

Macías Lozano, J. A., López Bustillos, S., González Ponce, V. E., y García, C. U. (2025). Comparison of nutritional aspects between breast milk versus artificial milk. En G. Mercado Mercado y M Del R. Moyeton Hernández (Coords). *Nutrition: Challenges, Opportunities, and Essential Strategies in the Prevention and Management of Chronic Diseases*. (pp. 18-26). Religación Press. <http://doi.org/10.46652/religacionpress.280.c469>



Chapter 1

Comparison of nutritional aspects between breast milk versus artificial milk

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Abstract

Research related to exclusive breastfeeding has not been sufficiently clear or well disseminated, it has been left aside by the facilities provided by artificial milk for being practical and effective for today's fast-paced lifestyles, but breast milk is the perfect food, because it adapts to the nutritional needs at the beginning of his life, helping in its entirety to their physical, neurological and psychological development. Likewise, the infant arrives to receive care of all kinds for an indefinite period of time, and by giving it to him, it is only expected that he grows healthy and strong, but there are numerous variables that will lead us to achieve it, in the present investigation two options are proposed to satisfy the nutritional needs of the newborns and the benefits directed to the mother.

Keywords:

breastfeeding; infant development; nutrition; women's health; child welfare.

Introduction

Newborns represent one of the highest priorities for society, as they are at the most vulnerable stage of life in terms of morbidity and mortality, which are undoubtedly preventable and/or treatable. For this, it is essential to ensure their good development and growth from their early stages in providing them with adequate nutrients for good health in infancy and adulthood (Pereira et al., 2022). Breastfeeding is a potential nutritious food (rich in proteins, lipids, vitamins, minerals, oligosaccharides, immunoglobulins and even the presence of stem cells) that allows providing an ideal food for the healthy growth and development of infants enough and, given its easy absorption, it is used effectively for their proper brain and cognitive development, as well as the prevention of diseases prevalent in children, with which the rates of infant morbidity and mortality are considerably decreased (Sitelbanat-Osman et al., 2023). Although there are several factors involved in growth and development, breastfeeding is the cornerstone for a healthy future in all its dimensions (biological, cognitive and social) (Pereira et al., 2022).

On the other hand, there is currently a marked competition between artificial milks and breast milk, which offer the supply of nutrients, probiotics, essential fatty acids, nucleic acids and other nutrients that need to be good for the health of newborns (Martin et al., 2016). Formula milk is a modified cow's milk that tries to resemble breast milk as closely as possible, i.e., it tries to add all the nutrients present in breast milk so that the infant can obtain effects similar to those of a breastfed infant. Artificial lactation has several advantages and/or recommendations, however, there is a great difference between these formulas and breast milk, such as bioabsorption and bioavailability of nutrients, early stimulation of the microbiota, cellular response for the development of children, development of different tissues, strengthening of the immune system, among other aspects (Pereira et al., 2022). Therefore, in this chapter we propose to analyze the nutritional aspects and benefits between breast milk and formula milk, in order to understand the implementation of both milks in the infant's diet.

Differences and benefits of breast milk and formula milk

The breast milk is a very complete food, which is why there are various reasons that support this natural practice of feeding an infant within the first 6 months of life, requiring prebiotics, as well as probiotics, transmission and reception of antibodies, living cells, as well as different psychological reasons that can create a bond between mother and child. During feeding there is direct skin-to-skin contact that helps foster attachment and a feeling of protection. Even a

benefit that breast milk has is that it can be adjusted to the needs of the baby, since as mentioned previously, breast milk has various stages that correspond and accompany each stage of the baby’s development.

Artificial milk: One of the advantages offered by the use of infant formulas is the availability since they can be used in cases in which mothers cannot breastfeed due to different factors, whether health or work. The implementation and development of infant artificial milk has been carried out with the aim of being able to match the composition that exists in breast milk as closely as possible, although on the other hand artificial milk lacks natural antibodies that are found in breast milk (Martínez, 2020).

Table 1. Parameters of breast milk vs. artificial milk.

Parameter	Breast milk	Artificial milk
Body composition	Breast milk is a food that adapts to the needs of the infant at each stage of its development and its content is highly bioavailable, which means better uptake of nutrients.	Artificial milk, despite being developed with the aim of being as similar as possible to breast milk, does not have certain natural antibodies and cannot fully match the complexity of breast milk.
Emotional benefit	Carrying out the practice of breastfeeding promotes the creation of a mother-child bond which results in the release of satisfying/relaxing hormones.	The creation of a mother-child bond cannot be created in the same way through this method.
Immune protection	Within the components of breast milk it contains immunological compounds such as antibodies that generate protection against diseases and promote the strengthening of the baby's immune system.	Formula milk does not provide specific immunological protection.

Source: own elaboration

Breastfeeding as an aid to postpartum recovery

Postpartum symptoms can include a host of discomforts from the well-known postpartum depression, which encompasses intense sadness, asthenia or excessive tiredness, and the inability to feel pleasure in activities that were previously enjoyed. This can delay the return to the mother’s activities, since she loses the notion of personal care, healthy sleep and feeding cycles, also having consequences for the newborn (Jordan, 2024).

Breastfeeding assists the movements of uterine contraction, this in turn helps eliminate lochia (which are the blood and placental waste left in the uterus), facilitating a successful recovery for the system, favoring the relationship between mother and child, a link that will help the patient secrete stress-regulating hormones such as oxytocins, and which in turn stabilizes blood pressure, reducing the chances of hemorrhage (Prieto, 2019).

The quality of sleep is also positively affected, remembering the hormone already mentioned and adding to it the effect that expelling prolactin has on the mother's body in the postpartum is to ensure mental well-being thanks to being able to feel that 90% of the needs they have in this period of life are being satisfied by simply providing a body fluid. Until just a few years ago, the psychological effect that motherhood has on women began to be mentioned. Self-esteem is generally deteriorated in the notable body change and other specific changes that depend on each woman, but one of the most frequent complexes is without a doubt the change in weight and the accumulation of fat; It is important to mention that the contribution of breast milk is mostly fats that are taken from the mother, the rest are carbohydrates and finally a low percentage of proteins. Having said this, it can be explained that, from the foods consumed, something is set aside for the baby and the caloric contribution of that food cannot be fully utilized, in addition to the fact that the energy expenditure required by breastfeeding on demand for a whole day is approximately equivalent to at least 40 minutes of intensive exercise, so yes, breastfeeding helps reduce the percentage of body fat and consequently to lose weight (Torres, 2019).

Finally, as a mention, we talk about breast and ovarian cancer as the most common causes of mortality in women around the world, but it has been shown that women who breastfeed from six months onwards reduce the probability of contracting them, but if the duration is greater than twelve months it can reduce its eventuality by up to 37% since the natural regulation of estrogen in pregnancy and breastfeeding has long-term effects. These results were observed in hormonal analyzes of premenopausal women who breastfed. during the mentioned time. Breastfeeding also helps to suppress possible diseased cells or the so-called free radicals of the mammary glands that also contribute to the formation of cancer; In this way we are sure that breastfeeding impacts mother and child in ways that we do not take into account every day, but from now on, we will (Cruz et al., 2024).

Benefits of exclusive breastfeeding for the baby's digestive development

According to Gigli (2020), Human milk is one of the only ones that adapts and changes according to the needs of the growing newborn, it has three stages:

colostrum, transitional milk and mature milk. For several years it was believed that colostrum (breast milk secreted in the first 3-5 days of breastfeeding) was a sterile substance, free of microorganisms that fed the unborn, it is not sterile at all, it has colonies of beneficial bacteria for the digestive system of the newborn, which will help it colonize its gastrointestinal tract and cover its intestine with immunoglobulins, that is, the first proteins for training its immune system.

Colostrum is mostly proteins, the first reserves of iron, sodium and other minerals as well as fat-soluble vitamins. Likewise, its consistency generates intestinal mucus and compensates for the inflammation generated by some microorganisms to which it was exposed during childbirth (Garcia, 2023). Transitional milk is that which, at a nutritional level, provides fewer immunoglobulins, but increases in percentage of fat, which will benefit even more, since fat-soluble vitamins continue to be administered, and a high intake of fat will help to metabolize the vitamins in a better way, at this point the chances of contracting common newborn diseases are lower and with this, mortality as well. And mature milk becomes more stable in terms of its structure, but not in its entirety because, as we remember, it is a living food that evolves according to the needs and requirements of the baby, starting with a greater contribution of water and calories to reach its demand due to greater activity, it still contains vitamins and minerals but now slightly reduced and with the flavors of everything that mother consumes (Medina, 2024).

Breastfeeding at least until 6 months is the technique that urgently needs to be implemented to avoid crib deaths and deaths from breast cancer. In newborns, all possibilities of food allergies and very strong diarrhea are practically eliminated, and their long-term health is improved due to the immunological and cognitive development benefits that it has compared to artificial milk (Franco, 2023).

Effects of breastfeeding on protecting the baby's health

During the first stage of any infant's life, breastfeeding is an essential process as this is a natural way of providing nutritional, immunological and emotional factors, the latter helping to create a bond between mother and child while at the same time receiving antibodies that will keep the child healthy. The first milk to be produced by the mother is called colostrum and it is characterized by being a creamy, yellowish liquid with high density. Substance that can be considered the perfect food for a newborn and is recommended to be consumed during the first hours of life. This substance called colostrum is mainly composed of white blood cells, protein and immuno agents that will serve to reinforce the infant's immune response. After colostrum, a milk called transitional milk is produced during the first 3 to 5 days after birth, which is responsible for and has the function of helping

to maintain the optimal pH of your excretions and maintain homeostasis in your intestinal flora, which means protection against possible bacterial diarrhea. From 7 to 14 days after childbirth, milk is produced called mature milk. This is the milk that is produced during most of breastfeeding. Given the protective effects that milk is shown to have, those babies who have been breastfed prove to be less likely to contract any disease compared to those who are fed by artificial feeding. Some breastfeeding compounds are shown in the breastfeeding composition table (Morales et al., 2022).

Table 2. Composition of breastfeeding

Antimicrobial compounds	Tolerance compounds	Immune system development compounds	Anti-inflammatory compounds
Immunoglobulins (IgA, IgG, IgM) Lactoferrin Lactoferricin B and H Lysozyme Lactoperoxidase Haptocorrin Mucins Fatty acids	Cytokines (IL-10 and TGF-beta) Anti-idiotypic antibodies	Macrophages Neutrophils Lymphocytes Cytokines Growth factors Hormones Dairy peptides	Cytokines (IL-10 and TGF-beta) IL-1 antagonist receptors Adhesion molecules Long chain fatty acids Hormones and growth factors Lactoferrin

Source: Rodríguez et al. (2022).

It is recommended that within the first hour of life the infant receives breast milk from its mother, that this be at the baby's free demand and that the use of milk or artificial breastfeeding (formula) be avoided since breast milk is a food rich in nutritional content, since it contains essential vitamins and minerals for the baby (micronutrients). Likewise, it is recommended that the infant receive complementary breastfeeding until around two years of age. Those neonates who have been breast-fed are less likely to die within their first year of life, compared to those infants who have been fed with artificial milk (formula). In the same way, neonates who have been breast-fed demonstrate a higher IQ and a lower probability of suffering from diabetes, asthma or leukemia (Rodríguez et al., 2022).

Obesity: It has been shown that breastfeeding reduces the chances of developing overweight and obesity by up to 13%. Since through breastfeeding the infant ingests only the amount he needs without overdoing it, which is the opposite of what happens in those infants who ingest their food through the use of a bottle, in which often the person in charge of preparing it for intake usually forces the infant to have the entire prepared portion of food be ingested, which is why it becomes a factor that prevents the baby from developing its ability to recognize its signals of satiety and its signals of appetite. in which the hormones ghrelin and leptin are responsible and if it is not corrected it can become a habit that accompanies it through the years.

Diabetes: There is little evidence that there is a relationship between breastfeeding consumption and a decrease in the prevalence of diabetes.

Leukemia: There is some evidence that indicates a reduction in developing leukemia or lymphoma, although for other types of cancer the evidence is still limited.

Neurodevelopment: There are studies that have reported greater academic performance and in logistics and intelligence tests in infants who have been breastfed, including some adolescents.

Attention and hyperactivity disorders: There are some studies that have shown a lower level of attention deficit and hyperactivity in children who show that they have been breastfed.

Otitis media: There is a lower prevalence of otitis media in infants who have been breastfed by the mother, extending their protection from 2 to 4 years of life even if they no longer receive breastfeeding during these ages (Rodríguez et al., 2022).

Conclusions

The findings of the present study show that despite the efforts made by the industry to have products similar to breast milk, the majority of artificial formulas are very far from having a similarity to it, however, this does not mean abandoning research in this regard, improving the quality of said formulas, assessing the true dimension of the differences and advantages of breast milk and artificial formula. a valid option. On the other hand, the research values a constant relationship between the mother/child, an aspect that must be considered in the management of children in general and in particular those under six months.

Acknowledgements

This chapter has been supported by the Fund of Centro de Estudios Universitarios Vizcaya de las Americas within the framework of the celebration of the day of the nutritionist in Mexico and with the purpose of increasing the academic and scientific capacity of Universidad Vizcaya de las Americas.

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Comparación de los aspectos nutricionales entre la leche materna y la leche artificial

Comparação dos aspectos nutricionais entre o leite materno e o leite artificial

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Resumen

Las investigaciones relacionadas a la lactancia materna exclusiva, no han sido lo suficiente claras ni bien difundidos, se ha dejado de lado por las facilidades que brinda la leche artificial por ser práctica y efectiva para los estilos de vida actuales tan acelerados, pero la leche materna es el alimento perfecto, pues se adapta a las necesidades nutricionales en el inicio de su vida, ayudando en la totalidad a su desarrollo físico, neurológico, y psicológico. Así mismo, el lactante llega para recibir cuidados de todo tipo durante tiempo indefinido, y al dárselos sólo se espera que crezca saludable y fuerte, pero hay numerosas variables que nos llevarán a lograrlo, en la presente investigación se proponen dos opciones para satisfacer las necesidades alimentarias de los neonatos y los beneficios dirigidos a la progenitora.

Palabras clave: lactancia maternal; desarrollo del niño; nutrición; salud de la mujer; bienestar de la infancia.

Resumo

As pesquisas relacionadas ao aleitamento materno exclusivo não têm sido suficientemente claras ou bem divulgadas, ele tem sido deixado de lado pelas facilidades proporcionadas pelo leite artificial por ser prático e eficaz para o estilo de vida acelerado dos dias de hoje, mas o leite materno é o alimento perfeito, pois se adapta às necessidades nutricionais no início de sua vida, ajudando em sua totalidade no seu desenvolvimento físico, neurológico e psicológico. Da mesma forma, o bebê chega para receber cuidados de todos os tipos por um período indefinido de tempo e, ao dar isso a ele, espera-se que ele cresça saudável e forte, mas existem inúmeras variáveis que nos levarão a alcançá-lo. Na presente investigação, duas opções são propostas para satisfazer as necessidades nutricionais dos recém-nascidos e os benefícios direcionados à mãe.

Palavras-chave: amamentação; desenvolvimento do bebê; nutrição; saúde da mulher; bem-estar da criança.