ISSN (electrónico): 1699-5198 - ISSN (papel): 0212-1611 - CODEN NUHOEQ S.V.R. 318

ARÁN

Nutrición Hospitalaria

Trabajo Original

Pediatría

Cardiometabolic evaluation of small for gestational age children: protective effect of breast milk

Evaluación cardiometabólica de niños pequeños para su edad gestacional: efecto protector de la leche materna

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Abstract

Introduction: human growth is the result of an interaction between genetic, hormonal, nutritional, and environmental factors. It is not yet fully understood what is predominant and decisive in determining an individual's weight and height.

Objective: the aim of this study was to evaluate the cardiometabolic profile of exclusively breastfed children born small for gestational age (SGA).

Methods: this is a prospective cohort study of children born at term who were classified as SGA, and as appropiate for gestational age (AGA), who were followed up to pre-school age. Anthropometric measures and body composition parameters were obtained. Breastfeeding duration was calculated in days, and achievement of catch up of weight was considered an increase in Z-score ≥ 0.67. The cardiometabolic profile was evaluated in the first month of life and repeated at pre-school age. At pre-school age, fasting blood glucose, insulin, HOMA-IR, and blood pressure were measured.

Results: twenty SGA and 12 AGA children were studied. The mean duration of exclusive breastfeeding (EBF) was 180 days in both groups. Of SGA children, 85 % had recovery anthropometric parameters for age within the first six months, with a speed of weight gain significantly higher than the that of AGAs ($p < 0.001$). SGAs continued to be thinner and smaller than AGAs at pre-school age. There was no diagnosis of overweight or obesity in the studied sample, and no differences were foun between groups in laboratory tests.

Conclusion: these findings suggest that EBF may confer protection until pre-school age in children born SGA, who are considered at higher risk for chronic non-communicable diseases.

Keywords:

Small for gestational age. Breastfeeding. Metabolic syndrome. Overweight. Insulin resistance.

Resumen

Introducción: el crecimiento humano es el resultado de la interacción de factores genéticos, hormonales, nutricionales y ambientales. Todavía no se comprende completamente lo que es predominante y decisivo para determinar el peso y la altura del individuo.

Objetivo: el objetivo de este estudio fue evaluar el perfil cardiometabólico de niños alimentados con lactancia materna exclusivamente y que nacieron pequeños para la edad gestacional (PEG).

Métodos: este es un estudio de cohortes prospectivo con niños nacidos a término, unos clasificados como PEG y otros como apropiados para la edad gestacional (AEG). Se hizo un seguimiento de estos niños hasta la edad preescolar. Se realizaron medidas antropométricas y de la composición corporal. La duración de la lactancia materna se calculó en días y el éxito en la recuperación del peso se consideró como un aumento de la puntuación Z ≥ 0,67. El perfil cardiometabólico se evaluó en el primer mes de vida y se repitió en la edad preescolar. En la edad preescolar se midieron la glucosa en sangre en ayunas, la insulina, el HOMA-IR y la presión arterial.

Resultados: el grupo del estudio estaba formado por veinte niños PEG y doce niños AEG. La duración media de la lactancia materna exclusiva (LME) fue de 180 días en ambos grupos. De los niños PEG, el 85 % tenían parámetros antropométricos de recuperación para la edad en los primeros seis meses, siendo la velocidad del aumento de peso significativamente mayor que en los AEG ($p < 0,001$). Aun así, los niños PEG continuaron siendo más delgados y pequeños que los AEG en la edad preescolar. No hubo diagnóstico de sobrepeso u obesidad en la muestra estudiada, y no hay diferencia entre los grupos relativos a las pruebas de laboratorio.

Conclusión: estos hallazgos sugieren que la LME puede conferir protección hasta la edad preescolar en los niños nacidos PEG, que se consideran en mayor riesgo de contraer enfermedades crónicas no transmisibles.

Palabras clave:

Pequeño para la edad gestacional. Lactancia materna. Síndrome metabólico. Sobrepeso. Insulinorresistencia.

Received: 03/08/2020 • Accepted: 07/10/2020

Conflicts of interest: the authors declare none.

Acknowledgements: we are indebted to APAE Salvador (Associação de Pais e Amigos dos Excepcionais) for their contribution.

Santiago ACT, Cunha LPM, Costa ML, Lyra PPR, Oliveira PR, Conceiçao GC, Moreira MLO, Alves CAD. Cardiometabolic evaluation of small for gestational age children: protective effect of breast milk. Nutr Hosp 2021;38(1):36-42

DOI: http://dx.doi.org/10.20960/nh.03267

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INTRODUCTION

Human growth is the result of an interaction between genetic, hormonal, nutritional, and environmental factors. It is not yet fully understood what is predominant and decisive in determining an individual's weight and height (1,2).

It is well known that, since intrauterine life and during early childhood, changes in the growth pattern may lead to permanent metabolic changes that may have consequences later in adult life (3).

A small-for-gestational-age (SGA) birth, that is, with a birth weight lower than the 10th percentile for gestational age (GA) in the absence of intrauterine growth restriction (IUGR), may be only a manifestation of genetic potential and, apparently, result in no metabolic impairment (4). On the other hand, when the fetus deviates from its growth pattern during gestation, or when the child undergoes growth acceleration within the first years of life after a restriction period or otherwise, the problem seems to be related to metabolic syndromes (MS) and increased risk for cardiovascular diseases (5). Reduced insulin sensitivity and increased fat accumulation seem to be related to the development of these diseases both in children (6) and in adults (7).

One of the main modulating factors of the growth pattern in infancy is nutrition. Exclusive breastfeeding (EBF) during the first six months of life has been described as a key predictor of future health (8). However, little is known about the role of breastfeeding (BF) in infants born SGA.

The aim of the present study was to evaluate the cardiometabolic profile of infants born SGA, and to compare it with that of children born adequate for gestational age (AGA), and its relationship with body composition and breastfeeding from the neonatal period to preschool-age.

MATERIAL AND METHODS

This is a prospective cohort study of children born at term between 2010 and 2013, classified according to the Intergrowth 21st (9) curve by sex and GA at birth as SGA (birth weight ≤ 10th percentile for the reported gestational age) or AGA (weight at birth between the 11th and 90th percentiles for the reported GA).

Children were recruited by convenience sampling from public maternity hospitals during the neonatal period and referred to ambulatory care. The inclusion criteria were: children born at term who were SGA, but not requiring intensive care, or AGA needing breastfeeding support. Twins were not included. Exclusion criteria included: congenital infections, metabolic diseases, neurological pathologies, and genetic abnormalities.

The mothers were instructed to maintain BF until the 6th month of life, and the type of breastfeeding was classified in accordance with the WHO (10). According to this information, the number of days of exclusive breastfeeding was calculated for each child.

The children were evaluated at intervals of one to three months up to two years, and the last evaluation was made between four and six years of age. A blood sample was collected within the first two months and at the end of the study, between four and six years of age. The evaluations were carried out by the same medical team. Growth and weight gain were assessed by the adequacy of growth indicators, by evaluating the occurrence and intensity of catch-up growth. Catch-up growth is defined as a difference of ≥ 0.67 standard deviations (SD) in the weight/age indicator (W/A) between two moments in a series of observations, and was considered in this study from birth up to six months of life (11), and intensity was estimated by the value of delta.

Weight was measured using a Welmy electronic scale, model W-200, and height was measured using the ROSS stadiometer (ROSS Anthropometer, Ltda, Ohio, USA) with a 100-210 cm measuring range, accurate to 0.1 cm. Neck circumference (NC), waist circumference (WC), and cephalic perimeter (CP) were measured with an inelastic tape (Sanny®) with a precision of 0.1 mm and a maximum length of 150 cm, as previously described (12,13). The subscapular (SS) and tricipital skinfolds (TS) were measured using a Lange skinfold caliper with a 0-60 mm measuring range and an accuracy to 1 mm. These measures were performed by a dietitian in duplicate, all in accordance with the techniques and guidelines proposed by the Brazilian Society of Pediatrics (12). For the anthropometric diagnosis at pre-school age, the measurements and their anthropometric indices using the z-score were considered using the WHO Anthro software (version 3.2.2 for five-year-olds, and version 1.0.4 for those older than five years), in addition to the body mass index (BMI) (14). These data were categorized as proposed by the World Health Organization (WHO) (14).

The following parameters were used: arm circumference for age (ACA), calculated and classified according to Frisancho (1990) (15); subscapular cutaneous (SS) and tricipital skinfolds (TS), adjusted for age, and the sum of skinfolds according to age, calculated according to the NCHS (National Center for Health Statistics, 1976-1980) (16), and classified according to Frisancho (1990) (15).

The waist circumference adjusted for age (WC/A), calculated according to the NCHS reference (2008) (18), and the neck circumference adjusted for age, calculated as proposed by the IDEFICS study (13), do not have established cut-off points that might be used to classify this age group, and they are only a reference used to compare groups of children. The waist/height ratio was calculated using both units in centimeters, and values greater than 0.5 were considered high (18).

The calculation of the mid-upper arm muscle area (MUAMA) was performed using TS and arm circumference (AC) according to the formula proposed by Jelliffe and Jelliffe (1969): MUAMA = [AC - (CTS / 10 x π)²] / (4 x π)] (19). This variable was categorized according to Frisancho (1990) (15). The calculation of fat percentage was carried out by determining the amount of fat in kilos, according to the protocol of Dezemberg et al. (1999) (20), in accordance with the formula: body weight (kg) = 0.332 x WEIGHT (kg) + 0.263 x CTS (mm) + 0.760 x GENDER + 0.704 x ETHNICITY - 8.004 (constants: gender: 1 for males and 2 for females; ethnicity: 1 for Caucasians and 2 for afro-descendants), and categorized according to the percentile table proposed by McCarthy et al. (2006) (21).

The reference used to classify fat percentage considers only children over the age of five years; thus, four participants in the SGA group were not included in this category.

Blood pressure (BP) was measured using an aneroid sphygmomanometer and classified according to the methodology previously described in the literature (22).

Blood samples were collected after 3-6 hours of fasting within the first year of life (first month) and after 8-12 hours of fasting in pre-school children in order to evaluate: triglycerides (enzymatic method), total cholesterol and fractions (enzymatic, colorimetric and calculated), glycemia (enzymatic method), and insulin concentration (chemiluminescence). The last two measures were only carried out for preschool-aged children. The HOMA-IR index (homeostasis model assessment of insulin resistance) was calculated using the formula: "fasting glucose x 0.0555 x insulin fasting / 22.5" for assessments in preschoolers. As there are no reference values for the age evaluated, we used the existing ones for 7-8.9-year-olds, according to gender: male 0.68 (0.54) ± 1.76, and female 0.65 (0.37) ± 1.39 (23).

STATISTICAL ANALYSIS

Initially, a descriptive analysis was carried out to characterize the study sample, considering absolute and relative frequencies for qualitative variables, and mean/median (with their respective variability measures) for quantitative variables.

Correlations between quantitative variables were assessed using Spearman's correlation coefficient. To compare the behavior of cardiometabolic outcomes between some groups, the non-parametric Mann-Whitney test was used for independent samples. The analyses were performed using the STATA 12 software with a significance level of 5 %.

The present study was approved by the Ethics Committee of our institution (report 1,741,320/2016). The children at preschool age whose parents or legal guardians agreed to participate in the study and signed the free and informed consent form (ICF), and in addition gave their verbal consent were included in the reassessment.

RESULTS

Initially, 65 newborns were pre-selected after birth at the maternity. Five did not participate or were excluded from the study due to prematurity (n = 3) and congenital infection (n = 2); 60 infants remained, of whom 20 (33.3 %) were born AGA and 40 (66.7 %) were born SGA. During the study 27 children were lost to follow-up, with the final assessment between 4 and 6 years of age consisting of 21 SGA children and 12 AGA. There was no statistical difference in anthropometric data at birth between the children who completed the study and those who were lost to follow-up. In the group of children who completed the study 54.5 % were male, 57.1 % of these being SGA. One child in the SGA group was excluded from the analysis because no laboratory examinations were performed during follow-up.

The general characteristics of the children at birth are shown in table I. Children born with SGA were smaller and thinner at birth. During the first six months of life, the speed of weight gain was evaluated, and it was found that, in addition to catch-up growth, weight gain in SGA children was greater than those in the AGA group (maximum delta in the SGA group 1.43 x AGA 0.55, $p < 0.001$). The analysis of the adequacy of the indicators revealed that, for both W/A and H/A, all children with birth deficits recovered these indicators throughout the period, but the H/A measure was missing for one child.

No children were diagnosed as overweight, obese, or short in stature in the studied population. Two children (10 %) were classified as below weight for age (according to the W/A indicator) and five children (25 %) had low BMI for age, which were all in the SGA group. The children in the AGA group continued to have age-appropriate anthropometric parameters at the age of four to six years.

Table I. General characteristics of the sample of SGA and AGA children at birth (n = 60)

	SGA (n = 40)				AGA (n = 20)			
	Followed up children (n = 21)		Loss to follow-up (n = 19)		Followed up children (n = 12)		Loss to follow-up (n = 8)	
	Median	IQ 25-75	Median	IQ 25-75	Median	IQ 25-75	Median	IQ 25-75
Weight (g)[a,b]	2370.00	(2260.00; 2675.00)	2304.00	(2220; 2640.00)	3386.50	(2907.00; 3527.50)	3127.00	(2870.00; 3377.50)
Height (cm)[a,b]	45.50	(45.00; 47.00)	46.00	(45.00;47.00)	49.00	(47.00; 49.50)	47.50	(47.00; 49.25)
CP (cm)[a,b]	32.00	(31.00; 34.00)	32.00	(31.00; 33.00)	34.00	(33.25; 35.50)	34.00	(33.00; 36.00)
W/A, Z-score[a,b]	-1.83	(-2.50; -1.76)	-2.17	(-2.59; -1.70)	0.13	(-0.77; 0.66)	-0.31	(-0.91; 0.33)
H/A, Z-score[a,b]	-2.03	(-2.93; -1.48)	-1.92	(-2.29; -1.48)	-0.33	(-0.90; -0.22)	-0.87	(-1.35; 0.24)
CP/A, Z-score[a,b]	-1.28	(-2.20; -0.37)	-1.63	(-2.04; -1.05)	0.36	(-0.24; 1.05)	-0.07	(-1.04; 1.27)

SGA: small for gestational age; AGA: adequate for gestational age; IQ: interquartile; CP: cephalic perimeter; W/A: weight for age; H/A: height for age; CP/A: cephalic perimeter for age - Intergrowth *(2014).* [a] *$p < 0.001$, Mann-Whitney test – a comparison between the SGA and AGA groups followed.* [b] *$p > 0.05$, Mann-Whitney test – a comparison between the SGA and AGA groups followed, and that represented loss to follow-up.*

Regarding the quantity of body fat, a significant difference was observed between the groups for most measurements and, in all the variables evaluated, the median of the values in the SGA children were lower than in the AGA children at preschool age (Table II).

Although adiposity indicators were normal or decreased (as in some SGA children), there was a moderate or strong positive correlation between BMI at the age of four to six years and body fat indicators in both SGA children [CP ($r = 0.7$, $p = 0.001$), WC ($r = 0.6$, $p = 0.002$), AC ($r = 0.9$, $p < 0.001$), MUAMA ($r = 0.9$, $p < 0.001$) and sum of skinfolds ($r = 0.7$, $p = 0.001$)] and in AGA children (CP ($r = 0.62$, $p = 0.03$), CC ($r = 0.9$, $p < 0.001$), AC = 0.8, $p = 0.003$) and MUAMA ($r = 0.6$, $p = 0.03$)].

Data on anthropometry and body composition, according to the variables studied, are described in table II. Figure 1 shows the evolution of BMI from birth to preschool age in both groups.

Table II. Anthropometric parameters and body composition of SGA and AGA preschool children (n = 32)

	SGA (n = 20)		SGA (n = 20)		p-value[a]
	Median	IQ 25-75	Median	IQ 25-75	
Age (years)	5.6	(5.1; 6.2)	5.6	(5.5; 6.2)	p = 0.552
Weight (kg)	16.6	(15.3; 19.2)	21.1	(17.34; 23.09)	*p = 0.004*
Height (cm)	111.6	(108.3; 118.2)	118.4	(114.32; 122.12)	*p = 0.009*
W/A (z-score)	-1.0	(-1.47; -0.28)	0.4	(-0.83; 0.82)	*p = 0.006*
H/A (z-score)	-0.15	(-0.88; 0.29)	0.7	(0.20; 1.49)	*p = 0.010*
BMI/A (z-score)	-1.6	(-2.02; -0.32)	-0.6	(-1.09; 0.66)	*p = 0.017*
Skinfold sum	12.0	(9.25; 13.75)	13.8	(11.25; 15.75)	p = 0.076
% fat	8.2	(5.70; 13.9)	14.7	(12.01;19.39)	*p = 0.005*
WC	48.3	(46; 51.9)	52.8	(49.42; 54.2)	*p = 0.010*
WC/height	0.44	(0.42; 0.45)	0.44	(0.43; 0.46)	p = 0.477
AC (cm)	15.7	(14.8; 17.0)	17.5	(15.92; 19.02)	*p = 0.010*
NC (cm)	24.5	(23.6; 25.9)	25.3	(23.87; 26.32)	p = 0.182
Arm muscle area	14.7	(13.7; 16.9)	14.3	(12.60; 18.16)	*p = 0.040*

SGA: small for gestational age; AGA: adequate for gestational age; IQ: interquatile; W/A: weight for age; H/A: height for age; BMI/A: body mass index for age (growth indicators calculated using the WHO reference); WC: waist circumference; AC: arm circumference; NC: neck circumference; [a]: Mann-Whitney test.

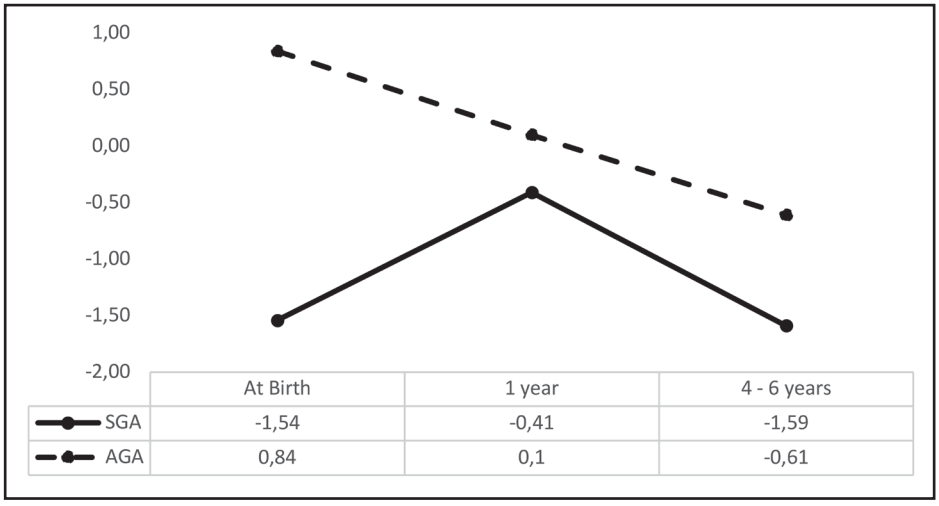

Figure 1.

Evolution of BMI z-scores according to the WHO from birth to pre-school age in the SGA and AGA groups.
BMI: body mass index; WHO: World Health Organization; SGA: small for gestational age; AGA: adequate for gestational age; *: p-value performed by the Mann-Whitney test (at birth, $p < 0.001$; at the age of 1 year, $p = 0.133$, and at the age of 4-6 years, $p = 0.017$).

Table III. Results of the laboratory examination during the first month of life and at pre-school age; blood pressure in pre-school children born SGA and AGA (n = 32)

	SGA		AGA		SGA		AGA		p-value[f] (1st examination/ 4-6 years)
	1st examination*	IQ 25-75	1st examination*	IQ 25-75	4-6 years**	IQ 25-75	4-6 years**	IQ 25-75	
Triglycerides	89.5	(65.8; 153)	56.5	(43.7; 134)	59	(42; 87)	69	(57.3; 74.5)	0.270/0.921
Cholesterol	122.0	(111; 158.5)	111.0	(105.3 195)	168.0	(139;195)	162.0	(151.3; 202)	0.910/0.921
LDL	70.5	(37.5; 82.2)	53	(38.3; 103.3)	112	(80;127)	106.5	(93; 130.8)	0.851/0.795
HDL	44.5	(33; 49.5)	48	(35.5; 78)	45	(39;53)	49	(40.3; 57.3)	0.384/0.399
Glycemia					80.5	(76; 88.5)	87	(80.3; 93.3)	0.124
HOMA-IR					0.5	(0.31; 0.77)	0.74	(0.67; 0.97)	0.072
SBP[e]**					90	(85; 95)	85	(82; 90)	0.064
DBP[e]**					55	(50; 60)	60	(55.7; 60)	0.306

*SGA: small for gestational age; AGA: adequate for gestational age; IQ: interquartile; LDL: low density lipoprotein; HDL: high density lipoprotein); HOMA-IR: homeostasis model assessment of insulin resistance; SBP: systolic blood pressure; DBP: diastolic blood pressure; [f]: p-value obtained by the Mann-Whitney test. *: SGA group, n = 12 with ± 30 days of life and two with ± 60 days of life; AGA group, n = 8, all with ± 30 days. **: SGA group = 19, AGA group n = 12.*

The BMI assessment also revealed that the SGA children presented a different evolution than the AGA children within the first year of life due to an initial phase of accelerated growth. However, this pattern was not maintained up to pre-school age.

In the analysis of laboratorial variables of cardiometabolic risk, carried out from the age of four to six years, no statistically significant difference was observed between the groups. It was not possible to perform tests in some children during the first month due to inadequate fasting or non-attendance on the day of collection (Table III). In one SGA child the glycemia sample was insufficient and, therefore, it was not possible to calculate the HOMA IR. Likewise, there was no statistically significant difference for systolic (SBP) and diastolic (DBP) measurements between the groups (Table III).

All children were breastfed for the first six months of life. In both groups the percentage of exclusive breastfeeding in the first six months of life was high: SGA group, 63.1 %, and AGA 58.3 %, so that the median in days of exclusive breastfeeding for the groups was, respectively, of 180 (126; 180) and 179.5 (138.75; 181.5). There was no difference between the two groups (p = 0.8). There was also no difference between EBF duration and catch-up growth among the children studied (p = 0.53), nor was there a statistically significant correlation between EBF duration and the highest weight gains in the groups (r = -0.35, p = 0.2).

In the SGA group, there was no relation between breastfeeding time and increased body fat in any of the analyses performed (BMI, CC, CP, and skinfolds). In the AGA group, a strong negative correlation was found between BF and BMI (r = -0.8, p = 0.001), CC (r = -0.7, p = 0.007) 0.7, p = 0.009), MUAMA (r = -0.7, p = 0.01).

DISCUSSION

SGA birth has been related to a higher risk of perinatal and child morbidity and mortality, and of cardiometabolic diseases further in life (24,25). Once the neonatal period has passed, the challenge is how to nurture these children and achieve balance between risk of malnutrition (causing cognitive development impairment) and accelerated growth without increasing the risk of chronic non-communicable diseases in the future (26).

Some authors have described a relationship between low birth weight and overweight or obesity, particularly if associated with early catch-up growth. Ibanez et al. showed that, even in the absence of BMI changes, SGA children who presented catch-up growth developed central adiposity concentration in the first four years of life related to increased insulin resistance (27).

Recently, body composition has become more important than anthropometric patterns alone when evaluating rapid postnatal growth. In this context, skinfold measurements have been used to evaluate fat mass in children (28). In the present study, unlike what is described in the literature, it was found that infants born SGA developed normal or even reduced anthropometric measurements and body composition parameters when compared to AGA children, instead of higher weight or adiposity related to their low birth weight at preschool age (29). There was also no evidence of increased insulin resistance in the SGA group. These differences can be attributed to a difference in genetic background between the populations studied. Alternatively, methodological diferences may explain these discrepancies.

It is noteworthy that the above-mentioned studies, which found a relationship between SGA birth, cardiometabolic outcomes, and adiposity, did not take into account the dietary pattern during the first years of life, nor the intake of breast milk. Studies conducted by Singhal et al. in 2007 and 2010 showed that SGA children born at full term and breastfed presented a different body composition than those fed with a standard milk formula or hypercaloric formulas (30,31); that is, children who received the highest caloric intake presented accelerated growth and increased fat mass when they were evaluated at the age of six to eight years. The children included

in the present study were all breastfed and the duration of EBF was longer during the first six months than as described for Brazilian children (63 % x 40 %) (32). Thus, the protective role of breastfeeding on the development of future cardiometabolic events seems to be possible. In a cohort study with breastfed SGA infants, Zegher et al. found that they had a high insulin sensitivity, and normal serum glucose, IGF-1 (insulin-like growth fator 1) and adiponectin levels, and that they developed a lower BMI and fat mass when compared to SGA children who were fed a milk formula, suggesting that breastfeeding is a healthy atitude (33), accepting that low adiposity in childhood could represent a better cost versus benefit regarding the prevention of future diseases (33). In agreement with this reasoning, López-Rodríguez et al. have suggested that BF for more than six months seems to attenuate or even reverse the risk of overweight, obesity, and pathological fat concentration in these children at risk (34). Another recent study suggested that BF for 4 to 6 months exerts an important protective and beneficial cardiovascular effect in infants born SGA presenting with an early initial cardiovascular dysfunction (35).

There are few studies in the literature in which breast milk is used as the only source of food for these children during the first months, since being born with low weight or premature is one of the causes of early weaning (36). For ethical reasons, it is not possible to carry out randomized clinical trials using milk other than the maternal one, and thus to make comparisons. Therefore, studies that evaluate BF are difficult to conduct, and reaching a definitive conclusion of its role is therefore difficult. The anthropometric pattern presented by the SGA children showed that it is possible to use EBF during the first six months without impairing growth. All the SGA children, except one, who had deficits in birth indicators, recovered by the age of six months when breast milk became their main source of nutrition. The speed of accelerated weight gain was not related to breastfeeding duration nor to unfavorable (laboratory or anthropometric) outcomes. Children with the highest delta weight gain were not more likely to have poor outcomes. Even after initial increased growth rate there was a drop in the anthropometric parameters until pre-school age. The findings related to the measurements and anthropometric parameters are consistent with the age group of the population in question, and according to the theory proposed Rolland-Cachera et al. (37) in the 1960s, there is a rapid increase in BMI during the first year of life that subsequently decreases and reaches its lowest point at the age of six years, when it then increases again and adiposity may occur.

The small number of children included in the present study is a limitation in the analysis of the risk factors associated with SGA birth. In the case of a cohort, the study design is difficult bevause of the dropouts occurring over the years. In addition, it is more difficult to conduct studies in developing countries due to low population adherence, scarce resources to maintain regular follow-ups, and issues to have an available team that can actively search for children. However, even with a reduced sample size, it was possible to obtain prospective information about BF and provide regular consultations during the first two years of life, offering nutritional guidance as well as clinical and laboratory examinations, all with the same team of professionals, thus ensuring less bias of information and measurement.

In conclusion, SGA born infants exclusively breastfed during the first six months of life may not suffer growth impairment, and their nutritional recovery is possible when compared with AGA children. Likewise, the cardiometabolic risk factors measured at preschool age were similar in both groups. BF may be a protective factor for these findings. Thus, although it is not possible to generalize the results, it seems reasonable to assume that the recommendation of exclusive BF until the sixth month, followed by adequate supplementary nutrition and regular outpatient follow-up, can contribute to ensure a better outcome.

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