: <http://www.who.int/nut/documents/code_english.PDF>. Accessed 8 July 2002.

RESEARCH ABSTRACTS

Does breastfeeding protect against paediatric overweight? Analysis of longitudinal data from the Centres for Disease Control and Prevention

Pediatrics. 2004 Feb: 113(2): e81-6, Grummer-Strawn LM, MEI Z, (Maternal and Child Nutrition Branch, Centres for Disease Control and Prevention, Atlanta, Georgia)

OBJECTIVE: To examine whether increasing duration of breastfeeding is associated with a lower risk of overweight in a low-income population of 4-year-olds in the United States.
A total of 177 304 children up to 60 months of age were included in our final paediatric-only analysis, and 12 587 were included in the pregnancy-paediatric linked analysis.

CONCLUSION: Prolonged breastfeeding is associated with a reduced risk of overweight among non-Hispanic white children. Breastfeeding longer than 6 months provides health benefits to children well beyond the period of breastfeeding.

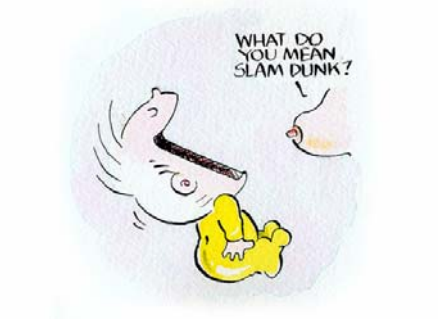
Protective effect of breastfeeding: an ecologic study of Haemophilus influenzae meningitis and breastfeeding in a Swedish population

Silfverdal SA, Bodin L, Olcén P, *International Journal of Epidemiology*, 28: 152-156, 1999.

Previously researchers in Sweden had done a case-control study between 1987 and 1992 in which they found that a long duration of breastfeeding decreased the risk of Haemophilus caused meningitis infection.

In the present study they studied the long-term effects of exclusive breastfeeding on the rate of meningitis infection over a period of 15 years (1956-1992) at a population level.

They found that breastfeeding strongly reduced the risk of contracting meningitis for 5-10 years, but not 15 years and beyond. Over the time span studied the data showed that low breastfeeding rates were followed by increased meningitis rates 5-10 years later. The authors concluded that the results should affect strategies to promote breastfeeding, especially in countries where Haemophilus vaccination is too costly.



Early weaning and hospitalization with alcohol-related diagnoses in adult life

Source: International Society for Research in Human Milk and Lactation
www.isrhml.org.umu.se/

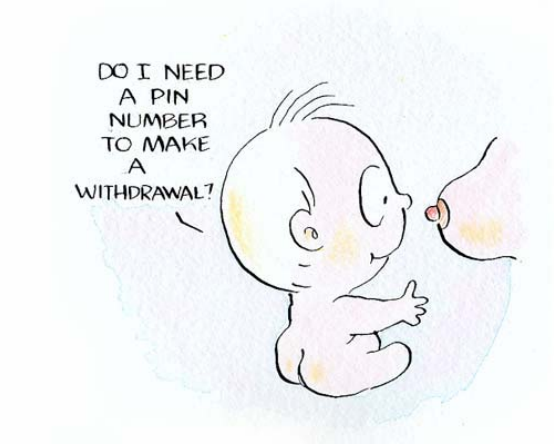
Sorensen HJ, Mortensen EL, Reinisch JM, Mednick SA., *American Journal of Psychiatry.* 2006 Apr: 163(4): 704-9 (Department of Health Psychology, Copenhagen University)

OBJECTIVE: This study attempted to determine whether lack of breast-feeding or a short duration of breast-feeding during infancy is associated with an elevated risk of hospitalization with alcohol-related diagnoses in adult life.

METHOD: The study was a prospective longitudinal birth cohort design conducted in a sample of 6,562 men and women, all of whom were born in Copenhagen, Denmark, between October 1959 and December 1961.
The sample was divided into two categories based on duration of breast-feeding, as assessed by a physician interview with mothers at a 1-year examination. Psychiatric hospitalizations with alcohol-related diagnoses according to ICD-8 or ICD-10 were identified in the Danish Psychiatric Central Register in 1999. Nine potential confounders were included as covariates: gender of the cohort member, maternal age, parental social status, maternal prenatal smoking, unwanted pregnancy, maternal and paternal psychiatric hospitalization with alcohol-related diagnosis, and maternal and paternal psychiatric hospitalization with other diagnosis.

RESULTS: Alcohol-related diagnoses were more frequent in men, but the results were comparable for men and women. The adjusted predictive effect of early weaning was 1.47. Elevated relative risks were also associated with maternal smoking during pregnancy (1.52) and unwanted pregnancy status (1.59). Other independent predictors were male gender, maternal psychiatric hospitalization with alcohol-related diagnosis, and low parental social status.

CONCLUSIONS: Independent of a number of other risk factors for alcoholism, a significant association between early weaning and elevated risk of hospitalization with alcohol-related diagnoses was observed.



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