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The benefits of breastfeeding for the health of the infant, the mother and the impact this has on public health in Brazil

Os benefícios do aleitamento materno para a saúde do lactente, da mãe e o impacto que isso tem na saúde coletiva no Brasil

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ABSTRACT
Breastfeeding is a fundamental practice for the health and proper development of the baby, offering a series of short- and long-term benefits for the baby, for the mother. This natural way of feeding provides all the essential nutrients a baby needs in the first 6 months of life, promoting proper, healthy growth and strengthening the newborn's immune system. In terms of nutrition, breast milk is a complete source of protein, fat, carbohydrates, and vitamins. Breastfeeding provides a deep emotional connection between mother and child, allowing the release of feel-good hormones, promoting affective bonding and a sense of security and tranquility for the baby. For mothers, breastfeeding also has numerous benefits. The release of oxytocin during breastfeeding helps reduce postpartum bleeding and increases contraction of the uterus, aiding in postpartum recovery and preventing hemorrhage. Breastfeeding can help with post-pregnancy weight loss and reduce the risk of developing breast and ovarian cancer. The WHO and UNICEF recommend exclusive breastfeeding for the first 6 months of the baby's life, followed by the gradual introduction of complementary foods until the age of two. However, despite the numerous benefits, many women face challenges in breastfeeding, including a lack of support, a return to work, and a lack of information. Therefore, it is crucial to promote breastfeeding support policies, such as paid maternity leave, breastfeeding-friendly workplaces, and education programs for expectant mothers and healthcare workers.

Keywords: Breastfeeding, Mother, Infant, Breast milk, Health.

INTRODUCTION

According to the WHO recommendation and guidance, babies should be fed exclusively with breast milk until they are 6 months old and even after the start of solid food feeding, they should continue to be breastfed until 2 years of age (FONSECA et al, 2012).

It is necessary to have a large scientific basis to declare to mothers that it is extremely important to breastfeed exclusively until 6 months and, whenever possible, until 2 years, taking into account the work that compares to the ease of giving formula to babies (NUNES et al, 2015).

It is a fact that there is a reduction in mortality with breastfeeding, regardless of socioeconomic class. This practice also benefits from reducing the morbidity of these children. It is evident that breastfeeding prevents death worldwide. More than 500,000 deaths of children under 5 years of age could be avoided annually around the world if the practice were carried out rigorously (AGUIAR et al, 2011).

Breastfeeding has a strong link with the baby's immunity, prevents acute illnesses while the baby is being breastfed, and also brings delayed protection, even after the breastfeeding period has ceased. Non-breastfed children were 17 times more likely to be hospitalized for pneumonia than those who received only breast milk. Non-breastfeeding further affected children under three months of age, whose relative risk for hospitalization for pneumonia was

61% (TOMA et al, 2008).

Acute immunity protection occurs through the passage of antibodies in breast milk, antibodies that the mother has accumulated throughout her life. These antibodies are an immunological inheritance that the mother passes on to the baby, an example of this is a strong protection against diarrhea and respiratory diseases such as pneumonia. And delayed immune protection occurs against diseases such as obesity, diabetes, lymphomas, leukemias (BINNS et al, 2016). It is also an important protective factor against Sudden Infant Death Syndrome (AAP, 2012).

There is a dose-dependent relationship between breastfeeding and not only in childhood, but this value also persists in adulthood. This change in the IQ index is dose-dependent, meaning the longer the baby is breastfed, the higher his IQ will be. From 9 to 12 months of breastfeeding, in terms of IQ, this increase reaches a plateau. Breast milk has components that help in the formation of brain tissue (HORTA et al, 2015).

Women naturally produce exosomes that have micro RNAs and they are released through breastfeeding, and have the power to modify the expression of genes for proper repair and regulation of genes, in relation to factors against obesity and diabetes (BINNS et al, 2016).

The microbiome has an important relationship with brain development, and oligosaccharides are substances released in breast milk, which are not absorbed by the intestine, but they are important foods for a healthy gut flora. Of course, the quality of this microbiome produced by the mother is related to the quality of the food the mother eats, but immunity is not altered in relation to the quality of the food she eats, but the microbiome is (HOUGHTELING and WALKER, 2015).

Regarding the baby's connection with the mother, breastfeeding promotes a very intimate bond, and it is proven to release endorphins and some hormones such as oxytocin, which is the love hormone that allow this bond. These substances that are produced by the mother not only affect her, but are also passed on to the baby, that is, the baby also has this connection with the mother and feels well after breastfeeding (CARVALHO et al, 2021).

Regarding protection against breast AC, it is possible to quantify that each month of breastfeeding is 6% less likely to have breast AC for each year that the woman breastfeeds. That is, the longer a woman breastfeeds, the lower the risk of breast AC. Consequently, with this prevention, there is a saving of money, time and emotional exhaustion, compared to having a diagnosis of breast AC, only with an adequate breastfeeding time (AAP, 2012).

This practice also has an important financial impact on the family nucleus, since it is an

economical and sustainable practice, where money is saved with possible expenses with formulas, disease prevention, consultations, exams and hospitals that are necessary to treat sick babies. All this wear and tear can be avoided with breastfeeding during the recommended period, thus taking advantage of the health benefits and disease prevention that breast milk provides (TOMA et al, 2008).

It is estimated that the world economy costs 1,100,000,000 dollars per day. And part of the loss of that value has to do with intellectual losses in IQ. Regarding the decrease in the IQ index, how much a national economy loses. On average, non-breastfeeding interferes with IQ by 3-4 points, and in isolation it does not have as much weight as the sum of this in society (HORTA et al, 2015).

The University of Oxford conducted a study on the economic impacts of not breastfeeding adequately in the world, and concluded that it would be possible to save 1.1 billion dollars annually if exclusive breastfeeding was practiced. The calculation takes into account the morbidity and mortality of diseases that could be prevented with breastfeeding (WALTERS et al, 2019).

The dimensions of this study also took into account the productivity lost with the death of babies and women as a result of non-breastfeeding, as well as the morbidity caused by inadequate nutrition in the first months of life, as well as diseases that could be avoided. As a result, they reached the value of 341.3 billion dollars lost per year (WALTERS et al, 2019).

In some countries, there are also important savings in relation to birth control in societies where contraceptives are not distributed free of charge (AAP, 2012).

METHOD

Considering that theoretical studies are an indispensable basis for field and laboratory research, we opted for a conceptual deepening and search for official data on the object of study, allowing the knowledge of the reality as well as the possibility of critical reflection on the subject within the scope of the Brazilian reality.

Based on the understanding of Creswell (2007) for whom the Literature Review is configured as a preliminary stage of scientific studies, then the research is a Bibliography Review, in which articles published in the National Library of Medicine (Pubmed), Virtual Health Library (VHL), Web of Science, Lilacs and Capes Journals by descriptors obtained by the Health Sciences Descriptors (DeCS) of the VHL were used as the basis of the study.

In a dialectical approach that, according to Minayo (1994), is the system of relationships that constructs the reality in which the object of study is inserted, research is characterized in the field of medicine with qualified data, considering the analysis of the elements that constitute as limiting or potentiating the procedure, according to studies analyzed.

SEARCH STRATEGY

This is a literature review of articles published in the National Library of Medicine (Pubmed), Virtual Health Library (VHL), Web of Science, Lilacs and Capes Journals by descriptors obtained by the Health Sciences Descriptors (DeCS) of the VHL.

A search was performed for the descriptors: *Breast Feeding AND Health AND Infant AND Public Health* in "All fields".

SELECTION STRATEGY

For the selection of articles, the following steps were followed: (I) search for articles in the databases; (II) reading of titles and abstracts, with analysis according to the eligibility criteria and; (III) full-text analysis of the studies, with only those required by the inclusion criteria and did not meet any of the exclusion criteria being included in the systematic review.

INCLUSION CRITERIA

Published studies were eligible if they met the following criteria:
(1) studies involving breastfeeding and its benefits for the mother and the baby; 2) studies in which the relationship between breastfeeding and public health was the object of study; (3) articles that studied non-breastfeeding and its consequences, and; (4) articles published in the last 13 years. There were no restrictions on sample size or foreign language.

EXCLUSION CRITERIA

Articles were excluded if: (1) published before 2001; (2) studied situations that do not include breastfeeding and its benefits; (3) duplicates; (4) breastfeeding was not directly related to the mother, the baby, or public health.

RESULTS AND DISCUSSION

Breastfeeding is the first practice of health promotion and disease prevention that a baby should experience. Breastfeeding is the most natural form of feeding and the only food capable

of meeting all the physiological and metabolic needs of a baby up to 6 months, the baby does not even need water. Since breast milk is the gold standard in infant feeding for the first 6 months of life and has all the nutrients necessary for the development of this child (MINISTRY OF HEALTH, 2014; COST et al, 2013).

Among these components, breast milk is made up of carbohydrates, lipids, protein, and lactose. It is important to note that the amounts of these elements are variable according to the baby's needs and what stage of development this child is in (CORREIA et al, 2022).

Colostrum is the first stage of breast milk to leave the lactating woman's breast and it has a higher concentration of proteins and less fat, in addition to being rich in fat-soluble vitamins and important defense factors (CALIL et al, 2003). The milk then goes through a gradual transition period until it reaches the state called mature milk, usually reached within the first month of breastfeeding (MIFUNE et al, 2022).

The fact that the baby was born at term (between 37 and 42 weeks of gestation) or preterm (before 37 weeks) can alter the milk according to the needs of the newborn, as shown in Table 1.

Table 1 – Composition of colostrum and mature breast milk from mothers of full-term and preterm infants.

Nutriente	Colostro (3 - 5 dias)		Leite Maduro (26 - 29 dias)	
	A termo	Pré-termo	A termo	Pré-termo
Calorias (kcal/dL)	48	58	62	70
Lipídios (g/dL)	1,8	3,0	3,0	4,1
Proteínas (g/dL)	1,9	2,1	1,3	1,4
Lactose (g/dL)	5,1	5,0	6,5	6,0

Source: adapted from Caderno de Atenção Básica, nª23 – Child Health, Child Nutrition; Breastfeeding and Complementary Feeding. Ministry of Health, 2015

Each of these compounds in breast milk has its function in the nutrition process of this baby, lipids through essential fatty acids participating in the myelination of the nervous system and the synthesis of inflammatory mediators (CALIL et al, 2003).

Proteins play several roles in the baby's development, such as the transport of plasma iron and the production of lactoferrin, which is an important glycoprotein capable of binding to iron and, therefore, promoting antimicrobial action. It also has an important anti-inflammatory and immunomodulatory action, contributing to the newborn's defense system (QUEIROZ et al, 2013).

Carbohydrates, the main one being lactose, is an important source of energy for the baby to perform its metabolism and constitutes a large part of the caloric content of human milk. The baby's body is able to absorb about 90% of the lactose present in milk, and even the unabsorbed portion has a physiological role: it helps with evacuation, promotes better mineral absorption and stimulates the formation of the gastrointestinal microbiota. Intestinal colonization is essential for the baby to develop its own immune system (NEVES et al, 2022; DOS SANTOS et al, 2014)

Breastfeeding is an important strategy in the establishment and maintenance of the health of neonates, children and women. Since breastfeeding could prevent more than 800,000 children annually around the world and would also prevent more than 20,000 deaths of women around the world due to its role in preventing breast and ovarian AC, precisely from these estimates it is evident that there is a need to raise awareness among the population about the importance and necessity of this practice by breastfeeding mothers (IP et al, 2007).

Some mothers actually have greater difficulties in breastfeeding, whether due to a difficult latch, pain in the act, insecurities, mastitis, the thought that their milk is not enough to feed their child or the need to go back to work, among other causes that make them give up persisting in breastfeeding (BRAGA et al, 2020).

Some situations may favor early weaning from breastfeeding, such as lack of knowledge, mother's level of education, younger mothers, first child, maternal work, little paternal support, family income, sociocultural influence of family members, overvaluation of the mother's body aesthetics, difficulty with the technique, some type of infection or need to take some medication that could pass into breast milk, as well as social exclusion, or lack of adequate places to breastfeed (ANDRADE et al, 2014; MACHADO et al, 2014; DA SILVA et al, 2017).

Due to these and several other factors, these mothers need information from health professionals, support at home and at work to facilitate this important process for the mother and the infant (ANDRADE et al, 2018; ROCCI et al, 2014).

The importance of paternal support for an adequate practice and in the time necessary for breastfeeding is fundamental, since the woman is already experiencing several changes in her routine, in her body and hormonally, especially in the puerperium. This support is necessary since the mother has insecurities about the process of starting breastfeeding, and often feels overwhelmed and abandoned during the process (SILVA et al, 2012).

Studies show that fathers who have more knowledge about the process and importance of breastfeeding, together with the mother, had better breastfeeding results and a lower rate of early weaning. And there was better adaptation in relation to breastfeeding for these couples. It is

important that the father actively participates in the processes of prenatal, prepartum, puerperium and breastfeeding as the support and support that the mother needs (JENERAL et al, 2015).

In this way, not only will the family be able to reach the time proposed for breastfeeding, but it will also strengthen family bonds. Fathers should not only encourage breastfeeding, but also encourage breastfeeding (SILVA et al, 2012; JENERAL et al, 2015).

The lack of awareness of the importance of the father figure in relation to breastfeeding sets a precedent for discussions that permeate the importance of the support of society and the economy for the improvement of laws that benefit family symbiosis. According to the Federal Constitution/88 in its article 7, the spouse is entitled to five days of paternity leave, but there was a gain, which expanded this right with Law 13.257, of March 8, 2016, thus extending paternity leave by another 15 days for employees of citizen companies ref. (SANTOS et al, 2016).

With the deconstruction of society in relation to the importance of the father in maintaining exclusive breastfeeding, precedents are set for the understanding of women in the labor market and the growing responsibility of men in the role of fathers, which until then was limited to obtaining financial resources (PIAZZALUNGA et al, 2012).

Studies prove that fathers present in early childhood create bonds that will be part of the construction of this individual and in his understanding of the father figure in this "new format" that gives men the opportunity to express feelings and participate in an active and equal way in the division of tasks and care for the newborn (PIAZZALUNGA et al, 2012).

As far as the ease of giving formula to the baby instead of breast milk is concerned, it does not compensate for the loss of short- and long-term benefits that the baby and the mother herself no longer have. One study showed that in women who did not develop gestational diabetes, lactation has a positive effect on the prevention of type 2 diabetes, with a risk reduction of between 4% and 12% for each year of breastfeeding (MIFUNE et al 2022).

For the baby, breast milk is the most complete food in the world, since no other food brings so much protection and nutrition. Exclusive breastfeeding up to 6 months sharply reduces morbidity and mortality rates worldwide, protects the baby against acute otitis media up to 2 years of age, reduces the risk of these children having celiac diseases, reduces the risk of hospitalizations and mortality from diarrhea and respiratory infections, reduces the risk of asthma and allergic rhinitis, it also closely links to the higher IQ of babies who have been breastfed for a longer period of time (FONSECA et al, 2015; ANDRADE et al, 2013).

Studies have also been done that demonstrate that IgA and IgG against SARS-CoV-2 were found in breast milk for 6 weeks after vaccination, suggesting a potential protective effect

on milk (PERL et al, 2021).

Table 2 - Benefits of Breastfeeding for the Baby

Benefits of Breastfeeding for the Baby				
Authors and Year of Publication	**Type of Study**	**Objectives**	**Type of health outcome analyzed**	**Main results**
BOWATTE et al, 2015	Systematic review and meta-analysis	Synthesize the relationship and evidence of the association between breastfeeding and the risk of acute otitis media	Occurrence of acute otitis media in childhood	Breastfeeding protects against acute otitis media up to two years of age, and protection is superior when breastfeeding is exclusive and longer lasting
AKOBENG et al, 2005	Systematic review and meta-analysis	Assessing the effects of breastfeeding on the risk of celiac disease	Incidence of celiac disease	Children who are breastfed during gluten exposure at food introduction have a lower risk of developing celiac disease
FOX et al, 2020	Prospective study	To evaluate the immune response of human milk to SARS-CoV-2, and the usefulness of these antibodies to prevent or mitigate COVID-19 in children	Presence of antibodies against SARS-CoV-2 in breast milk from mothers who have been infected with the virus	Significant amounts of IgA have been found in the breast milk of mothers who have been infected with SARS-CoV-2, mainly in its secretory form
PERL et al, 2021	Prospective study	To investigate whether SARS-CoV-2 antibody immunization from lactating women is transferred to infants	Presence of antibodies against SARS-CoV-2 in breast milk from mothers immunized with the 2 doses of vaccines	SARS-CoV-2-specific IgA and IgG were found in breast milk for 6 weeks after vaccination, suggesting a potential protective effect in milk
HORTA et al, 2013	Systematic review and meta-analysis	To assess the effect of breastfeeding on respiratory tract infections and diarrhoea in childhood	Occurrence, hospitalization and mortality due to diarrhea and respiratory infections	Breastfeeding reduces the risk of occurrence, hospitalization, and mortality from diarrhea and respiratory infections
HORTA et al, 2015	Systematic review and meta-analysis	Assessing the effect of breastfeeding on long-term health	Effects on Blood Pressure, Total Cholesterol, Obesity, Type 2 Diabetes, and Performance on Intelligence Tests	Breastfeeding protects against obesity and is associated with higher IQ. As for blood pressure and total cholesterol, it had no effects.
VICTORA et al, 2015	Prospective study	To assess whether breastfeeding is associated with intelligence, schooling and income in	Intelligence quotient, schooling, and income	Breastfeeding is associated with higher performance on intelligence tests 30 years later, and this can

		adulthood		lead to higher schooling and income in adulthood.
LODGE et al, 2015	Systematic review and meta-analysis	To review the association between breastfeeding and allergic diseases in childhood	Incidence of asthma, allergic rhinitis, eczema and food allergy	Breastfeeding protects against asthma (5 to 18 years). Limited evidence on protection against eczema and allergic rhinitis.
SANKAR et al, 2015	Systematic review and meta-analysis	Compare the effect of exclusive breastfeeding vs. predominant, partial, or non-breastfeeding	All-cause mortality and infection-related mortality	The risk of all-cause mortality and from infections is lower in exclusively breastfed infants.

Fonte: Adaptado de Miyuki et al, 2022

Breastfeeding also brings several benefits to mothers, including immediate recovery after childbirth due to the increased production of oxytocin, which is a hormone released in the breastfeeding process (NICOLAU et al, 2021; NUNES et al, 2015).

It helps in postpartum weight loss, promotes an increase in the mother-baby bond, brings financial savings to the family, not only the saving of formulas to replace milk, but also in the reduction of expenses associated with the treatment of childhood diseases, medical consultations, hospitalizations and medications that could have been avoided if the baby had been breastfed at the appropriate time (BRAGA et al, 2020).

Table 3 - Benefits of Breastfeeding for the Mother

Benefits of Breastfeeding for the Mother				
Authors and Year of Publication	**Type of Study**	**Objectives**	**Type of health outcome analyzed**	**Main results**
AAP, 2012	Systematic review and meta-analysis	To review the association between breastfeeding and intrauterine involution	Whether breastfeeding is related to the mother's uterine involution	In the short term, faster uterine involution and shorter postpartum bleeding period can be highlighted
IP et al, 2007	Systematic review and meta-analysis	To review the association between breastfeeding and the incidences of breast WC and ovarian WC	The relationship between breastfeeding and the incidences of breast WC and ovarian WC	There is an association between breastfeeding and lower incidences of breast and ovarian cancer

SCHWARZ et al, 2010	Systematic review and meta-analysis	To review the association between breastfeeding and the preventive effect of DM II	The relationship between breastfeeding and the prevention of DM II	In women who have not developed gestational diabetes, lactation has a positive effect on the prevention of type 2 diabetes, with a risk reduction of between 4% and 12% for each year of breastfeeding

Fonte: Adaptado de Miyuki et al, 2022

The practice of breastfeeding is also beneficial for public health, since it has the power to relieve basic and intermediate health systems with diseases or affectations that could have been avoided in the short term such as diarrhea, respiratory infections and pneumonia as well as later diseases such as celiac disease, obesity, DM that bring more and more drowning of the system. all this without also mentioning the reduction in expenses that proper practice would bring (BOCCOLINI et al, 2015)

Another important point is also the environmental benefits that breastfeeding brings, as it has a lower environmental impact compared to the production and disposal of infant formula, so breastfeeding contributes to environmental sustainability (MIFUNE et al, 2022).

Table 4 - Public Health Benefits of Breastfeeding

Public Health Benefits of Breastfeeding				
Authors and Year of Publication	**Type of Study**	**Objectives**	**Type of health outcome analyzed**	**Main results**
BALL et al, 2001	Cost-effectiveness analysis	Assess economic impacts and the effectiveness of implementing pro-breastfeeding initiatives	Cost data from the family, health insurance, and employer perspective	Evidence points to return on investment with breastfeeding promotion
WALTERS et al, 2019	Economic Evaluation Study	To estimate the cost of non-breastfeeding, in addition to illustrating the potential economic benefit of investing in breastfeeding promotion	Data on costs associated with infant and maternal morbidity and mortality; costs to the health system and the family nucleus; and future costs due to mortality and cognitive loss	Data on breastfeeding can help policymakers understand the economic benefits of the practice. Investments made today will boost long-term human capital development

HORTA et al, 2013	Systematic review and meta-analysis	To evaluate the effect of breastfeeding in reducing infant morbidity	The relationship between breastfeeding and the reduction of infant morbidity	Reduced infant morbidity: Infants who are properly breastfed have lower incidences of a variety of diseases, such as respiratory infections, gastrointestinal infections, allergies, childhood obesity, and type 2 diabetes
HORTA et al, 2013	Systematic review and meta-analysis	To evaluate the effect of breastfeeding on the economy of filial income	The relationship between breastfeeding and the saving of health resources with the baby	Saving healthcare resources: Increasing adequate breastfeeding can reduce costs associated with treating childhood illnesses, such as doctor visits, hospitalizations, and medications.
AAP, 2012	Systematic review and meta-analysis	To evaluate the effect of breastfeeding on the economy of filial income	The relationship between breastfeeding and the saving of health resources with the mother	Improved maternal health: Breastfeeding can also have positive impacts on maternal health, including a reduction in the risk of certain medical conditions, such as breast and ovarian cancer, and a faster recovery after childbirth.

Fonte: Adaptado de Miyuki et al, 2022

CONCLUSION

Breastfeeding emerges as a vital practice, supported by overwhelming scientific evidence and WHO recommendations, which resonates beneficially in several aspects. In addition to promoting crucial immunity for the baby, reducing infant mortality and morbidity globally, it establishes a unique bond between mother and child, underpinned by hormones that strengthen the emotional bond and protect against maternal breast cancer.

Breast milk not only nourishes but also positively influences cognitive development, proven to increase the child's IQ. Financially, its practice is a substantial saving for families and society, reducing spending on medical treatments and increasing economic productivity.

The rigorous implementation of this practice, as recommended by the WHO, not only ensures the optimal health of the baby, but also represents a solid investment in the future, both in terms of public health and socio-economic development.

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