IBFAN

Breastfeeding Briefs

June 2003
No. 36

Infant formula contaminated by Enterobacteria

Most mothers, and probably most health professionals, if asked, would state that powdered infant formula is a sterile product. Manufacturers and distributors do not spontaneously warn consumers that this is not the case. But when laboratory tested, 52.5% of 141 samples of powdered formula from 35 countries turned out to be contaminated by Enterobacteria.[1] This was in 1988. That report did not raise concern because the level of bacterial contamination was below the standards set by international legislation. Since then, however - and even before - there have been a number of reports of cases and outbreaks of infection and disease (sepsis, meningitis, diarrhoea, necrotising enterocolitis, urinary tract infection) caused by bacterial contamination in powdered formula. This contamination has been shown to be intrinsic, i.e. due to the presence of Enterobacteria before the can was opened, as opposed to the well-known contamination that can occur afterwards (up to 92% of samples).[2]

The cases and outbreaks were caused by Salmonellae and, more often, by Enterobacter sakazakii (previously known as yellow-pigmented Enterobacter cloacae), almost always in neonatal intensive care units (NICU), i.e. among sick and/or preterm infants. That was the case, for instance, for the outbreak reported in Tennessee, USA, where, among 49 infants in the NICU[3], one baby died of meningitis, two babies had infection and illness, and seven more were colonized by E. sakazakii. Other reports have come from Belgium, Spain and Israel. Indeed, more alarm was raised last year (2002) by the occurrence of the same infection and disease in a healthy, full term 5-day old baby that died of meningitis in Belgium.[4] E. sakazakii meningitis in a formula-fed healthy newborn infant had also been reported in Iceland in 1987.[5] We do not know if the event is more common than reported, especially in those countries where infant mortality is high, since the capacity to diagnose E. sakazakii infection is scarce or nil, and the reporting system is poor.

The alarm raised by contamination in powdered formula and by the high case fatality rates (from 33% to 75%), led to the recall of suspected batches of infant formula by Nestlé in Belgium and by Mead Johnson in the USA. In November 2002, Wyeth recalled a complete batch of products (11 different brands), manufactured in one of its factories in the USA and found to be contaminated. The alarm led also the health authorities in Belgium and the USA to issue safety statements to health professionals, mostly on the preparation, handling, storing and administration of powdered formula in NICUs and nurseries. Warnings to health professionals were issued also in other countries, mostly through journals or bulletins of professional societies.

There are several reasons why this may not be enough. First, the proportion of informed health professionals is probably still very low, especially in low-income countries. Second, warnings may lead to better practices in preparing and handling formula feeds, but may not reduce its widespread, and generally unnecessary use. Third, to the benefit of manufacturers, warnings may lead to the replacement of powdered formula by liquid formula, which is sterile. Should that happen, it would imply an increased cost to families and health services, and possibly poorer nutrition in preterm babies (there is some evidence that liquid formula may be less nutritious than powdered formula in this group). It could also lead to health professionals and mothers forgetting about safe practices for the use of powdered formula and subsequent increased risk in case they need to use it.
Most important, warnings have not been addressed to consumers. They need to know that the products they receive in hospitals and health facilities, or buy in pharmacies and shops, are not sterile and carry a small, but significant risk. Such warnings should be well highlighted on labels and on all promotional material developed to market the product. Consumers and associations for the protection of breastfeeding should put pressure on manufacturers and governments so that Codex Alimentarius rules are changed to include such a provision. In addition, Codex rules should lower the acceptable level of bacterial contamination of powdered formula to stimulate stricter and safer manufacturing practices.

---

[1] Muytjens HL, Roelofs-Willemse H, Jaspar GH. Quality of powdered substitutes for breastmilk with regard to members of the family Enterobacteriacae. J Clin Microbiol 1988;26:743-6

[2] Suthienkul O et al. Bacterial contamination of bottle milk in infants under six months in Children's Hospital, Bangkok, Thailand. Southeast Asian J Trop Med Public Health 1999;30:770-5

[3] Centers for Disease Control and Prevention. *Enterobacter sakazakii* infections associated with the use of powdered infant formula – Tennessee, 2001. MMWR 2002;51:298-300

[4] See the IBFAN Press Release of 10 May 2002 at http://www.ibfan.org/english/news/press/press10may02.html

[5] Biering G et al. Three cases of neonatal meningitis caused by Enterobacter sakazakii in powdered milk. J Clin Microbiol 1989;27:2054-6

Finally, as clearly stated by the Belgian authorities,[6] hospitals should not accept free donations of formula and should not give free samples to mothers. Use of formula should be restricted to the very few babies who may need it (very severe maternal disease, use of drugs absolutely contraindicated in breastfeeding mothers, rare congenital metabolic diseases of the newborn, very low birth weight and immaturity). All the other babies can be exclusively breastfed. In fact, such provisions would apply if all hospitals providing maternity services became Baby-Friendly, as assessed by UNICEF/WHO global criteria.

Breastfeeding why…

Breast cancer

Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50,302 women with breast cancer and 96,973 women without the disease. Lancet 2002;360:187-95

This systematic review of 47 studies in 30 countries shows that the longer women breastfeed the more they are protected against breast cancer. Women with breast cancer had, on average, fewer births than did controls (2.2 vs 2.6); 71% had ever breastfed, whereas among mothers without cancer, 79% had ever breastfed. Furthermore, among mothers who had breastfed, the average lifetime duration of breastfeeding was shorter for those who later developed cancer (9.8 vs 15.6 months). The relative risk of breast cancer decreased by 4.3% for every 12 months of breastfeeding. In addition, there was a decrease of 7.0% for each additional birth. The decline in the relative risk of breast cancer associated with breastfeeding was comparable for women in developed and in developing countries and it did not vary significantly by age, menopausal status, ethnic origin, the number of children, the mother's age when her first child was born, or any of nine other personal characteristics examined. It is estimated that in developed countries, the cumulative incidence of breast cancer would be reduced by more than half (from 6.3 to 2.7 per 100 women by the age of 70) if women there had the average number of births and lifetime duration of breastfeeding that has been prevalent until recently in developing countries. Breastfeeding could account for almost two-thirds of this estimated reduction in breast cancer incidence.

Acute respiratory infection and diarrhoea

Arifeen S, Black RE, Antelman G, Baqui A, Caulfield L, Becker S. Exclusive breastfeeding reduces acute respiratory infection and diarrhoea deaths among infants in Dhaka slums. Pediatrics 2001;108:e67

This prospective observational study conducted on a birth cohort of 1,677 infants, was carried out in Bangladesh, with a 12-month follow-up. Because most newborns were given water, sugar water, honey, or other liquids for a few days after birth, exclusive breastfeeding was only 6% at enrolment; it increased to 53% at 1 month, and then it gradually declined to 5% at 6 months. Predominant breastfeeding declined from 66% at enrolment to 4% at 12 months of age. Very few infants were not breastfed, whereas the proportion of partially breastfed infants increased with age. The overall infant mortality rate was 114 per 1,000 live births. Compared with exclusive breastfeeding in the first few months of life, partial or no breastfeeding was associated with a 2.23-fold higher risk of infant deaths from all causes and 2.40- and 3.94-fold higher risk of deaths attributable to ARI and diarrhoea, respectively.

Mother-to-child transmission of HIV

Miller M, Iliff P, Stoltzfus RJ, Humphrey J. Breastmilk erythropoietin and mother-to-child HIV transmission through breastmilk. Lancet 2002;360:1246-8

What protects the 85% of breastfed babies of HIV-infected mothers who do not become infected? This article suggests the hypothesis that erythropoietin (EPO), a hormone in human milk, may have a role in the prevention of HIV transmission during breastfeeding. EPO might maintain mammary epithelium integrity, thereby reducing viral loads in milk, or maintain intestinal epithelial integrity in the breastfed neonate, thus preventing ingested milk-borne virus from being infective. The hypothesis needs to be tested by further well-conducted experimental studies.

Hepatitis C

European Paediatric Hepatitis C Virus Network. Effects of mode of delivery and infant feeding on the risk of mother-to-child transmission of hepatitis C virus. European Paediatric Hepatitis C Virus Network. BJOG 2001;108:371-7

The results of this study suggest that HIV-infected women should undergo caesarean section delivery and avoid breastfeeding if they are also hepatitis C virus infected. On the other hand, if they are infected only by the hepatitis C virus, they should be able to choose the mode of delivery, as well as how they feed their child. Data on 1,474 hepatitis C virus infected women (503, 35%, co-infected with HIV) and their children show that co-infected women are more than twice as likely to transmit hepatitis C virus to their children as women with hepatitis C virus infection alone. Among the women with hepatitis C virus infection alone, multivariate analyses did not show a significant effect of mode of delivery or breastfeeding. However, HIV co-infected women delivered by caesarean section were 60% less likely to have an infected child than those delivered vaginally, and those who breastfed were about four times more likely to infect their children as those who did not. HIV-infected children were three to four times more likely also to be hepatitis C virus infected than children without HIV infection.

Gourmet?

Mennella JA, Jagnow CP, Beauchamp GK. Prenatal and postnatal flavor learning by human infants. Pediatrics 2001;107:e88
Mennella JA, Beauchamp GK. Flavor experiences during formula feeding are related to preferences during childhood. Early Human Development 2002;68:71-82

[6] Inspection Générale des Denrées Alimentaires. Circulaire pour les hôpitaux généraux du 29 août 2002 (DA35157/L31/PVDM). Mesures d'hygiène pour l'alimentation des nourrissons et mise à disposition d'aliments pour nourrissons dans les maternités.

Prenatal and early postnatal exposure to a flavour enhances the infants' enjoyment of that flavour in solid foods during weaning and in childhood. Very early flavour experiences may provide the foundation for cultural and ethnic differences in cuisine. These conclusions derive from two randomized trials. In the first one, pregnant women were assigned to three groups. Mothers in group 1 drank carrot juice during pregnancy and water during lactation; mothers in group 2 drank water during pregnancy and carrot juice during lactation, whereas those in group 3 drank water during both pregnancy and lactation. Approximately 4 weeks after the mothers began complementing their infants' diet with cereal and before the infants had ever been fed foods or juices containing the flavour of carrots, the infants were videotaped as they fed cereal prepared with water during one test session and cereal prepared with carrot juice during another. Immediately after each session, the mothers rated their infants' enjoyment of the food on a 9-point scale. The results demonstrated that the infants who had exposure to the flavour of carrots in either amniotic fluid or breastmilk exhibited fewer negative facial expressions while feeding the carrot-flavoured cereal compared with the plain cereal, whereas control infants whose mothers drank water during pregnancy and lactation exhibited no such difference. In the second study, newborn infants whose mothers had decided to bottle feed were exposed to different types of commercially available infant formulas. Their preference for different flavours was tested at 4-5 years of age. When compared to children who were fed milk-based formulas (n=27), children who had been fed protein hydrolysate formulas (n=50) were more likely to prefer sour-flavoured juices. Those fed soy formulas (n=27) preferred the bitter-flavoured apple juice. That the effects of differential formula feeding also modified children's food preferences is suggested by mothers' reports that children fed hydrolysate or soy formulas were significantly more likely to prefer broccoli than were those fed milk formulas.

Breastfeeding how…

Early skin-to-skin contact

Mikiel-Kostyra K, Mazur J, Boltruszko I. Effect of early skin-to-skin contact after delivery on duration of breastfeeding: a prospective cohort study. Acta Paediatr 2002;91:1301-6

The implementation of early skin-to-skin contact in a group of 1,250 Polish children followed up to 3 years significantly increased mean duration of exclusive breastfeeding The infants kept with the mothers for at least 20 minutes were exclusively breastfed for 1.35 months longer and weaned 2.10 months later than those who had no skin-to-skin contact after delivery.

Pacifiers

Howard CR, Howard FM, Lanphear B, Eberly S, DeBlieck EA, Oakes D, Lawrence RA. Randomized clinical trial of pacifier use and bottle-feeding or cupfeeding and their effect on breastfeeding. Pediatrics 2003;111:511-8

A previous randomised trial on the effect of pacifiers on breastfeeding (see BB33, Kramer et al. JAMA 2001;286:322-6) suggested that pacifier use could be a marker of breastfeeding difficulties or reduced motivation to breastfeed, rather than a true cause of early weaning. The present randomized trial, on the contrary, concludes that pacifier use in the neonatal period is detrimental to exclusive and overall breastfeeding. A total of 700 breastfed newborns (36-42 weeks, birth weight 2200 g or more) were randomly assigned to 1 of 4 intervention groups: bottle/early pacifier (n=169), bottle/late pacifier (n=167), cup/early pacifier (n=185), or cup/late pacifier (n=179). The assignment to cup vs. bottle was applied to infants who received supplemental feedings. In this way, the effects of two types of artificial nipple exposure on breastfeeding duration could be evaluated: 1) cup feeding versus bottle-feeding for the provision of in-hospital supplements, and 2) early (2-5 days) versus late (more than 4 weeks) pacifier introduction. Data were collected at delivery and at 2, 5, 10, 16, 24, 38, and 52 weeks postpartum. Supplemental feedings, regardless of method (cup or bottle), had a detrimental effect on breastfeeding duration. Exclusive breastfeeding at 4 weeks was less likely among infants exposed to pacifiers. Early, as compared with late, pacifier use shortened the overall duration of breastfeeding, but did not affect exclusive or full duration. These findings support recommendations to avoid exposing breastfed infants to artificial nipples in the neonatal period.

Maternal employment

Noble S; The ALSPAC Study Team. Avon Longitudinal Study of Pregnancy and Childhood. Maternal employment and the initiation of breastfeeding. Acta Paediatr 2001;90:423-8

This study examines whether planning to be employed postpartum has an effect on initiation of breastfeeding. Its results highlight the importance that employed mothers be protected by labour benefits and by an adequate length of maternity leave. The mothers of 10,530 full-term singleton infants gave information during pregnancy on their postpartum employment plans and their initial infant feeding methods. Information was also given by 7,642 of these mothers on the timing of their postpartum employment plans. A total of 8,316 (79%) of the women initiated breastfeeding. Older, more highly educated women, women who had or were planning to attend childbirth classes, those who were breastfed as infants, who did not smoke, and who were giving birth to their first child were significantly more likely to initiate breastfeeding. The decision to breastfeed was not associated with "any" plans to work postpartum. However, women who planned to commence work prior to 6 weeks postpartum were significantly less likely to initiate breastfeeding compared with those not intending to work postpartum.

Breaking the rules

Aguayo VM, Ross JS, Kanon S, Ouedraogo AN. Monitoring compliance with the International Code of Marketing of Breastmilk Substitutes in West Africa: multisite cross sectional survey in Togo and Burkina Faso. BMJ 2003;326:113-4

This multisite cross sectional survey in 43 health facilities and 66 sales outlets and distribution points, with interviews with 186 health providers and 105 mothers of infants aged less than 6 months, showed once again that violations of the International Code are systematic. Six (14%) health facilities had received donations of breast-milk substitutes. All donations were being given to mothers free of charge. Health providers in five (12%) health facilities had received free samples of breastmilk substitutes for purposes other than professional research or evaluation. Health professionals in five (12%) health facilities had received promotional gifts

from manufacturers. Promotional materials of commercial breastmilk substitutes were found in seven (16%) health facilities. Special displays to market commercial breastmilk substitutes were found in 29 (44%) sales and distribution points. 40 commercial breastmilk substitutes violated the labelling standards of the code: 21 were manufactured by Danone, 11 by Nestlé, and eight by other national and international manufacturers. Most (90%) health providers had never heard of the Code, and 66 mothers (63%) had never received any counselling on breastfeeding by their health providers. The implementation of the Code continues to be essential for the protection of breastfeeding against unethical marketing practices of breast-milk substitutes.

Teenage mothers

Quinlivan JA, Box H, Evans SF. Postnatal home visits in teenage mothers: a randomised controlled trial. Lancet 2003;361:893-900

In this randomized trial, 139 adolescents attending a teenage pregnancy clinic were assigned either to receive five structured postnatal home visits by nurse-midwives (n=65) or not (n=71). After completing an antenatal questionnaire designed to assess their knowledge of contraception, infant vaccination and breastfeeding, assessment interviews were done 6 months postpartum. Postnatal home visits were associated with a reduction in adverse neonatal outcomes and a significant increase in contraception knowledge. However, there was no significant increase in knowledge with respect to breastfeeding or infant vaccination schedules.

Peer counsellors

Dennis CL, Hodnett E, Gallop R, Chalmers B. The effect of peer support on breastfeeding duration among primiparous women: a randomized controlled trial. CMAJ 2002;166:21-8

This randomized controlled trial evaluated the effect of peer (mother-to-mother) support on breastfeeding duration among first-time breastfeeding mothers. A total of 256 breastfeeding mothers from two semi-urban community hospitals near Toronto, Canada, were randomly assigned to a control group (conventional care) or to a peer support group (conventional care plus telephone-based support, initiated within 48 hours after hospital discharge. The support was provided by a woman experienced with breastfeeding who had attended a 2.5-hour orientation session). Follow-up of breastfeeding duration, maternal satisfaction with infant feeding method and perceptions of peer support was conducted at 4, 8 and 12 weeks post partum. Significantly more mothers in the peer support group than in the control group continued to breastfeed at 3 months post partum (81% vs 67%) and did so exclusively (57% vs 40%). Breastfeeding rates at 4, 8 and 12 weeks post partum were 92%, 85% and 81% respectively among the mothers in the peer support group, as compared with 84%, 75% and 67% among those in the control group. In addition, when asked for an overall rating of their feeding experience, significantly fewer mothers were dissatisfied in the peer support group than in the control group (1.5% vs 10.5%). Of the 130 mothers who evaluated the peer support intervention, 82% were satisfied with their peer volunteer experience and 100% felt that all new breastfeeding mothers should be offered this peer support intervention.

Breastfeeding in Norway

Lande B, Andersen LF, Bærug A, Trygg KU, Lund-Larsen K, Veierød MB, Bjørneboe G-Eaa. Infant feeding practices and associated factors in the first six months of life: The Norwegian Infant Nutrition Survey. Acta Paediatr 2003;92:152-61

The majority of Norwegian women are advised to breastfeed their infants exclusively for six months. However, the duration of exclusive breastfeeding is shorter than recommended. This conclusion was drawn from self-administered food-frequency questionnaires filled by 2,383 mothers when their infants were aged 6 and 36 months. Only 1% of the infants had never been breastfed. The proportion of breastfed infants was 96% at 1 month, 85% at 4, and 80% at 6 months. The proportion of exclusively breastfed infants was 90% at 1 month, 44% at 4, and 7% at 6 months; 21% of the infants were introduced to solid foods before the age of 4 months. For exclusive breastfeeding at 4 months, breastfeeding at 6 months, and timely introduction of solid foods (not before 4 months), significant positive trends were found for maternal age, education and degree of urbanisation. On the other hand negative associations were found for maternal smoking. Finally, both the odds of exclusive breastfeeding at 4 months and of breastfeeding at 6 months increased with higher number of children in a family.

Cochrane reviews

Simmer K. Longchain polyunsaturated fatty acid supplementation in infants born at term. In: The Cochrane Library, 1, 2002. Oxford: Update Software.

Over the last few years some manufacturers have added long-chain fatty acids (LCPUFA) to formulae and marketed them as providing an advantage for the development of term infants. The aim of this review was to assess whether supplementation of formula with LCPUFA is safe and of benefit to term infants. Ten randomised trials of formula supplemented with LCPUFA and with clinical endpoints were identified and reviewed. One of these studies was excluded due to supplementation commencing after 3 weeks of age. Eight of the remaining nine trials were assessed to be of good quality. The conclusion of the reviewer is that at present there is little evidence to support the hypothesis that LCPUFA supplementation confers a benefit for visual, general development, or growth, of term infants.

*Prepared by the **Geneva Infant Feeding Association (GIFA)**, a member of the **International Baby Food Action Network (IBFAN)**.*

Editors: Marina Ferreira Rea, Adriano Cattaneo. Bob Peck and Elaine Petitat-Côté revised and edited the text.

Copies of *Breastfeeding Briefs* are sent upon request to GIFA, Box 157, 1211 Geneva 19, Switzerland, Fax: +41-22-798 44 43, e-mail: info@gifa.org, or to UNICEF country offices. Available also in French, Spanish, Portuguese and Arabic. A contribution of CHF 20.-- for a subscription to organisations in industrialised countries is gratefully accepted and can be sent by international postal order to account no. 12-17653-5