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Breastfeeding *vs*. Infant Formula Feed: A Mini Review

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Abstract

Mothers' milk provides best nutritional need for all infants. As a biologic fluid, it has kinds of benefits like, somatic growth, modulation of postnatal intestinal function, immune ontogeny and development of brain. Despite the fact that breastfeeding is strongly suggested, breastfeeding may not generally be conceivable, appropriate or exclusively sufficient. Infant formula is an industrially made alternative to the breast milk. This paper will guide the parents at the benefits of breastfeeding and answers parent's concerns when they choose the formula milk market by helping in choosing the right one.

Keywords: Breast milk, HMO, Colostrum, Transitional Milk, Mature Milk, Foremilk, Hindmilk, Cow Milk-Based Formula, Soy Based-Formula

Introduction

Breast milk is known as the best source of nourishment of a new born child [1]. Breast milk contains different bioactive agents that alter the gastrointestinal tract function, immune system and development of the brain. Thus, it is otherwise defined as a biological fluid needed for the ideal growth and development of new-born babies. Breastfed babies have a lower risk of getting infections than formula-fed infants.

The World Health Organization (WHO) recommends that mother's milk is the best choice for infants for the first six months of life [2], while The American Academy of Pediatrics (AAP) also recommends breastfeeding for at least 12 months for its unique nutritional, medical and neurodevelopmental benefits for babies [3]. Recently, the Academy of Nutrition and Dietetics confirms their mission that ideal nutrition and good health will be provided by breastfeeding for the first six months of life, and corresponding formula feed along with breastfeeding from six months until at least 12 months of age is the absolute feeding pattern for babies [1].

Breastfeeding is a highly private matter and there are several factors which affects breastfeeding. Only 38% of babies are breastfed worldwide [4]. In the United States, 75% babies start breastfeeding from birth, however 67% infants fed on infant formula when they turn into 3 months [3]. The first 6 months of infant's life are very important in getting an ideal nutrition because improper nutrition can lead to a severe consequence in infant's health. This review article exclusively focuses on the importance of breastfeeding over the infant formula feeding.

Human Breast Milk

Human breast milk constitutes live cells (blood cells and stem cells) [5], proteins [6], amino acids [7, 8], enzymes and hormones [9], growth factors [10], vitamins and minerals [10], antibodies [11], long chain fatty acids [12], micro RNAs [13], etc. It also contains several bioactive molecules: some of which are protein and lipid derived and indigestible protein-derived like oligosaccharides. Human milk oligosaccharides (HMOs) shows anti-infective properties against pathogens in the gastrointestinal tract of infants [14].

Breast Milk Types

Colostrum

It is the first milk produced in the breast after a child's birth. It adds an ideal nutrition for infants. It is highly concentrated, rich in proteins and nutrients, holds low fats and easily digestible. Colostrum plays a vital role in the development of immune system. It protects the babies from getting infection and jaundice [15].

Transitional milk

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Breast milk between day 5-14 of the child birth is known as transitional milk [16]. According to Professor Peter Hartmann (a leading authority on breast milk composition) from The University of Western Australia, progesterone (a female hormone) level starts dropping speedily with the delivery of the placenta. As a result, milk synthesis increased and normal composition of breast milk develops and it takes couple of weeks to mature.

Mature milk

When the new-borne baby turns into 1 month in age, the breast milk is converted into matured milk which is full of protein, sugar, minerals and vitamins and several bioactive compounds like immune cells, enzymes and growth hormones. So, mature milk helps in the growth and development of the infant making him/her healthy [9].

Foremilk and hindmilk

As the feed continues, the composition of fat increases, because the milk moves through the breast. Towards the end of breastfeeding, the breast milk looks creamier and thicker. This is known as hindmilk and the initial watery milk is called as foremilk. It is a irreversible process in which foremilk can't be turned into hindmilk [16].

Infant Formula

Breastfeeding is highly recommended, but it may be not possible every time and not suitable everywhere. So, infant formula is an effective substitute which is produced industrially and prepared in a way that it can be very similar with the nutritional composition as in breast milk. There are 3 forms of baby formula: **a) Powder**- Generally it is in powder form which is mixed with water before feeding, **b) Liquid**- This is in a concentrated liquid form and is mixed with equal amount of water and **c) Ready-to-Feed**- It is used as an instant and quick feed formula and requires no mixing.

There are 3 major types of infant formula like cow milk-based formula, soy-based formula and specialized formula. They all differ in nutritional components, calorific value, test and cost.

Cow milk-based formula

Majority of infant formula are based on Bovine milk which contains higher levels of fat, protein and minerals in comparison to breast milk. So, it must be diluted before feeding [17, 18]. Cow's milk in the infant diet causes food allergy [19].

Soy based-formula

They are prepared from soy proteins and useful for infants with congenital lactase deficiency. However, it is seen that, infants who have allergy to cow's milk, also have allergy to soy milk [20].

Specialized formula

Hypoallergenic formula and amino acid formula are included in the specialized formula. Babies who can't bear cow milk or soy milk they can take protein hydrolysate formula. Amino acid formula with no peptides are prepared for the infants who have serios allergy to cow milk [16].

Formula feed *vs*. breast feed

Lower respiratory tract infection

A study by Bachrach and associates in 2003 reported that, infants who were not breastfed faced a 3.6-fold increased risk (95% CI, 1.9-7.1) of hospitalization for lower respiratory tract infection in the first year of life, compared with infants who were exclusively breastfed for more than 4 months [21].

Gastrointestinal infections

Several studies found that, babies with formula feed have more risk of getting gastrointestinal problems and diarrhoea. A research by Chien and Howie [22] found that infants who were formula fed or fed a mixture of formula and human milk were 2.8 times (95% CI, 2.4-3.1) more likely to develop gastrointestinal (GI) infection than those who were exclusively breastfed.

Obesity and metabolic syndrome

Epidemiologic studies suggest that formulated infants are more likely to become obese or develop type 2 diabetes [23-25]. They have also a risk of getting cardiovascular diseases, high blood pressure and less lipid profiles [25].

Atopic dermatitis

Infants with a family history of atopy who were exclusively breastfed for less than 3 months have a 1.7-fold risk of atopic dermatitis (95% CI, 1.1–2.4) compared with infants who are exclusively breastfed [26].

Childhood leukemia

There are many studies which show associations between formula feeding and childhood leukemia. Kwan and colleagues also found a 1.2-fold higher risk of acute myeloid leukemia (95% CI, 1.0–1.4) among formula-fed infants compared with infants breastfed more than 6 months [27].

Conclusion

Although mother's milk is the best option for the infants, it is sometimes unavailable due to some clinical conditions of both mother and child. Infant formulae are a very good option for the child in these scenarios. However, the complications arising from the infant formulae need to be addressed to better fit into the infant and child nutrition.

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