Breastfeeding is associated with reduced risks of gastrointestinal and intestinal infections, and of mortality due to those infections. The protective effect is stronger against gastrointestinal infection than against respiratory infection, and in developing than in developed countries for both types of infection, and increases with the duration and exclusivity of breastfeeding. The magnitude of the protective effect wanes with age: highest in the first 3–6 months and diminishing thereafter when complementary foods are introduced in addition to breast milk, but continuing into the second year of life. The introduction of complementary foods and complete weaning (the cessation of any breastfeeding) are gradual and complex processes, however, which are affected by many biological, behavioural, and cultural factors. Because of the practical and ethical difficulties inherent in randomizing women and infants to different infant feeding modes, most epidemiological studies have relied on observational designs. Such studies are obliged to consider, and attempt to control for, selection bias, confounding, and reverse causality.

Most perinatal and paediatric epidemiologists recognize the importance of control for confounding by such factors as age (young infants are at higher risk of mortality and morbidity than older children), socio-economic status, and toilet and water facilities, particularly in developing country settings. But confounding by indication is both more insidious and more difficult to control. This source of bias arises when the reason for weaning is correlated with the outcome itself, the bias is often referred to as reverse causality bias. For example, early signs and symptoms of an infectious illness can lead to supplementation or even complete weaning. Several epidemiological studies of breastfeeding and mortality have relied on observational designs. Such studies are obliged to consider, and attempt to control for, selection bias, confounding, and reverse causality.

Commentary: Breastfeeding and child health, growth, and survival

M Kramer


breastfed. Associations between weaning due to pregnancy and gastrointestinal infection,9 growth,10 and mortality11,12 have been reported previously, but the mechanism remains unexplained. In the study by Jakobsen et al.,8 the higher risk of mortality in children weaned due to pregnancy persisted even after controlling for the child’s age, the interpregnancy interval, and other potential confounders. Does the mother become focused on her unborn child to the detriment of the living one? Does the shame at having violated the cultural taboo against having sexual relations while breastfeeding lead to faster weaning (as a way of hiding the violation), less vigilance or even frank rejection of the previously breastfed child, or other unmeasured maternal behaviours that lead to a higher incidence or case-fatality rate of infection? Or does the cultural taboo have an unknown biological rationale? Whatever the explanation, weaning because of pregnancy should be considered a marker of increased risk for the child, suggesting the need for closer surveillance of children weaned for this reason. Unless and until the taboo is shown to have a biological basis, mothers, fathers, and local communities should encourage continued breastfeeding when pregnancy occurs while breastfeeding, even when the breastfed child is older than 12 months of age, as in the study of Jakobsen et al.8

Confounding by indication may well explain the findings of another recent study published in the International Journal of Epidemiology. Padmadas et al.13 reported what is essentially a case-control study of the association between infant feeding history and stunting (height-for-age more than 2 SD below the age- and gender-specific NCHS/CDC/WHO reference mean) in 2–4 year old Indian children. ‘Weaning’ in that study was defined as the introduction of liquid or solid complementary foods, rather than complete cessation of breastfeeding, data about which were obtained retrospectively by interviews of the mothers at the time of their children’s anthropometric measurements. The authors reported that infants in whom complementary foods were introduced at 6 months or later were significantly more likely to be stunted at 2–4 years of age. Besides the possible random or systematic misclassification of the retrospectively obtained feeding histories, the use of prevalent (rather than incident) cases of stunting creates a considerable potential for selection bias, because the most stunted infants may have died before age 2–4 years. Valid assessment of factors associated with infant and child growth requires a prospective cohort design.

Perhaps more importantly, Padmadas et al. provide no information on the reasons for introduction of complementary foods. Studies from Peru14 and Sudan15 have reported that such foods are often introduced when the mother perceives that her child is growing well, not (as in developed countries) when the infant is ‘failing to thrive’. Thus even in the absence of feeding misclassification or selection bias, the higher risk of stunting in later-complemented infants reported by Padmadas et al. may be a consequence of poor growth during the first 6 months and the mother’s decision to continue exclusive breastfeeding. Analogously, a recent study from Senegal found that the mother’s perception of her child as ‘little or weak’ was the most frequently reported reason for continuing breastfeeding beyond 24 months.16 This may help explain Jakobsen et al.’s finding that children in whom breastfeeding was terminated because their mothers considered them ‘healthy’ had a reduced mortality compared with those weaned for other reasons.

These two studies illustrate the challenges inherent in observational studies of child health outcomes related to infant feeding. Whenever possible, researchers should consider an experimental (randomized trial) design. Recent randomized trials of age at introduction of complementary foods17,18 breastfeeding promotion interventions,19,20 and (in the case of HIV-positive women) breastfeeding itself21 have contributed considerably to our knowledge about the child health effects of breastfeeding. When randomized allocation is infeasible or unethical, researchers need to assess not only the type of feeding received, but also the mother’s reasons for feeding decisions and the cultural beliefs and traditions underlying those decisions.

References


13 Padmadas SS, Hutter I, Willekens F. Weaning initiation patterns and gastrointestinal infection, 9 growth,10 and mortality 11,12 in 2–4 year old Indian children. ‘Weaning’ in that study was defined as the introduction of liquid or solid complementary foods, rather than complete cessation of breastfeeding, data about which were obtained retrospectively by interviews of the mothers at the time of their children’s anthropometric measurements. The authors reported that infants in whom complementary foods were introduced at 6 months or later were significantly more likely to be stunted at 2–4 years of age. Besides the possible random or systematic misclassification of the retrospectively obtained feeding histories, the use of prevalent (rather than incident) cases of stunting creates a considerable potential for selection bias, because the most stunted infants may have died before age 2–4 years. Valid assessment of factors associated with infant and child growth requires a prospective cohort design.

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