DOI: https://doi.org/10.17921/2447-8938.2021v23n4p311-315

Continued Breastfeeding and the Influence of Fatty Acids on Infant Neurological Maturation: a Systematic Review

Amamentação Continuada e a Influência dos Ácidos Graxos na Maturação Neurológica do Lactente: uma Revisão Sistemática

Cristiane Movio[a]; Solange Aparecida de Oliveira Neves[bc]

[a]Unopar, Stricto Sensu Graduate Program in Rehabilitation Sciences.PR, Brasil.
[b]Unopar. Londrina. PR, Brasil.
[c]Universidade de Cuiabá. MT, Brasil.
*E-mail: solange.neves@educadores.net.br

Abstract

Breast milk is considered a complete food and the immediate effects of breastfeeding on the babies'neurological development are already recognized. This study aimed to describe the importance of continued breastfeeding and the influence of fatty acids on the infant's neurological maturation. For the study development, a systematic review was adopted, in which online search bases such as SciELO, PubMed and Google Scholar were used and whose publications comprised the period from 2008 to 2021. Out of the 969 articles found, 47 of them were selected that fulfilled the objective of the study. Breast milk is essential for the child's development and the benefits extend into adulthood, such as less chance of developing obesity, cardiovascular diseases, diabetes, hypersensitivity reactions, respiratory and gastrointestinal diseases. The mother-child bond is strengthened, enabling the child to develop emotionally, in addition to reducing the incidence of cancer in the mother. Breast milk has essential fatty acids (AGEs), such as linoleic and alpha-linolenic acid, which are essential for the development of neurological, visual and cellular activities. These compounds are present in breast milk in greater proportion than other types of milk and the more the mother ingests foods such as deep and cold water fish, seeds, flaxseed, chia, the greater the presence of AGEs and more benefits for the embryo-fetal period and for the infant. Thus, encouraging the breast milk consumption through suction improves stomatognathic functions, promoting harmonious orofacial growth, muscle balance, breathing coordination and proper tongue posture.

Keywords: Milk, Human. Speech, Language and Hearing Sciences. Stomatognathic System.

Resumo

O leite materno é considerado um alimento completo e os efeitos imediatos da amamentação no desenvolvimento neurológico dos bebês já é reconhecido. Esse estudo teve como objetivo descrever a importância da amamentação continuada e a influência dos ácidos graxos na maturação neurológica do lactente. Para o desenvolvimento do estudo, adotou-se uma revisão sistemática, no qual foram utilizadas as bases de busca on line como SciELO, PubMed e Google Acadêmico e cujas publicações compreenderam o período entre de 2008 a 2021. Dos 969 artigos encontrados, foram selecionados 48 que atenderam ao objetivo do estudo. O leite materno é fundamental para o desenvolvimento da criança e os benefícios se estendem até a vida adulta, tais como menor chances de desenvolver obesidade, doenças cardiovasculares, diabetes, reações de hipersensibilidade, doenças respiratórias e gastrintestinais. O vínculo mãe-filho fica fortalecido, dando condições à criança de se desenvolver emocionalmente, além de diminuir a incidência de câncer na mãe. O leite materno possui ácidos graxos essenciais (AGE), como linoleico e linolênico, que são fundamentais para o desenvolvimento das atividades neurológicas, visuais e celulares. Esses compostos estão presentes no leite materno em maior proporção que outros tipos de leite e quanto mais a mãe ingerir alimentos como peixes de águas profundas e frias, sementes, linhaça, chia, maior será a presença dos AGE e mais benefícios para o período embriofetal e para o lactente. Desta forma incentivar o consumo de leite materno de forma prolongada, pela sucção melhora as funções estomatognáticas, promovendo do crescimento orofacial harmonioso, equilíbrio da musculatura, coordenação da respiração e postura adequada de língua.

Palavras-chave*: Leite Humano. Fonoaudiologia. Sistema Estomatognatico.*

1 Introduction

Human milk is a fundamental food for the child's development up to the second year of life or more, contributing to survival and better quality of life, and this benefit can extend to adulthood[1].

World Health Organization (WHO)[2] states that breastfeeding is indicated to the baby in free demand, exclusively up to six months and continuously with solid food supplementation up to two years or more. There are theories that support breastfeeding beyond the age of two, because they understand that this practice brings many benefits to the mother-baby pair. For the mother, there may be a reduction in the incidence of cancer and for the child there may be a reduction in the tendency to develop metabolic syndrome (obesity, cardiovascular diseases, diabetes), in addition to being less prone to allergies, respiratory and gastrointestinal infections[3]. The mother-child bond is strengthened, giving the child the conditions to develop emotionally, as well as considering it to be essential for the good child's biopsychic-social-spiritual development and health[4,5].

Human milk is a complete food, since it has all the nutrients (carbohydrates, proteins, lipids, vitamins, minerals and water)

necessary to the baby's growth during the first years of life. The presence of long-chain polyunsaturated fatty acids (PUFAs) in breast milk can contribute to the baby's neurological maturation [6]. Therefore, the prolonged breastfeeding process may offer not only the nutritional benefits but also encourage the stomatognathic system maturation in the baby.

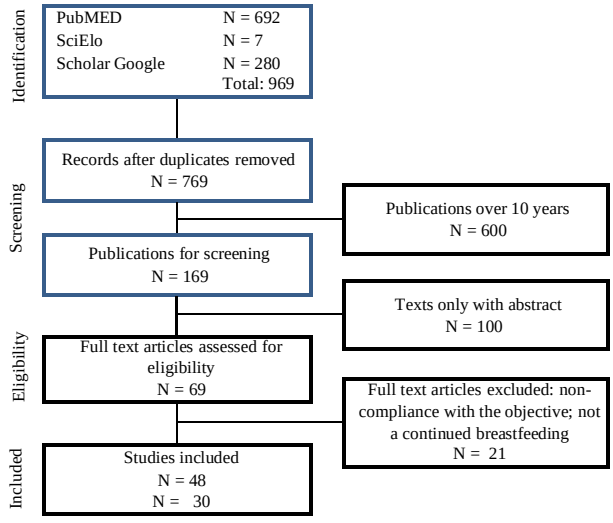
Considering the fundamental role of human milk in the newborn development, this study aimed to describe the importance of continued breastfeeding and the influence of fatty acids on the infant's neurological development.

2 Development

2.1 Methodology

To carry out this study, systematic bibliographic review was adopted. The *online* databases used to search the articles were Google Academic, SciELO and PubMed. Out of the 969 articles found regarding the study theme, only 48 were used for the development of this Article (Figure 1). Articles with full access, in Portuguese, English and Spanish, published in the last 10 years, were considered for the search. Two articles, published in 2008 and 2009, were included in the analysis, since they were considered relevant for the discussion.

Figure 1 - Information flow with the different phases in the selection of bibliographic material (Prisma method)



Source: Research data.

2.2 Breastfeeding

Nursing is the process in which the baby receives breastmilk directly from the breasts, while breastfeeding concerns the supply of human milk by differentiated techniques, and this may be related to problems in the breasts (mastitis, fissures), mother's infectious diseases, mother's pharmacological treatments of chronic diseases, use of illicit drugs or mother's absence[8,9]. In any case, the baby needs human milk, because it is considered the most complete and appropriate food for his or her development.

The act of breastfeeding is represented as the act of giving love, considering that this is an excellent object of transition for the baby, because it maintains the mother-child symbiosis, and the warmth of the mother's body and milk, replace the intrauterine heat, and the nipple, as before, the umbilical cord maintains the mother-child relationship that began in the uterus[10].

Prolonged breastfeeding is reponsbile for the existence of the humanity, according to anthropological evidences. Several studies in paleo physiology and anthropology establish that the age of natural weaning in *Homo sapiens sapiens*, occurred between 2,5 and 7 years[11]. A

According to the Ministry of Health, [12] breastfeeding is a strategic action in the context of public policies aimed at reducing malnutrition and infant mortality, encouraging exclusive breastfeeding up to six months of life and prolonged up to two years of age, thus favoring a great impact on the promotion of integral mother/baby health.

Human milk consists of water, vitamins, minerals, lipids, carbohydrates and proteins in the ideal proportion for the baby's development. Adequate nutrient balancing allows important immunological and psychological advantages in reducing infant morbidity and mortality, and is therefore a strategy of bonding, affection, protection and nutrition for the newborn[13]. The human milk composition adjusts along the baby's growth, favors intellectual development (an average increase of 3 points in the IQ), which can improve school and professional performance. Every year that the mother breastfeeds, the risk of developing invasive breast cancer is reduced by 6%.[14-16]

Studies show that the milk of mothers who have opted for prolonged breastfeeding has more energy and fat in its composition compared to the milk of mothers who breastfed for shorter periods. Thus, breast milk remains an important source of nutrients for two-year-old children. Breast milk is an important source of nutrients even considering those situations in which mothers opted for prolonged breastfeeding.[2,16,17].

Studies show that breast milk during the second year of life is very similar to milk in the first year[18]. In the second year of life, 500 ml of breast milk provides the child: 5% of the total vitamin C needed; 45% of the total vitamin A needed; 38% of the total protein needed; 31% of the calories needed. And knowing that many parents facing the current difficulties regarding the doubtful origin of the foods we consume, prefer to give cow's milk instead of keeping children on prolonged breastfeeding[9,18].

Supporting prolonged breastfeeding makes economic sense for all the countries[13,19]. Breastfed children have more immunological benefits, become more resistant to infectious agents and allergies, and prolonged breastfeeding extends these benefits by saving pediatricians' visits and less medication use. More economy for the family and for the nation by reducing the rate of infectious diseases and reducing infant morbidity and mortality[20].

2.3 Fatty acids (FA)

Myelin sheath (MS) is a membrane that protects the nerve cells (central and peripheral) and the MS formation process occurs until the adult phase. When MS is not structured properly, either by infection, inflammation, malformation, poisoning, sensitivity, motor and cognitive problems may arise, and severity will depend on the location and intensity of the lesion. The consumption of essential MS improves the myelinization process, since 70% of MS is formed by long-chain FA[21,22].

Essential FA (linoleic and alpha-linolenic acid) are those in which the human being cannot produce, therefore it is essential that it be acquired from the diet. These structural FA are necessary for lipid biosynthesis, have an important role in regulating various metabolic processes, transport and excretion. Linoleic and alpha-linolenic are Long-chain polyunsaturated fatty acids (LC-PUFAs) FA essential for fetal and neonatal development and growth, for neurological, behavioral and learning functions[13,23-25].

Alpha-linolenic FA belongs to the omega-3 class and are represented by eicosatetraenoic acids (EPA) and docosahexaenoic acid (DHA)[26]. The main sources of EPA and DHA are fish oils and flaxseed[27]. Biologically, the FA of the omega-3 series, present in membrane phospholipids, have anti-inflammatory, antithrombotic, antiarrhythmic and vasodilating properties. DHA is found in high concentrations in the brain and retina, while EPA decreases platelet aggregation and prevents cardiovascular diseases[28, 29]

The omega-6 series linoleic FA can be converted into arachidonic acid (AA). The main sources are nuts, sunflower seeds, soy, peanut, primrose. These FA are important for the functioning of the hypophysis and act as carriers of liposoluble vitamins (A, D, E and K). AA is present in high concentration in the nervous system[30] (improvement in brain functioning) and is also responsible for producing eicosanoid derivatives (prostaglandins, thromboxane, prostacyclin, leukotrienes), which are pro-inflammatory agents[31,32].

Omega-3 and omega-6 FA therefore have antagonistic biological functions, but both are considered neuroprotectors[32]. Therefore, it is essential that the proportion between them in the diet be adequate for the prevention of cardiovascular diseases and inflammatory diseases, as well as for improving neurological health[33-35].

The FA composition in breastmilk varies with the mother's feeding habits, stage of lactation, hormones and the metabolic ability to synthesize these nutrients. In the study by Nishimura et al.[36] verified that in the milk of mothers who lived farther from the coast, presented lower percentage of essential FA and higher concentration of *trans* FA, and the diet of these mothers consisted of many industrialized foods. The opposite was found in the milk of mothers who lived more on the coast, because they consumed more fish and less industrialized products.

Breastmilk expressed from mothers who breastfeed for more than a year has more fat and calories than breastmilk expressed from mothers who breastfed for less than a year. The lipid fraction of breastmilk is the main source of energy and nutrients for the neonate and AA and DHA are indispensable for the growth and development of NB and the presence in large quantities of these fatty acids in retina and brain reinforces the importance in CNS maturation[37].

2.4 Speech and language therapy and breastfeeding

In addition to the nutritional advantages of human milk, breastfeeding stimulates the baby's stomatognathic development. This system, which is composed anatomically by joints, muscles, bones, lips, tongue, cheeks and teeth have as their functions: to promote chewing, swallowing, phonation and breathing. The stomatognathic system stimulation during breastfeeding (sucking) favors musculoskeletal development and strengthening, generating craniofacial harmony[18,38]. The continuous use of a bottle nozzle or pacifiers does not promote these advantages and cause damage to teething[39,40]. The introduction of rigid artificial nozzles (pacifiers, bottles and silicone intermediates) alters the physiology of baby's sucking, occlusion, interferes with the stomatognathic system and neurovegetative functions (suction, breathing, speech, swallowing and chewing)[41-44].

The child, when breastfed, receives several stimuli during sucking that help in craniomyofacial evolution, such as tactile-kinesthetic, olfactory, visual, auditory and motor. Such stimuli provide for the development of primary and mucoskeletal neurovegetative functions, and such functions are initiated during the embryofetal period[45-47].

In order for breastfeeding to be successful, it is essential to integrate a specialized multiprofessional team that can guide and teach the correct breast positioning, and that has varied techniques to guide the mother in the breastfeeding process, even when this is not possible through natural pathways[48].

3 Conclusion

Breast milk has all the nutrients necessary for the different stages of baby's development, including lipid fraction. Alpha-linolenic essential fatty acid obtained by diet is metabolized in eicosatetraenoic acid (EPA) and docosahexaenoic acid (DHA) and classified as belonging to the omega-3 series. Linoleic fatty acid, also obtained by the diet, is converted into arachidonic acid (AA) and belongs to the omega-6 class. The embryofetal and neonate metabolic immaturity does not allow the production of EPA, DHA and AA, but these fatty acids can cross the blood-placental barrier and accumulate in the mammary glands. Thus, it is evident that the maternal diet is fundamental to the supply of these nutrients, which are responsible for the healthy development of neurological functions.

Prolonged breastfeeding, in addition to the mother-baby

affective bond, contributes positively to the supply of fatty acids and favors the stomatognathic system development that will collaborate with harmonious orofacial growth, muscle balance, breathing coordination and adequate tongue posture.

References

1. Vieira TS, Amaral M, Fujinaga CI, Magni C, Mascarenhas LPG. As influências do Aleitamento Materno para o Desenvolvimento Infantil: uma revisão integrativa de literatura. Rev Espacios 2017;38(12):15-22.
2. World Health Organization. Infant and young child nutrition: global strategy on infant and young child feeding. Geneva: WHO; 2021
3. Azevedo PTACC, Caminha MFC, Cruz RSBLC, Silva SL, Paula WKAS, Batista-Filho M. Estado nutricional de crianças em amamentação exclusiva prolongada no Estado de Pernambuco. Rev Bras Epidemiol 2019;22:e190007. doi: https://doi.org/10.1590/1980-549720190007.
4. Severiano AAO, Dantas DS, Oliveira VLC, Lopes JM, Souza DE, Magalhães AG. Associação entre amamentação, fatores obstétricos e o desenvolvimento infantil de crianças do interior do nordeste brasileiro. J Hum Growth Dev 2017;27(2):158-65. doi: https://dx.doi.org/10.7322/jhgd.114483
5. Jenkins JM, Foster EM. The effects of breastfeeding exclusivity on early childhood outcomes. Am J Public Health 2014;104:S128-35. doi: 10.2105/AJPH.2013.301713
6. Schipper, L, Van Dijk G, Van der Beek EM. Composição e estrutura lipídica do leite; A relevância para o desenvolvimento do cérebro infantil. OCL 2020;27(5). doi: https://doi.org/10.1051/ocl/2020001
7. Pang WW, Tan PT, Cai S, Fok D, Chua MC, Lim SB, et al. Nutrients or nursing? Understanding how breast milk feeding affects child cognition. Eur J Nutr 2020;59:609-19 doi: https://doi.org/10.1007/s00394-019-01929-2.
8. Guiné R, Gomes AL. A nutrição na lactação humana. Millenium 2015;49:131-55.
9. Souza TO, Morais TEV, Martins CC, Bessa-Junior J. Efeito de uma intervenção educativa sobre a técnica de amamentação na prevalência do aleitamento materno exclusivo. Rev Bras Saude Mater Infant 2020;20(1):297-304. doi: https://doi.org/10.1590/1806-93042020000100016.
10. Silva CM, Pereira SCL, Passos LR, Santos LC. Fatores associados ao contato pele a pele entre mãe/filho e amamentação na sala de parto. Rev Nutr 2016;29(4):457-71. doi: https://doi.org/10.1590/1678-98652016000400002.
11. Grueger B. Canadian Paediatric Society, Community Paediatrics Committee, Weaning from the breast. Paediatr Child Health 2018;18(4):210. doi: https://doi.org/10.1093/pch/18.4.210
12. Brasil. Ministério da Saúde. Todos pela amamentação. Brasília: MS; 2020.
13. Coutinho SF, Carvalho LC, Sarno AAC, Spadon F, Vasconcelos MPM, Santos M.Teor lipídico e composição mineral do leite materno e suas correlações. Ciência ET Praxis 2019;12(24):23-8. doi: https://revista.uemg.br/index.php/praxys/article/view/4288
14. Miliku K, Duan QL, Moraes TJ, Becker AB, Mandhane PJ, Turvey SE, et al. Human milk fatty acid composition is associated with dietary, genetic, sociodemographic, and environmental factors in the CHILD Cohort Study. Am J Clin Nutr 2019;1;110(6):1370-83. doi: 10.1093/ajcn/nqz229. PMID: 31589250
15. Czosnykowska-Łukacka M, Królak-Olejnik B, Orczyk-Pawiłowicz M. Breast milk macronutrient components in prolonged lactation. Nutrients 2018;10(12):1893. doi: 10.3390/nu10121893.
16. Ciampo LA, Ciampo IRL. Del. Breastfeeding and the benefits of lactation for women's health. Rev Bras Ginecol Obstet 2018;40(6):354-9. doi: https://doi.org/10.1055/s-0038-1657766.
17. Yang S, Martin RM, Oken E, Hameza M, Doniger G, Amit S, et al. Breastfeeding during infancy and neurocognitive function in adolescence: 16-year follow-up of the PROBIT cluster-randomized trial. PLoS Med 2018;15(4):e1002554. doi: 10.1371/journal.pmed.1002554.
18. Belfort MB, Anderson PJ, Nowak VA, Lee KJ, Molesworth C, Thompson DK, et al. Breast milk feeding, brain development, and neurocognitive outcomes: A 7-year longitudinal study in infants born at less than 30 weeks' gestation. J Pediatr 2016;177:133-9. doi: 10.1016/j.jpeds.2016.06.045.
19. Zhang Z, Tran NT, Nguyen TS, NguyenLT, Berde Y, Tey SL, et al. Impact of maternal nutritional supplementation in conjunction with a breastfeeding support program during the last trimester to 12 weeks postpartum on breastfeeding practices and child development at 30 months old. PLoS ONE 2018;13(7):e0200519. doi: https://doi.org/10.1371/journal.pone.0200519
20. Gomes C, Amaral J, Peres P, Rodrigues B. Cross-breastfeeding, from negligence to moral virtues: a descriptive study. Braz. J Nurs 2015;14(3):263-72. doi: https://doi.org/10.17665/1676-4285.20155157.
21. Mendes PB, Melo SR. Origem e desenvolvimento da Mielina no Sistema Nervoso Central - um estudo de revisão. Saúde Pesq 2011;4(1):93-9.
22. Almeida KCL, Boaventura GT, Guzman-Silva MA. A linhaça (Linum usitatissimum) como fonte de ácido α-linolênico na formação da bainha de mielina. Rev Nutr 2009;22(5):747-54. doi: https://doi.org/10.1590/S1415-52732009000500015.
23. González FE, Báez RV. In time: importância dos Ômega 3 na nutrição infantil. Rev Paul Pediatr 2017;35(1):3-4. doi: https://doi.org/10.1590/1984-0462/;2017;35;1;00018.
24. Guesnet P, Marmonier C, Boyer C, Delplanque B. Impact of maternal dietary lipids on human health. OCL 2018;25(3):302. doi: https://doi.org/10.1051/ocl/2018026
25. Costa AGV, Sabarense, Céphora MariaModulação e composição de ácidos graxos do leite humano. Rev Nutr 2010;23(3):445-57. doi: https://doi.org/10.1590/S1415-52732010000300012.
26. Souza TA, Almeida LMR, Lisboa CS. Suplementação de ácidos Graxos poli-insaturados de cadeia longa durante a gestação e fatores associados ao desenvolvimento infantile. Rev Saúde Coletiva 2021;11(1): e5736. doi: 10.13102/rscdauefs.v11i1.5736
27. Amorim EG. Benefícios da utilização de linhaça na formulação de novos produtos e preparações. Arq Bras Aliment 2017;2(3):210-22. doi: https://doi.org/10.53928/aba.v2i3.969
28. Fernandes DPS, Rezende FAC, Pereira RG, Filgueiras MS, Moreira PRS, Alfenas RCG. Effect of eicosapentaenoic acid and docosahexaenoic acid supplementations to control cognitive decline in dementia and Alzheimer's disease: a systematic review. Nutr Hosp 2015;32(2): 528-53. doi:

https://dx.doi.org/10.3305/nh.2015.32.2.9111.

29. Marques MBC, Leão PRD, Silva-Junior OM. Omega-3 during pregnancy and its benefits. Femina® 2018;46(1):54-8.

30. Orellana P, Valenzuela R, Valenzuela A, Morales G. Neuroprotective effects of arachidonic and docosahexaenoic acid in the extreme stages of life: an integrative view. Rev Chil Nutr 2018;45(1):80-8. doi: http://dx.doi.org/10.4067/s0717-75182018000100080.

31. Bernard JY, Armand M, Peyre H, Charles MA, Heude B. Breastfeeding, polyunsaturated fatty acid levels in colostrum and child intelligence quotient at age 5-6 years. J Pediatr 2017;183:43-50. doi: https://doi.org/10.1016/j.jpeds.2016.12.039

32. González HF, Visentin S. Nutrients and neurodevelopment: lipids. Arch Argent Pediatr 2016;114(5):472-6. doi: 10.5546/aap.2016.472

33. Almeida JM, Luz SAB, Ued FV. Apoio ao aleitamento materno pelos profissionais de saúde: revisão integrativa da literatura. Rev Paul Pediatr 2015;33(3):355-62. doi: https://doi.org/10.1016/j.rpped.2014.10.002.

34. Garcia LP. The lancet: série sobre amamentação. Epidemiol. Serv Saúde 2016;25(1):203-4. doi: http://dx.doi.org/10.5123/S1679-49742016000100022

35. Merey LSF, Palhares DB, Porto KRA. Ácidos graxos polinsaturados no sangue de gestantes suplementadas com ômega-3 e óleo de linhaça dourada. Interações 2018;19(4):845-53. doi: https://doi.org/10.20435/inter.v19i4.1615

36. Nishimura RY, Castro GS, Jordão Junior AA, Sartorelli DS. Breast milk fatty acid composition of women living far from the coastal area in Brazil. J Pediatr 2013;89:263-8. doi: https://doi.org/10.1016/j.jped.2012.11.007

37. Grace T, Oddy W, Bulsara M, Hands B. Breastfeeding and motor development: A longitudinal cohort study. Hum Mov Sci 2017;51:9-16. doi: https://doi.org/10.1016/j.humov.2016.10.001

38. Stelmach I, Kwarta P, Jerzyńska J, Stelmach W, Krakowiak J, Karbownik M, et al. Duration of breastfeeding and psychomotor development in 1-year-old children – Polish Mother and Child Cohort Study. Int J Occup Med Environ Health2019;32(2):175-84. doi: 10.13075/ijomeh.1896.01328.

39. McCrory C, Murray A. The effect of breastfeeding on neuro-development in infancy. Matern Child Health J 2013:1680-8. doi: https://doi.org/10.1007/s10995-012-1182-9

40. Pereira TS, Oliveira F, Cardoso MCAF. Association between harmful oral habits and the structures and functions of the stomatognathic system: perception of parents/guardians. Codas 2017;15;29(3):e20150301. doi: 10.1590/2317-1782/20172015301.

41. Vieira VCAM, Araújo CMT, Jamelli SR. Desenvolvimento da fala e alimentação infantil: possíveis implicações. Rev CEFAC 2016;18:1359-69. doi: https://doi.org/10.1590/1982-0216201618611516

42. Casagrande L, Ferreira FV, Hahn, D, Unfer DT, Praetzel JR. Aleitamento natural e artificial e o desenvolvimento do sistema estomatogmático. Rev Fac Odontol 2008;49(2):11-7. doi: https://doi.org/10.22456/2177-0018.3032

43. Cudziło D, Pałczyńska D, Bednarczyk M. Infant and baby feeding and the development of the maxillofacial complex based on own observations and the literature. Dev Period Med 2018;22(3):255-9. doi: https://doi.org/10.34763/devperiodmed.20182203.255259

44. Zhang Z, Tran NT, Nguyen TS, Nguyen LT, Berde Y, Tey SL, et al. Impact of maternal nutritional supplementation in conjunction with a breastfeeding support program during the last trimester to 12 weeks postpartum on breastfeeding practices and child development at 30 months old. PLoS ONE 2018;13(7):e0200519. doi: https://doi.org/10.1371/journal.pone.0200519

45. Kadosh KC, Muhardi L, Parikh P, Basso M, Jan Mohamed HJ, Prawitasari, T et al. Nutritional support of neurodevelopment and cognitive function in infants and young children: an update and novel insights. Nutrients 2021;13:199. doi: https://doi.org/10.3390/nu13010199

46. Hermont AP, Martins CC, Zina LG. Breastfeeding, bottle feeding practices and malocclusion in the primary dentition: a systematic review of cohort studies. Int J Environ Res Public Health 2015;12(3), 3133-51. doi: https://doi.org/10.3390/ijerph12030313336

47. Shoaibi A, Neelon B, Østbye T, Neelon SEB. Longitudinal associations of gross motor development, motor milestone achievement and weight-for-length z score in a racially diverse cohort of US infants. BMJ Open 2019;9e024440. doi: 10.1136/ bmjopen-2018-024440

48. Melo DS, Oliveira MH, Pereira DS. Brazil's Progress in protecting, promoting and supporting breastfeeding from the perspective of the global breastfeeding collective. Rev Paul Pediatr 2021;39 e2019296. doi: https://doi.org/10.1590/1984-0462/2021/39/2019296.