Factors associated with exclusive breastfeeding in children under the age of six months in Guarapuava, PR

Fatores associados ao aleitamento materno exclusivo em crianças menores de seis meses em Guarapuava, PR

Larissa Naiana Rauber[1]
Thais Fernanda Sehnen de Souza[1]
Priscilla Negrão de Moura[1]
Catiuscie Cabreira da Silva[1]
Luana Bernardi[1]
Paula Chuproski Saldan[1]

[1] Universidade Estadual do Centro-Oeste, Departamento de Nutrição. Guarapuava-PR, Brasil.

Correspondence
Paula Chuproski Saldan
Departamento de Nutrição Campus CEDETEG
Rua Simeão Camargo Varela de Sá, 03 Vila Carli
– CEP 85040-080 Guarapuava, PR, Brasil
E-mail: pchuproski@unicentro.br

Abstract

Objective: To analyze the factors associated with exclusive breastfeeding in children under the age of six months in Guarapuava, PR, Brazil. *Methods*: An analysis was made of data from children under the age of six months who participated in The National Vaccination Campaign against Poliomyelitis 2012 in Guarapuava, PR, Brazil. The data were collected by means of a questionnaire with questions about feeding children the day before the survey and characteristics of children and mothers. To identify factors associated with exclusive breastfeeding, Poisson regression models were constructed, obtaining Prevalence Ratios (PR) in bivariate and multiple models. The only factors considered to be associated with breastfeeding were those with $p<0.05$ in the multiple models. *Results*: Data from 459 children were analyzed. The independent factors associated with the interruption of exclusive breastfeeding in this study were the use of artificial nipples (PR 1.79; CI 1.57-2.05) and not being breastfed in the first hour of life (PR 1.18; CI 1.05-1.34). *Conclusions*: It is important to evaluate the factors that influence breastfeeding in order to offer more effective strategies for the protection of this action, aiming to increase the duration of exclusive breastfeeding.

Keywords: Breastfeeding. Infant. Cross-Sectional Studies.

Resumo

Objetivo: Analisar os fatores associados ao Aleitamento Materno Exclusivo (AME) em crianças menores de seis meses de vida em Guarapuava-PR. *Metodologia*: Foram analisados dados das

crianças menores de seis meses de vida que participaram da Campanha Nacional de Vacinação contra Poliomielite 2012, em Guarapuava-PR. A coleta ocorreu por aplicação de questionário contendo perguntas referentes à alimentação das crianças no dia anterior à pesquisa, características das crianças e das mães. Para a identificação dos fatores associados ao AME, foram construídos modelos de regressão de Poisson, obtendo-se Razões de Prevalências (RP) em modelos bivariados e múltiplo. Consideraram-se fatores associados ao AME as variáveis que mantiveram p<0,05 na análise múltipla. *Resultados*: Foram estudadas informações de 459 crianças. Os fatores independentes relacionados à interrupção do AME em menores de seis meses de vida foram o uso de bicos (RP 1,79; IC 1,57-2,05) e não ser amamentado na primeira hora de vida (RP 1,19; IC 1,05-1,34). *Conclusões*: É importante avaliar os fatores que influenciam a amamentação a fim de propor estratégias mais efetivas para proteção desta prática, em prol do aumento da duração do Aleitamento Materno Exclusivo.

Palavras-chave: Aleitamento Materno. Lactente. Estudos Transversais.

Introduction

Breast milk (BM) is the only complete food containing nutrients needed to feed babies in the first six months of life.[1] Since 2001, due to evidence of human milk benefits, the World Health Organization (WHO) recommends that children be exclusively breastfed in the first six months of life and only after that period adequate and safe complementary food (CF) be provided with continued breastfeeding (BF) for two years or more.[2]

Exclusive breastfeeding (EBF) in the first six months of life is a key intervention for children's survival and provides protection against respiratory infections and diarrhea.[3,4] Infants are more likely to die from infectious diseases in the first two months of life than those who are breastfed.[5] It has been estimated that deaths of 823,000 children and 20,000 mothers could be annually avoided with the worldwide expansion of breastfeeding, also with additional savings of 302 billion dollars.[6,7]

In addition, BF decreases risks of allergies and chronic noncommunicable diseases (NCDs), has a positive effect on intelligence, improves the development of the oral cavity, has some lower financial cost for the family and promotes bond between the mother and the child.[1]

Breastfeeding also brings benefits to mothers. It is estimated that for each year of breastfeeding there is a 4.3% reduction in breast cancer and 15% in diabetes risks. And for each month of breastfeeding the risk of ovarian cancer is 2% lower.[8,9] It also favors postpartum weight loss and prolongs lactational amenorrhea.[10]

Prevalence of EBF in Brazil at two and three months of life has increased from 26.4% in 1996 to 48.3% in 2006,[11] showing that despite the increase in prevalence, these numbers still fall short of recommendations. Data from the 2008 Second Survey of Breastfeeding Prevalence in Brazilian Capital Cities and Federal District have indicated EBF prevalences of 41% in children under six months and EBF mean duration of 54.1 days, lower than what is recommended.[12]

In Brazil, studies show that factors such as education, mothers' age, practices associated with childbirth and birth have influence on BF.[13,14] Other national studies warn that the feeding period is precocious, the consistency and the food offered are inadequate and factors such as primipara, age, education, work and mothers' income influence children's diets.[15-17]

EBF prevalence in children under six months of age in the Brazilian city of Guarapuava, PR, according to two local studies, is low. In 2004, EBF prevalence was 37.3% and in 2012 36.0%.[18,19] In the municipality, EBF average period found in 2012 among children under six months of age was 48.2 days.[19] Thus, the objective of this study was to analyze factors associated with EBF in children under six months of age in the city of Guarapuava, PR, in order to propose more effective strategies for coping with the low prevalence of this practice.

Methodology

For this study, part of the data collected in a cross-sectional study conducted during the 2012 National Polio Vaccination Campaign, in Guarapuava, PR, was used.[19] The study population was the group of children under two years of age who attended vaccination stations in urban and rural areas of the municipality during the campaign. But for this study data on children under six months of age were used.

The sample size was estimated based on EBF prevalence in children under six months of age, with a 40% parameter between 2-3 months, according to a local study,[20] and a sample error of 9%. Estimates were obtained by applying the algebraic expression by Lwanga & Lemeshow[21] described below:

$$n_1 = \frac{P.Q}{(d/1,96)^2}$$

Subsequently, a non-response adjustment of 5% and a design effect of 1.4 were applied. The final sample size of children under six months of life was 550, as can be seen in Table 1.

Chart 1. Calculation of the study sample

Group	Estimator	Parameter	Sample error	Confidence level	n of the range	n extended	*deff* 1.4	Non-answer (5%)	n final (for multiple analysis)
< 6 months	EBF (2 to 3 full months)	40%	9%	95%	(2-3 m) 114	(< 6 months) 342	478.8	502.7	550

EBF = Exclusive Breastfeeding, *deff* = abbreviation for "*design effect*" – Study design effect.

The study adopted cluster sampling. And considering that the children were not evenly distributed in the various vaccination stations (conglomerates), a two-stage draw[22] with probability proportional to the conglomerates size was applied. In the first stage, vaccination stations were randomly selected. And in the second one children were systematically drawn in the vaccination line at each vaccination station. Thirty-two vaccination posts were selected.

Data collection was carried out from June 11 to 29, 2012. The collection instrument was a questionnaire based on and modified from that applied in the Breastfeeding and Municipalities project vaccination campaigns of the Health Institute of the Department of Health in the Brazilian city of São Paulo[13] adopted by the Brazilian Ministry of Health to carry out the 2008 Second Survey of Breastfeeding Prevalence in Brazilian Capital Cities and Federal District.[12] Questions about diets would be based on all foods children would likely eat the day before the interview (BM, water, tea, other milks, porridge, fruit juice, fruit, salty food – food cooked in pans, mash or soup) (a 24-hour Reminder). And the other questions would be related to the children, mothers and health services.

For the data collection, 118 volunteer students were selected from Nutrition and Nursing courses at a local university and they received a 4-hour training. To identify factors associated with EBF, Poisson regression models were constructed, obtaining Prevalence Ratios (PR) in bivariate and multiple models, estimated by points and 95% Confidence Intervals (95% CI). The dependent variable of this study was the EBF indicator in children under six months of age (yes or no). Independent variables were: children's gender (female or male), type of delivery (vaginal or cesarean section), birth weight (≥ 2500 or < 2500 grams), breastfeeding in the first hour of

life (yes or no), use of baby bottle teats – baby bottle, feeding pacifier and pacifier – (yes or no), health services where children have consultations (public health system or private health system/ health insurance), mothers' parity (primiparous or multiparous), mothers' age (≥ 20 or < 20 years), mothers' education (≥ 8 or < 8 years of education), mothers' work (working outside the home, not working outside the home or in maternity leave), living with the children's father (yes or no) and area of residence (urban or rural). Children's age in months (0-1 month, 1-2, 2-3, 3-4, 4-5 months) was considered as a control variable. The reference categories were coded at 0 and the risk categories at 1.

Bivariate models were constructed containing each of the independent variables and the dependent variable. The variables for which values of $p \leq 0.20$ (Wald test) were obtained were selected for the multiple model. For the final model, the stepwise forward procedure was used, remaining in the model the variables that presented $p < 0.05$.

Estimates were calculated taking into account the design effect (survey module). Data analysis was processed in version 12.0 Stata (StataCorp, College Station, Texas, USA) general-purpose statistical software package.

The present study was approved by the Research Ethics Committee (REC) of Ribeirão Preto College of Nursing at Brazilian university *Universidade de São Paulo* (Document CEP-EERP/USP – 253/2012).

Results

In this study, factors associated with EBF practices of 459 children under six months of age were analyzed. The number of refusals in the original study was 149 (8.06%), in which data were collected from 1,848 children younger than two years of age.

Table 1 shows the main characteristics of the mothers and children participating in the study. It was observed that 51.63% of the children were vaginally born, 93.90% had adequate birth weight and 76.69% were breastfed in the first hour of life. Regarding the mothers, it was found that 67.54% were twenty years old or older and 66.45% had eight or more years of education.

In the bivariate analysis (Table 2), there was a significant association between EBF and the following variables: type of delivery ($p = 0.186$), birth weight ($p = 0.082$), breastfeeding in the first hour of life ($p = 0.001$), use of baby bottle teats ($p < 0.001$), mothers' parity ($p = 0.002$), mothers' education ($p = 0.182$), mothers' work ($p = 0.003$) and area of residence ($p = 0.208$).

Table 1. Characteristics of mothers and children under six months of age participating in the study in the Brazilian city of Guarapuava, PR, 2012.

Characteristics	N	%
Age range (months)		
0 ├──1	75	16.34
1 ├──2	78	16.99
2 ├── 3	76	16.56
3 ├── 4	80	17.43
4 ├── 5	74	16.12
5 ├── 6	76	16.56
Gender		
Female	231	50.33
Male	228	49.67
Type of parturition		
Vaginal	237	51.63
Cesarean section	221	48.15
Not informed*	1	0.22
Weight at birth (grams)		
≥ 2,500	431	93.90
< 2,500	26	5.66
Not informed*	2	0.44
The child has suckled in the first hour of life		
Yes	352	76.69
No	99	21.57
Not informed*	8	1.74
Use of baby bottle teats		
Yes	165	35.95
No	289	62.96
Not informed*	5	1.09

Continuation of Table 1

Characteristics	N	%
Health services		
Public health system	310	67.54
Private health system/health insurance	136	29.63
Not informed*	13	2.83
*Maternal parity***		
Primiparous	230	50.11
Multiparous	196	42.70
Not informed*	33	7.19
Mothers' age (years) **		
< 20	11	24.62
≥ 20	310	67.54
Not informed*	36	7.84
Mothers' education (years) **		
≥ 8	305	66.45
< 8	121	26.36
Not informed*	33	7.19
*Mothers' work***		
Mothers work outside the home	67	14.60
Mothers do not work outside the home	298	64.92
Mothers on maternity leave	60	13.07
Not informed*	34	7.41
*Mother lives with the child's father***		
Yes	367	79.96
No	59	12.85
Not informed*	33	7.19
Area of residence		
Urban	411	89.54
Rural	48	10.46

*Data not answered by the child's chaperone.

**Data collected when the child's chaperone was the mother.

Table 2. Bivariate models considering exclusive breastfeeding in children under six months and independent variables in the Brazilian city of Guarapuava, PR, 2012.

Variable	Raw PR	95% CI	p value*
Child's gender			
Female	1.00		
Male	0.95	(0.78 – 1.15)	0.593
Type of parturition			
Vaginal	1.00		
Cesarean section	0.91	(0.79 – 1.05)	**0.186****
Weight at birth (grams)			
≥ 2500	1.00		
< 2500	1.22	(0.97 – 1.53)	**0.082****
The child has suckled in the first hour of life			
Yes	1.00		
No	1.28	(1.12 – 1.46)	**0.001****
Use of baby bottle teats			
No	1.00		
Yes	1.93	(1.68 – 2.23)	**< 0.001****
Health services			
Public health system	1.00		
Private health system/health insurance	0.93	(0.79 – 1.09)	0.353
Maternal parity			
Multiparous	1.00		
Primiparous	1.23	(1.03 – 1.47)	**0.022****
Mothers' age (years)			
≥ 20	1.00		
< 20	1.03	(0.84 – 1.25)	0.775

to be continued

Continuation of Table 2

Variable	Raw PR	95% CI	p value*
Mothers' education (years)			
≥ 8	1.00		
< 8	1.10	(0.95 – 1.27)	**0.182****
Mothers' work			
Mothers work outside the home	1.00		
Mothers do not work outside the home	0.76	(0.64 – 0.90)	**0.002****
Mothers on maternity leave	0.63	(0.48 – 0.84)	**0.003****
Mother lives with the child's father			
No	1.00		
Yes	0.96	(0.78 – 1.17)	0.662
Area of residence			
Urban	1.00		
Rural	1.10	(0.95 – 1.27)	0.208**

PR = Prevalence Ratio, 95% CI = Confidence Interval, *Wald test,**Variables selected for the multiple model.

Independent factors associated with the EBF interruption in children under six months of age in Guarapuava, PR, were: using baby bottle teats (PR = 1.79; CI = 1.57 – 2.05) and not being breastfed in the first hour of life (PR = 1.19; CI = 1.05 – 1.34), after controlling for effects of children's birth weight, type of delivery, mothers' parity, education, mothers' age, mothers' work, area of residence and children's age in months (Table 3).

Table 3. Factors associated with interruption of exclusive breastfeeding in children under six months of age in the Brazilian city of Guarapuava, PR, 2012.

Variable	Raw PR (95% CI)	Adjusted PR (95% CI)*
Use of baby bottle teats		
No	1.00	1.00
Yes	1.93 (1.68 – 2.23)	1.79 (1.57 – 2.05)
The child has suckled in the first hour of life		
Yes	1.00	1.00
No	1.28 (1.12 – 1.46)	1.19 (1.05 – 1.34)

Controlled variables for child's birth weight, type of delivery, maternal parity, schooling, maternal age, maternal work, area of residence and child's age in months.

PR = Prevalence Ratio, 95% CI = Confidence Interval, *Poisson regression.

Discussion

This study has made it possible to analyze the characteristics of the participating mothers and children and to evaluate independent factors associated with EBF interruption among children under six months of age in the Brazilian city of Guarapuava, PR, which were: using baby bottle teats and not being breastfed in the first hour of life.

The association between stopping breastfeeding and using teats (in baby bottles and pacifiers) is well reported in the literature. Research with children under six months of age in a Multivaccination Campaign in the Brazilian city of Uberlândia, MG, in 2008 reported the use of pacifiers and teats (OR = 4.2, CI = 2.8 – 6.3) associated with early weaning,[23] similar to the present study. Pellegrinelli et al.,[24] in a study with 9,474 mothers between 2009 and 2011, analyzed sociodemographic information, obstetric history, data on breastfeeding, baby bottle and pacifier, and also found the use of baby bottle associated with EBF lower prevalence.

A cross-sectional study on the situation of breastfeeding and CF in a municipality in the Vale do Ribeira (region in the south of the state of São Paulo and the northeast of the state of Paraná, Brazil) has revealed that children who did not use a pacifier (PR = 1.95; 95% CI = 1.15 – 3.30) were more likely to be in EBF.[25] Campagnolo et al.,[26] in a survey conducted in the Brazilian city of Porto Alegre, RS, in 2008 with 1,099 children under one year of age, have also found EBF higher frequency among children who did not use pacifiers.

Ducci et al.,[27] in a cross-sectional study in the Brazilian city of Rolândia, PR, have concluded that children under four months of age who did not use a baby bottle presented a 13.56-fold greater EBF prevalence than children who used it (p < 0.001).

Early weaning caused by the use of a baby bottle can be explained by some confusion generated by exposure to different forms of suction. After trying the baby bottle, children begin to present difficulty when they are breastfed.[1]

Many mothers often offer pacifiers as a way of decreasing and spacing breastfeeding to meet suckling needs when returning to work in order to calm the babies and help them sleep.[28,29] Dadalto et al.,[30] initially investigating 62 mothers of preterm newborns in the Brazilian city of Vitória, ES, have observed that 34.6% of the mothers would offer pacifiers to calm the children; 26.9%, to help them fall asleep faster; 23.1%, to increase suckling time by being fed all night; 11.5%, because the baby started thumb sucking; and 3.8%, to see if they needed the pacifier. This study has also shown that the age to start a pacifier habit in 26.9% occurred before the three months of the child. And in 73.1%, at the age of three months or older.

A cohort study started in 2000 involving 250 children born at Brazilian Children's Hospital *Hospital Amigo da Criança* in the city of Porto Alegre, RS, has verified the use of pacifiers with data collection in the maternity ward at the end of the first month in the second, fourth and sixth months of life. It was found that 20.4% of the mothers took pacifiers to the maternity hospital facility and 1.2% offered it to the newborn. In the first month, 61.6% of the children located were using baby bottle teats. And of these, 34.2% were using them from the first week of life.[31] A regional cultural aspect is also related to the use of baby bottles and interrupting EBF. Saldiva et al.[32] have analyzed data from 18,929 children of the 2008 Second Survey of Breastfeeding Prevalence in Brazilian Capital Cities and Federal District, finding a higher prevalence ratio for tea consumption in southern capital cities among children under six months of age. The habit of introducing tea can be explained by the cold weather, in addition to being widely used for therapeutic purposes.

A cross-sectional study analyzing data from 34,366 children also obtained from the 2008 Second Survey of Breastfeeding Prevalence in Brazilian Capital Cities and Federal District evaluating factors associated with the use of pacifiers and/or baby bottles by children under one year of age has found that having been breastfed in the first hour of life favored less frequent use of artificial teats.[29]

Neves et al.,[33] in a survey with 9,060 children under six months of age living in the (the largest socio-geographic division in Brazil) Legal Amazon and Northeastern Brazil, have identified some 3,8%higher EBF probability among mothers who breastfed in the first hour of the children's life, as well as in the present study. A longitudinal study conducted with 246 women in 2003 with follow-

up up to the children's first year or until weaning, has found that the first feeding after six hours of life was associated with shorter BF duration (RR = 1.95, CI = 1.03 – 3.67).[34]

Ramos et al.[35] have conducted a diagnosis of BF situation by researching 1,963 children under one year of age in 45 municipalities of Brazilian state Piauí in 2006. Among the results, breastfeeding in the first hour of life was associated with breastfeeding (p < 0.001). In the study cited above, there was some greater significance (82%) of suckling among children who were fed on the first day of life regarding those who were not (68%).

A study conducted in the Brazilian city of Feira de Santana, Bahia, with 2,319 children under one year of age, has found greater chances of exclusive breastfeeding among children who were breastfed on the first day of life (40.4%) and who would not use pacifiers (49.4%), as well as data from the present study.[36]

Breastfeeding promotion in the first hour of life, besides being crucial to success of exclusive and continued breastfeeding, can be some protection factor against neonatal mortality rates and it is important to perform this procedure in the very delivery room.[37]

Will et al.[38] have investigated factors influencing breastfeeding in the first hour of life among 169 children from the Brazilian city of Vitória, ES, in 2009, enrolled in Brazilian government Family Health Care Units (USF, in the Portuguese abbreviation). They have found an association between breastfeeding in the first hour of life and the variables vaginal delivery and being in joint hospital inpatient ward accommodations. A cross-sectional study has analyzed data from the Brazilian municipality of Rio de Janeiro, RJ, between 1999 and 2001, investigating 8,397 mothers. It was found that BF in the first hour of life was less prevalent among newborns with complications after delivery among mothers who would have no contact with the babies in the delivery room, among those who would have cesarean section delivery and those whose delivery would take place in private maternity hospitals or in agreement with Brazilian government Unified Health System (SUS, in the Portuguese abbreviation). In this study, cesarean section birth reduced breastfeeding prevalence in the first hour in local maternity hospitals by half.[39] The southern region has one of the highest cesarean section birth percentages in Brazil, corresponding to 51.6% of births, which is a risk factor for not breastfeeding in the first hour of life.[11]

As a strategy for BF protection and promotion, there are the so–called *Hospitais Amigos da Criança* (Friendly Hospital for Children). Breastfeeding in the first hour of life corresponds to step 4 at *Hospital Amigo da Criança* (IHAC, in the Portuguese abbreviation) in order to support mother-infant interaction soon after delivery. This Initiative was launched in 1991 with the aim of changing hospital routines in accordance with the "Ten Steps to Successful Breastfeeding" by WHO and the United Nations Children's Fund (UNICEF) and not accepting donations from BM surrogates.[40]

Although the factors associated with EBF interruption in children under six months of age found in this study are already recognized in the literature, for the municipality and health managers this information is extremely relevant for planning actions aimed at promoting BF. Health professionals working with obstetrics need to promote breastfeeding within the first hour of children's life, given the benefits of this practice. However, the use of teats is more difficult to change and requires efforts from professionals working with breastfeeding but also parents and family members who need to rethink their use and what it implies for children's health.

As a more concrete action to improve BF prevalence in the municipality of Guarapuava, we can mention IHAC and the two hospitals in the municipality which are trying to accredit this strategy. In addition to this, we can also mention Brazilian government Strategy for Breastfeeding and Feeding Brazil (EAAB, in the Portuguese abbreviation), which aims to qualify primary care professionals in BF and CF topics.

Some limitations of the study are the way to evaluate EBF by the 24-hour Reminder method, which may overestimate this practice, since the children may not have received other fluids or food the day before the interview but may have received in others days not evaluated in this study. In addition, some data about the children not provided by the mothers may also compromise the present study results, especially when children were not accompanied by their mothers.

Conclusions

This study has made it possible to analyze factors associated with EBF in children under six months of age in the city of Guarapuava, PR. It was observed that the use of baby bottle teats and not being breastfed in the first hour of life are associated with EBF discontinuation.

It is important to evaluate factors influencing breastfeeding in each region/municipality in order to propose more effective strategies to protect EBF practices for children's health. Therefore, we highlight the promotion of continuous actions directed to factors that influence early weaning in the municipality, contributing to increase the duration of this practice. ´

Contributors

Rauber LN, de Souza TFS and Saldan PC have worked at all stages, from the study design to the article final version revision. Moura PN, da Silva C and Bernardi L have participated in writing the article and its final version.

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