

The Myths of Milk

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Introduction

It would seem that there ought not to be any mystery about mom's milk. From the moment of conception on, the system is so beautifully organized to guarantee the optimal growth and maturation of the infant.

It has been known for a long time the virtues and limitations of different types of infant feeding. In a study covering 20,061 babies

from birth to nine months during the years 1924-1929 inclusive, 48.5% were totally naturally nourished, 43.0% were partially breastfed and 8.5% received an artificial diet.¹ From Table 1, it is clear that the mortality and morbidity figures are strikingly different among the babies fed by natural versus artificial means.

Table 1. Percentage summaries of mortality/morbidity in 0-9 month old infants totally and partially breastfed versus artificially nourished

| Groups | a | b | c |
|------------------------------|--------------------|---------------------|------------------|
| | Entirely Breastfed | Partially Breastfed | Artificially Fed |
| Entire sample | 48.5 | 43.0 | 8.5 |
| Morbidity | | | |
| Total infections | 37.1 | 53.8 | 63.6 |
| Respiratory infections | 28.0 | 34.0 | 39.0 |
| Gastro-intestinal infections | 5.2 | 12.8 | 16.0 |
| Unclassified infections | 3.3 | 6.0 | 8.2 |
| Mortality | | | |
| Total deaths | 6.7 | 27.2 | 66.1 |
| Respiratory infections | 3.3 | 34.8 | 62.1 |
| Gastro-intestinal infections | 9.0 | 27.3 | 63.7 |
| Unclassified infections | 12.0 | 36.8 | 51.2 |

By act if not by word, the story of breast-feeding is shrouded in much mystery. Unhappily, a large section of the population does not begin life with mother's milk. One marketing study made in the United States in 1989 showed that only 52% of hospital-born infants received any breast milk during their initial institutional stay; only 18 of the 100 were still receiving natural nourishment by six months of age.² Happily, according to the World Health Organization (WHO), breastfeeding initiation rates are increasing in Europe and are as high as 90% or more in Scandinavia, Austria, Switzerland, Bulgaria, Germany and Hungary.

What is unequivocally clear is the consensus that babies milk is good for babies. How long after infancy can one expect benefits from

natural milk? How far reaching are its virtues? Is it more or less expensive than manufactured milk?

The Pluses and Minuses of Human Versus Nonhuman Milk

Three points are clearly evident. First, there is no question but that human milk is unique. It is distinctly different from the milk of other animal species and the composition of artificial feedings. Secondly, its specialness can be clearly demonstrated in three areas: vitamins, minerals, and immune characteristics. Finally, if one assumes the wisdom of the body, then the prevailing composition of human milk probably best satisfies the needs of the newborn.

All of the mysteries of milk have not yet been sorted out. However, there is reasonable evidence to suggest that human milk is une-

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quailed because of its immunologic potential.³ The protective properties of mother's milk can be divided into cellular and humoral factors. A wide variety of soluble and cellular components and microbial agents have been identified. Tables 2 and 3 underline the nutrient contents of human versus nonhuman milk. The ratio of vitamins and minerals in human versus cow's milk differs greatly. The first line (Table 2) underscores that the vitamin C content in mother's milk is approximately

fivefold greater than in bovine milk. In contrast in the last line, B₁₂ is almost one fifth as much. In general, in Table 3, the mineral content is higher in bovine milk. Undoubtedly, some of the infant problems to be discussed are related directly or indirectly to the just-cited vitamin-mineral-immunologic variations.

It will be the purpose of this report to analyze the pluses and the minuses of human versus nonhuman milk.

Table 2. Vitamins in human and cow's milk (per 100 mL)

| Vitamins | Human | | |
|------------------------|------------|------------|-----------------|
| | Human Milk | Cow's Milk | Human Cow Ratio |
| C(mg) | 5.0 | 1.1 | 4.55 |
| E(mg) | 0.25 | 0.07 | 3.57 |
| D (mcg) | 0.04 | 0.02 | 2.00 |
| Nicotinic Acid (mcg) | 160.0 | 82.0 | 1.95 |
| A (meg) | 75.0 | 41.0 | 1.83 |
| Folic Acid (mcg) | 0.14 | 0.13 | 1.08 |
| Pantothenic Acid (mcg) | 246.0 | 340.0 | .72 |
| B, (mcg) | 14.0 | 43.0 | .33 |
| B2 (mcg) | 40.0 | 145.0 | .28 |
| K (mcg) | 1.5 | 6.0 | .25 |
| B6 (mcg) | 12.0-15.0 | 64.0 | .21 |
| Biotin (mcg) | 0.6 | 2.8 | .21 |
| B12 (mcg) | 0.1 | 0.6 | .17 |

Table 3. Minerals in human and cow's milk (per 100 mL)

| Vitamins | Human | | |
|-----------------|------------|------------|-----------------|
| | Human Milk | Cow's Milk | Human Cow Ratio |
| Copper (mcg) | 40.0 | 14.0 | 2.86 |
| Iron (mcg) | 100.0 | 70.0 | 1.43 |
| Sulfur (mg) | 14.0 | 30.0 | .47 |
| Potassium (mg) | 57.0 | 145.0 | .39 |
| Chlorine (mg) | 40.0 | 108.0 | .37 |
| Magnesium (mg) | 4.0 | 12.0 | .33 |
| Calcium (mgt) | 35.0 | 130.0 | .27 |
| Sodium (mg) | 15.0 | 58.0 | .26 |
| Phosphorus (mg) | 15.0 | 120.0 | .13 |

Bugs and Babies?

Morbidity is lower among breastfed infants than among the formula-fed. The prevalence of exclusive natural-feeding among babies 0 to 3 months of age in a community was contrasted with that of infants hospitalized for the presence of presumed or established infections.⁴ During a one year period, 136 infants were admitted to the hospital. Only one out of ten was being exclusively fed mom's milk as contrasted with an expected frequency of one out of four based on community feeding patterns. The conclusion was that with breastfeeding there is less infections that ultimately require hospitalization.

It is generally recognized that artificially-fed infants have higher mortality and morbidity from respiratory illness, gastroenteritis and otitis. In this regard, the association be-

tween type of feeding and hospitalization during the first 18 months of life was examined among 1058 infants from Jing-An district, Shanghai, People's Republic of China.⁵ The rate of institutionalization for the artificially-fed babies was 18% versus 11 % for the breastfed kids. Multiple logistic regression analyses demonstrated that the adverse effect of artificial feeding on hospitalization rates for respiratory infections was independent of birth weight, father's education, passive smoking, and any case(s) of chronic respiratory disease in the family. The adjusted odds ratio for the artificially-fed infants compared with the breastfed babies was 2.11.

On a more specific note, recurrent otitis is a painful, harmful and common disease in infancy and early childhood. It may leave devastating sequelae (i.e. permanent deafness).

The incidence of middle ear infection was studied in 237 presumably healthy children in reference to the duration of breastfeeding, with a follow-up from birth to three years of age.⁶ Recurrent infections were strongly associated with early bottle-feeding. In contrast, prolonged breastfeeding had a sustained three year protective effect. As an aside, it is uncertain whether the results represent the pluses of human milk or the minuses of cow's milk. (This subject of other species will be detailed later in this report.)

A regional birth cohort of 5356 infants was investigated.⁷ The babies were examined at three, six and twelve months of age. At these occasions, the number of episodes of acute otitis media, the duration of breastfeeding, the number of siblings, the type of day care, parental smoking, the presence of animal pets at home and the number and type of other illnesses was registered. About 10% of the babies had experienced recurrent otitis media (three episodes or more) during their first year of life. Significant associations were found between the occurrence of acute ear infections and the number of siblings, the type of day care, the sex of the infant, maternal socioeconomic status, prematurity and, most importantly, the duration of breastfeeding.

Another one of the big problems in babies is diarrhea. To examine the role of breastfeeding and loose stools, Ruiz-Palacios, et al, followed 98 Mexican children prospectively for two years beginning at birth.⁸ Attack rates of diarrhea in children less than six months of age who were not fed human milk were 2.3 times greater than those in the same age breastfed kids.

Allergies ...?

There is no question that, of all of the problems in infancy and childhood, allergic states (however defined) rank highly.

- one third of all visits to the pediatrician are due to hypersensitivity states
- 33% of days lost from school stem from asthma
- one out of three of all chronic conditions under age 17 are the result of allergy
- 20% of all children are allergic by 20 years of age

Chandra and his group attempted to answer two questions.⁹ First, is there a shielding effect of breast milk on allergies? Secondly, can this protection be altered by modifying the quality

of maternal milk? Mothers who planned to breastfeed exclusively were randomly allocated to either a restricted diet (avoiding milk and other dairy products) or a menu without restrictions. Infants were followed up over 18 months and examined for eczema. Interestingly, this skin condition was less common and milder in babies who were breastfed and whose mothers were on a restricted diet (22% versus 48%). So, breastfeeding is desirable and grade A mom's milk makes a bigger and better difference!

Insights Into Infant Vision

It is generally recognized that photoreceptors in the visual cortex undergo rapid maturation during the last trimester of gestation and the first four to six months postterm. Researchers at the Retina Foundation of the Southwest, in Dallas, have tested the visual acuity of babies (both premature and full term) fed breast milk and/or formulas containing fats from various sources.¹⁰ They found that only the youngsters fed a mix of vegetable and fish-oil fats had the same acute eyesight as infants who were naturally nourished. Two points. First, breastfed babies are more likely to have better vision. Secondly, this may be so because of the more abundant supply of the essential fatty acids.

Breast Milk Makes Smart Babies

There has been considerable controversy over whether diet/nutrition in early life has a long-term influence on neurodevelopment. Premature babies are a case in point. They arrive in the world at a stage of rapid brain growth. Such infants are frequently fed milk by tube. This permits the sorting out of the relative benefits of the natural milk per se versus the suckling phenomenon. In a study done on preterm infants, mother's choice to provide breast milk was associated with higher developmental scores."

There is evidence to suggest that early diet also influences later performance on developmental tests. In these children (n = 300), IQ was assessed with an abbreviated version of the Weschler Intelligence Scale." Kids who had consumed mother's milk in the early weeks of life continued to have a significantly higher IQ even at 7 -8 years than did those who received no maternal milk. In fact, an 8-point

advantage in IQ remained even after adjustment for differences between groups in mother's education and social class. Also, this was heightened by the observation that the longer the child was breastfed, the higher the IQ.

Diabetes Mellitus ... Nature or Nurture?

There is no question but that diabetes mellitus, in its own right, produces metabolic havoc. Additionally, it plays an important role as a precursor to a number of killing and crippling syndromes (e.g. cancer, heart disease). Also, the evidence is clear that diabetes in general has been rising. Finally, there is today great concern with the relative contributions of nature/nurture in the diabetic process.

There is an hypothesis that breastfeeding can provide protection against the development of insulin-dependent diabetes mellitus (IDDM).¹² Two hundred and sixty cases were selected from the Colorado IDDM Registry and the Barbara Davis Center for Childhood Diabetes. Two control groups were recruited, one from physicians' practices throughout Colorado which included 291 nondiabetic subjects and the second (n = 188) through random-digit dialing from the Denver area. The clearly diabetic cases were less likely to have been breastfed than controls after adjustment for birth year, maternal age and education, family income, race and sex. Even more important, a greater decrease in risk of IDDM was seen among the kids who had been breastfed to an older age (12 months or longer).

Is cow's milk as protective? The answer is various bovine milk preparations have been reported to be diabetogenic in animal studies.¹³ There is a significant positive correlation between consumption of unfermented milk protein and incidence of IDDM in data from various countries.

After Infancy ... And Beyond

The general public notion is that cancer is a disease of the elderly. One of the most disturbing oncologic statistics is the increasing incidence and prevalence of malignant tumors during childhood. Why?

A case control study was used to assess whether inadequate exposure to the immunologic benefits of human milk may affect infant's response to childhood malignancies.¹⁴

Two hundred and one Denver children with cancer diagnosed at 1.5 to 15 years of age were compared with 1818 controls, who were selected to be similar to cases for age, sex and area of residence. Nourishment categories were: breastfeeding more than six months, breastfeeding less than six months, and artificial nourishment. The incidence and prevalence of cancer was significantly higher in the youngsters artificially fed and those provided mother's milk under six months.

What we want to know now is, are there effects lingering beyond childhood?

Here is a case-control study comparing the length of the breastfeeding period of patients who later in life develop Crohn's disease with matched control individuals.¹⁵ In 308 pairs both patient and control were able to produce information concerning the length of their period of natural feeding. The average duration of the breastfeeding period was 4.59 months among patients with Crohn's disease and significantly longer (5.76) among controls. In other words, subjects with Crohn's disease were particularly overrepresented among those with no or very short periods of breastfeeding.

Benefits Even for Mom

Two points have already been emphasized. There are clearly advantages for the infant during infancy. Secondly, the benefits seem to extend even into the later years of life.

What about the breastfeeder? Is there something about this natural phenomenon that makes for a more wholesome existence for the provider?

Principal attention thus far seems to have been directed to breast and ovarian tumors. A recent report from the Cancer and Steroid Hormone Study suggests a reduced risk of ovarian cancer among women who had years before breastfed.¹⁶ Specifically, the incidence and prevalence of tumors of the ovary are approximately halved in those women who had earlier nourished their children.

A multicenter, population-based, case-control study with a large sample of premenopausal women who had ever breastfed for long periods was conducted.¹⁷ Patients less than 74 years old (n = 5878) who had breast cancer were identified from statewide tumor registries in Wisconsin, Massachusetts, Maine and New Hampshire. Controls were randomly

selected from lists of licensed drivers and Medicare beneficiaries. Interestingly, there was a reduction in the risk of breast cancer among premenopausal women who had in their younger years lactated.

The Battle of the Bottle

Today good scientific design in many instances means the double-blind approach. In simple language, this methodology allows a study of an active principal (in this case human milk) versus an inert substance (generally referred to as a placebo). However, double-blind studies with human milk usually consider for the baseline placebo product cow's milk or manufactured formulas. Hence, the question that must now be resolved is how important are these nonmom's milks?

The general consensus (and earlier referred to) is that the quality and quantity, as well as the antigenic potential of artificial milk, leaves much to be desired.

One study is reported here to underscore the minuses of artificial feeding.¹⁸ The diagnosis of cow's milk protein allergy (CMPA) was considered in 303 infants aged less than one year, who presented with one or more generally acceptable symptoms of allergies. All cases improved on a milk-free diet.

In the final analysis, Mom makes her diagnosis about her infant's health by very simple and obvious barometers. One is sleep. To confirm that insomnia in babies can be related to an undiagnosed allergy to cow's milk protein, 71 infants were studied.¹⁹ Group I consisted of 20 babies referred for chronic insomnia that had appeared in the early days of life. Group II was made up of 31 little ones admitted for skin or digestive symptoms attributed to cow's milk intolerance; 13 of these infants were shown to sleep as poorly as the babies of Group I. Group III included 20 infants with no history of sleep disturbance and no milk allergy. The three subsets were comparable for sex and age. Laboratory tests revealed immunologic reactions to milk in the first two subgroups. The sleep of the insomniac infants (Group I, and the 13 "poor sleepers" in Group II) became normal after cow's milk was eliminated from their diet. Insomnia reappeared when the youngsters in Group I were challenged with milk. It can be concluded from these observations that little darlings with clinically evident milk allergy may suffer

from sleeplessness when no evident cause for a chronic insomnia can be found. The possibility of milk allergy should always be given serious consideration.

Summary and Conclusions

If there is anything crystal-clear about breastfeeding, it is that it is the best way of nourishing the infant. There is nothing in the literature to contradict this point. As a matter of fact, included in this report, just about every medical problem and physiologic system profits from this natural nutritional means. We have learned of the benefits in gastrointestinal disorders, respiratory problems, allergies, vision and intelligence. The one caveat is that breast milk may be of poor quality. Hence, where indicated, this should be corrected. And, a critical part of the solution for the improvement of mom's milk is to eliminate from her diet cow's milk and its products.

Less known, but equally exciting, is the clear observation that the benefits of breast milk linger beyond infancy. As a matter of fact, killing and crippling disorders like cancer and ulcerative colitis in late childhood and even during the adult period have been correlated with breastfeeding way back in the first few months of life.

Finally, what has even less been mentioned are the benefits of breastfeeding to the breastfeeder. Included in this report are the possible connections between ovarian and breast cancer in later life in terms of breastfeeding during the earlier reproductive years.

It is obviously clear from this discussion that there are unequivocal health benefits to the infant derived from the quality of the milk. We have also learned that there are distinct advantages even to the mother. There is much more that has not been discussed. The actual breastfeeding phenomenon may also provide bonuses. Data from the Child Health Supplement to the 1981 National Health Interview Survey were analyzed to assess the association between breastfeeding and malocclusion. Increased durations of natural-feeding were correlated with a decline in the proportion of children with crooked teeth.²⁰

So, what about the overall costs of breast versus artificial feeding? In addition to the unnecessary suffering from preventable illness experienced by infants who are not

breastfed, the economic impact is substantial. As of February 1992, the average yearly cost of the Women, Infants and Children (WIC) Program per bottle-feeding mother in North Carolina was \$8686 compared with the \$4848 per year for nutritional support provided by WIC to low-income breastfeeding mothers.²¹ A increase in the number of breastfeeding women can result in substantial savings in health expenditures for the government as well as for individuals.

For the record, we are told that the average American consumes about 183 gallons of fluid per year. This, according to USA Today, includes 18.9 gallons of milk. Probably, as we have seen earlier, the mother of all myths about milk is the notion that cow's milk is the perfect food for the human ... the babies as well as the grownup!

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