

Effectiveness of Feeding Supplements in Preterm Infants: An Institutional Based Study

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ABSTRACT

Objective: The aim of the study is to examine the effectiveness of feeding supplements in preterm infants and to assess whether supplementation of formula milk is safe and of benefit to preterm infants as compared to mother's milk.

Methods: The present study included 400 preterm infants to examine the effectiveness of feeding supplements in preterm infants. There were 250 males and 150 females in the study as assigned and divided randomly into the groups of formula milk and mother's milk.

Results: The analysis included 200 patients in both the groups. The infants were divided randomly into both the groups as they were given formula milk and mother's milk respectively.

Conclusion: The feeding supplements may improve the health outcomes of in preterm infants. Some nutrient supplementations, such as fat, carbohydrate, calcium, and phosphorus might work as fortifying components of human milk, thus aiding the understanding of the nutritional requirements of preterm infants. Supplements with positive

effects on health improvement should be added to the feeding of preterm infants.

Keywords: Preterm Infants, Feeding Supplementation, Nutritional Feeding.


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Article History:

Received: 07-05-2016, Revised: 02-06-2016, Accepted: 29-06-2016

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2016.2.4.057	

INTRODUCTION

Mother's milk contains a wide range of components that makes it the optimal source of nutrients for growing infants. However, many circumstances can arise that preclude breast feeding, leading to the use of ruminant milk-based infant formula to meet nutritional requirements. In these situations, the formulation and composition of infant formula have important consequences for the growing young; therefore, maximization of the nutritional properties of ruminant milk-based formula could provide important health benefits. An ideal infant formula would closely match the composition of human milk.¹ Human milk oligosaccharides (HMOs) possess anti-infective properties against pathogens in the infant gastrointestinal tract, such as Salmonella, Listeria, and Campylobacter, by flooding the infant gastrointestinal tract with decoys that bind the pathogens and keep them off the intestinal wall.² Oligosaccharides also play a vital role in the development of a diverse and balanced microbiota, essential for appropriate innate and adaptive immune responses, and help colonize up to 90% of the infant biome.³

The formulation and composition of infant formula have important consequences for the growing young; therefore, maximization of the nutritional properties of ruminant milk-based formula could provide important health benefits. An ideal infant formula would closely match the composition of HM. HM is thought to have superior effects on the growth and barrier integrity of the intestinal

tract, and on the development of mucosal defenses,^{4,5} compared with infant formulas.⁶ Breast feeding has also been shown to drive the intestinal microbiota toward a more beneficial community composition dominated by Bifidobacterium and Lactobacillus.⁷

The aim of the study is to examine the effectiveness of feeding supplements in preterm infants and to assess whether supplementation of formula milk is safe and of benefit to preterm infants as compared to mother's milk.

MATERIALS AND METHODS

The present study included 400 preterm infants to examine the effectiveness of feeding supplements in preterm infants. There were 250 males and 150 females in the study as assigned and divided randomly into the groups of formula milk and mother's milk.

Collection of breast milk: HM samples for nutritional profiling were collected from 900 volunteer mothers. All randomized trials of formula milk supplemented with mother's milk and with clinical endpoints were reviewed. The infant formula used for the controlled infant formula milk of the human study.

Inclusion criteria: (1) participants were preterm infants; (2) focused on the comparison of nutrient supplementation to breast milk or formula in order to observe its effects on health improvement.

Exclusion criteria: (1) participants were not preterm infants; (2) intervention did not meet the inclusion criteria

Statistical Analysis: Descriptive data are presented as number and percentages. Chi-square test was used to assess the association between neonatal jaundice with various factors. Microsoft word and SPSS software were used for the analysis of the results. A p value of 0.05 or less was considered for statistical significance.

RESULTS

There are three stages of nutrition support in preterm infants: (1) early aggressive nutrition during the first several weeks after birth when infants are at their most fragile (acute stage); (2) fortified human milk or preterm formula for the intermediate period when

infants are slowly advanced to full enteral nutrition, but which could potentially represent an opportunity for significant catch-up growth (growing care stage); and (3) the postdischarge stage. The present study included 400 preterm infants to examine the effectiveness of feeding supplements in preterm infants. There were 250 males and 150 females in the study as assigned randomly into the groups of formula milk and mother's milk. (Table 1 and 2)

Milk nutritional composition: The total solids, fat, protein, and ash contents of the reconstituted mother's milk and formula milk samples are summarized in Table 3, together with the sugar profile and total carbohydrates and energy by calculation. The total solids, protein, and fat in the formula milk were within the range reported for infant formula.⁸

Table 1: Distribution of infants according to gender

Gender	n
Male	250
Female	150
Total	400

Table 2: Distribution of infants according to supplements

Milk	n
Formula Milk	200
Mother's Milk	200

Table 3: Macronutrient composition analysis of single samples of pooled HM collected volunteers and formula milk

Macronutrient	Mother's milk	Formula milk
Total solids, 2 g/100 g	12.7	12.9
Fat, 3 g/100 g	3.32	3.67
Protein, 4 g/100 g	1.10	1.46
Lactose, 5 g/100 g	8.10	7.37
Calculated energy, 6 kJ/100 g	282	287

DISCUSSION

Human milk is the best food for newborn nutrition. There is no ideal composition of human milk and also no easy way to control the complexity of its nutritional quality and the quantity received by breastfed infants. The World Health Organization (WHO) recommends exclusive breastfeeding for up to 6 months, starting at the first hour of life. Despite the recommendations of the WHO and pro-breastfeeding messages delivered in hospitals and maternity hospitals, the exclusive breastfeeding rate remains quite low [even in low-income and middle-income countries, only 37% of infants younger than 6 months are exclusively breastfed].⁹

This study shows that exclusive breastfeeding or Formula milk feeding had similar effects on babies and on abundance of 3

groups of bacteria: Bifidobacterium, Lactobacillus, and Clostridium perfringens. The decision to breastfeed is highly personal and is often influenced by many factors. Under certain situations, breastfeeding might not be possible, unsuitable or inadequate, which warrants an interruption or cessation in breastfeeding. Globally, only 38% of infants are exclusively breastfed.¹⁰

Another mucin-degrading bacterium, Mucispirillum,¹¹ was also substantially more relatively abundant in rats fed HM. Surprisingly, Prevotella were substantially enriched in infants fed formula milk, despite the fact that formula milk has a slightly higher fat and protein content than does HM. Other studies have shown that increased Prevotella abundance is associated with diets lower in fat and protein and high in carbohydrates.^{12,13}

The concentrations of calcium and phosphorus in human milk are also significantly below that necessary to attain in utero levels of bone mineralization.^{14,15} Therefore, mother's own milk is nutritionally inadequate to meet the needs of infants weighing <1500 g at birth, unless it contains multi-nutrient human milk fortifiers (HMFs).¹⁶ In the absence of mother's breast milk, preterm formula may be selected for feeding. The preterm formula with energy similar to breast milk (20 kcal/oz or 67.6 kcal/100 mL) is protein-enriched (2.0 g/ 100 mL) and variably enriched with minerals, vitamins, and trace elements to support intrauterine nutrient accretion rates. These milks are often used for preterm infants before hospital discharge. There are also higher energy formulas of 24 kcal/oz (or 81 kcal/100 mL) and 30 kcal/oz (or 101 kcal/100 mL) that may be used to increase the nutrient density of the feeding regimens without increasing the fluid volume or as a ready-to-feed formula.^{17,18}

CONCLUSION

The feeding supplements may improve the health outcomes of in preterm infants. Some nutrient supplementations, such as fat, carbohydrate, calcium, and phosphorus might work as fortifying components of human milk, thus aiding the understanding of the nutritional requirements of preterm infants. Supplements with positive effects on health improvement should be added to the feeding of preterm infants.

Further research is required to optimize the nutritional needs of preterm infants and to evaluate the effects of nutritional interventions on long-term growth, neurodevelopment, and other health outcomes.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

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Cite this article as: Pankaj Agarwal. Effectiveness of Feeding Supplements in Preterm Infants: An Institutional Based Study. *Int J Med Res Prof*. 2016; 2(4): 227-29.