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Weaning and associated factors in children from low-income communities

Fatores associados ao desmame em crianças de comunidades de baixa renda

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Resumo

Introdução: A duração média do aleitamento materno ainda é insuficiente e apresenta grandes variações em razão do local e das características da população estudada. **Objetivo:** Analisar os fatores associados ao desmame em crianças sul brasileiras de comunidades de baixa renda. **Material e método:** Estudo transversal realizado através de entrevista envolvendo 124 mães de crianças com até 12 meses de idade, atendidas pela Pastoral da Criança, em Almirante Tamandaré, Paraná, Brasil. O risco ao desmame foi considerado como variável resposta e os dados do questionário, variáveis preditoras. Os dados foram analisados através do método de Kaplan-Meier, modelo de regressão de Cox e correlação de Spearman (α = 0,05). **Resultado:** A tábua de vida atuarial revelou uma probabilidade condicional de desmame maior aos 12 meses de idade, seguido do primeiro e quarto meses. A análise multivariada mostrou que o contato com a mamadeira antes do sexto mês de vida [HR=17,16 (2,34-125,86)] e o contato com a chupeta antes do sexto mês de vida [HR=3,48 (1,90-6,38)] foram variáveis de risco associadas ao desmame. Entre as crianças desmamadas, por ocasião da entrevista, a duração da amamentação apresentou correlação positiva com a idade do primeiro contato com açúcar (r_s=+0,419; p=0,001) e negativa com a duração do uso de chupeta (r_s=-0,300; p=0,017). **Conclusão:** O uso da mamadeira e da chupeta estiveram relacionados a uma menor duração do aleitamento materno nestas comunidades.

Descritores: Aleitamento materno; desmame; fatores de risco.

Abstract

Introduction: The average duration of breastfeeding is still insufficient and differ widely taking in account the location and specific characteristic of local people involved in these studies. **Aim:** This research aimed at studying factors associated to weaning among South Brazilian children living in a low-income household. **Material and method:** Cross-sectional study was carried out enrolling 124 mothers of 1 to 12-month-old children, who were interviewed at "*Pastoral da Criança*" (non-governmental organization) in Almirante Tamandaré, Paraná, Brazil. The risk of weaning considered was the dependent variable and the information collected from the questionnaires, independent variables. The method used to collect information in this study was Kaplan-Meier method and Cox regression model and Spearman's rank correlation (α = 0.05). **Result:** Actuarial life table presented a higher weaning conditional probability at 12 months of age, followed by first and fourth months of age. Multivariate analysis pointed out that contact with bottle feeding before the sixth month of age [HR=17.16 (2.34-125.86)] and contact with pacifier before the sixth months of age [HR=3.48 (1.90-6.38)] are risk factors associated with weaning. Among children who were not breastfed at the moment of the interview, breastfeeding duration presented a positive correlation with the ages when the children had their first contact with sugar (r_s=+0.419, p=0.001) and negative correlation with the use of pacifier (r_s=-0.300, p=0.017). **Conclusion:** Results from this study showed that the use of the feeding bottle and pacifier were related to a shorter breastfeeding time span at these communities.

Descriptors: Breast feeding; weaning; risk factors.

INTRODUCTION

The World Health Organization recommends exclusive breastfeeding until the child reaches six months of age and that, complemented with other types of nourishment, it persist until twenty-four months or more of age[1].

In Brazil, several sectors of society develop actions intended to promote and maintain breastfeeding and, despite advances in the average duration of this practice, it is still insufficient and presents large variations due to the location and socioeconomic characteristics of the population being studied[2].

The duration and prevalence of breastfeeding has been less in socioeconomically disadvantaged populations[3], where the negative consequences of the lack of breastfeeding may be even greater. Children who did not receive maternal milk effectively in the first years of life have greater risk of developing infections, in addition to increased risk of morbidity and mortality from pneumonia and diarrhea[4]. On the other hand, the practice of breastfeeding in low-income communities has contributed to the reduction in mortality in children less than five years of age[5].

The practice of breastfeeding is constructed from biological aspects and is socially conditioned[6]. Its success depends on several variables and not only on the maternal desire to breastfeed. Cultural practices such as the introduction of other liquids, use of a pacifier and bottle may influence the reduction of the duration of the breastfeeding[7]. Factors related to the child such as low birth weight may also contribute to early weaning[8]. Socioeconomic status, educational level, working conditions and maternal age may also affect the motivation to breastfeed[3,9].

Since breastfeeding is a practice that is intrinsically linked to the socioeconomic and cultural patterns of a particular population, it is highly appropriate that the characteristics of the breastfeeding pattern of specific populations be known in order to evaluate the risk factors for early weaning and to contribute to the planning of health actions that favor its practice.

Therefore, the objective of this study was to analyze the duration of breastfeeding and the factors associated with this practice in children from the south of Brazil, belonging to low-income communities, in the city of Almirante Tamandaré, in the state of Paraná, Brazil.

METHOD

1. *Design and Population of the Study*

This is a cross-sectional, epidemiological study using retrospective data collected between June and September 2011, through interviews with mothers of children up to 12 years of age. The mothers were participants in monthly follow-up meetings of the *Pastoral da Criança* (non-governmental organization that promotes actions aimed at health, disease prevention, nutrition, education and citizenship) in Almirante Tamandaré (PR), in six low-income communities in the city. *Pastoral da Criança* acts in the prevention of infant mortality through actions promoting healthy feeding, breastfeeding, monitoring pregnant women and child development.

According to data from the map of poverty and inequality from IBGE[10] (2003), the incidence of poverty in the city of Almirante Tamandaré is 48.63% (percentage of people below the poverty line). *Pastoral da Criança* monitors those children under six years of age and pregnant women who are part of this low-income population. According to data from the IBGE[11] (2010), there were 1743 children under one year of age in the city at the time of the study. In June 2011, 145 children between one and 12 months of age were registered in the *Pastoral da Criança* Information System in the city of Almirante Tamandaré and were actively monitored, thus constituting the population of the present study. All were invited to participate in the study by means of signing a Free and Informed Consent form, signed by the parents. Criteria for exclusion included: children who, during the four months of data collection, did not show up at any of the *Pastoral da Criança* monitoring meetings (n = 15); and, those for whom breastfeeding was impossible since birth due to infectious disease (like HIV) or anatomical problems and post-partum complications related to the mother (n = 6). Thus, 124 pairs of mothers and children were evaluated. This study was approved by the Committee for Ethics in Research of the Health Sciences Department of UFPR (record CEP/SD 1095.020.11.03 CAAE 0019.0.091.000-11).

2. *Questionnaire and Pilot Study*

A semi-structured questionnaire composed of open and closed questions adapted from another study with similar objectives[12], was administered in an interview format.

For cultural adaptation of the language and verification of its applicability for obtaining data that would respond to the objectives of the study, the questionnaire was submitted to pretesting, and was first applied to ten mothers of children in the same age range served by *Pastoral da Criança* in other communities (metropolitan region of Curitiba). The sequence of questions and the timing of the interview were also verified. The questionnaire was then reformulated and, to verify the understanding and consistency of the new version, a test-retest was done with 12 other mothers within 14 days. This version of the questionnaire was easily understood by all the mothers, having kappa values from 0.756 to 1.0 for nominal category variables and an intraclass correlation coefficient ranging from 0.906 to 1.0 for the numeric variables. The final version of the questionnaire was used in the data collection, and the interviews were conducted by a single, previously trained researcher (AKB).

Data about gestational age, birth weight and height were obtained from the children's health portfolios.

The dependent variable, the duration of breastfeeding, was noted in months. The following data related to the mother were included among the predictor variables: age, schooling (in nine categories, ranging from "no school" to "college completed") and employment status at the time of the interview ("work outside the house", "on maternity leave" or "do not work outside the house"). The mothers were asked about the introduction of sugar into the diet of the child ("no" and "yes") and the age in months of the

first contact with sugar. Information about the occurrence and duration of the habits of thumb-sucking ("no" and "yes"), the use of a pacifier ("no" and "yes") and the use of the bottle ("no" and "yes") was also collected.

3. *Statistical Analysis*

The survival analysis was done, at first, using actuarial life tables. For this model, the interruption of breastfeeding was considered the "outcome". The censored observations were considered when the event of interest (weaning) did not happen[13]. For the univariate and multivariate analyses, the outcome variable considered for the analyses was the duration of breastfeeding, measured in months. The independent variables were dichotomized and the reference category was considered to be the category that, according to the literature, hypothetically would be associated with a possible greater period of breastfeeding. This analysis was done using the Kaplan-Meier method, which allows the inclusion of censored data; that is, children who were still breastfeeding[13]. The survival curves were compared using the log-rank test. Univariate and multivariate analyses were done using the Cox proportional hazards model. The assumption of proportional hazards was evaluated using the Schoenfeld residuals. The independent variables with p-values ≤0.25 were selected for the multiple regression model in the univariate analysis. This probability was stipulated so that possible predictive variables of the event would not be left out of the analysis[14]. The multiple model was constructed using the *forward selection* method.

The individual association between the duration of breastfeeding and the other continuous variables, in children who had already interrupted breastfeeding at the time of the interview, was tested using the Spearman correlation coefficient (r_s). The 5% level of significance was adopted for all analyses, which were done using the STATA program (version 12.0).

RESULT

Among the 124 children evaluated, 64 (51.6%) were female. The mean age was 9.0 months, with a standard deviation (SD) of 3.2. There were 22 children (17.7%) who were less than 6 months old, and 102 (82.3%) were between 7 and 12 months.

The mean duration of breastfeeding was 5.6 months (SD = 4.0), with a median of 5 months.

Table 1 shows the survival analysis calculated by the actuarial life table. The cumulative conditional probability of breastfeeding up to 6 months of age was 54.9%; and, up to 12 months, was 34.2%. A greater conditional probability of weaning at 12 months of age (21%) was observed, followed by the first (11.9%), fourth (11.4%) and sixth (10.7%) months, respectively.

The Cox univariate regression model showed that low birth weight (HR=2.12; CI=1.10-4.09), the use of the bottle (HR=24.36; CI=3.37-175.84) and of the pacifier (HR=3.95; CI=2.23-7.00) prior to six months of age were associated significantly with weaning (Table 2).

The survival curves showed significant differences in the duration of breastfeeding according to the use of the pacifier and bottle (Figure 1), with greater weaning rates among those children who used the pacifier and bottle prior to the sixth month of life.

Analysis of the multivariate model showed that the use of the bottle prior to six months of life increased the risk of weaning by 17.16 times. Also, contact with the pacifier in this age range

Table 1. Analysis of the actuarial table for breastfeeding

Age range (months)	Number of children in the age range	Events in the age range	Censures in the age range	Conditional probability of weaning in the age range	Conditional probability of breastfeeding in the age range	Cumulative probability of breastfeeding at the end of the age range
0|- 1	124	6	0	0.04839	0.95161	0.95161
1|- 2	118	14	5	0.11864	0.88136	0.83871
2|- 3	99	8	2	0.08080	0.91920	0.77904
3|- 4	89	8	3	0.03370	0.96630	0.75278
4|- 5	78	9	4	0.11538	0.88462	0.66592
5|- 6	65	5	4	0.07692	0.92308	0.61469
6|- 7	56	6	2	0.10714	0.89286	0.54883
7|- 8	48	5	4	0.10416	0.89584	0.49166
8|- 9	39	3	1	0.07692	0.92308	0.45384
9|- 10	35	0	7	0	1	0.45384
10|-11	28	0	6	0	1	0.45384
11|-12	22	1	2	0.04545	0.95455	0.43321
12|-13	19	4	15	0.21052	0.78948	0.34201

presented a 3.48 times greater risk of weaning, adjusted for the employment status of the mother (Table 3).

The age at which sugar was introduced was positively correlated with the duration of breastfeeding (Figure 2a); whereas, the time of using the pacifier showed an inverse correlation with the duration of breastfeeding (Figure 2b) ($p < 0.05$; $r_s = +0.419$ and $r_s = -0.300$, respectively). The earlier the sugar was introduced, the shorter was the duration of breastfeeding; and, the greater the time of pacifier use, the shorter the duration of breastfeeding (Table 4).

Table 2. Socio-demographic and behavioral characteristics in the total sample, and for the children who were weaned at the time of the interview

Variables	Sample Total (n)		Weaned (n)	%	P*	HR** (95% CI)
Sex						
Female	64	51.6	29	45.3	0.7405	1
Male	60	48.4	34	56.6		1.083 (0.66-1.79)
Educational level of the mother						
> 8 years	48	38.7	23	47.9	0.845	1
≤ 8 years	76	61.3	40	52.6		1.06 (0.63-1.77)
Employment status of the mother						
Not working/on leave	88	71.0	41	46.6	0.1130	1
Working	36	29.0	22	61.1		1.48 (0.89-2.50)
Age of the mother (in years)						
> 26	57	46.0	27	47.4	0.3383	1
< 25	67	54.0	36	53.7		1.26 (0.76-2.08)
Birth weight						
≥ 2500 g	108	87.1	52	48.1	**0.0151**	1
< 2500 g	16	12.9	11	68.7		2.12 (1.10-4.09)
Prematurity						
No	115	92.7	57	49.6	0.0989	1
Yes	9	7.3	6	66.6		1.94 (0.84-4.51)
Use of pacifier prior to the 6th month						
No	57	46.0	17	29.8	**<0.001**	1
Yes	67	54.0	46	68.7		3.95 (2.23-7.00)
Thumb-sucking prior to the 6th month						
No	96	77.4	55	57.3	0.2744	1
Yes	28	22.6	8	28.6		0.67 (0.32-1.42)
Use of the bottle prior to the 6th month						
No	27	21.8	1	3.7	**<0.001**	1
Yes	97	78.2	62	64.0		24.36 (3.37-175.84)
Introduction of sucrose prior to the 6th month						
No	26	21.0	15	57.7	0.4993	1
Yes	98	79.0	48	49.0		1.21 (0.67-2.19)

*Log-rank test. **Crude hazard ratio, univariate analysis using the Cox proportional hazards model.

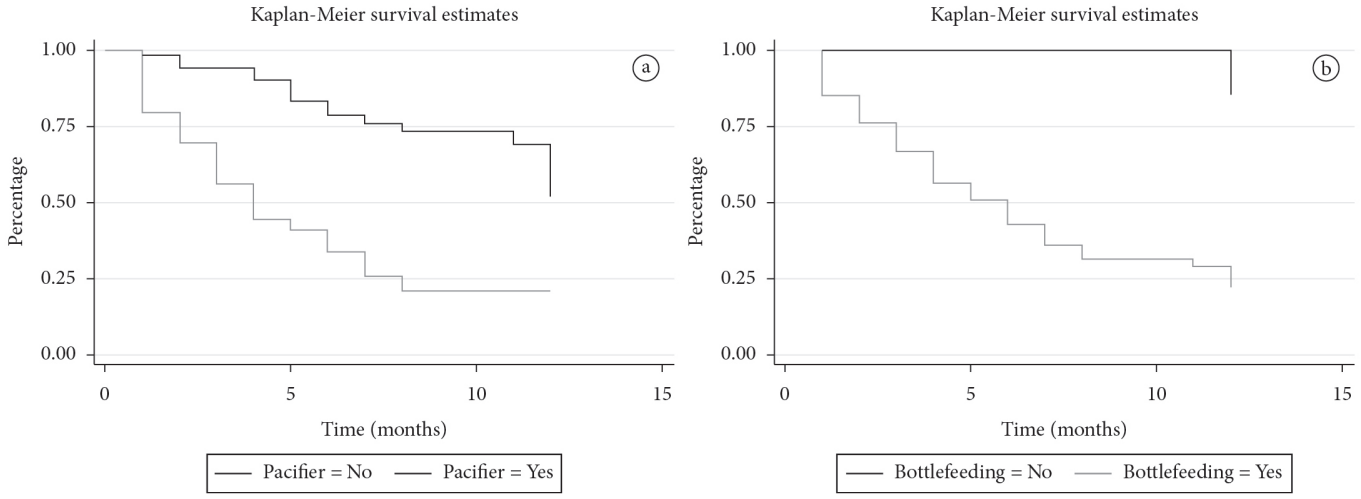

Figure 1. a. Survival curve of the time of breastfeeding stratified by the use of the pacifier prior to the sixth month of life. b. Survival curve of the time of breastfeeding stratified by the use of the bottle prior to the sixth month of life.

Table 3. Independent variables associated with weaning identified by the Cox proportional hazards model, adjusted by the employment status of the mother during the period. Multivariate regression analysis

Variable	Category	HR (crude)	HR (adjusted)	CI 95% (HR adjusted)
Bottle	No	1	1	1
	es	24.36	17.16	2.34-125.86
Pacifier	No	1	1	1
	Yes	3.95	3.48	1.90-6.38
Employment status of the mother	Not working/on leave	1	1	1
	Working	1.48	1.35	0.79-2.33

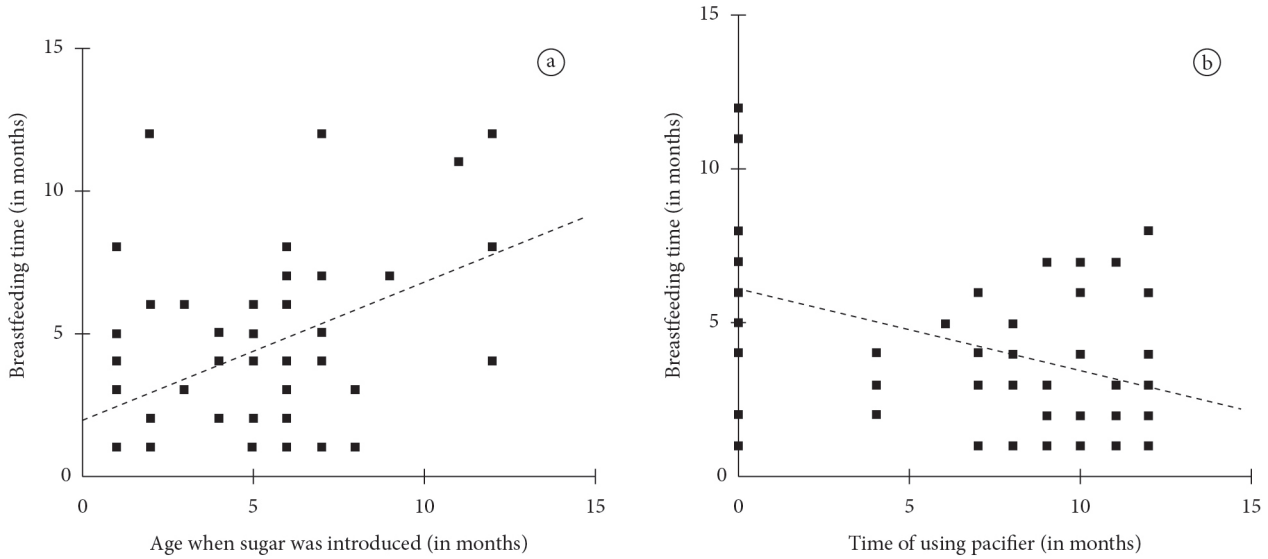

Figure 2. Dispersion diagrams showing the relation of the time of breastfeeding and the age when sugar was introduced (a); and, the time of using the pacifier (b).

Table 4. Correlation between duration of breastfeeding and variables of interest (n = 63*)

VARIABLES	r_s **	*P*
Age when sugar was introduced (months)	+0.419	**0.001**
Time of using pacifier (months)	–0.300	**0.017**
Birth weight (grams)	–0.149	0.243
Age of mother	–0.009	0.946
Number of children	–0.099	0.442
Education of the mother	–0.070	0.586

*Children up to 12 months who were already weaned. **Spearman correlation coefficient.

DISCUSSION

In this group, the cumulative probability of breastfeeding at 12 months of age (34.2%) was highly similar to the values of the prevalence of breastfeeding at 12 months obtained for the southern region in the 2008 national survey[2], which was 37.9%. At 6 months of age, the cumulative probability of breastfeeding was 54.9%, the approximate value of the prevalence found in a 2012 study conducted in the state of Rio Grande do Sul (56.4%)[7]. Contrasted to the results of the present study, a 2009 study performed in Curitiba with children from low-income families showed that 54.2% of children up to 2 years of age were still being breastfed[15]. The differences observed in the duration and prevalence of breastfeeding among populations with geographic proximity, as is the case of Curitiba and Almirante Tamandaré, highlights the complex network of variables capable of influencing this practice and justifies the development of studies to identify the factors associated with weaning in specific communities. Independently of the differences observed, these values are much lower than those recommended by the WHO, which suggests the extent of breastfeeding up to two years of life[1].

Among the variables capable of influencing the duration of breastfeeding, the outstanding socioeconomic and demographic conditions include income[3], schooling[13], age[16] and mother's work[3]. However, in this study, the variables corresponding to the age, schooling and employment status of the mothers had no statistically significant association with the length of breastfeeding.

Univariate analysis showed that low birth weight children had two times greater risk of having been weaned precociously. Another study with children from the south of Brazil belonging to low income families also identified low birth weight as a risk factor in weaning before two years of life[15]. Low birth weight, primarily when associated with prematurity, may cause alterations in the suction of the baby during breastfeeding, consequently resulting in precocious weaning[17]. The study by Sanches et al.[18] found that only 33.3% of low birth weight babies were exclusively breastfed up to 3 months of age and that the difficulties presented in the first feedings were significantly associated to precocious weaning in this population. On the other hand, this variable did not remain in the final model when adjusted for other factors.

In the present study, the use of the pacifier and the longer duration of this habit were associated with the shorter duration of breastfeeding. The use of pacifiers as a time modifying factor during breastfeeding has been demonstrated in other Brazilian studies with low-income communities[13,19,20]. When breastfeeding has not yet been established, the use of pacifiers may result in precocious weaning[21]. It is possible that the precocious and high daily frequency use of the pacifier may result in reduction of the feedings and, consequently, in less stimulation of the breasts and reduction in the production of maternal milk, creating the need for complementary feeding[22]. Thus, the use of pacifiers in the first weeks of life should be avoided[23]. However, the introduction of the pacifier does not appear to affect the prevalence or the duration of breastfeeding when the practice is already established[24], particularly among women with less difficulty and greater confidence in relation to breastfeeding[22].

Confirming previous studies[7,25], the precocious introduction of the bottle was a risk factor for weaning in the population studied. Children who use the bottle are more prone to the interruption of breastfeeding and the introduction of new foods in the diet[25]. Items, such as bottles and pacifiers, are culturally accepted for weaning the child, replacing the maternal nipple[22]. The fact that precocious weaning and bottle use may increase the risk of obesity[7], childhood diabetes[26] and dental caries[27] make the educational measures focused on this aspect highly important.

The reduced duration of breastfeeding in children who had contact with sugar at younger ages may be related to the presence of complementary foods which, in low-income populations such as the one in this study, are composed in large part of sugary liquids. Offering teas and other sweetened milks at a young age may cause gastric filling in the child and reduce the stimulation of the breasts, representing a possible risk factor for weaning[28]. In addition, children who are genetically predisposed to prefer sweet tastes tend to prefer foods rich in sugar as a substitute for milk; and, the expressions of this preference may encourage the mothers to increase the offering of these foods to the detriment of breastfeeding[29].

These aspects should be considered in the formulation of strategies to promote breastfeeding, which potentially will have positive impacts on the prevention of obesity, childhood diabetes and dental caries.

The present study is limited in that it is a cross-sectional survey, which makes it impossible to establish a causal relationship. The data were recorded from the responses regarding phenomena that occurred as much as 12 months previously, raising the possibility of memory bias. However, the reliability of the responses is greater in studies about breastfeeding[30].

CONCLUSION

The results of the present study support the conclusion that, in this population, weaning is influenced mainly by behavioral factors. Measures specific to these communities should be implemented, including orientation to delay infant contact with sugar, avoid the use of bottles and discourage the use of pacifiers when breastfeeding is not yet established.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interest.

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