Breastfeeding promotion network of India and beyond: A commentary on the breastfeeding

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ABSTRACT

Breast milk promotion network of India and the infant milk substitute Act (IMS Act) 1992 have prevented the slide down in the rates that existed at the time of their inception but there has only been a modest 5.8% increase in the exclusive breastfeeding rate at 6 months from 1992–1993 to 2016–2017. Over these years, formula milk researchers have made a significant leap in catching up with the putative nutritive and nonnutritive advantages of human milk feeding. This article revisits the human versus formula milk debate and concludes that no significant advisory changes need to be incorporated in the existing World Health Organization policy on the promotion of breastfeeding.

Key words: *Breastfeeding, Exclusive breastfeeding, Formula feeding, Human milk*

In 1996–98, when this author was an assistant professor in Chennai, he had published his viewpoint in Indian Journal of Practical Pediatrics arguing against the existence of the now well-accepted condition hypernatremic dehydration due to breast milk insufficiency [1]. Not only reference weight loss has been suggested for early identification of hypernatremic dehydration but also strong protagonists of breastmilk have suggested the use of occasional bottle feeding on such rare occasions in the interest of the baby [2,3].

Wang *et al.* have recently reported the serial values of sialic acid and iron content of breast milk at different stages of lactation [4]. This article again raises an important practical question - how closely could infant milk formulas mimic the nature's gift of human milk. This article provided the impetus to academically (acamedically!) analyze this question in the current era with special reference to India and other economically poorer economies.

The benefits of human milk and its supremacy over the infant formulas have traditionally been outlined as immunological, economical, and nutritional factors [5]. The immunological factors are the ones which are responsible for designating human milk as "living biological fluid [5]." These immunological factors include secretory IgA, interleukins, interferons, and cellular factors, and complement factors. The purported beneficial effects of human milk in protecting against respiratory and gastrointestinal infections presumably result from these immunological factors. The increased risk of infections is to a major extent muffled in the developed world by the superior hygiene that results from the ease of availability of portable drinking water.

Human milk is readily available for feeding the infant and results in considerable savings from the economic cost that results from purchasing formula milk together with the added cost of treating infections and malnutrition resulting from the unhygienic preparation of formula feeds with improper over-dilution. In an earlier study from Northern India, it has been reported that the cost of formula feeding in Indian setting is 3 times the per capita income [6]. Thus, the economic benefits of breastfeeding overwhelmingly tilt the balance in its favor against a major opposing force that is the risk of transmitting HIV in economically underprivileged population. This led to the dichotomy of World Health Organization (WHO) recommendation for feeding HIV positive infants [7].

Human milk oligosaccharides (HMO) are the second most abundant glycans next only to lactose present in human milk. They are not digestible in the infant's gut, and so their component sugars cannot serve a calorific purpose as do the other macronutrients [8,9]. On the other hand, they play a major role in preventing gut infections by enteropathogens such as cholera, rotavirus, and *Escherichia coli* by a decoy mechanism (mimicking intestinal receptors for these enteropathogens) [8]. Sialic acid in its form as N acetyl moiety is an important component of HMO. Human milk contains the appropriate form of sialic acid as the N acetylneuraminic acid whereas the bovine milk contains N glycolylsialic acid which might be biologically harmful.

Breastfed preterm infants have an IQ advantage of 7.5 points over their bottle-fed counterparts at ages 7.5–8 years while term infants have a modest but questionable increase of 3 points [10,11]. Brain maturation and myelination in early infancy are putatively facilitated by human milk and its components (the nutritional factor) apart from the unquantifiable emotional bonding factor. The role of omega3 (docosahexaenoic acid) and

omega 6 (arachidonic acid) in conferring this IQ advantage has been copied by infant formulas [12]. The relative contribution by sialylated HMO in conferring this IQ advantage is not clearly deciphered at this moment [9].

Human milk has special benefits for premature infants so much so that it is hailed as "baby specific" by the protagonists because of the differential composition of preterm milk protein and immunological factors versus the term human milk. However, the inadequacies of preterm milk in terms of volume availability, calorie, and micronutrient composition such as iron, calcium, and Vitamin D have also been well known. The need for adequate milk volume for preterm babies during the initial colostrum phase (hypoglycemic risk phase) mandates the use of infant formula/banked human milk for bridging the volume gap. Tolerance had been an important issue with earlier preterm milk along with the risk of necrotizing enterocolitis, but with the addition of prebiotics and probiotics, this risk is proven to be mollified to a great extent [13-15]. In a study by Modi *et al.*, on the supplementation of galactooligosaccharides and fructooligosaccharides in the ratio of 9:1 (prebiotic) to preterm infant formulas in babies <32 weeks, the prebiotic-supplemented group had better enteral tolerance leading to a faster establishment of full enteral feeds (150 mL/kg/day) [13]. Only 8% of infants in that study was exclusively breastfed, and only 15% exclusively formula feed meaning that about 75% of preterm babies need formula feeds in addition to human milk (both groups together) [13].

In a cohort study on routine supplementation of all neonates weighing between 1000 and 1999 g at birth with probiotic (*Saccharomyces boulardii*), the authors found that the incidence of severe sepsis and necrotizing enterocolitis Stage 2 and above and all-cause mortality was significantly lowered in the supplemented group. In this study, over 90% of the babies were exclusively fed on maternal preterm milk in both the control and supplemented groups. These results reiterate that ensuring exclusive breastfeeding alone may not be successful in reducing severe Gram-negative sepsis in Indian units [14]. In a WHO commissioned systemic review, Kramer *et al.* conclude that exclusive breastfeeding does not significantly reduce the rate of atopic eczema, respiratory infection, otitis media, and hospitalization for respiratory and gastrointestinal infections [16].

The immune benefits of human milk have been studied before, but the putative mechanisms for these benefits have been evaluated only in a few recent studies. In an earlier randomized controlled study from Delhi, Narayanan *et al.* had reported significantly reduced hospital-acquired infection rates in the human milk-fed group, and this was despite a higher "contamination" rate with the expressed human milk than the formula milk [17]. A subsequent study found that this so thought contamination was indeed by the innate flora of the lactation that results from translocation of maternal bacteria from the mothers gut and plays an important role in educating the immature neonatal immune cells to tolerance of beneficial commensals in the intestine [18]. Immunological benefits to young infants that accrue from human milk have previously been ascribed to a major extent to the passive transfer of maternal immunoglobulins (secretory IgA in particular).

Recent experiments in murine pups suggest that the protective cellular mechanisms may also be equally if not more relevant in that maternal human milk derived CD8 cytotoxic T cells preferentially home in to the payers patches of the pups and elicit protective immune responses to compensate for the defective immune response of the native T lymphocytes of the infant [19]. The Promotion of Breastfeeding Intervention Trial (PROBIT) is the largest cluster randomized trial conducted in the Republic of Belarus with 17,046 mother-infant dyads participating with long-term follow-up [20]. Significant benefits seen in the breastfeeding group were a reduction in the diarrhea rate and atopic eczema at 12 months follow-up and an improvement in cognitive ability at 6.5 years follow-up [20,21]. The 11.5 years follow-up data of PROBIT are currently under review for publication [21].

Coming to the real-life scenario on the prevalence of breastfeeding as well as exclusive breastfeeding in different countries, the available data are not that encouraging! The all out efforts to promote exclusive breastfeeding in India by the Breast milk promotion network of India (BPNI) and other national associations have not yielded the desired results and the proportion of mothers exclusively breastfeeding their infants <6 months of age in 2 well- conducted National Family Health Surveys (NFHS) separated over a 13 and 23 years' time frame bears testimony to this 46.3% in NFHS 1 1992–1993, 48.6% in the NHFS 3 2005–2006, and 52.1% in NHFS 2016 [22]. This figure is a cumulative sum of all mothers exclusively breastfeeding at any point within 6 months of infant age which means that if a single valid point of 6 months of infant age is taken, then the figure will be only of the order of 20% as reported in a previous study [6]. Obviously, the data in economically developed countries can be no better with reported percentage of mothers exclusively breastfeeding at 6 months being 2% in the United Kingdom and 18% in the United States [23].

Despite the 25 years existence of stringent infant milk substitutes (IMS) feeding bottles, and infant foods (regulation of production, supply, and distribution) act enacted way back in 1992 (IMS Act) and an exclusive association (BPNI) that is in existence from the same year the exclusive breastfeeding rate in the country has seen only a notional increase of 5.8%. What could be the underlying reasons?

1. Majority of the Indian mothers are still homemakers as evidenced by the percentage of female workers out of the total workforce in rural India (25%) and urban India (15%). Hence, the issue of availability of adequate maternity leave is not the issue in the vast majority of the mothers [24].
2. Health education and spreading awareness about benefits of breastfeeding are the legal and accepted way of practice in India with all health associations endorsing breastfeeding. Institutional deliveries in India have increased from 35% in 2006 to 79% in 2014 [25]. That means the majority of mother-infant dyads are accessing services of physicians for delivery and subsequent follow-up visits including immunizations.

3. Hence, the obvious inference is that health-care professionals are not able to convince, support, and ensure that the exclusive breastfeeding rates improve significantly and at a faster pace. This may be due to the fact that influences outside our purview such as domestic elders' views (grandmothers, etc.), peer group pressures and social media messages (people trust social media messages more easily than the physicians), and personal conveniences often overwhelm the professional recommendations.
4. The increased purchasing power of the Indian households; especially, in urban areas may also be a contributing factor.
5. The modern-day formula milk manufacturers also proclaim that the incremental benefits of human milk are not significant and by these claims, they have been able to provide reassurance and comfort to lactating mothers facing inadequate supply and a hungry, irritable baby!

To be on the positive side, it is entirely possible that the exclusive breastfeeding rates have not declined in Indian population despite all the opposing market forces due to the untiring efforts of professionals and lawmakers in India. Hence, while we can redouble efforts to promote exclusive breastfeeding, the vibrant supply of infant formulas exists, and we have to accept this ground reality!

The denouement: For formula feeding: Why should we (attempt to) conquer nature?

- The volume of human milk available during the colostrum phase (15–20 mL in the first 24 h) is often inadequate to achieve euglycemia in babies at risk of hypoglycemia [26].
- Human milk-fed infants have a six-fold increased occurrence of bilirubin levels >15 mg in the neonatal period than their formula-fed counterparts. Lactation failure is the underlying factor in the majority of these babies who suffer from dehydration and weight loss. On the other hand, there are certain gene polymorphism variants of uridine diphosphoglucuronic transferase 1 enzyme, that when coupled with human milk feeding, could result in a massive 22–88-fold increase in significant hyperbilirubinemia >20 mg [27]. All cases of kernicterus over the previous 3 decades that happened in the USA were all in breastfed infants [26]. Hence, guidelines from academic associations do mention exclusive human milk feeding as a significant independent risk factor for hyperbilirubinemia [27].
- There are many situations where a substitute for human milk is a necessity such as parental choice and maternal infections such as HIV, working women, destitute babies, infants with metabolic errors, and severe atopy.
- The advanced infant formulas of the modern age are claiming to have copied all the beneficial constituents of the human milk, and only the immunological factors cannot be provided for in the formula milk as available in human milk.
- However, in developing countries like rural India, considering the economic cost savings offered by exclusive breastfeeding and lack of universal access to potable water, formula milk feeding can be accepted as an alternative only when the parents choose to give formula milk instead of breast milk.

For breastfeeding: Why nature should not be conquered?

- Even over a span of 3000 years in spite of our best efforts to understand the human body - its physiology and functions, many things remain as elusive to decipher as before. Many of our misguided experiments in modern medicine have backfired. The infant formulas *per se* have been designed to mimic the human milk with respect to its nutrient and nonnutrient factors so much to say that nature is the benchmark gold standard for technology. It may quite rightly be said that we cannot make cow produce human milk using genetic engineering.
- In developing economies like India, the cost economics of human milk feeding coupled with the sinister of bottle feeding with infant formulas, especially the hygiene part of it, make breastfeeding promotion the norm as the majority of Indians still lives in its villages.
- The author has observed that in a rural health medical facility of a medical college, exclusive breastfeeding and rooming in with mothers has not been associated with any instance of Bilirubin Induced Neurological Dysfunction over the past 4 years and before as well with the provision that babies at risk of hypoglycemia are assisted and given top up feeds when required inside NICU (this constitutes a negligible proportion of deliveries, and at discharge all babies are exclusively breastfed) (Sudevan P, personal communication). Furthermore, UDGP and other gene polymorphisms that potentiate pathological hyperbilirubinemia in breastfed infants have not been studied across all the population ethnic groups in India.

The 25 years of our battle against IMS (which are half won or half lost depending on how we perceive it) shall not lose its momentum at this critical juncture lest we fall back into the known traps of malnutrition and diarrheal deaths. Hence, exclusive breastfeeding shall continue to be our agenda with the rare exceptions for the situational use of substitutes, and even the later may be mitigated by the recent resurge in the process of establishing human milk banks.

CONCLUSIONS

This article provided the current evidence about the human versus formula milk and concluded that no significant advisory changes need to be incorporated in the existing policies on the promotion of breastfeeding. The exclusive breastfeeding shall continue to be our agenda, and the process of establishing human milk banks should be promoted to mitigate the rare situational use of milk substitutes.

REFERENCES

1. Karthikeyan G. Breastfeeding malnutrition - view point 2. Ind J Pract Pediatr 1997;5:359-60.
2. Dommelen PV, Van Wouwe JP, Breuning-Boers JM, van Buuren S, Verkerk PH. Reference chart for relative weight change to detect hypernatremic dehydration. Arch Dis Child 2007;92:490-4.

3. Modi N. Avoiding hypernatremic dehydration in healthy term infants. Arch Dis Chid 2007;92:474-5.
4. Wang HJ, Hua CZ, Ruan LL, Hong LQ, Sheng SQ, Shang SQ. Sialic acid and iron contents analysis in breastmilk of Chinese lactating women. Ind Pediatr 2017;54:1029-31.
5. Hoddinott P, Tappin D, Wright C. Breast feeding. BMJ 2008;336:881-7.
6. Bhatnagar S, Jain NP, Tiwari VK. Cost of infant feeding in exclusive and partially breastfed infant. Indian Pediatr 1996;33:655-8.
7. World Health Organization. Guidelines on HIV and Infant Feeding 2010. Principles and Recommendations for Infant Feeding in the Context of HIV and a Summary of Evidence. Available from: http://www.apps.who.int/iris/bitstream/10665/44345/1/9789241599535_eng.pdf. [Last retrieved on 2018 Mar 08].
8. Newburg DS. Glycobiology of human milk. Biochem (Moscow) 2013;78:771-85.
9. Wang B, Brand-Miller J. The role and potential of sialic acid in human nutrition. Eur J Clin Nutr 2003;57:1351-69.
10. Lucas A, Morley R, Cole TJ, Lister G, Leeson-Payne C. Breastmilk and subsequent IQ in children born preterm. Lancet 1992;339:261-4.
11. Isaacs EB, Fischl BR, Quinn BT, Chong WK, Gadian DG, Lucas A. Impact of breastmilk on IQ, brain size and white matter development. Pediatr Res 2010;67:357-62.
12. Tai EK, Wang XB, Chen ZY. An update on adding docosahexaenoic acid (DHA) and arachidonic acid to baby formula. Food Funct 2013;4:1767-75.
13. Modi N, Uthaya S, Fell J, Kulinskaya E. A randomized double blind controlled trial of the effect of prebiotic oligosaccharides on enteral tolerance in preterm infants. Pediatr Res 2010;68:440-5.
14. Karthikeyan G, Govindarajan M, Veerasekar G. Routine probiotic supplementation (*Saccharomyces boulardii*) of neonates with birth weight 1000-1999 g: A cohort study. Int J Sci Study 2015;3:121-5.
15. Karthikeyan G, Bhat BV. The PiPS (probiotics in preterm infants study) trial - Controlling the confounding factor of cross contamination unveils significant benefits. Ind Pediatr 2017;54:7.
16. Kramer MS, Kakuma R. The optimal duration of exclusive breastfeeding. A systematic review. Adv Exp Biol 2004;554:63-77.
17. Narayanan I, Prakash K, Prabhakar AK, Gujral VV. A planned prospective evaluation of the anti-infective property of varying quantities of expressed human milk. Acta Pediatr Scandinav 1982;71:441-5.
18. Perez PF, Dore J, Leclerc M, Levenez F, Benyacoub J, Serrant P, *et al.* Bacterial imprinting of the neonatal immune system: Lessons from maternal cells? Pediatrics 2007;119:e724-32.
19. Cabinian A, Sinsimer D, Tang M, Zumba O, Mehta H, Toma A, *et al.* Transfer of maternal immune cells by breastfeeding: Maternal cytotoxic T lymphocytes present in breastmilk localize in the payers patches of the nursed infant. PLoS One 2016;11:e0156762.
20. Kramer MS. Breast is best: The evidence. Early Hum Dev 2010;86:729-32.
21. Patel R, Oken E, Bogdanovich N, Matush L, Sevkovskaya Z, Chalmers B, *et al.* Cohort profile: The promotion of breastfeeding intervention trial (PROBIT). Int J Epidemiol 2014;43:679-90.
22. Chandiok N, Singh KH, Sahu D, Singh L, Pandey A. Changes in exclusive breastfeeding practices and its determinants in India 1992-2006: Analysis of national survey data. Int Breastfeed J 2015;10:34-47.
23. Fewtrell MS, Morgan JB, Duggan C, Cunnlaugson G, Hibberd P, Lucas A, *et al.* Optimal duration of breastfeeding: What is the evidence to support current recommendations? Am J Clin Nutr 2007;85:635S-8.
24. Catalyst. Quick Take. Women in the Labour Force in India. New York, Catalyst; 2017. Available from: http://www.catalyst.org/knowledge/women-workforce-india#footnote28_2e4xt4u. [Last retrieved on 2018 Mar 08].
25. UNICEF. Place of delivery - updated, January; 2018. Available from: https://www.data.unicef.org/topic/maternal-health/delivery-care. [Last retrieved on 2018 Mar 10].
26. Hurst N. Breastfeeding. In: Cloherty P, Eichenwald EC, Hansen R, Stark AR, editors. Manual of Neonatal Care. 7th ed. Philadelphia, PA: Lippincott Williams and Wilkins and Wolters Kluwer; 2012. p. 263-8.
27. Watchko JF, Lin Z. Genetics of neonatal jaundice. In: Stevenson DK, Meisels MJ, Watchko JF, editors. Care of the Jaundiced Neonate. New York: McGraw Hill Medical; 2002. p. 1-28.

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