DOI: http://dx.doi.org/10.12957/demetra.2015.13479

Exclusive breastfeeding and supplementary feeding among children under one year of age in Ribeirão das Neves, Minas Gerais state, Brazil

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Abstract

Objective: The study aimed to identify the rate of exclusive breastfeeding and complementary feeding of children aged under one year in the city of Ribeirão das Neves-MG, Brazil. *Material and methods*: Research conducted in 10 municipal primary health units, with data collected through a questionnaire with 55 questions to be completed by the parents/carers of children under one year, who attended the vaccine room in the study period. A total of 353 questionnaires were distributed to the health units. Data analysis comprised the association of variables with exclusive breastfeeding based on asymptotic and exact Pearson's chi-square tests and exact Pearson's chi-square tests with the study variables. *Results*: The exclusive breastfeeding rate in the city was 30%, requiring development of activities, programs or services to promote, support and advise on breastfeeding. The variables that have correlation with the low breastfeeding rate in the municipality were the use of bottle and child's age. We identified early supplementary feeding and use of foods not recommended for the child's age, practice that can be linked to cultural factors. *Conclusion*: Early introduction of foods not recommended for age favors early weaning and the establishment of unhealthy dietary habits in adulthood. Data suggest that the multidisciplinary team should be prepared to meet the individual needs of mother and child when monitoring and evaluating breastfeeding or supplementary feeding.

Key words: Food Supplementation. Feeding Behavior. Breastfeeding. Infant Nutrition.

Introduction

Breastfeeding (BF) is socially and culturally determined; exclusive breastfeeding has been indicated in infants until six months of age and complemented until two years of age. It enhances mother-child bonding and prevents against diseases and health impairments.[1,2]

BF was largely influenced during the industrialization process in Brazil, when workers were overwhelmed both in quantity of work and in number of hours put in work. Kemp[3] considers that "[the] objective was to ensure that workers paid full attention to the task assigned to them. The operations that they performed and the pace of work should keep pace with the machine itself." (p. 33). The author also emphasizes the "use of cheap female and child labor".

After the industrial revolution, women became formal workers, and their children were taken to someone else's care, which interfered negatively in maintaining BF. It should be noted that, after the Industrial Revolution, women began to occupy spaces previously intended to men only, and such insertion into the labor market produced social consequences in the family nucleus. As a result, women became overwhelmed with both double or triple day's work journey and changes in the family's emotional structure. Children are too early taken to someone else's care, who many times do not have any affective bond with the child, and this child must get used to the mother's absence too early.

The use of powder milk and other industrial foods for children became much more common after the industrialization period. Since then until the present days, powder milk has its image associated with a product that promotes good nutrition, with negative repercussions on breastfeeding.[4]

According to Frota,[2] the mother's difficulties in interpreting her baby's cries, problems with the breast, breast refusal by the baby, and insufficient amount of breastmilk can also affect breastfeeding. According to Venâncio & Monteiro's conception,[5]

> *firstly, it should be considered that artificial feeding has become not just an option for women, but a widely accepted practice. Accordingly, breastfeeding should be socially reconstructed. (p. 47) (author's translation).*

Regardless of existing public policies that encourage breastfeeding, it can be observed in healthcare services that pregnant women arrive at hospitals still lacking guidance on BF, and when discharged do not have a referral service for postnatal monitoring, guidance and support to BF.[1] Such conditions end up favoring early weaning and the introduction of other foods not recommended for the baby's age (such as maize starch, rice starch, coffee, among others). Based on this scenario, it could be inferred that the primary healthcare units (PHUs) in the municipality of Ribeirão das Neves have not been developing actions to promote, protect and support BF, as established by the National Policy for the Promotion, Protection and Support to Breastfeeding.

In all healthcare levels, there is a need to comply with the specifics contained in integral healthcare, relating to either the care, management or education of pregnant/lactating women. One of the instruments used to monitor healthcare in Brazil is the Primary Care Information System (SIAB), which also enables to estimate breastfeeding prevalence in the population.[6] However, important limitations on the quality of information produced by this service should be taken into account. For example, according to SIAB's data, in Ribeirão das Neves, state of Minas Gerais, in 2010, exclusive breastfeeding (EBF) rate for babies under four months of age was more than 70% and also as high as 100%. A questionable data, if compared to the clinical practice observed in the city.[6]

The present investigation on the prevalence of breastfeeding in this locality is therefore justifiable, which may contribute to guide proposed and existing health-promotion actions regarding breastfeeding.

Material and Methods

A questionnaire with 55 questions was administered to the parents and/or carers of children under one year of age who were present the healthcare unit. Prior to that, ten healthcare units were selected in the five healthcare regions of the locality. The units were selected randomly, after consent by the Coordination of Primary Healthcare, as well as by the Coordination of Immunization of the city. Prior to the collection, the nurse in charge of the unit was communicated about the survey.

The National Survey on Nutrition Practices in the First Year of Life validated the instrument of analysis, which assesses infant or young child feeding in the last 24 hours.[7] The use of this instrument aims at identifying the BF rate in the city and obtaining reliable data.

Data were collected during the polio vaccination campaign, on June 16, 2012, when 353 questionnaires were distributed to all ten healthcare units. However, it was not possible to fill out all questionnaires at the day of vaccination. It was necessary to return later to some units to submit the questionnaire, and include the *Centro Viva Vida de Referência Secundária (CVVRS)* in data collection.

CVVRS is a Secondary Healthcare Unit, whose services are specific to premature babies, low-birth weight, malnutrition, positive neonatal screening and other clinically relevant problems related to birth or early infancy. The inclusion of CVVRS became imperative, because it is a unit that serves the entire municipality. In its work dynamics, attendance is provided only through scheduled appointments and to a specific public (considering clinical criteria for referral), so it was considered important to identify the BF rates and the complementary feeding practices in such risk group.

The questionnaires were administered again until August 21, 2012, when all questionnaire forms were filled out and collected. All respondents were informed on the nature and scope of the survey, and authorized verbally the administration of the questionnaire.

A total of 353 questionnaires was defined, with 5% sampling error, comprising N= 4,307 children of the municipality under one year of age (according to information provided by the coordinator of the Immunization Sector of the City Health Secretary, based on data from SIAB) and 50% confidence interval, based on the following calculation: [8]

$$n = \frac{z^2.\sigma^2.N}{d^2(N-1) + Z^2.\sigma^2}$$

Where: Z = standard normal abscissa

σ^2 = population variance

N = population size

d = sampling error

Data were analyzed by SPSS version 15.0. Data characterization was made by means of absolute frequencies and percentages and bars graphs. Association analyses were made by asymptotic and exact Pearson's chi-square test. To locate the association point, the standardized adjusted residual was calculated: if the residual value was lower than or equal to -1.96, and the residual values was higher than or equal to +1.96.

Association analyses of variables with EBF were based on asymptotic and exact Pearson's chi-square tests with the study variables.

Results and Discussion

The municipality of Ribeirão das Neves is divided into five healthcare regions, aiming at the decentralization and regionalization of healthcare actions. Such regions were divided geographically to meet the regional needs of each population group. Thus, data were collected from all healthcare regions and CVVRS to identify whether there were significant differences in EBF practices and maintenance between the regions of the municipality.

Data collection in the healthcare regions was characterized as follows: 14.2% belong to the CVVRS; 11.3%, to region I; 10.5%, to region II; 25.8%, to region III; 22.7%, to region IV; and 15.6%, to region V. Data collection was greater for regions III and IV, which can be explained by the geographic region, which has a large number of residents, as well as the largest number of children who attended the vaccination campaign.

The children's mothers or carers were interviewed, of which 87.8% were mothers and 12.2%, carers of the children. Regarding the children age, 12.5% were between 1-29 days old; 40.2%, from 1 to 3 months and 29 days; 17.3% from 4 to 5 months and 29 days; and 30% were from 6 to 12 complete months.

Regarding gender, male subjects was slightly predominant, represented by 50.7% of the study sample. With regard to the feeding habit, 74.2% were breastfed in the last 24 hours, and of those who were breastfed, 48.2% were nursed eight times or more per day. Of the sampling universe, 62.3% drank water; 44.2%, tea; and 55.5% were fed other milk in the last 24 hours prior to the interview.

More than 50% of the children who participated in the survey were in the age range of up to five months and 29 days. Ideally, such percentage of children should be exclusively breastfed. However, there was a high ingestion rate of water and other milk. Similar data was found by Arantes et al.,[9] who identified that the introduction of another milk occurred as early as three months of age and increased until five months; they also noticed a statistical correlation between water, tea and juices intake and interrupted EBF.

To determine the EBF rate, the child's feeding variables in the last 24 hours were crossed with the "was breastfed" variable. Exclusive breastfed infants should receive answer "no" for all complementary food variables. The results were described on Table 1.

Table 1. Infants feeding in the last 24 hours, Ribeirão das Neves-MG, Brazil 2012.

Variables	n (%)
Baby was breastfed	
Yes	262 (74.2)
No	91 (25.8)
How many times was breastfed	
1 to 3 times	21 (5.9)
4 to 7 times	44 (12.5)
8 times or more	170 (48.2)
I don't know	28 (7.9)
Not informed	90 (25.5)
Drank water	
Yes	220 (62.3)
No	133 (37.7)
I don´t know	0 (0.0)
Drank tea	
Yes	156 (44.2)
No	196 (55.5)
I don't know	1 (0.3)

Variables	n (%)
Drank other milk	
Yes	196 (55.5)
No	154 (43.6)
I don't know	3 (0.8)
Child was fed other milk	
Only during daytime	41 (11.6)
Only at night	26 (7.4)
During daytime and nighttime	131 (37.1)
I don't know	2 (0.6)
Not informed	153 (43.3)
Ate sweet or salty porridge	
Yes	98 (27.7)
No	254 (72.0)
I don't know	1 (0.3)
Ate chopped, crushed or pureed fruit	
Yes	169 (47.9)
No	184 (52.1)
I don't know	0 (0.0)
Ate savory puree	
Yes	161 (45.6)
No	191 (54.1)
I don't know	1 (0.3)
Drank fruit juice	
Yes	178 (50.4)
No	174 (49.3)
I don't know	1 (0.3)
Drank processed juice	
Yes	37 (10.5)
No	315 (89.2)
Not informed	1 (0.3)

The prevalence of BF in the municipality of Ribeirão das Neves is of 30%, far below the recommended level by the WHO and the national rate, which is 41%.[7]

Prevalence of EBF was observed in infants up to three months of age and 29 days, corroborating study by Flamingo, Lisboa & Basso,[10] who found EBF prevalence of 74.4% in children up to four months of age and 15.4% in six-month children.

Similar result was also found in another study, where 63.6% of the children were weaned before completing six months, and such early weaning was identified as a consequence of early introduction of non-breast milk into the babies' diet.[11]

BF was maintained in 74.2% of the children's diets, either complemented (when the child receives other solid or semi-solid foods), predominant (when the child receives water-based drinks), mixed (when the baby receives another kind of milk) or only breastfeeding (when the child receives breast milk irrespective of receiving or not another food). The definitions of the type of breastfeeding adopted follow the standards described by the WHO, which also defines that BF should be maintained up to two years of age or beyond.[1] Somehow, the population studied follows the guidelines described by the Ministry of Health when adopting BF, irrespective of its classification.

Of the children who were fed another milk, i.e., 55.5% of the respondents, 37.1% of the children received it during daytime and at nighttime.

In the last 24-hour diet, the respondents reported that 27.7% of the children ate salty porridge; 47.9% ate fruit; 45.6% ate savory puree; 50.4% drank fruit juice; 10.5% drank industrial juice; 10.5% drank soda; 9.3% drank coffee, 39.1% received sugar-sweetened food; 35.1% ate biscuits, crackers or snacks; 21.5% drank or ate other foods. Regarding bottle, 65.2% used it or other drinking device, and 51% used pacifier.

The introduction of complementary foods should be based on a healthy diet, rich in nutrients, fruits and vegetables. The consumption of industrial foods, rich in salt, sugar or fat should be avoided, especially in the child's first year of age.[12]

As can be seen, the introduction of foods high in sugar, salt or fat is significant in the population studied. Fruit intake does not reach 50% of the population, which leads us to wonder whether mothers have been properly instructed about the introduction of complementary foods.

In a study about complementary feeding in infancy, the authors found that the consumption of soda was, respectively, of 0% and 9% in infants younger and older than six months; consumption

of biscuits was of 38.5% and 79.3%; artificial juice consumption, 1.5% and 20.7%; and fruit consumption was of 84.6% and 97.3%.[13] These data are similar to the ones found in this survey, and it is worth noting that fruits intake was much higher than the one identified in the Ribeirão das Neves' population.

Proper dilution of the infant formulas is a key factor to be discussed with the mothers that offer this type of complement to their child. A study found that 23.8% of the infant formulas offered to infants younger than six months and 34.7% to babies older than six months were properly diluted. Concerning cow's milk dilution, the same study reported that 3.9% of the children aged less than six months were fed with correct dilution of this milk, against 15.3% for children older than six months.[13] This study showed that 37.1% of the children studied are fed another kind of milk, which calls for the importance of evaluating the dilution, preparation and administration of this food in order to ensure proper infants' nutrition.

Table 2. Results of the analysis of the association of the child's age with feeding habit, Ribeirão das Neves-MG, Brazil, 2012.

Variables	Child´s age				Total	p-value
	1 to 29 days	1 month to 3 months and 29 days	4 to 5 months and 29 days	6 to 12 months		
Child drank water						
Yes	5 (11.4)*	64 (45.1)*	53 (86.9)**	98 (92.5)**	220	**<0.0001**[1]
No	39 (88.6)**	78 (54.9)**	8 (13.1)*	8 (7.5)*	133	
Drank tea						
Yes	12 (27.3)*	64 (45.1)	28 (45.9)	52 (49.1)	230	
No	32 (72.7)**	77 (54.2)	33 (54.1)	54 (50.9)	123	0.258[2]
I don't know	0 (0.0)	1 (0.7)	0 (0.0)	0 (0.0)		
Drank another milk						
Yes	13 (29.5)*	64 (45.1)*	41 (67.2)**	78 (73.6)**	196	0.902[2]
No	31 (70.5)**	76 (53.5)**	20 (32.8)	27 (25.5)*	154	
I don't know	0 (0.0)	2 (1.4)	0 (0.0)	1 (0.0)	3	

Variables	Child´s age				Total	p-value
	1 to 29 days	1 month to 3 months and 29 days	4 to 5 months and 29 days	6 to 12 months		
Child was fed another milk						
Only during daytime	3 (23.1)	19 (28.8) **	11 (26.8)	8 (10.0) *	41	
Only during nighttime	5 (38.5) **	13 (19.7) **	3 (7.3)	5 (6.3) *	26	
Day and night	5 (38.5) *	34 (51.5) *	27 (65.9)	65 (81.3) **	131	**<0.0001[2]**
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.4)	2	
Not informed	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
Ate sweet or savory porridge						
Yes	1 (2.3) *	22 (15.5) *	23 (37.7)	52 (49.1) **	98	**<0.0001[2]**
No	43 (97.7) **	120 (84.5) **	38 (62.3)	53 (50.0) *	254	
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.0)	1	
Ate chopped, pureed or crushed fruit	1 (2.3) *	25 (17.6) *	43 (70.5) **	100 (94.3)	169	**<0.00011**
Yes	43 (97.7) **	117 (82.4) **	18 (29.5) *	**	184	
No	0 (0.0)	0 (0.0)	0 (0.0)	6 (5.7) *	0	
I don't know				0 (0.0)		
Ate savory puree						
Yes	1 (2.3)	19 (13.4)	42 (68.9)	99 (93.4)	161	**0.2151**
No	43 (97.7)	123 (86.6)	19 (31.1)	6 (5.7)	191	
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	1	
Drank fruit juice						
Yes	1 (2.3) *	38 (26.8) *	48 (78.7) **	91 (85.8) **	178	**<0.0001[2]**
No	43 (97.7) **	104 (73.2) **	13 (21.3) *	14 (13.2) *	174	
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	1	
Drank processed juice						
Yes	1 (2.3)	9 (6.3) *	3 (4.9)	24 (22.9) **	37	**<0.0001[1]**
No	43 (97.7)	133 (93.7) **	58 (95.1)	81 (77.1) *	315	
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	

Variables	Child´s age				Total	p-value
	1 to 29 days	1 month to 3 months and 29 days	4 to 5 months and 29 days	6 to 12 months		
Drank soda						
Yes	0 (0.0) *	7 (5.0) *	1 (1.6) *	29 (27.4) **	37	**<0.0001**[1]
No	44 (100.0) **	134 (95.0) **	60 (98.4) **	77 (72.6) *	315	
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
Drank coffee						
Yes	0 (0.0) *	4 (2.8) *	4 (6.6)	25 (23.6) **	33	**<0.0001**[1]
No	44 (100.0) **	138 (97.2) **	57 (93.4)	81 (76.4) *	320	
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
Ate sugary food						
Yes	3 (6.8) *	27 (19.0) *	37 (60.7) **	71 (67.0) **	138	**<0.0001**[1]
No	41 (93.2) **	115 (81.0) **	24 (39.3) *	35 (33.0) *	215	
Ate biscuits or snacks						
Yes	1 (2.3) *	15 (10.6) *	25 (41.0)	83 (78.3) **	124	**<0.00011**
No	43 (97.7) **	127 (89.4)**	36 (59.0)	22 (20.8) *	228	
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	1	
Drank or ate other foods						
Yes	0 (0.0) *	9 (6.3) *	17 (27.9)	50 (47.2) **	76	**<0.00011**
No	44 (100.0)**	133 (93.7)**	44 (72.1)	55 (51.9) *	276	
I don't know	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.0)	1	

[1]Asymptotic Pearson's chi-square test. [2] Exact Pearson's chi-square test. *Adjusted residual <-1.96. **Adjusted residual >1.96.

Table 2 describes the relationship between the "child's age" variable and the dietary habit variables. The complementary feeding variables that showed statistical association with the child's age, according to $p \leq 0.05$ values in the asymptotic and exact Pearson's chi-square tests, were: [the baby] drinks water, receives other type of milk, eats salty or sweet porridge, eats chopped or crushed fruit, drinks industrial fruit juice, drinks soda and/or coffee, eats sugary foods, eats biscuits or snacks, and drinks or eats other foods.

According to the analysis of adjusted residuals, conclusion is that the children who drank more water, ate more fruit, drank more juice fruit and received sugary foods were aged between 4-5 months and 29 days and 6-12 months. The children who ate sweet or savory porridge, drank processed juices and coffee, ate cookies or snacks and drank or ate other foods were 6-12 months old.

The children under one month who drank another milk did it during the night; the children aged 1-3 months and 29 days ingested other milk only during the day or only at night, and those between 6-12 months, during daytime and nighttime.

Early introduction of complementary foods increases the risk of the child developing some diseases correlated to early weaning. It is known that early weaning increases the risk of developing pneumonia; increases 2.2 times the risk of death caused by infectious diseases and 3.9% by diarrhea or respiratory diseases.[14]

As discussed earlier in this paper, human milk can provide all nutrients that the baby needs until the sixth month of life. When other foods are introduced early, a nutritional deficiency occurs in the child's diet, because no other food contains the nutritional properties of the human milk, which can lead to child's malnutrition caused by inappropriate practices of weaning and introduction of other foods.[14,15]

Cow's milk accounts for 20% of food allergies and its introduction into the child's diet should be delayed as long as possible, not before the age of nine months, as suggested in literature.[13-15] This milk is rich in proteins, which are fully absorbed by the child's intestinal mucosa; so, there is an immunological response to this whole protein, leading to food allergies. Cow's milk is also an independent risk factor for the development of iron deficiency anemia, accounting for a drop of 0.2g/dl/month of the child's hemoglobin levels.[13-15] This milk is also associated with the occurrence of diarrhea caused by contamination during preparation, atopic diseases, diabetes *mellitus* type I and asthma. It should also be noted that the child who is fed cow's milk before four months of age has three times higher risk of developing asthma until four years of age than those not fed this milk.[15,16]

Early intake of coffee and tea is also correlated with low iron absorption, and so these foods are not advisable until the child reaches one year of age.[15,16] Fruit purees introduced before six months of age has two key factors to be observed: it is a source of contamination when not properly cleaned, which could lead to diarrheas; and due to the child's neurological immaturity until six months, non-liquid foods may not be properly swallowed and cause food aspiration or choking when eating. [9,14]

Regarding the early use of water and fruit juice, such ingredients showed to be less aggressive to the child when compared to other foods. In case of the need of an early introduction of foods to the child's diet or if the mother has already started complementary feeding, health professionals should be prepared to offer appropriate support and guidance to meet the mother's and child's particular needs.[14]

The intake of non-nutritious foods such as sodas, sugar, biscuits, snacks, cookies, sweets, fried and processed foods should be discouraged, because they are associated with the onset of iron deficiency anemia, child obesity and food allergies. Iodized salt has a key importance in the child's diet, because it ensures iodine ingestion; however, it should be consumed moderately.[12]

Situations of food insecurity should be the first item to be assessed and monitored. In another research, the authors identified that the BF rate is much higher in children that are in a situation of food insecurity.[17] As described before, BF does not replace complementary feeding after the child's six months of age, but in such specific situation, its extended use, added to complementary feeding, is beneficial to the child's health.

Conclusion

This study showed that the feeding practices for children under one year of age are not appropriate considering the Ministry of Health's guidelines. High intake of foods not recommended for the age can help building unhealthy dietary habits in adult life.

The exclusive breastfeeding rate in the municipality is much lower than the recommended levels. This scenario makes us reflect on the involvement of the healthcare staff in counseling and monitoring the woman who nurses and the one who is willing to start complementary feeding.

The complementary feeding practice may be connected with cultural and regional factors, requiring further in-depth studies in order to identify the sociocultural interference on the establishment of complementary feeding and BF.

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Received: October 30, 2014
Reviewed: December 19, 2014
Accepted: January 05, 2015