

Anelise Henrich Crestani<sup>1</sup>  
Ana Paula Ramos de Souza<sup>2</sup>  
Luciane Beltrami<sup>1</sup>  
Anaelena Bragança de Moraes<sup>3</sup>

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### Correspondence address:

Anelise Henrich Crestani  
R. André Marques, 185/301, Santa Maria  
(RS), Brasil, CEP: 97010-041.  
E-mail: any.h.c@hotmail.com

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## Analysis of the association among types of breastfeeding, presence of child development risk, socioeconomic and obstetric variables

### *Análise da associação entre tipos de aleitamento, presença de risco ao desenvolvimento infantil, variáveis obstétricas e socioeconômicas*

### ABSTRACT

**Purpose:** To investigate the association among types of breastfeeding, presence of child development risk, socioeconomic and obstetric variables. **Methods:** The sample was composed of 182 mother-child dyades. Data were collected through an initial interview about breastfeeding; obstetric, socioeconomic, demographic and psychosocial aspects; and mother-child interaction analysis by the Child Development Risk Inventory. The data were organized in categories related to breastfeeding, presence or absence of child development risk, obstetric and socioeconomic variables, and were analyzed in Statistica 9.0 software for statistical analysis. **Results:** The mixed breastfeeding type shows statistical correlation between presence of child development risk as well as to variables such as prematurity, low weight, birth interurrences and mother's domestic profession. **Conclusion:** The results show that factors such as low weight, prematurity and presence of birth interurrences can be associated to mixed breastfeeding, even if the mothers present physical and time availability for breastfeeding. These variables can be associated to mother-child initial interactions detected by Child Development Risk Inventory.

### RESUMO

**Objetivo:** Investigar a associação entre tipo de aleitamento, presença de risco ao desenvolvimento infantil, e variáveis obstétricas e socioeconômicas. **Métodos:** A amostra foi constituída de 182 díades mães-bebês. A coleta de dados ocorreu por meio de uma entrevista inicial que investigou o aleitamento, aspectos obstétricos, socioeconômicos, demográficos e psicossociais e a análise da interação mãe-bebê por meio do Protocolo de Índices de Risco ao Desenvolvimento Infantil. Os dados foram organizados em categorias em relação ao aleitamento, presença ou ausência de risco ao desenvolvimento infantil, variáveis obstétricas e socioeconômicas lançadas para a análise estatística. **Resultados:** O tipo de aleitamento misto correlacionou-se de modo significativo à presença de risco ao desenvolvimento infantil e também às variáveis prematuridade, baixo peso, presença de intercorrências ao nascimento, e profissão. **Conclusão:** Fatores obstétricos como baixo peso, prematuridade e presença de intercorrências ao nascimento podem estar associados ao aleitamento misto, mesmo que as mães apresentem disponibilidade física e de tempo para o aleitamento. Tais fatores se associam às alterações nas interações iniciais detectadas por meio do protocolo de Índices de Risco ao Desenvolvimento Infantil.

The research was conducted at the Graduate Program in Human Communication Disorders, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.

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(1) Graduate Program in Human Communication Disorders, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.

(2) Department of Speech-Language Pathology and Audiology, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.

(3) Department of Statistics, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.

**Conflict of interests:** None

## INTRODUCTION

Although it is widely known and publicized the importance of breastfeeding for infants both in society and in scientific circles, early weaning and the adoption of baby bottles from birth are still very common in the population<sup>(1)</sup>. Preterm newborns, birth complications, low birth weight, maternal age, socioeconomic status, and educational level of the mother<sup>(2)</sup> are some of the factors that are investigated for the occurrence of early weaning. Moreover, there are references to the conditions of maternal employment, marital status, social support, parity, previous experience, intention to breastfeed, the mother's illness, offering another type of feeding to the infant, "no milk", "weak milk", breast problems, refusal of the baby, maternal feelings, among others<sup>(3-7)</sup>.

Besides the biological function of nurturing, meeting the specific physiological needs of the infant, ensure immunological protection and modulator function, breastfeeding has an effect on the social dimension and on the psychic apparatus of the actors directly involved, both mother and baby<sup>(8)</sup>. In this sense, recent researches showed that maternal emotional status, as well as the difficulty in performing the maternal role may be related both to difficulties in exclusive breastfeeding, encouraging mixed breastfeeding practices and to the presence of risks to child development<sup>(9)</sup>. In another study, conducted with mothers and babies aged from zero to four months, the author found a correlation between mixed feeding, difficulties in establishing the maternal function and changes in risk levels to child development (IRDIs)<sup>(10)</sup>. These indexes evaluate aspects of the mother-infant relationship covering proto-conversation, relating thus to the whole development and especially to language development.

In a case study, the results indicated that there is a relationship between feeding problems and oral language, especially considering biopsychic aspects. Thus, the authors suggest that speech pathologists that deal with language disorders in children perform routinely an inquiry about eating behaviours, even when there are no complaints<sup>(11)</sup>.

None of the aforementioned studies previously conducted<sup>(9)</sup>, however, detailed the relationship between the type of breastfeeding and aspects such as prematurity, baby complications, low birth weight, maternal occupation or family income, among others. Therefore, this research proposes a new analysis aiming to investigate the association between breast-feeding, presence of risk to child development, and socioeconomic and obstetric variables.

## METHODS

To perform the research, ethical standards required for human researches (Resolution 196/96 of the National Health Council - CNS) were used. This study was approved by the Ethics Committee of the Universidade Federal de Santa Maria (UFSM) under the protocol number 0284.0.243.000-09. All the

involved individuals were informed about the objectives and procedures and signed the consent form.

The sample consisted of 182 mothers and their babies, who were part of a larger research project, which examined other aspects, such as maternal moods and conditions for performing motherhood. The babies and their mothers were contacted and the newborn hearing screening was performed at a University Hospital from March to June 2010. The babies born with malformations or syndromes and also babies whose mothers presented committed psychic structure such as psychosis and schizophrenia were excluded from the study. These aspects were assessed through observations and interviews conducted by psychologists who collected part of the data of the larger project. Therefore, infants born at term or preterm, with no diagnosis of biological disorder were included.

Data collection was structured from an initial interview to investigate obstetric, socioeconomic, demographic and psychosocial aspects. The interview and the collection of Risk Indexes to Infant Development (IRDIs)<sup>(12)</sup> were performed by a team of psychologists and speech pathologists. The interview based on the protocol\* was already used in other works, deals with various aspects such as family income, profession of the parents, family support and type of breastfeeding (Appendix 1).

During the interview, the IRDIs were observed following the methodology of the multicenter study funded by the Ministry of Health<sup>(12)</sup>. Considering that the age of the babies was evaluated from zero to four months, five initial IRDIs of the scale in the mother-child interaction were observed:

1. When the child cries or screams, the mother knows what he/she wants. This index was observed on the situation in which the mother thought the baby wanted something and if she could interpret this demand.
2. The mother talks to the child on a style particularly directed at him/her (mother language). This index examines how the mother interacts with her child in a particular way, appropriate to the productions of the baby.
3. The child reacts to the mother language. In this index, it is sought to investigate whether the baby engages in the proto-conversation and actively seeks such participation. In cases where the mothers could not talk to their babies in a tuned mood, the researcher sought to do that with babies and analyze such a response when this occurred.
4. The mother offers something to the child and waits for his/her reaction. This item sought to determine whether the mother gave attention to her son/daughter during proto-conversation.
5. There is exchange of glances between the child and the mother. This index was observed in times of proto-conversation and of silent exchanges between mother and baby.

This observation was made by at least two research psychologists, and had 90 to 100% of agreement in the responses.

Then, the mothers were requested to interact with their babies for a short film recording. This served to guide this

\*Schwengber DD, Piccinini CA. Protocolo de análise da interação mãe-bebê de um ano de idade durante a interação livre. Unpublished work, Universidade Federal do Rio Grande do Sul, Porto Alegre, 2001.

work, to verify the interaction and IRDIs. The film recording was standardized in the sense that mothers should, wherever possible, speak naturally with their babies and the examiner recorded them from nearly three meters with zoom mode to decrease the attention of the baby and of the mother to the camcorder. The baby should be awake and aware to his mother, bodily positioned in the way the mother wanted.

In case of doubt or disagreement between the observational examiner's markings and the guiding of the work, the babies retested for a week after the first collection. Also, some babies who attended asleep retested for the same period. The observation of the guiding was considered as a gold standard in marking the IRDIs in case of doubt.

From these data, data was stored in an Excel database. Statistic analysis was performed on the STATISTICA 9.0 computer package. The used categories were:

- In relation to breastfeeding, in this study, depending on the age of the babies (most less than two months), the initial analysis consisted of three categories: exclusive breastfeeding, exclusive bottle feeding and mixed feeding. Considering the criteria of the Ministry of Health<sup>(13)</sup> on the primary care notebook, number 23, called Child Health: child nutrition, breastfeeding and complementary feeding (2009), the type of lactation was categorized as follows:
- Exclusive breastfeeding: when the child received only breast milk straight from the breast, or breast milk from another source, no other liquids or solids except for drops or syrups containing vitamins, oral rehydration salts, mineral supplements or medicines.
- Exclusive bottle feeding: when the baby only received artificial milk and no other food.
- Mixed feeding: when the child received breast milk and other types of milk concomitantly.

In our sample the latter type of feeding was characterized by the daily frequency of the two types of lactation (maternal and artificial). No baby of the sample used another type of food at the time of the study.

Considering the theoretical aspects highlighted in a previous study<sup>(9)</sup> which indicated that mixed feeding could be an evidence of doubt or maternal insecurity on food choice, the data were grouped into two categories for a second analysis: exclusive lactation type (maternal or artificial) and mixed feeding, for comparative analysis with the IRDIs.

- Regarding IRDIs, the number of changes was analysed: no changed IRDI, one to two changed IRDIs, three or four changed IRDIs, five changed IRDIs.
- The obstetric variables analyzed were: History of abortion with the answers (yes or no), type of birth (vaginal or caesarean), preterm birth (yes or no), low weight (yes or no); complications in the newborn (yes or no).
- Socioeconomic variables observed were related to: the profession (housewife or other); family income (less than a minimum wage and the minimum wage), and education (elementary education/illiterate, high school, higher education).

The quantitative data analysis was performed by means of descriptive and inferential statistics. Nonparametric tests

of independence of the chi-square, Mann-Whitney U test and Kruskal-Wallis test with multiple comparisons were used, with a significance level of 5%.

## RESULTS

Analysis of the lactation from three categories (mixed feeding, exclusive bottle feeding and exclusive breastfeeding), showed no statistical association with the presence of changed IRDIs. The analysis of the two categories of lactation, exclusive or mixed, revealed a difference ( $p=0.010$ ), that is, infants who received mixed feeding had a higher number of missing IRDIs compared to infants who received exclusive breastfeeding.

The same variables were observed on the distribution of types of feeding in function of the IRDIs frequency. It was found that the missing IRDIs one, two and five were those that had higher frequency as a function of breastfeeding, which are prevalent in the case of the mixed feeding type. This observation demonstrates some independence between variables regarding type of feeding and type of changed IRDI. Thus, one can say that there is only one positive association between the amount of changed IRDIs and the presence of mixed feeding (Table 1).

**Table 1.** Distribution of lactation types on the basis of individualized IRDIs

Missing IRDIs	Lactation			Total
	Exclusive maternal	Exclusive artificial	Mixed	
IRDI 1	8	0	5	13
IRDI 2	7	0	5	12
IRDI 3	6	0	3	9
IRDI 4	7	0	3	10
IRDI 5	8	0	5	13

**Note:** IRDI = risk indicators for child development

On the analysis of the types of lactation and obstetric risk factors, there was a difference for the variables related to prematurity, low birth weight and complications in newborns (Table 2).

In relation to prematurity, term infants received exclusive breastfeeding more frequently. In premature babies, although most also receive exclusive breastfeeding, the mixed feeding type was common.

Infants of low birth weight mostly received the mixed feeding. This feeding was also more frequent among infants who had complications, that is, factors commonly associated such as prematurity, low birth weight, and presence of pre- and postnatal complications that were positively associated with the presence of the mixed feeding type.

Concerning the relationship between breastfeeding and socioeconomic variables, the mother's occupation category was significant ( $p=0.030$ ), being that the category: housewife mothers showed prevalence of the type of mixed feeding. This result means that the physical availability of mothers for breastfeeding is not the only condition for the maintenance of exclusive breastfeeding (Table 3).

**Table 2.** Distribution of the lactation types and obstetric risk factors

Obstetric risk factors	Lactation				p-value
	Number of mothers n (%)	Exclusive maternal n (%)	Exclusive artificial n (%)	Mixed n (%)	
History abortion					
Yes	32 (17.6)	23 (71.9)	4 (12.5)	5 (15.6)	0.701
No	150 (82.4)	104 (69.4)	14 (9.3)	32 (21.3)	
Type of birth					
Vaginal	68 (37.4)	50 (73.5)	4 (5.9)	14 (20.6)	0.372
Caesarean	114 (62.6)	77 (67.5)	14 (12.3)	23 (20.2)	
Premature					
Yes	50 (27.5)	28 (56.0)	6 (12.0)	16 (32.0)	0.033*
No	132 (72.5)	99 (75.0)	12 (9.1)	21 (15.9)	
Underweight					
Yes	14 (7.7)	2 (14.3)	3 (21.4)	9 (64.3)	0.000*
No	168 (92.3)	125 (74.4)	15 (8.9)	28 (16.7)	
Complication NB					
Yes	59 (32.8)	31 (52.5)	10 (17.0)	18 (30.5)	0.002*
No	121 (67.2)	94 (77.7)	8 (6.6)	19 (15.7)	
Total	182 (100.0)	127 (69.8)	18 (9.9)	37 (20.3)	

\* Significant values ( $p \leq 0.05$ ) – Chi-square test

Missing data: complications in NB (2)

**Note:** NB = newborn**Table 3.** Distribution of types of breastfeeding and socioeconomic risk factor

Socioeconomic risk factor	Lactation				p-value
	Number of mothers n (%)	Exclusive maternal n (%)	Exclusive artificial n (%)	Mixed n (%)	
Profession					
Housewife	98 (53.8)	63 (64.3)	8 (8.2)	27 (27.5)	0.030*
Other	84 (46.2)	64 (76.2)	10 (11.9)	10 (11.9)	
Education					
Elementary/Illiterate	78 (42.9)	53 (67.9)	9 (11.5)	16 (20.1)	0.999
High school	90 (49.5)	63 (70.0)	8 (8.9)	19 (21.1)	
Higher Education	13 (7.1)	10 (72.9)	1 (7.7)	2 (15.3)	
Family income (m.i)					
Less than 1	52 (29.4)	37 (71.1)	2 (3.9)	13 (25.0)	0.580
From 1 to 2,9	103 (58.2)	68 (66.0)	13 (12.6)	22 (21.4)	
3 or more	22 (12.4)	17 (77.3)	3 (13.7)	2 (9.0)	
Total	182 (100.0)	127 (69.8)	18 (9.9)	37 (20.3)	

\* Significant values ( $p \leq 0.05$ ) – Chi-square test

Missing data: Education (1); Family income (5)

**Note:** m.i = minimum income

## DISCUSSION

It is worth mentioning the fact that IRDIs have higher prevalence of absence in babies whose mothers offered mixed breastfeeding. Breastfeeding, especially the maternal, is consolidated in a moment of intimate contact between mother and child, in which the emotional bonding comes naturally.

Authors demonstrated that even when the biology contributes to maternal breastfeeding, that is, its physiological framework is able to produce milk, breastfeeding may not occur<sup>(8)</sup>. Researches show that breastfeeding is associated with subjective, sensory and affective factors, conscious and unconscious, in an early relationship established between mother and child<sup>(14)</sup>.

In this regard, it is noteworthy that the analysis of IRDIs most frequently altered in relation to the type of feeding, being these: the mother knows what the baby wants when he cries or screams, presented at IRDI 1; the mother speaks to the child in a style particularly directed to him (mother language), observed in IRDI 2, and the fact that there is an exchange of glances between the child and the mother, seen in IRDI 5. These IRDIs demonstrate that there is not a proto-conversation, which can be related to several factors of the mother and of the baby, such as changed maternal emotional states, the mother's ability to perform the maternal function and infant's biological conditions.

So there is not a direct association regarding changed IRDI and the scene of breastfeeding, as these can both be present during bottle feeding and breastfeeding. What this frequency of changed IRDIs may represent is that there is a break in the mother-infant relationship and that the changed IRDIs relationship with the mixed feeding is done by an indirect pathway, that is, that the mother's difficulty in exercising its function, for her or for her baby's conditions, it is also based on the difficulty in choosing a type of lactation for the child.

The hypothesis suggested by the statistical study is that the mother does not sustain exclusive breastfeeding or does not decide by the exclusive bottle feeding due to some kind of conflict in the exercise of motherhood. This conflict also shows the difficulty of communication and the identification of her baby's demands evidenced by the presence of changes in the indexes one, two and five.

Other factors that were statistically associated with the type of feeding were the obstetric variables: prematurity, low birth weight and complications in the newborn associated with the provision of two types of simultaneous breastfeeding. Although several studies have demonstrated that this is a possible association<sup>(15-19)</sup>, it draws attention to the fact that there are many babies at term with adequate weight and without complications at birth that also had mixed breastfeeding. This information suggests that the type of breastfeeding is not only associated to the biological conditions of the baby, but also to several factors such as the difficulty in the formation of maternal experience, maternal feelings, social support offered to the mother<sup>(4-8,9)</sup>, among others.

Several studies describe that the practice of exclusive breastfeeding is associated with the maternal profession. Several of them showed that exclusive breastfeeding occurs twice as much for the children of women who do not work in contrast to mothers who have any occupational activity<sup>(20)</sup>. In this study, the presence of mixed breastfeeding type in the category housewife mothers is important because it indicates that despite the physical availability of mothers (by being at home to offer exclusive breastfeeding), there was a predominance of mixed breastfeeding. This again reinforces the fact that breastfeeding may depend on several factors, not just on the mother's physical availability.

The results suggest that maintaining exclusive breastfeeding depends not only on the biological status of the baby, but on the mother's reactions facing the challenge of being a mother and, in particular, on the availability of mothers to breastfeed. So there is a need to look more carefully at the relationship of mother-infant dyad facing difficulties with exclusive breastfeeding or even to assume the exclusive bottle feeding.

## CONCLUSION

Considering the proposed initial analysis regarding the association between breastfeeding and the presence of risk to child development, the present study confirms the presence of an association between the mixed feeding type and the presence of risk indexes to child development. Both factors when combined suggest that there may be a breakdown in early mother-infant relations that are evident both in the mixed feeding type as in the changed IRDIs.

The study also shows that there is an association between mixed breastfeeding and the variables related to prematurity, low birth weight, and presence of complications at birth. This finding reinforces the idea that the population of premature infants, especially with underweight, deserves special care not only because of the organic sequel, but also because of the interactional complications that can arise in their development.

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**Appendix 1.** Interview guide for mothers

Parental functions and risk for language acquisition: speech therapy interventions

Identification of the mother:  
 Mother's name: \_\_\_\_\_  
 Age: \_\_\_\_\_

Socio-demographic and obstetric history of postpartum women  
 Marital status:  
 Single ( ) Married ( ) Separated ( ) Widowed ( ) other: \_\_\_\_\_  
 Education:  
 Primary school ( ) High school ( ) Higher education ( )  
 Occupation:  
 Housewife ( )  
 Other ( ) \_\_\_\_\_  
 Number of pregnancies:  
 Five or more ( ) Two to four ( ) One ( )  
 Number of births:  
 Five or more ( ) Two to four ( ) One ( )  
 History of abortion: No ( ) Yes ( )  
 History of preterm births: No ( ) Yes ( )  
 Number of prenatal visits:  
 None ( ) Until 5 ( ) Six or more visits ( )  
 Number of children: None ( ) 1 ( ) 2 ( ) 3 or more ( )

Obstetric characteristics of postpartum women, newborns, type of feeding and social support  
 Planning pregnancy: Planned ( ) Not planned ( ) Unintended ( )  
 Type of birth: Vaginal ( ) Caesarean ( )  
 Gestational age: Term ( ) Preterm ( ) Post-term ( ) \_\_\_\_\_ weeks  
 Complications in the newborn: No ( ) Yes ( )  
 Underweight: No ( ) Yes ( )  
 Type of lactation:  
 Exclusive breastfeeding ( )  
 Predominant/ complementary ( )  
 Artificial ( )  
 Social support:  
 No support ( ) Husband ( ) Mother ( ) Others ( )  
 Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_