

Culled by **Ade Oluwasanmi**

Mammalian species produce breast milk which is suited to the specific nutritional needs of their youngsters. The chemical nature of various milks has been well studied in the last two hundred years. Many studies on the immune system have revealed some fascinating information which shows that breast milk boosts the host defences of the neonate.

Up to the turn of this century, infants were exclusively breast fed, since it was considered not only the best but the safest food for them. Despite the universal practice of breastfeeding, very little information is available about the advantages of breastfeeding in the medical writings of the eighteenth and nineteenth centuries, except the mention of high mortality associated with "dry nursing" of infants. Dry nursing, or comfort nursing, is a process in which an infant or toddler engages in the act of sucking without consuming any breast milk or formula. This practice has been observed in many cultures for centuries and is often used to provide comfort, security, and bonding between a mum and the baby.

Artificial feeding of infants was looked upon with horror because of the attendant mortality, as high as 85-99% associated with the action in foundling homes of Paris and Dublin in the late eighteenth century. Similar trends in mortality in artificially-fed infants persisted throughout the nineteenth century in the overcrowded cities of the U.S. and Europe, leading Holt (c. 1855-1924) to remark. "In my practice, it is exceedingly rare to find a healthy child who has been reared in a tenement house and who has been artificially fed from birth."

Much of this mortality, associated with cow's milk, of course, resulted from bacterial contamination, a problem which was resolved only after pasteurisation was instituted – and Chicago was the first city in the world to require it, in 1908. However, not all the reduction in morbidity and mortality in babies can be attributed to improved sanitation, health care, and affluence. Careful analysis of several old studies from Europe and U.S., and some recent ones from developing countries, comparing mortality and morbidity of bottle-fed and breast-fed infants, showed significant protection from respiratory and intestinal infections in breast-fed infants. Indeed, this information has considerable significance for the developing world.

Works by Paul Ehrlich and Kazuyo Moro provided some information about the contribution of breast milk to the neonatal immune response. Recent improvements in immunology coupled with advances in technology, have seen a remarkable understanding of the functional qualities of breast milk.

The infant at birth has only one type of immunoglobulin, IgG, acquired transplacentally. Analysis of breast milk proteins shows that they contain a high level of IgA and some IgM and IgG-immunoglobulins which do not cross the placenta. There is little correlation between serum and milk antibodies in several other areas. Different classes of antibodies appear in the breast milk and serum following challenges with the same pathogen. For example, antibodies to poliovirus in the serum reside in the IgG class primarily, whereas in the colostrum it is in the IgA class. The third difference is within the IgA class itself. In breast milk 80% IgA is of the secretory type and only 20% resembles the serum IgA.

The immunoglobulin characteristics of breast milk, therefore, resemble those of the mucosal sites in the intestinal and respiratory tract. High titres of antibody are present in the colostrum which drops sharply over the next few days. There is no information to suggest that milk immunoglobulins are absorbed in sufficient quantities to contribute to the serum immunoglobulins of the newborn.

However, secretory IgA can bind microorganisms and prevent their penetration of the intestinal mucosa. IgA can also lyse certain enteric bacteria in the presence of complement and lysozyme. In addition to the specific antibodies, breast milk also contains nonspecific humoral factors such as lysozyme, lactoferrin and lactoperoxidase.

Colostrum and breast milk contain a lot of white blood cells (leukocytes) per millilitre. Macrophages make up 90% of these white cells, forming the primary line of defence against many pathogens. The other 10% of colostral cells are small lymphocytes with about equal proportions of B and T cells. The function of these lymphocytes is not precisely known, though an interesting relationship has been observed between the colostral B cells and antibodies, and the mucosal immune system. Most of the antibodies secreted by breast milk

are directed against enteric and respiratory pathogens.

According to Mabel Charles-Davies, a professor of Neonate Immunology at the University of Ibadan, breast milk also contains, in addition to the antibodies mentioned above, essential nutrients which are needed for the growth of the baby, and the development of its immune system. This statement was corroborated by John Anetor, a professor of Chemical Pathology and an expert in the field of nutrient-based immunity at the same University. According to Anetor, since the baby is usually being exclusively breast-fed for the first few months of delivery, the development of its immune system is fully dependent on the availability of nutrients from its mother's breast milk.

It is evident then, that in the course of evolution each mammal has developed special characteristics in the milk which fulfil not only the nutritional needs but also provide other biologic advantages for its nursing newborn.

*Additional information by Tayo Fasuan*

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