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Dietary habits, anthropometric and metabolic profile of adolescents born prematurely

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Abstract

Introduction: Prematurity may be related to the early onset of obesity and metabolic syndrome in adolescence. Breastfeeding and feeding are crucial factors in the genesis of cardio metabolic risk.

Objective: To analyze the relationship between the type of breastfeeding and eating habits with the blood pressure, lipid, glycemic and anthropometric profile of adolescents born prematurely.

Methods: Cross-sectional study with 50 adolescents born prematurely in western Paraná, Brazil, aged 10 to 19 years. Data on birth, breastfeeding and feeding using the 24-hour Food Consumption Marker were evaluated. Weight, height, abdominal circumference (AC), blood pressure (BP) were verified; concentrations of glucose, total cholesterol (TC) and triglycerides (TG) were measured by capillary puncture. Data analysis using descriptive statistics and analysis of variance.

Results: Out of total, 78%   eat in front of screens and 52% do not take the main meals during the day. Regardless of the amount of meals a day, the lipid, glycemic and AC profiles did not show a statistically significant difference between the groups. There is a statistically significant association between BP and number of meals ($p = 0.01$), TC and breastfeeding ($p = 0.03$) and TG with consumption of sausages ($p = 0.02$) and products rich in carbohydrates ($p = 0.01$). Most of them (72%) consumed cow's milk before completing one year and only 30% received exclusive breastfeeding until six months of age. Related other values, 30% had high BP, 22% and 41% high TC and TG, respectively. Of the 30% overweight, 60% had high BP, 53% high TG, 33% high TC and 33% percentile AC ≥90.

Conclusion: Breastfeeding did not influence the metabolic profile, but it was evidenced as risk factors for adolescents to develop future cardiovascular problems due to prematurity, inadequate eating habits, overweight, alterations in abdominal circumference, blood pressure and lipid profile.

Keywords: Infant, Premature, Adolescent Health, Adolescent Nutrition, Feeding Behavior, Cardiovascular Diseases, Metabolic Syndrome X.

Authors summary

Why was this study done?
Premature birth influences the individual's entire life, increasing the risk of injuries in the short, medium and long term; as cardiovascular problems in the adulthood.

What did the researchers do and find?
The researchers evaluated the dietary, metabolic and anthropometric profile of adolescents born prematurely through a cross-sectional study and showed that even with healthy eating habits, they can present alterations in blood pressure, lipid, glycemic and/or anthropometric profiles. The prevalence of metabolic syndrome was 8%.

What do these findings mean?
Adolescents born prematurely have a high cardiovascular risk. In this sense, early identification of this profile and recognition of the metabolic syndrome index in this group contribute to reduce the development of chronic diseases in adulthood.

INTRODUCTION

According to the World Health Organization[1], one in every 10 births is a premature baby, totaling approximately 15 million annually. Of these, around one million die from complications of prematurity or have impairments in their quality of life, with permanent sequelae or chronic conditions[1,2].

Many of the repercussions of prematurity are due to feeding in the neonatal period[3]. For the premature newborn, both the excess and the lack of food cause damage. The objective of feeding in this phase is to promote weight gain, adequate growth and development, preventing possible metabolic and neurological changes[4]. Given the condition of prematurity, parenteral nutrition has been the first option in nutrition, although it triggers immediate changes, such as hyperglycemia, electrolyte disturbances and hypertriglyceridemia. Enteral feeding should be started as soon as possible with the mother's own milk, which is considered the most appropriate for the gestational age of the premature newborn[4].

In the first months, the premature newborn presents catch-up, characterized by higher than expected growth rates[5]. However, the risk of developing cardio metabolic diseases due to catch-up is an important aspect that must be considered in the follow-up of the premature newborn[6].

The concern about possible adverse effects of the very fast or very slow growth of the premature newborn is growing, since a non-ideal nutrition can cause deep and lasting reflexes, with a higher risk for obesity and cardiovascular disorders in adolescence and adulthood[6,7]. Thus, malnutrition in the womb or during early childhood predisposes the fetus to metabolic changes, which can have an impact on the metabolic profile in childhood, a fact known as the fetal origin of these diseases[8].

These periods are known as critical exposure windows for metabolic programming, that is, the time of greatest risk[9]. The lactation period is considered a critical stage of development[10], since malnutrition or overfeeding during it can contribute to the development of Metabolic Syndrome (MetS). In children born at term, the use of formula for feeding and rapid growth was associated with MetS, while breastfeeding was associated with a low risk of developing MetS[9].

It is a common practice, that the family offer big portions of food and milk to the premature infant, because, they believe that the newborn needs to gain weight and grow quickly, which increases the risk of obesity and its morbidities, such as MetS[6].

MetS is a complex disorder associated to cardiovascular risk factors, defined as the presence of three or more metabolic changes: hypertriglyceridemia, reduced concentrations of high-density cholesterol (HDL), insulin resistance, arterial hypertension and visceral obesity which can be verified by Abdominal Circumference (AC)[11]. Several conditions are related to its appearance, such as genetic predisposition, lack of physical activity and inadequate nutrition[12].

In addition to these conditions, fetal and postnatal growth are determinant for MetS, since newborns small for gestational age and premature infants have an increased prevalence of MetS components from childhood to adulthood, inversely proportional to birth weight[13]. As adults, they have higher levels of Blood Pressure (BP) and fasting glucose, and low insulin sensitivity when compared to those born at term[13,14].

It is evident that prematurity and the feeding of the newborn may be associated with the occurrence of changes in metabolism. Considering that the diagnosis of MetS has increased every year among children and adolescents, due to their lifestyle and the high rate of overweight and obesity among this public, it is questioned whether among adolescents born prematurely this occurrence is also present.

Therefore, the objective of this study is to analyze the relationship between the type of lactation and eating habits with the pressure, lipid, glycemic and anthropometric profile of adolescents born prematurely.

METHODS

A cross sectional study of quantitative approach, in which the variables are described as a photograph of a time frame, the causes and effects being permanent with chronic or prolonged evolution[15], as in the case of prematurity. The research was carried out in a Basic Health Unit (UBS-Unidade Básica de Saúde) in a municipality in western Paraná, Brazil, in the first half of 2017.

The population was composed of adolescents between 10 and 19 years old, born prematurely. Since the sample was of the convenience type, different strategies were carried out to include the largest possible number of participants; all medical records of users in this age group were manually checked in the UBS files, looking for births that occurred in the time frame between 1998 and 2006. Additionally, a search at a school in the region and approach of users who attended the UBS were made.

At the UBS, 91 births were identified weighing less than 2500g, but with no record of Gestational Age (GA). Of these, 43 adolescents were not found after three or more attempts at telephone contact on different days and times. Of those contacted, four refused the invitation to participate in the research, one was hospitalized for detoxification and 10 had GA greater than 37 weeks. In the search at school and in the approach at UBS, 32 more adolescents were identified; of these, four were not born premature, two lived in another municipality and, with six, telephone contact was not possible.

Adolescents who were not located and those who did not attend the third attempt to schedule an evaluation were excluded from the study. The final sample comprised 50 adolescents born prematurely aged between 10 and 19 years.

Data collection took place at the UBS, after scheduling according to the availability of the adolescent and their guardian. Participants were informed about the scope of the study and its ethical and legal aspects.

For the interview, a form was used that included sociodemographic, clinical and behavioral aspects, based on the Goldenring and Cohen[16] instrument. To investigate breastfeeding, it was asked about the time of exclusive breastfeeding (EBF) and supplemented, age of introduction of infant formula and cow's milk. To investigate eating habits, the 24-hour Food Consumption Marker, recommended by the Food and Nutrition Surveillance System, was used[17].

After the interview, a physical examination was performed in the presence of the guardian. The BP was checked with a Premium aneroid sphygmomanometer with a suitable cuff, with the cuff occupying two thirds of the arm. BP was measured after at least 10 minutes of rest, in the left upper limb, supported at heart level; twice, with a maximum interval of 10 minutes. The mean values of the measurements were evaluated by age, height and sex percentile graphs, being considered high when systolic or diastolic BP greater than or equal to the 95th percentile, in accordance with the 7th edition of the Brazilian Guidelines on Arterial Hypertension[18]. Participants over 18, were assessed with adult parameters.

For weight assessment, a portable digital platform scale, Líder® brand, model P200m, with a capacity of 200 kg was used. Height was measured with a Sanny® wall stadiometer, model Standart, with scale in millimeters. Weight (W) in kilograms (Kg) and height (H) in meters (m) were recorded; to obtain the Body Mass Index (BMI) the formula BMI = $W/H2$ (weight divided by height squared) was applied, using the cut-off points of Z-score for evaluation[19].

AC was found at the midpoint between the lower margin of the last rib and the upper edge of the iliac crest with an inelastic measuring tape graduated in millimeters, with the adolescent standing, feet together and exposed abdomen. The data were evaluated according to IDF[11] criteria, recommended by the SBD12 Guidelines; those over the age of 18 were assessed using adult parameters, which considers AC <90cm for men and <80cm for women to be adequate.

Subsequently, the teenagers underwent capillary blood collection - peripheral puncture was performed with Premium® automatic lancets. To evaluate glucose, the Accu-Chek® Active device was used and the result was analyzed according to the 6th edition of the Brazilian Diabetes Society Guidelines for plasma blood, since the result obtained with the test strip corresponds to the concentration of plasma glucose[12,20].

To perform the Triglycerides (TG) and Total Cholesterol (TC) tests, the Accuntrend Plus® device was used, with test strips for quantitative research of TG and TC in fresh capillary blood, following the manufacturer's guidelines. The Brazilian Society of Clinical Analyzes[21] states that TC and TG determinations can be analyzed without previous fasting, as they provide important information about the increased risk of coronary heart disease. Thus, the results of TC and TG were evaluated according to reference values of the Brazilian Consensus for the Standardization of Laboratory Determination of the Lipid Profile[21].

After typing with double verification in Microsoft Excel for Windows 2010, statistical analysis was performed using the R (R Development Core Team) software, with hypothesis testing power greater than 80%. Descriptive statistics and analysis of variance were performed; to assess qualitative variables and their relationship with quantitative variables, the analysis of variance table (ANOVA) was built. The analysis of the association between qualitative variables was performed using Fisher's exact association test and its hybrid version, all with 5% probability. For the analysis of the proportion of adolescents in each group to compare the categories, absolute frequency, sample proportion and Wilson's confidence interval, valid for small samples, were analyzed.

The study was registered by the Certificate of Presentation for Ethical Appreciation (CAAE) 16348813.7.1001.0107 and approved with opinion 1,134,712; all adolescents and their respective guardians signed the Free and Informed Consent Form.

RESULTS

Regarding the characterization of the sample, 26 (52%) were male, with a majority of self-reported white color (54%) and aged between 10 and 14 years (68%). Most (80%) were classified as moderately or late preterm, with an average gestational (GA) of 33.18 weeks and an average birth weight of 2046g, with the appropriate weight for GA in 70% of cases.

In relation to eating habits, 28% were breastfed for more than a year, with an average time of 13.29 months. . Regarding current habits, 78% eat in front of some type of screen; more than half (52%) don't consume the main meals of the day; between 54% and 80% have a diet consisting of beans, fresh fruits and vegetables. However, from 26% to 68% take food rich in carbohydrates and fats (Table 1).

Table 1: Characterization of adolescent born prematurely in terms of eating habits. Cascavel, Paraná, Brazil, 2017. (N 50).

Variables	n	%
Breastfeeding time		
Did not receive	8	16.0
0 – 6 months	15	30.0
>6 months – 1 year	11	22.0
>1 year	14	28.0
Does not remember	2	4.0
Infant Formula introduction age		
Did not receive	15	30.0
0 – 6 months	29	58.0
>6 months – 1 year	2	4.0
>1 year	1	2.0
Does not remember	3	6.0
Cow Milk Introduction age		
Did not receive	1	2.0
0 – 6 months	15	30.0
>6 months – 1 year	21	42.0
>1 year	13	26.0
Food consumption markers (SISVAN*)		
Eat in front of screens	39	78.0
3 main meals a day	24	48.0
Beans	40	80.0
Fresh fruits	27	54.0
Vegetables	33	66.0
Hamburger and/or sausages	23	46.0
Sweet drinks	34	68.0
Instant noodles, packaged snacks or crackers	13	26.0
Stuffed cookies, sweets or treats	21	42.0

Legend: * Food and Nutritional Surveillance System.

Most of adolescents born prematurely had normal levels as follows: BP (70%), blood glucose (98%), TC (78%), TG (59%) and AC <90 percentile (90%). However, it should be considered that those adolescents with high BP (30%), with high TC and TG (22 and 41%, respectively) and 30% with excess weight, 22% with overweight and 8% with obesity, constitute a risk group to develop MetS in adulthood, and the prevalence of MetS in this sample was 8%.

Table 2 illustrates the distribution of adolescents regarding the type and duration of breastfeeding and their lipid, glycemic, blood pressure and AC profile.

As for the type of dairy feed, 30% received EBF up to six months of age, while more than half (54%) received breast milk (BM) with infant formula as a supplement and 16% were fed exclusively with infant formula and/or cow's milk. There was no statistically significant association between the type of breastfeeding and altered levels of BP, TC, TG, blood glucose and AC.

Concerning the meals eaten throughout the day, it is observed that those who eat the three main meals (breakfast, lunch, dinner), present results more adequate to the parameters established for BP, blood glucose, TC and AC (Table 3). Still, 42% do not eat breakfast and 10% do not have lunch or dinner. However, regardless of the daily number of meals, the lipid, glycemic and AC profile did not show statistical difference between the groups. However, among those who did not have one of the main meals, 20% had high BP and 24% high TG.

Table 4 specifies the analysis of the association between food consumption indicated in the Food Consumption Marker and number of daily meals in relation to the pressure, glycemic, lipid and anthropometric profiles of adolescents born prematurely.

Table 2: Comparison between type and duration of breastfeeding and pressure, glycemic, lipid profile and waist circumference of adolescents born prematurely. Brazil, 2017 (N 50).

Groups	Variables under study			
	Normal BP	CI	Elevated BP	CI
Formula or CM	5 (0.10)aA	0.14[0.06; 0.29]	3 (0.06)aA	0.20[0.07; 0.45]
EB up to 6 months	11 (0.22)abA	0.31[0.19; 0.48]	4 (0.08)aA	0.27[0.11; 0.52]
BM + Formula	19 (0.38)bA	0.55[0.38; 0.70]	8 (0.16)aB	0.53[0.30; 0.75]
Total	35(0.70)		15(0.30)	
	Normal blood glucose	CI	Altered blood glucose	CI
Formula or CM	7 (0.14) aA	0.14[0.07; 0.27]	1 (0.02) aB	1.00[0.21; 1.00]
EB up to 6 months	15 (0.30) abA	0.31[0.20; 0.45]	0 (0.00) aB	0.00[0.00; 0.79]
BM + Formula	27 (0.54) bA	0.55[0.45; 0.68]	0 (0.00) aB	0.00[0.00; 0.79]
Total	49(0.98)		1(0.02)	
	Desirable TC	CI	Elevated TC	CI
Formula or CM	4 (0.08) aA	0.11[0.04; 0.24]	3(0.06) aA	0.17[0.10; 0.57]
EB up to 6 months	11 (0.22) abA	0.29[0.17; 0.45]	4 (0.08) aA	0.22[0.15; 0.65]
BM + Formula	23 (0.47) bA	0.60[0.45; 0.74]	4 (0.08) aB	0.61[0.15; 0.65]
Total	38(0.78)		11(0.22)	
	Desirable TG	CI	Elevated TG	CI
Formula or CM	3 (0.06) aA	0.10[0.04; 0.26]	4 (0.08) aA	0.20[0.08; 0.42]
EB up to 6 months	8 (0.16) abA	0.28[0.15; 0.46]	7 (0.14) aA	0.35[0.18; 0.57]
BM + Formula	18 (0.37) bA	0.62[0.44; 0.77]	9 (0.19) aA	0.45[0.26; 0.66]
Total	29(0.59)		20(0.41)	
	AC <90	CI	AC ≥90	CI
Formula or CM	7 (0.14) aA	0.15[0.08; 0.29]	1 (0.02) aB	0.20[0.04; 0.62]
EB up to 6 months	13 (0.26) abA	0.29[0.18; 0.43]	2 (0.04) aB	0.40[0.12; 0.77]
BM + Formula	25 (0.50) bA	0.56[0.41; 0.69]	2 (0.04) aB	0.40[0.12; 0.77]
Total	45(0.90)	1	5(0.10)	1

Legend: BP: Blood Pressure; TC: Total Cholesterol; TG: Triglycerides; AC: Abdominal Circumference. CM: Cow's milk. EB: Exclusive Breastfeeding. BM: Breast milk.
For each group (line), different capital letters represent significant differences in the proportions between the levels of each variable; and for each category of each variable (column), different lowercase letters represent significant differences in proportions between groups.
Results obtained through confidence intervals without overlap, with 95% reliability, expressed in absolute frequency and proportion.

Table 3: Comparison between number of daily meals and blood pressure, glycemic, lipid profile and waist circumference of adolescents born prematurely. Brazil, 2017 (N 50).

Groups regarding daily meals	Variables under study*			
	Normal BP	CI	Elevated BP	CI
Eat 3 main meals	19(0.38)aA	0.54[0.38; 0.70]	5(0.10)aB	0.33[0.15; 0.58]
Skip breakfast	13(0.26)aA	0.37[0.23; 0.54]	8(0.16)aA	0.53[0.30; 0.75]
Skip lunch/dinner	3(0.06)bA	0.09[0.03; 0.22]	2(0.04)aA	0.14[0.04; 0.38]
Total	35(0.70)		15(0.30)	
	Normal blood glucose	CI	Altered blood glucose	CI
3 main meals	24(0.48)aA	0.49[0.36; 0.63]	0(0.00)aB	0.00[0.00; 0.79]
Skip breakfast	21(0.42)aA	0.43[0.30; 0.57]	0(0.00)aB	0.00[0.00; 0.79]
Skip lunch/dinner	4(0.08)bA	0.08[0.03; 0.19]	1(0.02)aA	1.00[0.21; 1.00]
Total	49(0.98)		1(0.02)	
	Desirable TC	CI	Elevated TC	CI
Eat 3 main meals	19(0.39)aA	0.50[0.35; 0.65]	4(0.08)aB	0.36[0.15; 0.65]
Skip breakfast	15(0.31)aA	0.39[0.26; 0.55]	6(0.12)aB	0.55[0.28; 0.79]
Skip lunch/dinner	4 (0.08)bA	0.11[0.04; 0.24]	1(0.02)aA	0.09[0.02; 0.38]
Total	38(0.78)		11(0.22)	
	Desirable TG	CI	Elevated TG	CI
Eat 3 main meals	15(0.31)aA	0.52[0.00; 0.69]	8(0.16)aA	0.40[0.22; 0.61]
Skip breakfast	13(0.27)aA	0.45[0.00; 0.62]	8(0.16)aA	0.40[0.22; 0.61]
Skip lunch/dinner	1(0.02)aA	0.03[0.01; 0.17]	4(0.08)aA	0.20[0.08; 0.42]
Total	29(0.59)		20(0.41)	
	AC <90	CI	AC ≥90	CI
Eat 3 main meals	22(0.44)aA	0.49[0.35; 0.63]	2(0.04)aB	0.40[0.12; 0.77]
Skip breakfast	18(0.36)aA	0.40[0.27; 0.55]	3(0.06)aB	0.60[0.23; 0.88]
Skip lunch/dinner	5(0.10)bA	0.11[0.05; 0.23]	0(0.00)aB	0.00[0.00; 0.43]
Total	45(0.90)	1	5(0.10)	1

Legend: BP: Blood Pressure; TC: Total Cholesterol; TG: Triglycerides; AC: Abdominal Circumference. For each meal group (row), different capital letters represent significant differences in proportions between the levels of each variable; and for each category of each variable (column), different lowercase letters represent significant differences in the proportions between the levels of prematurity. Results obtained through confidence intervals without overlap, with 95% reliability, expressed in absolute frequency and proportion * Pressure, glycemic, lipid and waist circumference profiles.

Table 4: Relationship between number and type of meals for adolescents born prematurely. Brazil, 2017 (N 50).

	BP	Blood sugar	TC	TG	BMI	AC
Beans1	0,99	0,99	0,73	0,77	0,42	0,26
Fresh fruits1	0,75	0,46	0,13	0,47	0,42	0,36
Vegetables1	0,05*	0,34	0,53	0,21	0,25	0,15
Hamburger and/or sausages1	0,75	0,99	0,13	0,02*	0,89	0,65
Sweet drinks1	0,51	0,99	0,99	0,25	0,11	0,31
Instant noodles, packaged snacks, crackers1	0,99	0,26	0,14	0,01*	0,46	0,59
Stuffed cookies, sweets, treats1	0,06	0,42	0,30	0,74	0,16	0,99
Number of mealsa	0,01*	0,48	0,85	0,46	0,06	0,43
Breastfeeding1	0,68	0,16	0,03*	0,10	0,28	0,99

Legend: BP: Blood Pressure; TC: Total Cholesterol; TG: Triglycerides; BMI: Body Mass Index; AC: Abdominal Circumference 1: Fischer's exact hypothesis test. 2: Anova. a: Considered categorical. P-value* of 5% significance.

An association was observed between high BP and not having one of the three main meals of the day, a habit of 66.7% of adolescents, and consumption of greens, which is usual for 86.7%. There was a tendency for the association of high BP with those who eat foods with a high index of trans-saturated fat and carbohydrates, found in 20%.

There was an association between TC and those who received BM, both exclusive and complemented, since 72.7% of those who received BM had high TC. TG showed an association with consumption of hamburgers and/or sausages, in which paradoxically only 21.7% of those who consume these foods had high TG; as well as instant noodles, packaged snacks and crackers, since 61.5% of those who consume these products had high TG values. There is also a tendency for an association between BMI and the number of daily meals, as 48.4% of adolescents who ate the three main meals were eutrophic.

Among overweight and obese adolescents, although there was no statistically significant difference in relation to the variables analyzed, there was a prevalence of elevated BP (60%) and TG (53%) and 33% had a high TC and 33% percentile of AC ≥ 90, as shown in Table 5.

Table 5: Blood Pressure, glycemic, lipid profile and waist circumference of overweight adolescents born prematurely. Brazil, 2017 (N 50).

Overweight teenagers		Total
Normal BP	Elevated BP	
6 (0.40) [0.20; 0.64] A	9 (0.60) [0.36; 0.80] A	15(1.00)
Normal blood sugar	Altered blood sugar	
15 (1.00) [0.80; 1.00] A	0 (0.00) [0.00; 0.20] B	15(1.00)
Desirable TC	Elevated TC	
10 (0.67) [0.42; 0.85] A	5 (0.33) [0.15; 0.58] A	15(1.00)
Desirable TG	Elevated TG	
7 (0.47) [0.25; 0.70] A	8 (0.53) [0.30; 0.75] A	15(1.00)
AC <90	AC ≥90	
10 (0.67) [0.41; 0.85] A	5 (0.33) [0.15; 0.58] A	15(1.00)

Legend: BP: Blood Pressure; TC: Total Cholesterol; TG: Triglycerides; AC: Abdominal circumference.
Different capital letters represent significant differences in the proportions between the desirable and altered levels of each variable.
Results obtained through confidence intervals without overlap, with 95% reliability, expressed in absolute frequency and proportion.

■ DISCUSSION

The characterization of the sample in this study corresponded to international data carried out in different regions, consisting of a predominance of premature births with GA between 32 and 36 weeks - around 80%, with weight appropriate to gestational age at birth[1,2].

Although many of the adolescents born prematurely had adequate blood pressure, glycemic, lipid and anthropometric levels, the study showed that a significant portion of them have risk factors for MetS, in addition to having irregular eating habits.

Despite the fact that most adolescents consume healthy foods, our study found that many eat foods rich in fats and carbohydrates, in addition to having a high consumption of food in front of the screens, with more than half not doing one of their main meals. The consumption of soft drinks and sweetened beverages is correlated with the increase in cases of childhood obesity, even if it is natural fruit juice, and there is still inadequate consumption of micronutrients by adolescents, such as calcium, iron, sodium and vitamins, since they eat more unhealthy foods when compared to adults[22,23]. During the interviews some teenagers said they liked fruits and vegetables, but they used to consume only at the beginning of the month and that they did not consume more due to their high cost.

As healthy feeding involves the combination of nutrient intake and the social and cultural aspects of eating, ingest meals in front of screens encourages consumption beyond what is necessary; the characteristics of the environment where people eat influence the amount of food eaten, in addition to interfering with the physiological signals that regulate hunger and satiety[17]. However, this is the habit of young people today, also pointed out in a national study with students aged 12 to 17 (ERICA), which revealed that around 60% ate meals almost always or always while watching television[24].

Although the protective factors of BM have already been described[3,4], in the studied sample, regardless of receiving EBF up to the sixth month, adolescents showed proportionally the same changes as those who received a supplement or did not receive BM. However, when BM was consumed, there was a higher proportion of normality in all variables, compared to cow's milk.

It is noteworthy that, among adolescents who presented high BP and TG, there was consumption of BM associated with the infant formula. Of these, 44% do not eat breakfast and 4% do not have lunch or dinner. Still, 81.5% eat in front of screens, 55.5% eat sausages and 70.4% drink sweetened drinks. A recent study[25] indicates that 51.4% of Brazilian adolescents never or sometimes consume breakfast. Skipping a meal negatively reflects essential processes for growth and development, especially for preadolescents, given the rapid growth in this phase. Furthermore, not eating breakfast is associated with an increase in obesity in children - although there is a reduction in caloric intake - and with losses in school performance[25,26].

The association of cardiovascular risk factors with prematurity is well established[13,14], which was also evidenced by Sipola-Leppänen et al.[6] in young adults born prematurely, when stating that they are two to three times more likely to have arterial hypertension, as well as higher rates of obesity and abdominal fat. Their findings also showed similar glucose levels among premature, late preterm and those born at term, which corroborates this study, which found no changes in the glycemic profile.

Results of research with premature infants in analysis on cardiovascular risk throughout life are heterogeneous, making it difficult to pinpoint the influence of their multiple determinants[7]. It should be noted that few studies have been conducted with adolescents born prematurely in Brazil, this being the first in the region.

Among the adolescents under study, the percentage of overweight was considerable and BP and TG were high in this portion of the sample. Overweight is an important indicator of the individual's future health condition, when associated with excess weight, there are blood pressure and lipid changes, there is an increased risk of developing diabetes and coronary heart disease. In addition, studies have established that obese children and adolescents remain so in adulthood, foreshadowing MetS[14]. Thus, the adolescent born prematurely and presented these changes is vulnerable to developing future chronic health conditions.

Despite the importance of the theme in focus, it is emphasized that the study is limited by the fact that it is cross sectional and does not show a characteristic that can be generalized to all adolescents born prematurely. However, it contributes to the identification of prematurity, inappropriate eating habits, overweight, altered blood pressure and lipid profile as risk factors for the development of future cardiovascular problems.

The information presented confirms the importance of long-term follow-up of the preterm infant, subsidizing the development of actions and the establishment of monitoring services and protocols during the adolescence of preterm infants.

Since in Brazil access for adolescents born prematurely is limited to a few outpatient clinics located in large centers, the identification of the present sample, within the scope of primary health care, represents an important step to broaden the view of this public and offer care to comprehensive and longitudinal health.

Still, it can be considered that the identification of the lipid and glycemic profile of Brazilian premature adolescents is configured in new knowledge, since the studies with this population mostly do not relate these data to GA. Thus, knowing this profile and recognizing the MetS index in this group is a contribution to prevent future complications to their health. In this context, new comparison studies with a similar cohort of full-term adolescents are suggested, since another limitation of this study concerns the influences of puberty on metabolism, and it is necessary to expand studies to clarify and present preventive paths.

■ CONCLUSION

The results of this study demonstrated that the type of lactation did not show a statistical association with changes in blood pressure, total cholesterol, triglycerides, blood glucose or abdominal circumference of premature adolescents. Although, the proportion of normal values is higher in those who were feed with breast milk.

Adolescents born prematurely, even with healthy eating habits, may present changes in blood pressure, lipid, glycemic and/or anthropometric profiles, increasing cardiovascular risk.

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Resumo

Introdução: A prematuridade pode estar relacionada à instalação precoce de obesidade e síndrome metabólica na adolescência. O aleitamento e a alimentação são fatores cruciais na gênese do risco cardiometabólico.

Objetivo: Analisar a relação do tipo de aleitamento e hábitos alimentares com o perfil pressórico, lipídico, glicêmico e antropométrico de adolescentes nascidos prematuros.

Método: Estudo transversal com 50 adolescentes nascidos prematuros no oeste do Paraná, com idades entre 10 e 19 anos. Avaliaram-se dados do nascimento, aleitamento e alimentação (Marcador de Consumo Alimentar de 24 horas). Verificou-se peso, altura, circunferência abdominal (CA), pressão arterial (PA); dosadas concentrações de glicose, colesterol total (CT) e triglicerídeos (TG) por punção capilar. Análise de dados por estatística descritiva e análise de variância.

Resultados: 78% realizavam alimentação em frente a telas e 52% não realizavam todas as principais refeições do dia; independentemente da quantidade de refeições diárias, os perfis lipídico, glicêmico e CA não apresentaram diferença estatística significante entre os grupos. Observou-se associação estatisticamente significante entre PA e número de refeições (p=0,01), CT e aleitamento materno (p=0,03) e TG com consumo de embutidos (p=0,02) e produtos ricos em carboidratos (p=0,01). Para 72% foi ofertado leite de vaca antes de completar um ano e somente 30% receberam aleitamento materno exclusivo até os seis meses de idade. Na amostra, 30% apresentaram PA elevada, 22% e 41% CT e TG elevados, respectivamente. Dos 30% com excesso de peso, 60% apresentaram PA elevada, 53% TG, 33% CT elevado e 33% percentil CA ≥90.

Conclusão: O aleitamento não influenciou no perfil metabólico, porém se evidenciou como fatores de risco para os adolescentes desenvolverem problemas cardiovasculares futuros à prematuridade, hábitos alimentares inadequados, excesso de peso, CA e perfil pressórico e lipídico alterados.

Palavras-chave: Prematuridade, Saúde do Adolescente, Nutrição do Adolescente, Comportamento Alimentar, Doenças Cardiovasculares, Síndrome X Metabólica.