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# Consequences of Using Artificial Nipples in Exclusive Breastfeeding: An Integrative Review

**Theme:** promotion and prevention.

**Contributions to the field:** This review provides a better understanding of the mechanisms by which the offer of artificial nipples to newborns interferes with the initiation or maintenance of exclusive breastfeeding. This may favor planning by multidisciplinary primary medical care teams focused on promoting, protecting, and supporting breastfeeding.

## ABSTRACT

**Objective:** To describe the consequences of using artificial nipples to exclusive breastfeeding. **Materials and method:** An integrative review carried out in the Medline<sup>®</sup>, Cinahl, Lilacs, Web of Science, and Scopus databases to answer the following question: What are the consequences of using artificial nipples to exclusive breastfeeding? **Results:** 38 articles were analyzed; the analysis gave rise to two categories: neonatal factors and maternal factors influencing exclusive breastfeeding. Breastfeeding interruption was the neonatal factor most associated with the use of artificial nipples, while the level of maternal education stood out as an intervening factor in exclusive breastfeeding. Pacifiers were the dummy type more commonly mentioned, followed by feeding bottles and nipple shields. **Conclusions:** The consequences of offering artificial nipples to breastfed infants are mostly negative and associated with the newborn, such as early weaning, refusal to breastfeed, impaired suction technique, incorrect latch-on, interference with orofacial development, and interruption of exclusive breastfeeding. Mothers who offered artificial nipples to their infants are more likely to experience pain, nipple fissures, frustration, and reduced interaction with their infants.


## KEYWORDS (SOURCE: DECS)

Breastfeeding; nursing bottles; bottle feeding; maternal and child health; artificial nipples.

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# *Consecuencias del uso de pezones artificiales para la lactancia exclusiva: una revisión integradora*

## RESUMEN

**Objetivo:** describir las consecuencias del uso de pezones artificiales para la lactancia exclusiva. **Materiales y método:** revisión integradora realizada en las bases de datos Medline®, Cinahl, Lilacs, Web of Science e Scopus para contestar a la siguiente cuestión: ¿cuál es la influencia que ejerce en la lactancia la oferta de pezones artificiales a los recién nacidos? **Resultados:** se analizaron 38 artículos; el análisis originó dos categorías: factores neonatales y factores maternos de influencia en la lactancia exclusiva. La interrupción de la lactancia materna fue el factor neonatal más asociado al uso de pezones artificiales, mientras el nivel de escolaridad materno se destacó como factor interviniente en la lactancia exclusiva. El chupo fue el pezón artificial más encontrado citado, seguido del biberón y del protector mamilar. **Conclusiones:** las consecuencias de la oferta de pezones artificiales a los bebés en la lactancia son, en su mayoría, negativas y relacionadas con el neonato, como el desmame temprano y el rechazo al seno, la succión perjudicada, el agarre inadecuado, la interferencia en el desarrollo orofacial y la interrupción de la lactancia materna exclusiva. Las madres que ofrecieron pezones artificiales a sus hijos están más propensas a sentir dolor, tener fisura mamilar, frustración y reducción de la interacción con su hijo.

## PALABRAS CLAVE (FUENTE: DECS)

Lactancia materna; biberones; alimentación artificial; salud materno-infantil; pezoneras.

# *Consequências do uso de bicos artificiais para a amamentação exclusiva: uma revisão integrativa*

## RESUMO

**Objetivo:** descrever as consequências do uso de bicos artificiais para a amamentação exclusiva. **Materiais e método:** revisão integrativa realizada nas bases de dados Medline®, Cinahl, Lilacs, Web of Science e Scopus para responder à seguinte questão: qual a influência que a oferta de bicos artificiais aos recém-nascidos exerce na amamentação? **Resultados:** foram analisados 38 artigos; a análise deu origem a duas categorias: fatores neonatais e fatores maternos de influência na amamentação exclusiva. A interrupção do aleitamento materno foi o fator neonatal mais relacionado ao uso de bicos artificiais, enquanto o nível de escolaridade materno destacou-se como fator interveniente na amamentação exclusiva. A chupeta foi o bico artificial mais encontrado citado, seguido da mamadeira e do protetor mamilar. **Conclusões:** as consequências da oferta de bicos artificiais às crianças em amamentação são, em sua maioria, negativas e relacionadas ao neonato, como o desmame precoce, a recusa do peito, a sucção prejudicada, a pega incorreta, a interferência no desenvolvimento orofacial e a interrupção do aleitamento materno exclusivo. As mães que ofereceram bicos artificiais aos seus filhos estão mais propensas a ter dor, fissura mamilar, frustração e redução da interação com seu filho.

## PALAVRAS-CHAVE (FONTE: DECS)

Aleitamento materno; mamadeiras; alimentação artificial; saúde materno-infantil.

## Introduction

Exclusive breastfeeding is considered the gold standard in infant feeding and, when maintained for up to six months of age, provides proven benefits to the mother-infant binomial, the family, and the society (1). However, breastfeeding is strongly influenced by external factors that can lead to the interruption of exclusive breastfeeding (EBF), such as the use of dummies — pacifiers and feeding bottles, for example —, which are affordable and geographically disseminated (2).

According to the World Health Organization (WHO), EBF is the ideal form of infant nutrition up to six months of age, when solid foods are introduced as complementary feeding. The WHO has drafted the “Ten steps to successful breastfeeding” and does not recommend the use of feeding bottles and other dummies because they can potentially interfere with optimal breastfeeding practices (3).

However, women in low- and middle-income countries show poor adherence to EBF, with only 37 % of infants under six months of age being exclusively breastfed (4). In Brazil, breastfeeding (BF) is initiated but more than half of Brazilian mothers interrupt it after the first month (5). BF indicators have been stable in Brazil since 2006: - 36.6 % of EBF in infants under six months of age and - 52.1 % of BF in infants under two years of age (6).

It is known that the use of artificial nipples can lead to early weaning and/or reduced BF duration. However, the aspects and mechanisms by which this interference occurs must be clarified and discussed (7-9). Thus, this article aimed at describing the consequences of using artificial nipples to exclusive breastfeeding.

## Materials and methods

### Type of study

Integrative literature review carried out in six steps: identifying the research question; setting inclusion and exclusion criteria; categorizing (extracting, organizing, and summarizing information); reviewing the studies; interpreting the results; and presenting the review (10).

### Identifying the research question

The Population, Variables, and Outcomes strategy (Table 1) was used, which also allows for the identification of the most appropriate descriptors for the search intended in the review.

**Table 1.** Formulating the research question and identifying descriptors, with population, variables, and results from elements. Crato, Ceará, Brasil, 2020

Strategy items	Components	Subject descriptors
<i>Population</i>	Newborns	<i>Infant, newborn</i>
<i>Variables</i>	Mamilos	<i>Educational technology</i>
<i>Outcomes</i>	Consequences to breastfeeding	<i>Health promotion</i>

Source: Prepared by the authors based on research data.

So, the question is: What are the consequences of using artificial nipples to exclusive breastfeeding?

### Setting the inclusion and exclusion criteria

Original studies that answered the research question and were published between 2006 and 2019 were defined as inclusion criteria. This time frame is justified by the year when Law 11.265/2006 became effective, which regulates the marketing and appropriate use of food and dummies for infants and children. Duplicate references and studies unavailable for download were excluded.

### Methodology

A paired search was carried out by two authors in March 2020, in the Medical Literature Analysis and Retrieval System Online (Medline®), Cumulative Index to Nursing and Allied Health Literature (Cinahl), Latin American and Caribbean Health Sciences Literature (Lilacs), Web of Science, and Scopus databases. The following controlled descriptors of the Medical Subject Heading (MeSH) were used: “breastfeeding”, “pacifiers”, “breastfeeding”, “bottles”. Two crossings were implemented using the Boolean operator “AND”. A total of 1,239 references were identified in the databases, with the respective crossings (Table 2).

This process resulted in 427 studies, but after excluding 37 duplicates, 390 studies were read in full. After careful reading, 247 studies were excluded for not addressing the desired population (infants aged 0 to 6 months) and 105 were excluded for not being available for download. Thirty-eight articles were included

**Table 2.** References found with the respective crossings (n = 1,239), 2020

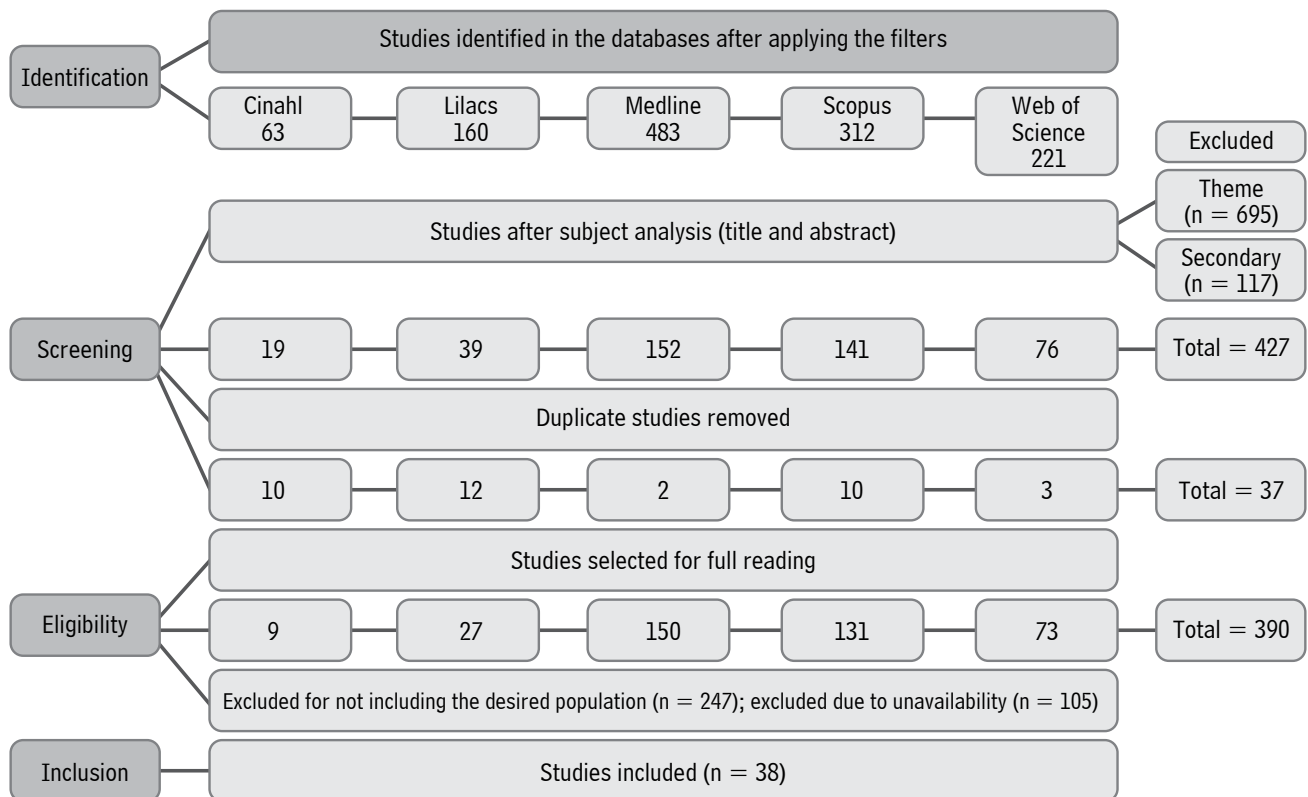
Crossings	Cinahl	Lilacs	Medline®	Scopus	Web of Science	Total
<i>"breastfeeding AND pacifiers"</i>	52	98	346	193	138	827
<i>"breastfeeding AND bottles"</i>	11	62	137	119	83	412
Total	63	160	483	312	221	1,239

Source: Prepared by the authors based on research data.

in the final sample. The flowchart of the Preferred Reporting Items for Systematic Review and Meta-Analysis (Prism) was used

to illustrate the process of study identification, screening, eligibility, and inclusion, as shown in Figure 1.

**Figure 1.** Flowchart for identifying, screening, selecting, and including studies. Crato, Ceará, Brasil, 2020



Source: Prisma flowchart for systematic reviews.

Data were collected with the aid of a previously defined table, which included: author, year, journal/database, location, methodological design, level of evidence, and types of artificial nipples.

Subsequently, the factors influencing the use of artificial nipples on breastfeeding were summarized, found in primary studies, giving rise to two categories: neonatal factors and maternal factors.

Therefore, the articles found were numbered and the levels of evidence of the studies were categorized. Level 1: evidence resulting from a meta-analysis of multiple randomized controlled clinical

trials; level 2: evidence obtained in individual studies with experimental design; level 3: evidence from quasi-experimental studies; level 4: evidence from descriptive (non-experimental) studies or with a qualitative approach; level 5: evidence from a case or experience reports; level 6: evidence-based on expert opinions.

## Results

Thirty-eight articles were analyzed, initially characterized by authors, year, journal, database, location, methodological design, level of evidence, and types of dummies (according to Table 3).

**Table 3.** Characterization of the primary studies included in the review, regarding authorship, year, journal, database, location, design, type of dummy found, and level of evidence. Crato, Ceará, Brasil, 2020

Authors and year	Journal and database	Location	Methodological design	Dummy	Level of evidence
Rocha, Verga, Sipsma, Larson, Phillipi, Kair, 2020 (2)	<i>Breastfeed Med</i> Scopus	The United States.	Qualitative, 23 women, interview	Pacifier	4
Zarshenas, Zhao, Scott, Binns, 2020 (11)	<i>Int J Environ Res Public Health</i> . Medline	Iran	Prospective cohort, 700 women, interview	Pacifier	4
Bezerra, Magalhães, Pereira, Gomes, Netto, Rocha, 2019 (7)	<i>Rev. Bras. Saúde Mater. Infant</i> . Scopus	Brazil	Cross-sectional study, 354 infants, interview	Feeding bottle and pacifier	4
Maastrup, Walloee, Kronborg, 2019 (12)	<i>PLoS One</i> . Medline	Denmark	Prospective cohort, 1,488 newborns and 1,221 mothers, questionnaire, telephone interview	Nipple shield	4
Salcan, Topal, Ates, 2019 (13)	<i>Eurasian J Med</i> . Scopus	Turkey	Cross-sectional, 2,166 babies, interview	Pacifier and feeding bottle	4
Silva, Caminha, Silva, Serva, Azevedo, Filho, 2019 (14)	<i>J Pediatr (Rio J)</i> . Lilacs	Brazil	Analytical cross-sectional study, 310 infants, database	Pacifier	4
Wu, Gao, Sha, Zeng, Liu, Li et al., 2019 (15)	<i>Int J Environ Res Public Health</i> . Medline	Switzerland	Cohort, 951 binomials, questionnaire, phone call	Feeding bottle	4
Batista, Ribeiro, Nascimento, Rodrigues, 2018 (9)	<i>J Pediatr (Rio J)</i> . Web of Science	Brazil	Cross-sectional, observational study 427 binomials, questionnaire	Pacifier and feeding bottle	4
Buccini, Pérez-Escamilla, Benicio, Giugliani, Venancio, 2018 (16)	<i>PLoS One</i> . Medline	England	Secondary study, 42,395 infants, national BF prevalence research data	Pacifier	4
Cruz, Reducino, Probst, Guerra, Ambrosiano, Cortellazzi et al., 2018 (17)	<i>Cad. Saúde Coletiva</i> . Web of Science	Brazil	Cross-sectional, epidemiological study, 301 binomials, data from medical records	Pacifier	4
Júnior, Mohr, Pereira, 2018 (18)	<i>Arq. Catarinense Med</i> . Lilacs	Brazil	Randomized clinical trial, 132 mothers, interview, questionnaire, telephone call	Pacifier	2

Authors and year	Journal and database	Location	Methodological design	Dummy	Level of evidence
Manhire, Williams, Tipene-Leach, Baddock, Abel, Tangiora et al., 2018 (19)	<i>BMC Pediatr.</i> Cinahl	New Zealand	Randomized controlled trial, 197 mother-infant binomials, questionnaires	Pacifier	2
Silva, Cirino, Santos, Oliveira, Sousa, Lima, 2018 (20)	<i>Saúde e Pesquisa.</i> Lilacs	Brazil	Quantitative, cross-sectional, descriptive-exploratory study, 546 newborns, form	Pacifier and feeding bottle	4
Bomfim, Novaes, Bonanato, Navarro, Tedesco, Imparato et al., 2017 (21)	<i>Pesq Bras Odontopediatria Clin Integr.</i> Scopus	Brazil	Cross-sectional, qualitative study, 156 binomials, interview	Feeding bottle	4
Carvalho, Fonsêca, Nobre, Silva, Pessoa, Ribeiro et al., 2017 (22)	<i>Ciêñ Saúde Colet.</i> Web of Science	Brazil	Cohort, 247 infants, semi-structured interview with mothers	Pacifier	4
Dadalto, Rosa, 2017 (23)	<i>Rev Paul Pediatr.</i> Scopus	Brazil	Cross-sectional, descriptive study, 114 binomials, interview	Feeding bottle and pacifier	4
Silva, Pellegrinelli, Pereira, Passos, Santos, 2017 (24)	<i>Ciêñ Saúde Colet.</i> Medline	Brazil	Retrospective study, 12,283 mothers, secondary form data	Feeding bottle and pacifier	4
Praborini, Purnamasari, Munandar, Wulandari, 2016 (25)	<i>Clinical Lactation.</i> Web of Science	The United States.	Quantitative, cross-sectional study, 58 mothers and infants, observation, and questionnaire	Feeding bottle, nipple shield	4
Figueiredo, Bueno, Ribeiro, Lima, Silva, 2015 (26)	<i>J. Hum. Growth Dev.</i> Scopus	Brazil	Cross-sectional study, 25 mothers, structured questionnaire	Pacifier and feeding bottle	4
Lindau, Mastroeni, Gaddini, Lallo, Nastro, Patanè et al., 2015 (27)	<i>Eur J Pediatr.</i> Cinahl	Italy	Longitudinal study, 605 women, questionnaire	Pacifier	4
Pellegrinel, Pereira, Ribeiro, Santos, 2015 (28)	<i>Rev Nutr.</i> Lilacs	Brazil	Cross-sectional, retrospective study, 9,474 mothers, secondary form data	Pacifier and feeding bottle	4
Carrascoza, Possobon, Ambrosano, Júnior, Moraes, 2014 (29)	<i>Rev. CEFAC.</i> Web of Science	Brazil	Descriptive, exploratory, longitudinal, quantitative study, 120 binomials, questionnaire	Pacifier and feeding bottle	4
Demitto, Bercini, Rossi, 2013 (30)	<i>Esc. Anna Nery.</i> Lilacs	Brazil	Descriptive, exploratory, quantitative study, 378 mothers and 383 infants, structured interview	Pacifier	4
Ducci, Vannuchi, Tacla, Souza, Reis, 2013 (31)	<i>Rev Min Enferm.</i> Lilacs	Brazil	Quantitative cross-sectional study, 285 infants, interview with a questionnaire	Pacifier and feeding bottle	4
Rocha, Garbin, Garbin, Saliba, Moimaz, 2013 (32)	<i>Pesqui Bras Odontopediatria Clin Integr.</i> Lilacs	Brazil	Longitudinal, prospective study, 87 binomials, interview with a questionnaire	Pacifier	4
Kaufmann, Albernaz, Silveira, Silva, Mascarenhas, 2012 (33)	<i>ver. Paul Pediatr.</i> Web of Science	Brazil	Prospective cohort, 951 binomials, interview with a questionnaire	Pacifier	4
Queluz, Pereira, Santos, Leite, Ricco, 2012 (34)	<i>Rev Esc Enferm USP.</i> Web of Science	Brazil	Quantitative, cross-sectional study, 275 infants, questionnaire	Pacifier	4
Salustiano, Diniz, Abdallah, Pinto, 2012 (35)	<i>Rev Bras Ginecol e Obstet.</i> Lilacs	Brazil	Cross-sectional, analytical study, 667 infants, semi-structured interview	Pacifier	4
Carrascoza, Possobon, Ambrosano, Costa, Moraes, 2011 (36)	<i>Cien Saude Colet.</i> Web of Science	Brazil	Longitudinal study, 111 binomials, questionnaire	Pacifier	4

Authors and year	Journal and database	Location	Methodological design	Dummy	Level of evidence
Sanches, Buccini, Gimeno, Rosa, Bonamigo, 2011 (37)	<i>Cad Saúde Pública</i> . Lilacs	Brazil	Cross-sectional, 170 binomials, 2 forms	Pacifier	4
Roig, Martínez, García, Hoyos, Navidad, Álvarez et al., 2010 (38)	<i>Rev Lat Am Enfermagem</i> . Scopus	Brazil	Cross-sectional, quantitative, descriptive study 248 mother-infant binomials, interview	Pacifier and feeding bottle	4
Vieira, Martins, Vieira, Oliveira, Silva, 2010 (39)	<i>J Pediatr (Rio J)</i> . Web of Science	Brazil	Cohort, 1,309 binomials, interview	Pacifier	4
Araújo, Silva, Coutinho, 2009 (40)	<i>Rev CEFAC</i> . Lilacs	Brazil	Observational, cross-sectional study, 74 infants, infant assessment, filming, and recording	Pacifier	4
Kishi, Caccia-Bava, Martinez, 2009 (41)	<i>Rev APS</i> . Lilacs	Brazil	Quantitative, cross-sectional study, 53 mothers, interview with a questionnaire	Pacifier	4
Marques, Cotta, Araújo, 2009 (42)	<i>Rev Bras Enferm</i> . Web of Science	Brazil	Qualitative study, 19 mothers, semi-structured interview	Pacifier	4
Parizoto, Parada, Venâncio, Carvalhaes, 2009 (43)	<i>J Pediatr (Rio J)</i> . Web of Science	Brazil	Comparison of three cross-sectional surveys, with 496, 674, and 509 infants, interview	Pacifier	4
França, Giugliani, Oliveira, Weigert, Santo, Köhler et al., 2008 (44)	<i>Rev Saúde Pública</i> . Web of Science	Brazil	Cross-sectional in a cohort, 211 binomials, interview and observation	Feeding bottle and pacifier	4

Source: Prepared by the authors based on research data.

Pacifiers were the type of dummy more commonly found in the studies, followed by feeding bottles and nipple shields.

The summary of the consequences of the use of artificial nipples to exclusive breastfeeding is shown in Table 4. The consequences have been divided into two categories: neonatal consequences and maternal consequences.

**Table 4.** Consequences of the use of artificial nipples to exclusive breastfeeding

Consequences	Evidence extracted from studies
Neonatal	Refusal to breastfeed (2, 26)
	Reduced crying — newborn soothing (26, 30, 43)
	Impaired suction technique (2, 9, 46, 12, 21, 26, 29, 36, 41, 44, 45)
	Incorrect latch-on (7, 9, 44, 45)
	Interference with orofacial development (2, 9, 46)
	Interruption of EBF (2, 12, 25, 26, 29-33, 35, 36, 39, 14, 40-46, 15, 17, 19-23)
Maternal	Early weaning (2, 17, 19-21, 23, 27, 31, 33, 34, 36, 39-41, 43)
	Nipple fissure/pain (9, 21, 30, 40, 45, 46)
	Frustration (23, 30, 37, 38, 45)
	Decreased interaction with the newborn (9, 13, 46)

Source: Prepared by the authors based on research data.

In the first category, the consequences that stood out were the interruption of EBF and early weaning. Regarding maternal consequences, the most prevalent were nipple fissure/pain, frustration, and reduced interaction with the newborn.

## Discussion

Regarding the consequences of the use of artificial nipples to breastfeeding that are associated with the newborn, this review pointed out aspects that ranged from incorrect latch-on to long-term anatomical changes.

One of the relevant effects of the use of artificial nipples on newborns related to exclusive breastfeeding may be changes to the latch and suction pattern. Disagreement on the mechanisms by which this relationship occurs has been found in the literature, with nipple confusion being one of the aspects mentioned. Nipple confusion is a situation in which the suction pattern of the infant is modified due to the properties of the dummy (rigidity and shape of the dummy and base). Consequently, the infant may lose interest in sucking the breast because it is harder to express milk compared to artificial nipples. The nipple confusion phenomenon is



not fully elucidated, as research studies indicate that suction processing in the brainstem allows healthy term infants to adapt suction in response to the specific properties of each dummy being used (1). Thus, nipple confusion is a risk newborns are exposed to when using pacifiers, feeding bottles, or nipple shields.

Another result of this study was newborns refusing to breastfeed due to the use of a pacifier or feeding bottle. Another hypothesis to explain the negative influence of pacifiers on the biomechanics of breastfeeding includes reduced demand for breast milk by the newborn, since pacifier non-nutritive sucking causes fatigue and reduced nursing sessions or breastfeeding suspension (45).

Nevertheless, the pacifier is useful in conditioning and to help preterm infants transition from enteral or gavage nutrition to oral feeding during hospitalization in intensive care units. They also benefit from the weight gain that occurs by regulating gastric motility. Pacifiers with sensory technologies are being developed to quantify the pressure of the sucking pattern and thus gain a better understanding of neurological and motor development in childhood, and explore the potential diagnostic information contained in sucking patterns under various clinical conditions (46, 47).

A positive outcome of the use of artificial nipples was reduced crying and the soothing effect for infants. This effect is also reported in the literature as a causal factor for using a pacifier (48). A study with a Spanish cohort showed that co-sleeping for more than six months seems to be associated with less anxiety, less negative sucking habits (with a pacifier or feeding bottle), and a lower incidence of malocclusions (49), which indicates that other strategies can be used to reduce infant's stress, such as bouncing and breastfeeding.

As for feeding bottles, these similarly interfere with breastfeeding because of the great difference between the flow of milk that is extracted from the breast and that from the feeding bottle, making infants prefer the latter. Furthermore, breastfeeding is a complex task that requires the integration and organization of several different skills, demanding greater effort from newborns (9, 50).

Regarding growth performance, partially breastfed and formula-fed newborns lag slightly behind exclusively breastfed infants in the first six months of life (51), confirming the benefits of maintaining exclusive breastfeeding.

As a result of the use of artificial nipples, this study significantly revealed the negative influence on EBF, leading to interruption and early weaning. However, even though the use of a pacifier/feeding bottle is an indicator of breastfeeding problems, a woman's desire and intention to breastfeed must be taken into account. Given its decisive character for the success of exclusive breastfeeding, this is perhaps the most important indicator of breastfeeding duration. It should be mentioned that the success of breastfeeding depends on several factors, including sociodemographic, biophysical, and psychosocial factors (52, 53).

This study also found factors associated with mothers as a result of the use of artificial nipples, such as the incidence of pain, nipple fissures, frustration, and reduced interaction with their infants.

Nipple pain is related to breast trauma and infections, such as nipple fissures and candidiasis. Therefore, it has been shown that the use of pacifiers and feeding bottles is associated with a higher rate of nipple injury because it can potentially change the sucking pattern and interfere with a proper breastfeeding latch (54). In an Iranian study, pacifier use was a significant risk factor for acute mastitis in the first four weeks and between weeks 5 and 12 postpartum, being associated with duct obstruction, as the infant does not fully empty the breast, in addition to oral contamination with the transmission of pathogens to the breast (55).

An experimental study concluded that pacifiers can potentially interfere with a mother's or infant's ability to read emotional expressions. That is, the harmful effects of the use of pacifiers in newborns imply the perception of less pleasant and less stimulating emotions (56). This finding corroborates a study with binomials in Australia, where mothers with depression were evaluated. When asked to interact with their infants, they inserted a pacifier into their mouths several times, which showed difficulty in interacting (48).

Breastfeeding is not only a result of knowing the benefits and correct techniques or prior decision, but also of a woman's relationships with her social network. That said, women must get support from members of their primary network (relationship with family members, friends, or neighbors), who can help them with household chores and childcare. Taking the relationships established between breastfeeding women and the members of their social networks into account helps professionals address other aspects in addition to the biological aspects of breastfeeding (57), reaching dimensions that can lead to increased EBF duration.

As a limitation, we emphasize the inclusion of studies with a low level of evidence. The descriptors also do not restrict knowledge that is associated with the nursing field. However, the findings allow nursing professionals to broaden their knowledge regarding the risk factors for interrupting EBF due to the use of pacifiers, feeding bottles, and nipple shields.

## Conclusions

The consequences of offering artificial nipples to breastfed infants are mostly negative and associated with the newborn, such as early weaning, refusal to breastfeed, impaired suction technique, incorrect latch-on, interference with orofacial development, and interruption of EBF. Reduced crying and newborn soothing are positive outcomes of the use of artificial nipples during breastfeeding.

Repercussions associated with the mother as a result of offering artificial nipples to infants include nipple fissures and pain, frustration, and reduced interaction with her infant.

It can be emphasized that offering artificial nipples to infants of any age without the risk of discontinuing EBF is not guaranteed. The discussion about whether or not to use artificial nipples does not end here, considering that their use has been normalized by the population. Nevertheless, this review made it possible to understand the mechanisms by which artificial nipples interfere with EBF, and this can support planning by multidisciplinary primary medical care teams focused on promoting, protecting, and support breastfeeding.

**Conflicts of interest:** None declared.

## Referências

1. Zimmerman E. Chupeta e mamadeira: os alvos para os desfechos desfavoráveis da amamentação. *J Pediatr (Rio J)*. 2018;94(6):571-3. DOI: <https://doi.org/10.1016/j.jped.2018.02.001>
2. Rocha CR, Verga KE, Sipsma HL, Larson IA, Phillipi CA, Kair LR. Pacifier use and breastfeeding: A qualitative study of postpartum mothers. *Breastfeed Med*. 2020; 15(1):24-8. DOI: <https://doi.org/10.1089/bfm.2019.0174>
3. World Health Organization (WHO). Guideline: Protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services. Geneva: WHO; 2017. Available from: <https://apps.who.int/iris/handle/10665/259386>
4. Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J *et al*. Breastfeeding in the 21st century: Epidemiology, mechanisms, and lifelong effect. *Lancet*. 2016;387(10017):475-90. DOI: [https://doi.org/10.1016/S0140-6736\(15\)01024-7](https://doi.org/10.1016/S0140-6736(15)01024-7)
5. Pereira-Santos M, Santana MS, Oliveira DS, Nepomuceno Filho RA, Lisboa CS, Almeida LMR *et al*. Prevalência e fatores associados à interrupção precoce do aleitamento materno exclusivo: metanálise de estudos epidemiológicos brasileiros. *Rev. Bras. Saúde Matern. Infant*. 2017;17(1):59-67. DOI: <https://doi.org/10.1590/1806-93042017000100004>
6. Boccolini CS, Boccolini PMM, Monteiro FR, Venâncio SI, Giugliani ERJ. Tendência de indicadores do aleitamento materno no Brasil em três décadas. *Rev Saude Publica*. 2017;51:1-9. DOI: <https://doi.org/10.11606/S1518-8787.2017051000029>
7. Bezerra VM, Magalhães EIS, Pereira IN, Gomes AT, Netto, MP, Rocha DS. Prevalence and determinants of the use of pacifiers and feedingbottle: A study in Southwest Bahia. *Rev. Bras. Saúde Matern. Infant*. 2019;19(2):311-21. DOI: <https://doi.org/10.1590/1806-93042019000200004>
8. Batista CLC, Ribeiro VS, Nascimento MDSB. Influência do uso de chupetas e mamadeiras na prática do aleitamento materno. *J. Health Biol Sci*. 2017;5(2):184-91. DOI: <https://doi.org/10.12662/2317-3076jhbs.v5i2.1153.p184-191.2017>
9. Batista CLC, Ribeiro VS, Nascimento MDSB, Rodrigues VP. Association between pacifier use and bottle-feeding and unfavorable behaviors during breastfeeding. *J Pediatr (Rio J)*. 2018;94(6):596-601. DOI: <https://doi.org/10.1016/j.jped.2017.10.005>
10. Mendes KDS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. *Texto Contexto Enferm*. 2008;17(4):758-64. DOI: <https://doi.org/10.1590/S0104-07072008000400018>

11. Zarshenas M, Zhao Y, Scott JA, Binns CW. Determinants of Breastfeeding Duration in Shiraz, Southwest Iran. *Int J Environ Res Public Health*. 2020;17(4):1192. DOI: <https://doi.org/10.3390/ijerph17041192>
12. Maastrup R, Walloe S, Kronborg H. Nipple shield use in preterm infants: Prevalence, motives for use and association with exclusive breastfeeding — Results from a national cohort study. *PLoS One*. 2019;14(9):e0222811. DOI: <https://doi.org/10.1371/journal.pone.0222811>
13. Salcan S, Topal I, Ates I. The frequency and effective factors of exclusive breastfeeding for the first six months in babies born in Erzincan Province in 2016. *Eurasian J Med*. 2019;51(2):145. DOI: <https://doi.org/10.5152/eurasianj-med.2018.18310>
14. Silva VAAL, Caminha MFC, Silva SL, Serva VMSBD, Azevedo PTACC, Filho, MB. Maternal breastfeeding: Indicators and factors associated with exclusive breastfeeding in a subnormal urban cluster assisted by the Family Health Strategy. *J Pediatr (Rio J)*. 2019;95(3):298-305. DOI: <https://doi.org/10.1016/j.jped.2018.01.004>
15. Wu X, Gao X, Sha T, Zeng G, Liu S, Li L *et al*. Modifiable individual factors associated with breastfeeding: A cohort study in China. *Int J Environ Res Public Health*. 2019;16(5):820. DOI: <https://doi.org/10.3390/ijerph16050820>
16. Buccini G, Pérez-Escamilla R, Benicio MHD, Giugliani ERJ, Venancio SI. Exclusive breastfeeding changes in Brazil attributable to pacifier use. *PLoS One*. 2018;13(12):e0208261. DOI: <https://doi.org/10.1371/journal.pone.0208261>
17. Cruz NACV, Reducino LM, Probst LF, Guerra LM, Ambrosano GMB, Cortellazzi KL, *et al*. Association between type of breastfeeding of newborns at hospital discharge and at six months of age. *Cad. Saúde Colet*. 2018;26(2):117-24. DOI: <https://doi.org/10.1590/1414-462x201800020349>
18. Júnior FJMM, Mohr R, Pereira, DN. O uso de chupetas influencia no tempo de aleitamento materno? *Arq. Catarin Med*. 2018;47(2):156-69. Disponível em: <http://www.acm.org.br/acm/seer/index.php/arquivos/article/view/333/260>
19. Manhire KM, Williams SM, Tipene-Leach D, Baddock SA, Abel S, Tangiora A *et al*. Predictors of breastfeeding duration in a predominantly Māori population in New Zealand. *BMC Pediatr*. 2018;18(1):299. DOI: <https://doi.org/10.1186/s12887-018-1274-9>
20. Silva LLA, Cirino IP, Santos MS, Oliveira EAR, Sousa AF, Lima LHO. Prevalência do aleitamento materno exclusivo e seus fatores de risco. *Saúde e Pesquisa*. 2018;11(3):527-34. DOI: <https://doi.org/10.17765/1983-1870.2018v11n3p527-534>
21. Bomfim LTM, Novaes TF, Bonanato K, Navarro RS, Tedesco TK, Imparato JCP *et al*. Factors related to the practice of exclusive breastfeeding in different cities of the States Minas Gerais and Bahia, Brazil. *Pesq Bras Odontoped Clin Integr*. 2017;17(1):1-10. DOI: <https://doi.org/10.4034/PBOCI.2017.171.14>
22. Carvalho CA, Fonsêca PCA, Nobre LN, Silva MA, Pessoa MC, Ribeiro AQ *et al*. Sociodemographic, perinatal and behavioral factors associated to types of milk consumed by children under in six months: birth cohort. *Cien Saude Colet*. 2017;22:3699-710. DOI: <https://doi.org/10.1590/1413-812320172211.28482015>
23. Dadalto ECV, Rosa EM. Knowledge about the benefits of breastfeeding and disadvantages of the pacifier related to the mother's practice with preterm infants. *Rev Paul Pediatr*. 2017;35(4):399. DOI: <https://doi.org/10.1590/1984-0462/2017;35;4;00005>
24. Silva CM, Pellegrinelli ALR, Pereira SCL, Passos IR, Santos LC. Práticas educativas segundo os “Dez passos para o sucesso do aleitamento materno” em um Banco de Leite Humano. *Cien Saude Colet*. 2017;22:1661-71. DOI: <https://doi.org/10.1590/1413-81232017225.14442015>
25. Praborini A, Purnamasari H, Munandar A, Wulandari RA. Hospitalization for Nipple Confusion. *Clinical Lactation*. 2016;7(2):69-76. DOI: <https://doi.org/10.1891/2158-0782.7.2.69>
26. Figueiredo MCD, Bueno MP, Ribeiro CC, Lima PA, Silva ÍT. Human milk bank: The breastfeeding counseling and the duration of exclusive breastfeeding. *J. Hum. Growth Dev*. 2015;25(2):204-10. DOI: <https://doi.org/10.7322/jhgd.103016>
27. Lindau JF, Mastroeni S, Gaddini A, Lallo DD, Nastro PF, Patané M *et al*. Determinants of exclusive breastfeeding cessation: identifying an “at risk population” for special support. *Eur J Pediatr*. 2015;174(4):533-40. DOI: <https://doi.org/10.1007/s00431-014-2428-x>
28. Pellegrinelli ALR, Pereira SCL, Ribeiro IP, Santos LC. Influência do uso de chupeta e mamadeira no aleitamento materno exclusivo entre mães atendidas em um Banco de Leite Humano. *Rev Nutr*. 2015;631-9. DOI: <https://doi.org/10.1590/1415-52732015000600006>

29. Carrascoza KC, Possobon RF, Ambrosano GMB, Júnior ÁLC, Moraes ABA. Determinants of pacifier use among infants attending an interdisciplinary breastfeeding promotion program. *Rev. CEFAC*. 2014;16(2):582-91. DOI: <https://doi.org/10.1590/1982-021620149712>
30. Demitto MO, Bercini LO, Rossi RM. Uso de chupeta e aleitamento materno exclusivo. *Esc. Anna Nery*. 2013;17(2):271-6. DOI: <https://doi.org/10.1590/S1414-81452013000200010>
31. Ducci AL, Vannuchi TO, Tacla MTGM, Souza SNDH, Reis TB. Prevalência e fatores associados ao aleitamento materno exclusivo em menores de seis meses no município de Rolândia-PR. *Rev Min Enferm*. 2013;17(2):381-97. DOI: <https://doi.org/10.5935/1415-2762.20130029>
32. Rocha NB, Garbin AJI, Garbin CAS, Saliba O, Moimaz SAS. Estudo longitudinal sobre a prática de aleitamento materno e fatores associados ao desmame precoce. *Pesq Bras Odontoped Clin Integr*. 2013;13(4):337-42. DOI: <https://doi.org/10.4034/PBOCI.2013.134.06>
33. Kaufmann CC, Albernaz EP, Silveira RB, Silva MB, Mascarenhas MLW. Feeding during the first three months of life for infants of a cohort in Pelotas, Rio Grande do Sul, Brazil. *Rev. Paul Pediatr*. 2012;30(2):157-65. DOI: <https://doi.org/10.1590/S0103-05822012000200002>
34. Queluz MC, Pereira MJB, Santos CB, Leite AM, Ricco RG. Prevalence and determinants of exclusive breastfeeding in the city of Serrana, São Paulo, Brazil. *Rev Esc Enferm USP*. 2012;46(3):537-43. DOI: <https://doi.org/10.1590/S0080-62342012000300002>
35. Salustiano LPQ, Diniz ALD, Abdallah VOS, Pinto RMC. Fatores associados à duração do aleitamento materno em crianças menores de seis meses. *Rev Bras Ginecol Obstet*. 2012;34(1):28-33. DOI: <https://doi.org/10.1590/S0100-72032012000100006>
36. Carrascoza KC, Possobon RD, Ambrosano GMB, Costa AL, Moraes ABA. Determinants of the exclusive breastfeeding abandonment in children assisted by interdisciplinary program on breast feeding promotion. *Cien Saude Colet*. 2011;16(10):4139-46. DOI: <https://doi.org/10.1590/S1413-81232011001100019>
37. Sanches MTC, Buccini GS, Gimeno SGA, Rosa TEC, Bonamigo AW. Fatores associados à interrupção do aleitamento materno exclusivo de lactentes nascidos com baixo peso assistidos na atenção básica. *Cad Saude Publica*. 2011;27:953-65. DOI: <https://doi.org/10.1590/S0102-311X2011000500013>
38. Roig AO, Martínez MR, García JC, Hoyos SP, Navidad GL, Álvarez JCF *et al*. Factors associated to breastfeeding cessation before 6 months. *Rev Lat Am Enfermagem*. 2010;18(3):373-80. DOI: <https://doi.org/10.1590/S0104-11692010000300012>
39. Vieira GO, Martins CC, Vieira TO, Oliveira NF, Silva LR. Factors predicting early discontinuation of exclusive breastfeeding in the first month of life. *J Pediatr (Rio J)*. 2010;86(5):441-4. DOI: <https://doi.org/10.1590/S0021-75572010000500015>
40. Araújo CMT, Silva GAP, Coutinho SB. A utilização da chupeta e o desenvolvimento sensorio motor oral. *Rev CEFAC*. 2009;11(2):261-7. DOI: <https://doi.org/10.1590/S1516-18462009000200011>
41. Kishi RGB, Caccia-Bava MCGG, Martinez EZ. Prevalência do aleitamento materno exclusivo e fatores associados entre as crianças menores de 6 meses cadastradas em unidades de saúde da família. *Rev APS*. 2009;12(1). Disponível em: <https://periodicos.ufjf.br/index.php/aps/article/view/14248>
42. Marques ES, Cotta RMM, Araújo RMA. Social representations of women who breastfeed about breast feeding and the use of pacifiers. *Rev Bras Enferm*. 2009;62(4):562-9. DOI: <https://doi.org/10.1590/S0034-71672009000400012>
43. Parizoto GM, Parada CMGL, Venâncio SI, Carvalhaes MABL. Trends and patterns of exclusive breastfeeding for under-6-month-old children. *J Pediatr (Rio J)*. 2009;85(3):201-8. DOI: <https://doi.org/10.1590/S0021-75572009000300004>
44. França MCT, Giugliani ERJ, Oliveira LD, Weigert EML, Santo LCE, Köhler CV *et al*. Bottle feeding during the first month of life: Determinants and effect on breastfeeding technique. *Rev Saude Publica*. 2008;42(4):607-14. DOI: <https://doi.org/10.1590/S0034-89102008000500028>
45. Buccini G, Pérez-Escamilla R, Venancio SI. Routine pacifier use in infants: Pros and cons. *J Pediatr (Rio J)*. 2019;95(5):619-21. DOI: <https://doi.org/10.1016/j.jped.2019.06.001>
46. Grassi A, Cecchi F, Sgherri G, Guzzetta A, Gagliardi L, Laschi C. Sensorized pacifier to evaluate non-nutritive sucking in newborns. *Med Eng Phys*. 2016;38(4):398-402. DOI: <https://doi.org/10.1016/j.medengphys.2015.12.013>

47. Calik C, Esenay F. The clinical effect of pacifier use on orogastric tube-fed preterm infants: A randomized controlled trial. *J Pak Med Assoc.* 2019;69(6):771-6. Available from: [https://jpma.org.pk/article-details/9183?article\\_id=9183](https://jpma.org.pk/article-details/9183?article_id=9183)
48. MacMillan KK, Lewis AJ, Watson SJ, Power J, Galbally M. Maternal psychosocial predictors of pacifier use in a mother-infant interaction task: An observational study from the MPEWS pregnancy cohort. *Infant Behav Dev.* Elsevier; 2020;61:101505. DOI: <https://doi.org/10.1016/j.infbeh.2020.101505>
49. Carrillo-Díaz M, Ortega-Martínez AR, Ruiz-Guillén A, Romero-Maroto M, González-Olmo MJ. The impact of co-sleeping less than 6 months on children's anxiety, oral habits, and malocclusion in a Spanish sample between 2 and 5 years old: A cross-sectional study. *Eur J Orthod.* 2021. DOI: <https://doi.org/10.1093/ejo/cjab032>
50. Pineda R, Prince D, Reynolds J, Grabill M, Smith J. Preterm infant feeding performance at term equivalent age differs from that of full-term infants. *J Perinatol.* 2020;40(4):646-54. DOI: <https://doi.org/10.1038/s41372-020-0616-2>
51. Zong X-N, Li H, Zhang Y-Q, Wu H-H. Growth performance comparison of exclusively breastfed infants with partially breastfed and formula fed infants. *PLoS One.* 2020;15(8):e0237067. DOI: <https://doi.org/10.1371/journal.pone.0237067>
52. Alyousefi NA. Determinants of successful exclusive breastfeeding for saudi mothers: Social acceptance is a unique predictor. *Int J Environ Res Public Health.* 2021;18(10):5172. DOI: <https://doi.org/10.3390/ijerph18105172>
53. Hermanson Å, Åstrand LL. The effects of early pacifier use on breastfeeding: A randomised controlled trial. *Women Birth.* 2020;33(5):e473-82. DOI: <https://doi.org/10.1016/j.wombi.2019.10.001>
54. Sousa TM, Santos LC, Peixoto ÉF, Lopes LMC, Andrade LB, Frois MC *et al.* Factors associated with nipple lesions in puerperae. *J Trop Pediatr.* 2016;62(1):63-8. DOI: <https://doi.org/10.1093/tropej/fmv056>
55. Zarshenas M, Zhao Y, Poorarian S, Binns CW, Scott JA. Incidence and risk factors of mastitis in Shiraz, Iran: Results of a cohort study. *Breastfeed Med.* 2017;12(5):290-6. DOI: <https://doi.org/10.1089/bfm.2016.0153>
56. Rychlowska M, Korb S, Brauer M, Droit-Volet S, Augustinova M, Zinner L *et al.* Pacifiers disrupt adults' responses to infants' emotions. *Basic Appl Soc Psych.* 2014;36(4):299-308. DOI: <https://doi.org/10.1080/01973533.2014.915217>
57. Souza M, Nespoli A, Zeitoune R. Influence of the social network on the breastfeeding process: A phenomenological study. *Esc Anna Nery.* 2016;36(4):657-72. DOI: <https://doi.org/10.1177/0890334420930696>