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DIETARY PATTERNS AND EPIDEMIOLOGICAL PROFILE OF NEWBORNS

Padrões alimentares e perfil epidemiológico de neonatos

Patrones dietéticos y perfil epidemiológico de los neonatos

Raíssa Barreto Santana[1]
Larissa de Araújo Correia Teixeira[1]
Simone Beatriz dos Santos Santana[1]
Ana Jovina Barreto Bispo[1]
Fábio Batista Miranda[2]
Estélio Henrique Martin Dantas[2]

ABSTRACT

Objectives: to characterize the eating patterns of infants discharged from the Neonatal Intensive Care Unit and Intermediate Unit in the first six months of life. **Methods:** study carried out in a risk maternity located in the city of Sergipe. Data were collected from hospital discharge summaries and from interviews with caregivers during outpatient visits. **Results:** the sample consisted of 85 infants. Exclusive breastfeeding prevailed 45(52.33%), followed by mixed breastfeeding 30(34.88%) and isolated infant formula 11(12.79%). At six months, 25(29.41%) of the children received exclusive breastfeeding, 23(26.83%) had started the introduction of food and 24 (28%) the incorporation of farinaceous foods in the dietary pattern. **Conclusions:** there was a predominance of infant and farinaceous formulas before the sixth month in children.

DESCRIPTORS: Infant; Breastfeeding; Food behavior; Growth and development.

[1] Universidade Tiradentes (UNIT), Aracaju, Sergipe, Brazil
[2] Universidade Federal do estado do Rio de Janeiro (UNIRIO), Rio de Janeiro, Rio de Janeiro, Brazil

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Corresponding Author: Raíssa Barreto Santana, E-mail: dra.raissabarreto@gmail.com

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RESUMO

Objetivos: caracterizar o padrão alimentar de lactentes egressos da Unidade de Terapia Intensiva Neonatal e Unidade Intermediária nos primeiros seis meses de vida. **Métodos:** estudo realizado em uma maternidade de risco localizada na cidade de Sergipe. Os dados foram coletados a partir dos resumos de alta hospitalar e de entrevistas com os cuidadores durante as consultas ambulatoriais. **Resultados:** a amostra foi composta por 85 lactentes. O aleitamento materno exclusivo prevaleceu 45 (52,33%), seguido pelo aleitamento misto 30(34,88%) e fórmula infantil isolada 11(12,79%). Aos seis meses, 25(29,41%) das crianças receberam aleitamento materno exclusivo, 23(26,83%) iniciaram a introdução de alimentos e 24(28%) a incorporação de alimentos farináceos no padrão alimentar. **Conclusões:** houve predomínio de fórmulas infantis e farináceas antes do sexto mês nas crianças.

DESCRITORES: Lactente; Aleitamento materno; Comportamento alimentar; Crescimento e desenvolvimento.

RESUMEN

Objetivos: caracterizar los patrones alimentarios de los lactantes egresados de la Unidad de Cuidados Intensivos Neonatales y Unidad Intermedia en los primeros seis meses de vida. **Métodos:** estudio realizado en una maternidad de riesgo ubicada en la ciudad de Sergipe. Los datos se recogieron de los resúmenes de alta hospitalaria y de las entrevistas realizadas con los cuidadores durante las consultas externas. **Resultados:** la muestra estuvo conformada por 85 infantes. Predominó la lactancia materna exclusiva 45(52,33%), seguida de la lactancia materna mixta 30(34,88%) y fórmula infantil aislada 11(12,79%). A los seis meses, el 25(29,41%) de los niños recibía lactancia materna exclusiva, el 23(26,83%) había iniciado la introducción de alimentos y el 24(28%) la incorporación de farináceos en el patrón dietético. **Conclusiones:** hubo predominio de fórmulas infantiles y farináceas antes del sexto mes en los niños.

DESCRIPTORES: Infante; Amamantamiento; Comportamiento alimentario; Crecimiento y desarrollo.

INTRODUCTION

Breast milk is the most complete food for the infant and the single measure that most prevents mortality until five years of age.[1-4] There are several known advantages of exclusive breastfeeding (EBF): fewer chances of allergies, respiratory infections, diarrhea, hypertension, dyslipidemia, obesity, and diabetes; strengthening of the mother-child bond, with reduced postpartum depression; low cost.[4] Thus, since the 1990s, the World Health Organization has recommended breastfeeding from zero to six months of life.[5] After this period, the supply of breast milk should continue and a complementary diet consisting of fruits, cereals or tubers, vegetables, vegetable and animal proteins should be offered, avoiding processed foods.[2]

Although adherence to breastfeeding has increased significantly, Brazil still has a high early supply of other breastmilk substitutes in all social strata, whether due to economic, cultural, emotional, or physiological conditions.[2-6] The difficulty of EBF is even greater for mothers of newborns (NB) who need to remain hospitalized in Neonatal Intensive Care Units (NICU) or Intermediate Units (IU) after birth. The separation between mother and child and the need to use alternative feeding routes, determined by hospitalization, can cause early weaning in infants who are even more vulnerable to comorbidities.[7] The replacement of breast milk by infant formulas offered in the hospital is not always reversible, due to the biological conditions and poor breastfeeding technique to which the binomial has been subjected.[8] All these aspects contribute to further reduce the prevalence of breastfeeding among preterm infants (PNICs) and small for gestational age (SGA), most of whom are admitted to NICUs.

Babies requiring admission to NICU or NICU are considered high risk even after hospital discharge. According to the Brazilian Society of Pediatrics, PIs and Newborns have considerably higher risks for chronic morbidities, especially those associated with delayed growth and development than full-term children who are appropriate for their gestational age.[7,9] Knowing that growth depends on factors inherent to the NB, but is also related to environmental factors, such as nutrition and diseases, it is important to monitor the growth of NB at risk and to associate and thus identify environmental factors that influence the growth in the first year of life of children at risk, such as feeding pattern and clinical complications after hospital discharge.

This study aimed to identify the prevalence of exclusive breastfeeding and characterize feeding patterns of infants discharged from Neonatal and Intermediate Intensive Care Unit in the first six months of life.

METHODOLOGY

This is an observational and analytical study conducted with infants who were admitted to NICU and/or NICU after birth and who maintained regular monitoring in the outpatient follow-up clinic of egresses from the Hospital e Maternidade Santa Isabel. This institution provides care to the Unified Health System and has been a Child-Friendly Hospital since 2014, for promoting and supporting breastfeeding.

For inclusion, we considered infants who had been admitted to NICU and/or NICU after birth and who were 1 year old by the end of the data collection period. Infants who were hospitalized for less than a week, who had medical contraindications to bre-

astfeeding, or who were diagnosed with a disease that prevented oral feeding were excluded.

After the TCLE was applied, data were collected from discharge summaries and primary caregiver interviews by the researchers during follow-up visits.

Categorical variables were described by absolute and relative frequency and numerical variables by mean, median, and standard deviation. Associations were analyzed using Pearson's chi-square test with Monte-Carlo simulations and Fisher's exact test. Differences in measures of central tendency were analyzed using the ANOVA test. The significance level adopted was 5% and the software used was R Core Team 2019.

The study was approved by the Research Ethics Committee of the Federal University of Sergipe, according to CAAE no. 09107019.8.0000.5546 and opinion no. 3,226,420, on March 7, 2019.

RESULTS

The sample consisted of 85 infants with 44 (51.76%) males. The mean gestational age (GA) at birth was 36.68 weeks (±3.56), most infants were born at term 52 (61.18%) and by natural birth 61 (71.76%). The Apgar score at the 5th minute of life was less than seven in 26 (30.24%) of the sample. The period of hospitalization was from seven to 13 days in 41 (47.67%) and 25 (29.07%) infants remained hospitalized for more than 20 days. The main diagnoses responsible for hospitalization were: congenital syphilis 33 (39.53%), anoxia 21 (24.42%), prematurity 14 (16.28%), seizure 13 (15.12%), low weight 9 (10.47%), clinical emergencies – Sepsis, Shock, Cardiac arrest – 6 (6.98%), hypoglycemia 4 (4.65%), jaundice 4 (4.65%), infections 4 (4.65%), pneumonia 3 (3.49%), anemia 1 (1.16%), and others 7 (8.14%). In those younger than 34 weeks gestational age, prematurity itself was established as the main reason for hospitalization, while in the full-term population 28 (53.8%) and post-term two(100%) the diagnosis of congenital syphilis predominated.

During hospitalization, exclusive breastfeeding predominated 45 (52.33%), followed by mixed breastfeeding (MMA) 30 (34.88%) and isolated infant formulas 11 (12.79%). After discharge, 79 (91.86%) of the mothers reported receiving instructions on the technique and benefits of EB, and 77 (89.53%) of the mothers reported trying to breastfeed after leaving the NICU.

In the first month after discharge, the prevalence of EB was 46 (53.94%), as one baby migrated from MMA to EB. At six months of life, 25 (29.41%) of the children received EB, EBF was the feeding pattern of 40 (47.05%), with 34 (40.00%) supplementing EB with infant formula and six (7.05%) with fluid or powdered cow's milk, and 20 (23.52%) receiving formula or unmodified cow's milk. Regarding the cause for abandoning breastfeeding, most mothers did not specify the reason, hypogalactia 17 (30.36%), the child's insatiability 15 (26.79%), and the difficulty to perform the correct grip eight (14.29%) were the most frequent complaints. Powdered cow's milk predominated 18 (81.82%) to the detriment of the fluid form, and when questioned about the reason for the introduction before the sixth month, half did not specify a reason, five (22.73%) reported insatiability, two (9.09%) hypogalactia, two (9.09%) financial cause, and one (4.55%) diarrhea with infant formula.

As for the introduction of the complementary diet, 47 (85.45%) of the mothers said they had received guidance on the correct form and period to start it, however, 11 (26.83%) of them introduced it before six months of life. The following frequency of food groups was verified in children older than six months: vegetables 37 (88.10%), fruits 36 (85.71%), vegetables 33 (78.57%), animal protein 33 (78.57%), legumes 28 (66.67%), cereals/tubers 21 (50%) and oil 12 (28.57%). Processed foods were components in the diet of n(64.7%) of the patients, the most common types being cookies 19 (46.35%), yogurts 18 (43.9%), boxed juices nine (21.95%), and instant noodles four (9.76%).

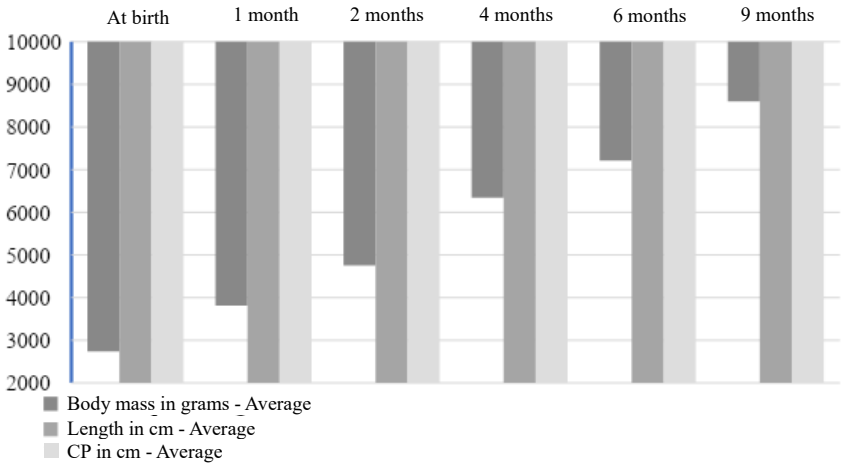
The addition of flour to milk was present in the feeding pattern of 25 (30.86%) infants, and in seven (28.00%), the introduction was performed before the sixth month of life. The addition occurred for nonspecific reasons n? (55.56%), insatiability n? (29.63%), financial cause n? (7.41%), and diarrhea n? (3.70%). The average rate of weight gain was 33.59 g/day during the first trimester, 20.53 g/day in the second trimester, and 15.39 g/day in the third trimester. And the rate of head circumference growth ranged from 1.62 cm/month in the first trimester, 1.33 cm/month in the second trimester, and 0.41 cm/month in the third trimester. Finally, the average annual height gain was 28.11 cm, Graph 1.

The presence of asphyxia at birth did not compromise the evolution of anthropometric parameters in the first nine months of life, as described in Table 1. Children with lower anthropometric values at birth remained hospitalized for a longer interval of time. The hospitalization period had no influence on the weight gain in the first nine months of life in most cases, Table 2. Among infants who were exclusively breastfed during hospitalization, the mean rate of weight gain was 35.6 g/day, 21.06 g/day and 20.38 g/day in the first, second and third trimesters of life, respectively. Patients on EB had a rate of weight gain of 37.47 g/day in the first trimester, 17.09 g/day in the second, and 16.14 g/day in the third. Children who received only infant formula while hospitalized had a mean rate of weight gain of 26.45 g/day in the first three months, 21.73 g/day from the 4th to the 6th month and 6.16 g/day from the 6th to the 9th month of age.

Children who maintained breastfeeding for a period less than or equal to six months showed a mean rate of weight gain of 30.10 g/day, 17.39 g/day and 19.22 g/day in the first, second and third trimesters, respectively. In infants who maintained breastfeeding after six months, the rate was 48.8 g/day in the first trimester, 20.99 g/day in the second and 11.17 g/day in the third.

The introduction of infant formulas before six months of age showed a rate of weight gain equal to 33.37 g/day from zero to three months, 21.61 g/day from three to six months, and 19.22 g/day from six to nine months. When performed after the second trimester, the rate found was 39.43 g/day, 16.34 g/day, 20.04 g/day, in the same order.

Chart 1 – Mean body mass, length, and cephalic perimeter by age in the first nine months of life in infants followed in a high-risk outpatient clinic in the period from April 1 to August 30, 2019. Aracaju, SE, Brazil, 2019.



Legend: CP – Cephalic Perimeter. Cm – centimeters. Source: own research.

Table 1 – Association between Apgar score and body mass, Length and Cephalic Perimeter during the first 9 months of life of infants followed in a high-risk outpatient clinic in the period from April 01 to August 30, 2019. Aracaju, SE, Brazil, 2019

	Apgar score	Body mass in grams – Mean (SD)	Length in cm – Average (SD)	CP in cm – Mean (SD)
Birth	No choking	2769,6 (757,8)	46,7 (3,6)	33,6 (3,9)
	Mild Asphyxia	2774,7 (910,2)	45,5 (5,5)	32 (2,8)
	Moderate asphyxia	2397,5 (1424,8)	45 (8,5)	32,2 (5,4)
	Severe asphyxia	2490,8 (1180,6)	43,4 (6,8)	31,2 (4,6)
1st Month	No choking	3828,7 (973,3)	52,3 (3,9)	36,8 (2)
	Mild Asphyxia	3622 (629,3)	52,9 (2,9)	36,1 (2)
	Severe asphyxia	4770 (0)	55 (0)	38,5 (0)
2nd Month	No choking	4576,5 (1497,8)	55,1 (6,8)	38,2 (3,7)
	Mild Asphyxia	4778,3 (1214,8)	56,1 (5,4)	36,6 (2,4)
	Moderate asphyxia	6158 (0)	60 (0)	41 (0)
	Severe asphyxia	5440 (0)	56 (0)	38 (0)
4th Month	No choking	6388,9 (1432,1)	61,3 (3,9)	40,6 (2,3)
	Mild Asphyxia	6065,6 (1068,3)	61,2 (4,4)	40,1 (2,1)
	Severe asphyxia	7000 (0)	64 (0)	41 (0)
6th Month	No choking	7079,3 (1647)	65,3 (5,4)	41,5 (2,1)
	Mild Asphyxia	7274,4 (1110,8)	67 (4)	42,4 (3,6)
	Severe asphyxia	7756 (463,4)	66,7 (1,2)	43,5 (2,1)
9th Month	No chokingNo choking	9043,3 (1617,2)	71,9 (4,4)	43,5 (3)
	Mild Asphyxia	7856,7 (1169)	70,8 (5,6)	42,8 (0,3)
	Severe asphyxia	7947,5 (2938)	71 (2,8)	42 (4,9)
	p-valor	0,747	0,915	0,844

Legend: CP – Cephalic Perimeter. SD – Standard Deviation. cm – Centimeters. ANOVA.
Source: own research.

Table 2 – Correlation between length of hospitalization and growth velocity in the first 9 months of life of infants followed in a high-risk outpatient clinic in the period from April 1 to August 30, 2019. Aracaju, SE, Brazil, 2019.

	Hospitalization Time	Body mass in grams – Mean (SD)	Length in cm – Average (SD)	CP in cm – Mean (SD)
Birth	<7 days	2754,4 (686,7)	46 (3,7)	32,6 (2,2)
	7 to 13 days	2926,5 (637,4)	47,5 (2,5)	34,1 (3,9)
	13 to 20 days	3275,8 (813,7)	49,3 (4,6)	34,3 (2,2)
	>20 days	2317,9 (997,8)	42,4 (5,6)	30,8 (3,8)
1st Month	<7 days	3227 (1059,2)	50 (5)	35,7 (2,8)
	7 to 13 days	4252,2 (710,7)	53,7 (2,8)	37,4 (1,2)
	13 to 20 days	4235 (756,6)	55,8 (1,1)	37,8 (1,1)
	>20 days	3034,3 (597,1)	49,8 (3,4)	34,9 (2,5)
2nd Month	<7 days	3575,3 (1462,1)	49,5 (6,9)	35,3 (0,6)
	7 to 13 days	5401,2 (1092,7)	58,6 (4,4)	40 (3)
	>20 days	4232 (1307,5)	53,7 (5,8)	36,1 (2,6)
4th Month	<7 days	5980,5 (2028,2)	61 (6,4)	40,6 (2,5)
	7 to 13 days	6851,6 (1129,3)	62,6 (1,8)	41,5 (1,9)
	13 to 20 days	6555 (0)	63,5 (0)	41,5 (0)
	>20 days	5977,6 (1203,6)	60,2 (4,3)	39,4 (2,1)
6th Month	<7 days	5590 (1541,5)	59,8 (3,9)	41 (1,4)
	7 to 13 days	7573,6 (1662,3)	67,6 (5,4)	41,8 (2,2)
	13 to 20 days	7357 (1316,6)	65 (1,4)	43,5 (2,1)
	>20 days	7117,4 (967,1)	65,5 (3,3)	41,8 (3,2)
9th Month	<7 days	10700 (0)	78 (0)	46 (0)
	7 to 13 days	9026,7 (1673,8)	73,3 (3,3)	44,5 (2,2)
	13 to 20 days	10025 (0)	73 (0)	45,5 (0)
	>20 days	7385,2 (1099,3)	67,7 (2,1)	40,7 (2,2)
	p-value	0,182	0,124	0,781

Legend: CP – Cephalic Perimeter. SD – Standard Deviation. cm – Centimeters. ANOVA.
Source: own research

The use of cow's milk (VL), on the other hand, showed a rate of weight gain of 22.92 g/day in the first trimester, 25.54 g/day in the second, and 15.41 g/day in the third when introduced before 6 full months of life, and 33.67 g/day, 23.75 g/day, and 14.05 g/day, respectively, when started after the sixth month.

The use of farinaceous in children younger than six months resulted in a rate of weight gain of 17.37 g/day during the first trimester, 25.85 g/day during the second, and 9.3 g/day during the third. When added to meals after six months, the speed found was 50.73 g/day, 16.96 g/day, 20.29 g/day, in the same order.

The introduction of complementary diet before six months of age determined a mean weight gain velocity equal to 30.80 g/day in the first three months and 21.32 g/day from the third to the sixth month. Children who started feeding after six months evolved with a ponderal gain equal to 32.92 g/day in the first trimester, 23.15 g/day in the second trimester, and 18.21 g/day in the third trimester.

The association between the diet pattern after hospital discharge and complications in the first year of life are described in Table 3.

DISCUSSION

The study showed a similar distribution between the sexes in hospitalized newborns, congruent with studies conducted in Sudeste[10] and in Northeast[11] in Brazil, which showed a mild prevalence of males of 51.5% and 55.45%, respectively.

According to what is expected for a maternity of usual risk, full-term births and vaginal delivery predominated, taking into account the recommendation of the World Health Organization[12] and demonstrating the value of normal delivery.

The frequency of asphyxiation found was much higher than that presented by a research conducted in Joinville – SC with

Table 3 – Factors related to the onset of intercurrences in the first year of life of infants followed in a high-risk outpatient clinic in the period from April 1 to August 30, 2019. Aracaju, SE, Brazil, 2019.

	Intercurrences		
	Yes n (%)	No n (%)	
Hospitalization time			
<7 days	8 (14,5)	5 (16,1)	0,169 QM
7 to 13 days	29(52,7)	12 (38,7)	
13 to 20 days	6 (10,9)	1 (3,2)	
>20 days	12(21,8)	13 (41,9)	
In-hospital feeding pattern			
AME	34(61,8)	11 (35,5)	0,038 QM
AM+FI	14(25,5)	16 (51,6)	
FI	7 (12,7)	4 (12,9)	
Post-discharge eating pattern			
AME	31(56,4)	15 (48,4)	0,476 F
AM+FI	24(43,6)	16 (51,6)	
AM post-discharge			
<6 Months	26(68,4)	21 (80,8)	0,389 F
>6 Months	12(31,6)	5 (19,2)	
FI Introduction Period			
<6 Months	33(76,7)	21 (77,8)	1,000 F
>6 Months	10(23,3)	6 (22,2)	
LV Introduction Period			
<6 Months	15(48,4)	6 (42,9)	0,759 F
>6 Months	16(51,6)	8 (57,1)	
Farinaceous Products Introduction Period			
<6 Months	15(51,7)	10 (71,4)	0,325 F
>6 Months	14(48,3)	4 (28,6)	
Apgar Rating			
No choking	39(70,9)	21 (67,7)	0,765 QM
Mild Asphyxia	10(18,2)	7 (22,6)	
Moderate choking	2 (3,6)	0 (0)	
Severe choking	4 (7,3)	3 (9,7)	

Legend: EB - Exclusive Breastfeeding. AM - Breastfeeding. FI - Infant Formula. VL - Cow's Milk. n - absolute frequency. % - relative frequency percentage. QM Pearson's Chi-square test with Monte-Carlo simulations. F Fisher's Exact Test.
Source: own research

920 infants where this condition was observed in 4.6% of the Nbs hospitalized in NICU.[13]

Congenital syphilis deserves attention as the main reason for hospitalization. In the literature, this condition does not occupy the first place and has been declining in recent years.[10-11]

This study observed a frequency of low birth weight and hospitalizations carried by this condition above that found by Vasconcelos et al. (2013),[11] in a research conducted in Maceió – AL, which may be a reflection of the social condition of the parturients attended, as it can also mean inappropriate prenatal care.

Hospitalization in NICU/IU compromised breastfeeding, due to the NB's own conditions and the separation of the mother-child binomial during hospitalization. A study showed that n? (33%) of infants received breast milk at the moment of discharge from the NICU and only n? (22%) were found in EBF.14-15 Mothers who left the hospital exclusively breastfeeding their children were able to maintain this practice in the first month after discharge. However, only around n? (46.3%) of them managed to maintain exclusive breastfeeding until six months of life. We can infer that hospitalization in the NICU/IU negatively influences the EBF during the period that the NB remains hospitalized, but other factors after discharge are responsible for the important EBF drop in the subsequent months.[14]

Although this study found an early offer of complementary diet, and even inadequacy of foods offered after the sixth month of life, the situation found was still better than that observed in a study carried out in the northwestern region of Goiânia[16] that demonstrated that n? (55.1%), n? (57.2%) and n? (62.7%) of the

children had already consumed salty porridge, juices and fruits, respectively, before the sixth month. It was observed that most of the infants did not receive all the recommended food groups for their age. Data published in the literature indicate that the negative impact on health occurs to a greater degree when food groups are not introduced, compared to when they are initiated early, but respecting the variety. It is noticed that family beliefs and habits still have great importance in the dietary pattern of northeastern infants, and that, health education guidelines and actions need to be strengthened to minimize inappropriate practices in the introduction of complementary diet and reduce health damage in the short and long term, such as the development of chronic non-communicable diseases in adulthood.[17-19]

As for the adequacy of eating patterns in relation to growth, the children breastfed in the first six months of life were the ones who presented weight gain rates closer to those recommended by the Ministry of Health. Infants who received infant formula, associated or not with BF, had marked weight gain during the three quarters. On the other hand, those who used cow's and/or farinaceous milk early revealed an inversion of the weight gain pattern, with lower speeds in the first trimester and higher in the following two trimesters. When comparing this result with that of other studies, there was a similar impairment of the early supply of protein and dairy foods (formulae and cow's milk), which occurs not only directly in the growth, but also interfering in the ingestion, in the absorption and development of allergies.[20-22]

A higher frequency of illness was observed among children with early weaning and who introduced supplements to breastfeeding or other types of milk before the sixth month of life, mainly cow's milk. The observation of this study corroborates that of other studies that associate inappropriate eating practices in infants with increased diarrhea and infections.[23-24]

CLOSING REMARKS

Even recognizing the limitation of not having characterized factors inherent to the NB itself that lead to early weaning, the results showed low EBF rates during the first six months of life in NICU/IU graduates.

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