

Breastfeeding: helping to reduce the

Protection, energy and nutrients

Leonardo Mata considers the unique role of breastfeeding in child health and survival, and possible interventions to promote it in areas where bottle-feeding is common.

The exceptional properties of human milk are the:

- numerous powerful substances in human colostrum and milk which protect against infectious diseases; unique biochemical properties which assure the best combination of energy and nutrients for the growing child;
- remarkable behavioural interactions of mother and child which arise from breastfeeding;
- significantly lower cost when compared to any other form of infant substitute feeding.

Anti-infectious role

Many elements able to protect against pathogenic viruses, bacteria and parasites are found only in human colostrum and milk. They are not present in either quality or quantity in other animal milks, nor have they been synthesised or imitated by modern science. Anti-infectious substances can be:

- specific — such as immunoglobulins (antibodies) and lymphocytes (white blood cells) which affect humoral and cellular immune responses; or
- non-specific — like lactoferrin, lysozyme and bifidus factors which either make human milk a poor medium for bacterial survival or make the intestine unsuitable for the growth of pathogenic agents.

Furthermore, the electrolyte composition of human milk makes additional water unnecessary for the child even under dry and hot climatic conditions, reducing the risk of giving contaminated water. The many anti-infectious factors reduce the severity of symptoms of illness particularly diarrhoeal diseases. Epidemiological studies in both developed and developing countries reveal a lower incidence of diarrhoeal diseases, otitis

and acute respiratory infections in breastfed compared with bottle-fed infants.

It has been argued by some that infant mortality declined in the industrialized countries over the years during which bottle-feeding became popular. Any such direct correlation is not valid because other factors which can affect bottle-feeding techniques — education, availability of sanitation and safe water and improved standards of home hygiene — changed also over the same period. When social class and these other variables are taken into account, bottle-fed babies are seen to suffer more malnutrition, more

infections and to die more frequently than their breastfed counterparts in all countries.

Nutritional factors

Human colostrum and milk have unique biochemical properties — for instance a high content of energy from lactose and lipids. The protein composition of human milk is perfectly constituted and so amino acid imbalance is unlikely. Furthermore, human milk contains substances that bind iron, zinc and other elements, allowing them to be easily absorbed, whilst protecting them from use by bacteria. The unique biochemical composition of human milk protects against nutritional deficiency and results in adequate growth, even among rural and slum infants living in poverty. In fact, growth rates are comparable with those of North American and European infants up to four to six months of age and even longer in some infants. When growth slows down in a two to four month old breastfed baby, the most common cause is deficient calorie consumption by the mother; food supplementation of the mother usually leads to a prompt increase in milk output and a subsequent improvement in growth of the baby.

Behavioural factors

Close contact and interaction between mother and infant immediately after birth stimulate successful breastfeeding. Sucking is strongest during the first hour after delivery and there is no difficulty in initiating breastfeeding even in mothers who had not wanted to do so. Early suction of colostrum stimulates the production of prolactin and synthesis of milk. It also indirectly strengthens the maternal self-confidence which is necessary for the release of oxytocin and the flow of milk. Breastfeeding strengthens the bonds of attachment and love between mother and child both during the critical child-rearing period and probably later in life.

Economic factors

Breastfeeding simplifies child-rearing in poor communities as it does not require refrigeration, bottles, fuel and money to purchase breastmilk substitutes. Cost-benefit analysis shows



The marvellous interaction between mother and baby.

severity of diarrhoea

that breastfeeding is less expensive than any other form of nourishment. To this should be added savings in transport, medicines and hospitalisation due to more illness in bottle-fed infants. It is impossible to calculate the value of human lives saved.

Decline in breastfeeding in developing countries

Children have survived through centuries because of breastfeeding. Non-human milk became available for human infants when animals were domesticated about 15,000 years ago. However, techniques to feed substantial amounts of non-human milk to infants and the mass production and preservation of cow's milk formulae only developed in this century. The most rapid changes in life styles have also occurred in the 20th century, contributing to a marked decline in incidence and duration of breastfeeding in most developing countries. At present, only traditional rural societies, for instance in Bangladesh, Peru and Zaire, carry on universal breastfeeding. Populations in transition — in either cities or countryside — are subjected to factors that interfere with breastfeeding. Among them are urban migration, changes from extended to nuclear families, exposure to inadequate medical practices and the promotion of milk formulae.

Promotion of breastfeeding

Studies in the Philippines and Costa Rica showed clearly that much can be done to alter the trend described above. It is relatively easy to increase the incidence and duration of breastfeeding in transitional societies by encouraging early mother-infant interaction through *rooming-in* and by providing maternal support in the post-partum period. More than 95 per cent of infants in a large maternity unit in Costa Rica have successfully started breastfeeding following interventions carried out after 1977, compared to the situation before in which 20 per cent of infants were not breastfed at all. A follow-up showed that more than 80 per cent were still at the breast at age three months, contrasting with 66 per cent of infants artificially fed at age three months before the interventions



Extracting milk with a breast pump

Photo by Leonardo Mata

began. The increased incidence and duration of breastfeeding was attributed to the new hospital interventions, and to contact between health workers and mothers shortly after discharge and at monthly intervals. The swing to breastfeeding was accompanied by a marked reduction in the incidence of diarrhoeal disease. Remaining limitations on lactation result from an excess of caesarean sections and other problems during childbirth. Feeding all pre-term and high-risk neonates from a pool of fresh colostrum in one large maternity unit in Costa Rica resulted in the virtual disappearance of diarrhoeal illness in neonates over the five years of the programme. Sepsis, acute respiratory infection and meningitis have also been significantly reduced.

Early discontinuation of breastfeeding and the introduction of substitutes is increasing in less developed countries. The rapid adoption of modern ways of life and of inappropriate Western medical practices are the most negative factors affecting breastfeeding. The negative role of some medical practices to which communities in less developed countries are increasingly exposed can be counteracted by encouraging mother-infant interaction after delivery through close contact and by promoting breastfeeding in the community. Most mothers know that breastfeeding is best but society often interferes with the process. It is time to reverse this trend.

Leonardo Mata Instituto de Investigaciones en Salud (INISA) Universidad de Costa Rica.

Further reading

- Cunningham A S 1979. Morbidity in breastfed and artificially fed infants. *Journal of Paediatrics* (95) Vol pp 685-689.
- Elliott K and Fitzsimons D W 1976. *Breastfeeding and the mother*. Ciba Foundation Symposium No. 46 (new series), Amsterdam: Elsevier/Excerpta.
- Jelliffe D B and Jelliffe E F P 1978. *Human milk in the modern world: psychosocial, nutritional and economic significance*. New York. Oxford University Press.
- Klaus M H and Kennell J H 1976. *Maternal-infant bonding*. St. Louis: C V Mosby.
- Mata L et al 1984. *Promotion of breastfeeding, health, and survival of infants through hospital and field interventions*. *Malnutrition: determinants and consequences*. Alan R Liss, Inc., N.Y.
- Relucio-Clavano 1981. *The results of a change in hospital practice. A paediatrician's campaign for breastfeeding in the Philippines*. *Assignment Children* 55/56 pp, 139-165.
- Winikoff B and Baer E C 1980. *The obstetrician's opportunity: translating "breast is best" from theory to practice*. *American Journal of Obstetric Gynaecology* 138 pp 405-412.

Collecting, processing and storing breastmilk

Perspectives on human milk banking

David Baum and Peter Rolfe discuss how breastmilk banking is carried out in the U.K.

All healthy, mature newborn infants are best fed with their own mother's milk. There is, however, considerable uncertainty about the ideal way to feed low birthweight, preterm (premature) and sick newborn infants. Recent studies suggest that human milk, and particularly the infant's own mother's milk, may be the best food for all babies.

Low birthweight and preterm infants spend many weeks in special care baby nurseries and many mothers, even those most motivated to breastfeed, find it difficult to keep up their milk supply. This is partly because of anxiety about their child; partly due to the inability of the immature and sick baby to suck; and partly due to practical problems of being able to stay near the baby. It follows that to feed most preterm, sick or low birthweight infants with human milk, some system of human milk banking needs to be set up. In developed countries this can be achieved by systematically collecting, processing and storing donated breastmilk. Is the same possible in developing countries?

Collecting donated breastmilk

There are many different ways to collect breastmilk from donors. The system used in Oxford depends on the collection of drip breastmilk — milk which drips spontaneously from the non-feeding breast in about twenty per cent of lactating mothers.⁽¹⁾ Drip milk donors contribute between 50-100 ml of milk per 24 hours and individual mothers may contribute overall anything from 100 ml to 40 litres of drip breastmilk. Collecting milk in this way avoids 'pumping' the breast which many mothers find unattractive and which requires buying and sterilizing breast pumps. It also avoids asking mothers to produce milk over and above the needs of their own babies — particularly inappropriate in countries where the nutritional state of the population may be marginal.

Practical constraints

However, the collection of donor milk, whether drip milk or expressed milk, in the community depends on the availability of clean water for washing hands, breasts and utensils, access to deep freeze storage facilities and some system for collecting and transporting the donated frozen milk to the hospital special care baby nursery. For these reasons, the development of a community-based donor breastmilk system might not be considered universally appropriate. The alternative is the collection of donor breastmilk within the maternity hospital. Under these circumstances it is easier to maintain standards of hygiene and sterility of equipment. The limiting factor is the relatively small proportion of mothers who stay in the maternity hospital after delivery long enough to establish lactation to feed their own babies and donate milk, drip or expressed, to the milk bank. Nevertheless, such a system exists and appears to work satisfactorily in at least one maternity unit in India.

Processing and storing donated breastmilk

In developed countries there is debate as to whether donated human milk needs to be routinely pasteurized or used in its untreated state, provided the system of collection, transport and storage can be adequately controlled. We have argued in favour of routine precision pasteurization. In this process the amount of bacteria is minimised without damaging the majority of the heat sensitive proteins, and particularly the non-nutritional proteins, present in human milk. It seems likely that the argument for precision pasteurization would be greater in a developing country, although this poses the problem of purchasing and maintaining the equipment together with the appropriate deep-freeze storage facilities.

Is the effort worthwhile?

While appreciating the difficulties which need to be overcome in establishing a human milk bank in a developing country district hospital, there are considerations which indicate that such a scheme should be piloted to assess all aspects of the issue. For example:

- In the future larger numbers of smaller and less mature babies will be looked after and survive in some developing countries.
- The use of artificial formula preparations for such infants would have undesirable effects on the maternity hospital and the local community both in terms of the expense and the negative influence on breastfeeding practice.
- There is an educational role in collecting donated breastmilk for high risk infants, affecting attitudes of parents and health workers both in the hospital and in the community at large about the importance of human milk and breastfeeding.
- Infection is significantly more common among low birthweight infants in developing countries and the studies of Narayanan et al suggest that the use of donated human milk may reduce the incidence and severity of infection among such high risk infants.

Meeting nutritional needs

Mothers should be enabled and encouraged to donate their own fresh milk to their own babies whether they live in a developed or developing country. However, there will always be large numbers of low birthweight, preterm and sick newborn infants whose mothers cannot meet all their nutritional needs and for whom alternative milk is necessary. Formula milk represents one solution to the problem but frequently has serious and undesirable economic and social side-effects. The setting up of appropriate systems for banking human milk may appear difficult but requires closer study particularly in view of the therapeutic and communal advantages associated with it.

David Baum and Peter Rolfe, Department of Paediatrics, University of Oxford, John Radcliffe Hospital, Oxford OX3 9DU.

⁽¹⁾Baum J D 1980 *Preterm milk. Early human development* Vol. 4 (1).

Journal of Diarrhoeal Diseases Research

International Centre for Diarrhoeal Disease Research, GPD Box 128, Dhaka 2, Bangladesh

In 1978 the World Health Organization set up a control programme for diarrhoeal diseases, and the International Centre for Diarrhoeal Disease Research was established in Bangladesh (ICDDR,B). The Centre is the home of this new journal, and it naturally lays special emphasis on work in Asia. However, anyone in the world interested in advances in the field would be well advised to examine this periodical since so much research in recent years has come from this part of the world.

There are to be four issues each year. The first half of each is devoted to original articles and short communications. In the first two issues these have come from countries as far apart as China and the USA, and have covered a range of subjects from developments in oral rehydration and drug therapy to the mechanisms of a variety of diarrhoeal agents, but especially cholera. The second half is devoted to an annotated bibliography.

About one third of the articles are merely mentioned by title and summarized in one or two paragraphs. These reviews might be more valuable if they concluded with a few sentences of critical comment, preferably signed by an authority on the subject. This would indicate the novelty and strength of the papers presented. However, the journal is off to an excellent start, has set itself a high standard to maintain, and is a valuable source for all those interested in research and for the many concerned with the management of diarrhoeal diseases.

Readers in the Asian region may like to know that the Centre also publishes a newsletter, *Glimpse*, which covers items of local popular interest relating to diarrhoeal disease prevention and control.

WHO study

WHO has carried out a collaborative study on prevalence and duration of breastfeeding in nine countries. Findings indicate that while there are

signs of a decline in breastfeeding among certain groups in developing countries, there is also a marked increase in the prevalence and duration of breastfeeding elsewhere. In Sweden and Hungary, the two most industrialized of the nine countries, only 7 per cent and 3 per cent respectively of the mothers studied had never breastfed their youngest child, a marked improvement from 25 years ago. In the Philippines and Guatemala the situation among middle-income mothers was significantly different: 32 per cent and 23 per cent respectively had never attempted to breastfeed their last child.

A more recent review of 200 studies suggests that a process is emerging in which higher income groups and industrialized countries set the trend, and are then followed gradually by the urban lower income, rural groups and less industrialized countries. Later, there is a resurgence of interest in breastfeeding among middle-income families and this, in turn, is gradually followed by other urban and rural groups.

Clear lessons

The information offers clear lessons for health planners and educators. A crucial fact is that breastfeeding is declining in urban areas of developing countries. At the same time, the data show that breastfeeding is quite compatible with an urban industrial environment and that appropriate breastfeeding promotion can succeed anywhere. It would therefore be ironic if, while breastfeeding rates were to increase in countries with low infant mortality and morbidity, they were allowed to diminish in countries where breastfeeding is still critical to sound infant and young child health.

Good infant health also depends on the capacity of mothers to care for their children. The mother of a large family of small children has little time or energy to attend to the needs of any one child. Child spacing is therefore an important aspect of the infant and young child morbidity and mortality equation. The WHO study showed that where the use of contraception was low, patterns of child spacing were closely related to the length and frequency of breastfeeding.

Promotion and support

If breastfeeding is to be effectively promoted, comprehensive programmes will need to be developed. These must involve measures to improve the social conditions in which women live and work and strengthen informal social support systems to help at-risk mother-child groups. The health care system in general needs to make a more concerted effort to promote appropriate infant and young child feeding and provide adequate educational support for mothers. In many situations this will require the revision of health care practices and attitudes.

The development of appropriate interventions also calls for the regular monitoring of trends in feeding practices. A simplified methodology has been developed by WHO for use in preparing national surveys of infant and young child feeding. This is available from the Maternal and Child Health Unit at WHO.

Manuel Carballo, Scientist, Maternal and Child Health, WHO, 1211 Geneva, Switzerland.

The Code: country evaluation

WHO has recently published a report⁽¹⁾ evaluating progress round the world in the implementation of the International Code of Marketing of Breastmilk Substitutes. Judging by the amount of information sent to WHO by Ministries of Health, it appears that many governments are taking the code seriously and ensuring that health staff are aware of its contents. Legislation has been altered in some countries to accommodate the provisions of the code.

James Akre, Technical Officer, Division of Family Health, WHO, 1211 Geneva, Switzerland 27.

In the next issue . . .

Recent studies have underlined the key role of personal hygiene — especially handwashing — in preventing diarrhoea. *DD18* will look at these issues and includes a practical advice page on making soap.