Feeding Mode, Infections, and Anthropometric Status in Early Childhood

The WHO recommendation to exclusively breastfeed for 4 to 6 months assumed that breast milk quantity and quality become insufficient to meet the nutritional requirements of infants around these ages. Prolongation of exclusive breastfeeding up to 6 months is of particular relevance for developing countries because of lower risks for morbidity and mortality; and because, in those underprivileged groups, complementary foods frequently have very low-energy density, displacing energy and micronutrients from breast milk. They may also be a significant source of microbiologic microbial contamination. Recent studies with observational and experimental designs,\textsuperscript{1,2} demonstrated that exclusive breastfeeding is able to maintain a growth pattern similar to that of infants fed with a combination of breast milk and bacteriologically safe complementary foods from 4 to 6 months of age, because infants self-regulated their energy intake. This was true even for premature and other low birth infants but, because of the small sample size, the statistical power was not strong enough to make conclusions indisputable.

Another issue of some concern is that women with low adiposity produce milk with lower concentrations of fat, particularly from 4 months postpartum.\textsuperscript{3} Although higher milk volumes compensate for low fat concentration, it is not clear to what extent
women with the lowest adiposity are able to fully compensate for total fat intake. Nor is it known whether key fat-soluble vitamins are similarly affected.

Research Questions

1. Although there is convincing evidence that exclusive breastfeeding until 6 months of age maintains adequate growth, replication of similar experiments are needed, including where possible, random allocation of feeding mode, particularly in vulnerable groups such as premature and other low birth weight infants.

2. It is also necessary to assess whether undernourished women (BMI <18), who produce milk with low fat concentration, are able to compensate for total fat and energy intake by increasing milk output.

3. Are key fat-soluble vitamins negatively affected by low maternal adiposity?

Milk Volume in Late Infancy and Total Duration of Breastfeeding in Developing Countries

In many traditional societies prolonged breastfeeding frequently goes beyond 1 year of age. In such societies high rates of infant mortality and malnutrition are also the norm, and food availability and certain cultural beliefs frequently interfere with the introduction of appropriate complementary foods. Prolonged breastfeeding might be advantageous for them, because in late lactation breast milk provides significant amounts of energy and micronutrients (two-thirds of energy intake, 70% of vitamin A, 40% of calcium, 37% of riboflavin at 15 to 18 months of age). In addition, it is source of indispensable polyunsaturated fatty acids and plays a key role in preventing vitamin A deficiency.

Studies in Guinea-Bissau and Bangladesh have reported breastfeeding beyond 1 year to be associated with lower rates of acute infection, less severe diarrheal attacks by shigellosis, better survival rates, and better attained anthropometric status. However, other studies conducted in Bangladesh, India, and Brazil have reported higher mortality rates, higher prevalence of acute infections, and poorer anthropometric status among children breastfed for 2 to 3 years compared with their weaned counterparts.

Such controversy is still unresolved because available studies are difficult to compare, because of methodologic differences, and because many of them are affected by reverse causality or failed to control for some relevant confounders. Some typical examples for reverse causality are that better growing infants or those achieving earlier development are weaned earlier; or, on the contrary, weaning is prompted by the maternal perception of poor growth or apparent hunger of her child. It is also possible that prolonged breastfeeding might be caused by a lower acceptance of nonbreast milk foods resulting in lower energy intakes and suboptimal growth. Dewey in 1993, in a cross-sectional analysis of a combined sample of American and European infants, found that children weaned after 18 months preferred milk to solids. Such a preference was already identifiable in the first year of age.

These, apparently contradictory, results might be explained by the theoretical model depicted in Fig. 1. In such a model, the anthropometric status of children breastfed for more than 12 months in developing societies is the result of a balance among several interacting forces. These are as follows: 1) the positive effects of breast milk by furnishing significant amounts of key nutrients to foster growth and of non-nutritional substances that protect children against infection; 2) the negative effects of infections on growth and mortality, potentiated by poverty trough several intermediate variables, among them the level of microbial contamination of the environment, poor caregiving, low accessibility to health services; and 3) the potential negative effects of introducing contaminated complementary foods that concomitantly displace good quality nutrients from breast milk resulting from their low-energy density.

Under this model, it might be possible to observe a positive association between prolonged breastfeeding, morbidity, and anthropometric status, if the level of poverty and thus, the negative effect of its intermediate variables are weak. In this case, the positive effects of breastfeeding will predominate. On the contrary, the association between prolonged breastfeeding, morbidity, and anthropometric status might turn to be negative if the levels of poverty is more extreme, offsetting the positive effects of breast milk.

Fig. 1. Interactions between feeding mode, infections, and anthropometric status in early childhood.

Whether prolonged breastfeeding is or is not advantageous for underprivileged groups will be answered only by cohort studies in which temporal relations among introduction of complementary food and anthropometric status can be assessed. Those studies must furnish quantitative and qualitative information on complementary food and breast milk intake, morbidity and mortality, maternal characteristics, such as general health, education and skills as caregiver, and other variables such as accessibility to health services and socioeconomic status.

Research Questions

In any attempt to promote breastfeeding beyond 1 year of age the most relevant questions are:

1. What are the ideal proportions of energy and other nutrients derived from breast milk and from complementary foods?

Brown published an exercise attempting to assess the desirable proportions of breast milk and complementary food at different ages, based on the calculated differences between the energy requirements and observed breast milk intake in well-nourished children. This calculation based on observed practices might be a good start for further discussions of concrete schemes to be tested in the field.

2. How do complementary feeding practices in different cultures affect breast milk intake and total duration of breastfeeding, considering energy density of complementary foods, number of feeds per day, order of breastfeeding, and attitude of the caregiver?

3. In addition to the effects of prolonged breastfeeding on physical growth, it is important to evaluate its effects on functional outcomes, comparing children breastfed for more than 12 months with their early-weaned peers in terms of behavioral development, motor and social skills, and physical activity patterns. Efforts to establish the directionality of such relationship must be encouraged.

REFERENCES


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