ORIGINAL ARTICLE

Prevalence and factors associated with obesity in children under five years old in Rio Branco – Acre

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Abstract

Introduction: The nutritional status of children is considered an important instrument in measuring the health conditions and quality of life of a population. The increasing prevalence of obesity in children is a significant public health problem as it is an important risk factor for obesity in adulthood.

Objective: To evaluate the prevalence and factors associated with childhood obesity in the city of Rio Branco - Acre.

Method: A database analysis was carried out from the Risk Factors and Morbidity Survey for Noncommunicable Diseases in the Municipality of Rio Branco / Health and Nutrition for Adults and Children in 2008.This cross-sectional study examined 687 children aged 0 to 60 months in urban and rural areas. Statistical analysis considered expansion and sample design. The prevalence of childhood obesity according to the anthropometric indices P / I (weight for age), P / E (weight for height) and BMI / I (Body Mass Index) were respectively 6.85% (95% CI = 5.30). - 8.80), 6.66% (95% CI = 3.22 - 13.27) and 6.61% (95% CI = 3.25 - 12.98).

Results: The final model showed a higher prevalence of obesity in the BMI / I index under the following conditions: home in the urban area (PR = 6.81; 95% CI = 1.27 - 36.38), electric lighting without meter (PR = 2.10; 95% CI = 1.22 - 3.59), mother's height greater than 163cm (PR = 2.24; 95% CI = 1.12 - 4.47) and maternal obesity (RP = 2.37 95% CI = 1.19 - 4.72).

Conclusion: The prevalence of obesity in the BMI / I index was high and is related to socioeconomic factors and specific maternal characteristics. It is necessary to promote actions that lead to the formation of a healthy lifestyle even in childhood.

Keywords: childhood obesity, anthropometry, nutritional epidemiology.

Authors summary

Why was this study done?
The prevalence of obesity in children is a public health problem, the study was made because it is known that there is an association of overweight with the child's quality of life, so there is a need to investigate obesity focusing on this group to be create health promotion strategies.

What did the researchers do and find?
The researchers aimed to evaluate the prevalence of obesity among children under 5 years old through a population-based cross-sectional study in Rio Branco, Acre, Brazil and found that the prevalence of obesity is related to socioeconomic factors. and well-defined maternal characteristics such as: Urban domicile, type of electric light with meter, maternal height greater than or equal to 163cm and maternal obesity.

What do these findings mean?
The findings mean that there is a need for social intervention for the prevention of childhood obesity, starting with the promotion of a healthier lifestyle through the development of public policies, focusing on food orientation programs to address the challenges in preventing childhood obesity.

INTRODUCTION

Obesity is a disease determined by the accumulation of energy, in the form of triglycerides, in adipose tissue distributed throughout the body and can cause health damage, facilitating the development or aggravation of associated diseases[1]. Obesity is treated as a worldwide epidemic, and its prevalence in children and adolescents has been increasing in the last three decades in developed and developing countries, causing a negative impact on public health[2,3].

In children and adolescents, obesity is associated with risk factors for cardiovascular, respiratory and metabolic diseases, as well as contributing to low self-esteem and social discrimination. Thus, affecting school and social performance, leading to long-term psychological consequences, that also lead to emotional complications[4–6]. The growing increase in obesity in children and adolescents is important, since obesity, especially in adolescence, is a predictive factor for obesity in adulthood[3,7].

In the pathogenesis of obesity, studies address behavioral and environmental aspects, as well as evaluate genetic and metabolic aspects. No environmental component, studies have shown that parents play an important role in choosing a child's food choices - especially in the first two years of life - and are also crucial in building self-esteem and self-image[8,9].

With regard to the genetic factor, studies with adopted children showed that they had body mass index (BMI) related to their biological parents and not to the adoptive ones. This indicates that although the environment plays an important role in determining obesity, genetic influence is also crucial for its development[10]. The growing obesity situation in developing countries is critical and influences not only the economically disadvantaged individual, but also the disadvantaged groups[11].

Therefore, the conceptual model of childhood obesity is still completely misunderstood. The results of targeted studies point to the coincidence of social, environmental, family and individual factors in determining overweight and obesity[12]. Anthropometric relationships between mothers and children, in addition to the biological component of genotypes, express the conditions between the generations that grew up in different times in different micro and macro environments[13].

In 2014, the World Health Organization estimated that there were approximately 43 million overweight children up to 5 years of age in the world[14]. According to IBGE data, between 2008 and 2009, about 52% of boys and 34% of girls from five to nine years old were overweight or obese in Brazil[15]. Considering that the association of overweight is linked to reduced quality of life in children, several studies have been conducted to investigate obesity in this group aiming at the creation of health promotion strategies[16]. Thus, the objective of this study was to evaluate the prevalence of obesity among children under five years old in Rio Branco, Acre, Brazil.

METHODS

This is a population-based cross-sectional study[17], which is part of the research "Health and Nutrition in Children and Adults in the Municipality of Rio Branco, Acre (2008)" conducted by the Federal University of Acre in partnership with the Secretariat of Health Surveillance of the Ministry of Health, State Department of Health of Acre and Municipal Health Department of Rio Branco. The study population consisted of children under five years of age living in Rio Branco.

The sampling was obtained by conglomerates in two stages of selection, the first stage being the selection of census tracts and the second stage the selection of households within each sector, where the parents/guardians of children under five were interviewed, configuring a representative sample of the geographically distributed population in the city of Rio Branco.

In the first stage of selection, the primary sampling unit was the division of the municipality of Rio Branco into 250 census sectors, prepared by the Brazilian Institute of Geography and Statistics[18] for the Census. Demographic survey of the year 2000, from which the 35 census sectors previously used by the National Household Sample Survey (PNAD) in 2006 were selected. In the second stage of selection, 25 households from each sector were drawn, totaling 875 households. In order to supply probable losses and refusals, 15% more households were selected, increasing the sample to 977 households, thus totaling 701 individuals for the initial sample, of these 98% (n = 687) were evaluated, 2% (n = 14) were losses due to non-consent of the parent or guardian in the child's participation in the research.

The data collection instrument used was an individual questionnaire elaborated based on the questionnaires applied in the Survey of Risk Factors and Protection against Chronic Diseases by Telephone Survey[19] and in the Household Survey on Risk Behaviors and Morbidity Diseases and Noncommunicable Disorders: Brazil, 15 Capitals and Federal District, 2002-2003[20]. The questionnaire consists of thematic modules, with closed, semi-open and open questions, including the following restrictions: (1) socio-demographic and economic, with data on gender, age, marital status, income, education, occupation, among others; (2) health service usage and coverage assessment; (3) assessment of individual health status, with data on morbidity, lifestyle, tobacco and alcohol consumption, physical activity, among others; and (4) assessment of nutritional status, with data on anthropometry and eating habits.

Age was calculated based on physical exam collection data and birth data after the removal of birth records or equivalent documents. The weight was used with the aid of the microelectronic scale (Tanita bf 572 body fat, capacity of 130 kg with variation of 100g) evaluated by INMETRO with accepted and reproduced tolerance as children without shoes and clothes.

Height was measured horizontally in children under two years of age with an anthropometer made of natural wood measuring 1.30m and upright and using a stadiometer accurate to 1mm in children over two years. The answers regarding socioeconomic, family and child health data were answered, preferably, by the child's mother and in the absence of the child, by the responsible adult. Data were collected from November 2007 to October 2008, through an interview conducted by a team of research assistants trained for the application of the instrument and physical evaluation.

To evaluate obesity used as curves of the World Health Organization[21]. Obese children were used as children with anthropometric indices greater than +2 standard deviations (SD) for the P/I (weight by age), P/A (weight by height/length) and BMI/I (Body Mass Index by age). The indexes above -5DP and + 5DP were removed. As they were used when the disability of weight and height in three attempts on different days and times, and occurred when the guardian did not authorize the child's participation in the research.

The Epi Info 6.0[22] program (Centers for Disease Control and Prevention, Atlanta, United States) was used for database creation and double data entry was performed. Anthropometric indices were taken from the WHO Antro[23] program (Department of Nutrition, World Health Organization, Geneva, Switzerland).

The analyses were performed using the Stata[24] 10.023 statistical package (Stata Corp. College Station, United States), in the survey module, where the specifications included the calculated sample weights for each household, the geographical strata, and the primary sampling unit, thus having the corrected data considering the effect of the sample design for the calculation of point estimates and confidence intervals. The prevalence of obesity for the P/I, P/A and BMI/I indexes was removed.

To evaluate the obesity risk association, the BMI/I index was chosen. Thus, prevalence ratios with 95% CI were calculated using Poisson regression. The final multivariate model adopted an association between obesity without BMI/I index and the socioeconomic-environmental conditions studied with a significance level of p <0.05. Data analysis was performed in stages. Firstly, a bivariate analysis between underprivileged obesity (BMI/I) was performed and as selected variables select no study, with an analysis of the risk of misuse due to brutality. As independent variables were performed so that a treatment period was treated as a reference, and as the risk of stratum excess was used in relation to this reference parameter.

To identify the factors associated with undoing and defining variable control, a multivariate block model was created and selected as candidates for the model as covariates with significance below 20% (p <0.20), and remained, without the final model, as variables with statistical significance after adjustment.

In compliance with the requirements required by Resolution no. 510/16 of the National Health Council, the project was examined and approved by the Research Ethics Committee of the Federal University of Acre (Protocol No. 23107.01150/2007-22). Written consent was requested by the parent or guardian of the child, and information was secured or confidential by means of the Informed Consent of Children (ICF-I).

■ RESULTS

The distribution by sex disassembled that 49.80% (n = 342) were male, in the distribution by age group, children aged 25 to 36 months represent 21.80% (n = 150), being the largest population in the sample, the smallest population was in the age group of 49 to 60 months but representing 17.50% (n = 120). Considering the place of domicile 93% (n = 639) of the children lived in the urban area of Rio Branco.

Table 1: Distribution of prevalence of obesity according to anthropometric indices according to sex, place of domicile, age group of children under 5 years old in the city of Rio Branco, 2007-2008.

Variables	%	Weight/age		Weight/height		BMI/age	
		Prevalence	CI95%	Prevalence	CI95%	Prevalence	CI95%
Total children	100	6.85	5.30 – 8.80	6.66	3.22 – 13.27	6.61	3.25 – 12.98
Sex							
Male	49.8	7.71	5.01 – 11.67	8.40	3.53 - 18.71	7.66	3.45 – 16.15
Female	50.2	5.94	3.99 – 8.77	4.83	2.12 – 10.61	5.50	2.38 – 12.23
Domicile							
Urban	93	6.77	4.82 - 9.42	10.91	8.55 – 13.81	10.81	8.41 – 13.80
Rural	7	6.95	4.74 – 10.07	1.33	0.17– 9.34	1.33	0.17 – 9.33
Age Range							
0 – 12 months	19.5	22.99	14.42 - 34.59	17.58	11.08 - 26.05	15.55	9.27 – 24.91
13 – 24 months	20.7	3.06	1.22 - 7.47	9.08	4.11 – 18.87	10.41	5.04 – 20.26
25 – 36 months	21.8	6.23	2.42 – 15.09	2.12	0.51– 8.30	2.41	0.74 – 7.54
37 – 48 months	20.5	3.19	1.06 - 9.20	5.41	2.23 – 12.54	5.41	2.23 – 12.54
49 – 60 months	17.5	0.93	0.17 - 4.93	2.58	0.72 – 8.75	2.58	0.72 – 8.75

Source: Research database "Health and Nutrition in Children and Adults in the Municipality of Rio Branco, Acre (2008)".

Table 1 presents the prevalence of obesity according to the anthropometric indices of the study population. It was observed that the highest prevalence was in the P/I index = 6.85% (95% CI = 5.30–8.80), in relation to gender, the male gender presented the highest prevalence in all studied indexes and the highest in the P/A ratio = 8.40% (95% CI = 3.53–18.71). As for the place of domicile, the urban area had the highest prevalence in the P/A and BMI/I indexes, with the highest in the P/A index = 10.91% (95% CI = 8.55–3.81). The highest prevalence of obesity in rural areas was found in the P/I ratio = 6.95% (95% CI = 4.74–10.07).

Regarding the age group, the highest prevalence were always found in the age group from 0 to 12 months, being the highest in the P/I index = 22.99 (95% CI = 14.42–34.95%), in the age 13 to 24 months the highest prevalence of obesity was 10.41% (95% CI = 5.04–20.26) in the BMI/I index; for the age group 25 to 36 months the highest prevalence was found in the P/I index = 6.23% (95% CI = 2.42–15.09), in the age groups from 37 to 48 months and 49 to 60 months the highest prevalences were found in the P/A and BMI/I indexes.

Table 2: Prevalence of obesity BMI / Age and Gross prevalence ratio of children under five according to general family characteristics and household characteristics, in the municipality of Rio Branco, 2007-2008.

Variable	Obesity Prevalence BMI / Age		Total	PR_{Gross}	IC_{PR}
	Yes	No			
Sex					
Female	5.50	94.39	345	1	
Male	7.66	92.33	342	1.39	(0.62 – 3.10)
Total	66	621	687		
Lives with father					
No	4.78	95.21	226	1	
Yes	7.32	92.67	459	1.53	(0.66 – 3.52)
Total	66	619	685		
Mother color					
White	7.44	92.55	129	1	
Black	6.55	93.44	67	0.88	(0.23 – 3.30)
Brown	6.55	93.45	437	0.87	(0.40 – 1.91)
Yellow	8.69	91.31	8	1.16	(0.18 – 7.24)
Dark skinned	4.51	95.49	43	0.38	(0.18 – 1.95)
Total	66	618			
Father color					
Black	1.86	98.14	55	1	
White	6.69	93.31	172	3.58	(1.04 – 12.36)
Brown	6.27	93.73	384	3.36	(0.73 – 15.27)
Dark skinned	15.92	84.08	58	8.52	(1.83 – 39.74)
Total	64	605	669		
Maternal Education					
Incomplete high school and less	5.43	94.56	334	1	
High school and more	8.98	91.02	346	1.65	(0.70 – 3.87)
Total	66	614	680		
Family Income					
Greater than 3SM reais	5.94	94.06	157	1	
Less than 3SM reais	6.05	93.95	499	0.98	(0.30 – 3.17)
Total	58	598	656		
Local de Domicilio					
Countryside	1.33	98.67	639	1	
Urban Area	10.81	89.19	48	8.12	(1.07 – 61.36)
Total	66	621	687		
Wall Type					

Continuation - Table 2: Prevalence of obesity BMI / Age and Gross prevalence ratio of children under five according to general family characteristics and household characteristics, in the municipality of Rio Branco, 2007-2008.

Variable	Obesity Prevalence BMI / Age		Total	PR$_{Gross}$	IC$_{PR}$
No Brickwork	5.50	94.50	436	1	
Brickwork	10.08	89.92	251	1.83	(0.79 – 4.22)
Total	66	621	687		
Floor type					
Wood	5.02	94.97	361	1	
Not Wood	9.91	90.08	326	1.97	(0.66 – 5.86)
Total	66	621	687		
Lighting type					
Electric without meter	5.21	94.78	514	1	
Electric with meter	11.59	88.41	173	2.22	(1.27 – 3.88)
Total	66	621	687		
Toilet Presence					
No	4.17	95.82	186	1	
Yes	9.81	90.19	501	2.34	(0.71 – 7.66)
Total	66	621	687		

Source: Research Database "Health and Nutrition in Children and Adults in the Municipality of Rio Branco - Acre (2008)".

Table 2 presents the prevalence of obesity according to the BMI / I index for the general characteristics of the child, family and home. Males had a prevalence of obesity BMI / I = 7.66%, when compared to females we had a prevalence ratio of 1.39 (95% CI = 0.62–3.10).

Regarding self-reported mother color, the highest prevalence was found in the group of children with yellow and white mothers, respectively, 8.69% and 7.44%. Regarding the color of the child's self-reported father, the group of children with the black father had the lowest prevalence (1.86%), when compared to the group of the white father, we have a prevalence ratio of 3.58. (95% CI = 1.04–12.36) and, when compared to children with dark-haired fathers, we have a prevalence rate of 8.52 (95% CI = 1.83 - 39.74). The group of children in which the mother completed high school has a prevalence of 8.98% of obesity. Regarding family income, children living in households with income below 1000 reais (Brazilian coin) had a prevalence of 6.05% (Table 2).

In relation to the place of domicile, the urban area has a prevalence of obesity of 10.81%, compared to the group of children living in the countryside, a prevalence ratio of 8.12 (95% CI = 1.07) is obtained. –61.36). Regarding household characteristics, the highest prevalence of obesity according to BMI/I index was for the type of wall to be brickwork (10.08%), the floor was not wood (9.91%) and the presence of toilet (9.81%), but the condition of having electric lighting with meter had a prevalence of 11.59%, when compared to the group of children living at home with lighting meter we have a prevalence ratio of 2.22 (CI95 % = 1.27–3.88) (Table 2).

Regarding maternal care, pregnancy and participation, the highest prevalence of obesity was found in the group of children in which the mother is prenatal (6.76%), and who are oriented about breastfeeding (6.83%). When children who smoke before and during pregnancy have a prevalence of obesity of 5.54%, and those who have or suffer from alcohol before and during pregnancy result in pregnancy 6.95%. The group of children in which the mother underwent a cesarean section had a prevalence of obesity of 7.96%. Regarding the characteristics of children, those with birth weight greater than 2,500g had a prevalence of 7.23% and those with birth length less than or equal to 45cm had a prevalence of 11.25%. According to maternal characteristics, children with a height of 163cm or more presented a prevalence of obesity of 12.36%, when compared to the group with a height of less than 163cm, we obtained a prevalence ratio of 2.41 (95% CI = 1.26–4.62). Maternal obesity, according to body mass index, increasing the prevalence of obesity, according to the BMI/I index, in children by 134%. Regarding maternal age, the group of children with mothers aged 21 - 30 years had the highest prevalence of obesity of 7.52%. (Table 3).

Table 3: Prevalence of obesity BMI / Age and Gross prevalence ratio of children under five years of age according to maternal care, pregnancy, childbirth and maternal characteristics, in the municipality of Rio Branco, 2007-2008.

Variable	Obesity Prevalence BMI / Age		Total	RP$_{Gross}$	IC$_{RP}$
Prenatal care	Yes	No			
No	5.23	94.77	15	0.77	(0.15 – 3.85)
Yes	6.76	93.23	627	1	
Total	62	580	642		
Received breastfeeding counseling					
No	6.07	93.93	84	0.88	(0.39 – 2.01)
Yes	6.83	93.17	557	1	
Total	62	579	641		
Smoking					
Yes (before and during pregnancy)	5.54	94.46	124	0.83	(0.35 – 1.93)
No	6.64	93.35	519	1	
Total	58	585	643		
Alcohol					
Yes (before and during pregnancy)	6.95	93.05	155	1.09	(0.48 – 2.46)
No	6.35	93.64	485	1	
Total	58	582	640		
Delivery Type					
Cesarean	7.96	92.04	250	1.30	(0.68 – 2.47)
Normal	6.11	93.88	390	1	
Total	62	578	640		
Birth weight					
Greater than 2,500g	7.23	92.76	555	3.61	(0.82 – 15.77)
Less than 2,500g	2.00	98.00	42	1	
Total	57	540	597		
Length at birth					
Smaller and equal to 45cm	11.25	88.75	80	1.62	(0.83 – 3.19)
Greater than 45 cm	6.90	93.10	511	1	
Total	59	532	591		
No. of Live Births					
3 or More	7.85	92.15	299	1.37	(0.69 – 2.72)
Until 2	5.72	94.28	378	1	
Total	64	613	677		
Mother's Height					
Greater than or equal to 163cm	12.36	87.64	135	2.41	(1.26 – 4.62)
Menor que 163cm	5.11	94.89	552	1	
Total	66	621	687		
Mother's Body Mass Index					
Obesity	13.46	86.54	104	2.34	(1.23 – 4.44)
Underweight, proper weight and overweight	5.73	94.26	563	1	
Total	65	602	667		
Mother's Age					
14 – 20 years	4.87	95.12	110	1	
21 – 30 years	7.52	92.47	383	1.54	(0.60 – 3.91)
More than 31 years	6.37	93.62	192	1.30	(0.60 – 2.81)
Total	66	641	685		
Age of first pregnancy					
Less than 18 years	6.83	93.17	407	1.04	(0.56 – 1.92)
19 years and over	6.53	93.47	272	1	
Total	66	615	679		
Age of last pregnancy					
Until 24 anos	7.55	92.45	371	1.26	(0.95 – 1.68)
25 years or older	6.19	93.81	300	1	
Total	66	605	671		

Source: Research database "Health and Nutrition in Children and Adults in the Municipality of Rio Branco, Acre (2008)".

Table 4 presents the prevalence of obesity according to the morbidities reported by the mother or guardian on the day of the interview. In the illnesses that occurred in the last 15 days, the highest prevalence of obesity for the BMI / I index was found in the groups without diarrhea (6.90%), without blood in the stool (6.66%), who had vomiting. (8.22%) and had no loss of appetite (7.59%). Children with wheezing in the last 12 months have a prevalence of obesity of 5.39%.

Table 5 shows the result of the final Poisson regression model for the prevalence of childhood obesity for the BMI / I index. In the adjusted model, the variables tested as factors associated with obesity, which remained significant were: the place of domicile in the urban area with PR = 6.81 (95% CI = 1.27-36.38), type of electric lighting with meter, RP = 2.10 (95% CI = 1.22-3.59), mother's height greater than or equal to 163cm with PR = 2.24 (95% CI = 1.12-4.47) and Body Mass Index of Mother classified as obesity PR = 2.37 (95% CI = 1.19-4.72).

Table 4: Prevalence of obesity BMI / Age and Gross prevalence ratio of children under five years of age according to reported morbidity, in the municipality of Rio Branco, 2007-2008.

Variable	Prevalence and obesity		Total	RP$_{Gross}$	IC$_{RP}$
	BMI/Age				
	Yes	No			
Diarrhea in the last 15 days					
Yes	5.58	94.41	161	0.80	(0.30 – 2.12)
No	6.90	93.10	526	1	
Total	66	621	687		
Blood in stools last 15 days					
Yes	4.47	95.53	31	0.67	(0.13 – 3.46)
No	6.66	93.34	656	1	
Total	66	621	687		
Vomiting in the last 15 days					
Yes	8.22	91.78	111	1.31	(0.64 – 2.68)
No	6.27	93.73	576	1	
Total	66	621	687		
Loss of appetite in the last 15 days					
Yes	4.98	95.02	279	1	
No	7.59	92.41	408	1.52	(0.83 – 2.77)
Total	66	621	687		
Wheezing in the last 12 months					
Yes	5.39	94.61	310	1	
No	7.69	92.31	375	1.42	(0.85 – 2.39)
Total	65	620	685		
Anemia					
Yes	5.19	94.81	357	0.62	(0.23 – 1.67)
No	8.33	91.67	286	1	
Total	58	585	643		
The child is fine on the interview day					
No	8.31	91.69	198	1.40	(0.71 – 2.74)
Yes	5.93	94.06	489	1	
Total	43	644	687		

Source: Research Database : "Health and Nutrition in Children and Adults in the Municipality of Rio Branco, Acre (2008)".

Table 5: Prevalence ratio (gross and adjusted), respective confidence intervals for obesity in the BMI / Age index, according to the general characteristics of the family, children and domicile of children under five years old in Rio Branco.

Variable	RP$_{Gross}$	IC 95%	RPAj*	IC 95%
Father color				
Black	1		1	
White	3.58	(1.04 – 12.36)	1.66	(0.49 – 5.65)
Brown	3.36	(0.73 – 15.27)	2.31	(0.48 – 11.00)
Dark skinned	8.52	(1.83 – 39.74)	3.06	(0.71 – 13.20)
Place of residence				
Crosscountry	1		1	
Urban zone	8.12	(1.07 – 61.36)	6.81	(1.27 – 36.38)
Lighting type				
Electric without meter	1		1	
Electric with meter	2.22	(1.27 – 3.88)	2.10	(1.22 – 3.59)
Mother height				
Less than 163cm	1		1	
Greater than or equal to 163cm	2.41	(1.26 – 4.62)	2.24	(1.12 – 4.47)
Mother's Body Mass Index				
Underweight, proper weight and overweight	1		1	
Obesity	2.34	(1.23 – 4.44)	2.37	(1.19 – 4.72)

*Adjusted by father's color, place of residence, lighting type, mother's height, and mother's BMI.

*Source: Research database "Health and Nutrition in Children and Adults in the Municipality of Rio Branco - Acre (2008)".

■DISCUSSION

The characterization of obesity in children does not yet show consensus in the literature, and the variety of methods applied and the different cutoff values employed make it difficult to compare the results obtained with other studies. Thus, the present discussion is based in person on the survey of studies that used BMI by age to determine obesity[25].

The results reveal a high prevalence of obesity for children under five years old in the city of Rio Branco, which demonstrates the seriousness of the situation and reveals the need to include childhood obesity as a serious public health problem.

To compare our results, few studies were found or what are the same methods used for the age group and the determination of the indices used (BMI/I). Namely, Bueno and Fisberg[26], in a representative study on children in public daycare centers in the city of São Paulo, found a prevalence of obesity in 2-4 year-olds of 4.6% and 2.4% for females and male, respectively. Silva et al.[27] in a cross-sectional convenience sample study conducted at the Childcare Ambulatory Hospital of the Clinical Hospital of the Federal University of Pernambuco (UFPE) found a prevalence of obesity in preschoolers of 13.8 %.

Many studies have been found using school-age children, for example, in 2000, Giugliano and Carneiro[28], in a study involving 452 schoolchildren in Brasilia aged 6 to 10 years found a prevalence of 5.3% for obesity. Soar et al.[29] studying 419 children between seven and nine years old in a public school in Florianópolis - SC, found a prevalence of 6.7% for obesity. Trocon et al.[9], in a cross-sectional study using a sample of schoolchildren, aged 6 to 14 years, in a public school (n = 107) in the city of Campinas and a sample from the Pediatric Outpatient Clinic. HC – Unicamp (n = 109) found a prevalence of obesity, respectively, of 20.2% and 11.2%. Abrantes et al.[30] using data from the IBGE Survey on Living Standards in 2,683 children aged 2 to 10 years, a prevalence of 7.0% were observed.

Regarding the gender of the child, Martin and Ferris[31] suggest that females may be a risk factor for childhood obesity since girls have more fat than boys. However, in our study, the prevalence of obesity in males was higher regardless of the anthropometric index used and a similar result was reported by Soar et al.[29]; Costa et al.[32]; Siqueira and Monteiro[33].

Regarding the place of domicile, the high prevalence of obesity found in the urban area can be explained by the socioeconomic pattern of families, confirmed by the variable electric lighting with meter present in the household that remained in the final model. families in the city to high-carbohydrate foods, and decreased intake of animal and vegetable protein[34].

According to the 2002-2003[25] Household Budget Survey, the average food availability in the urban area was 1700 kcal per person, while in the rural area it was 2400 kcal, despite the contradiction, this is explained by the higher frequency of food consumption outside household and genetic needs lower than the rural environment. The food culture of rural families in the northern region of Brazil, similar to that of the Northeast Region, is characterized by subsistence agriculture with limitations

for high-fat foods, resulting in the high prevalence of food insecurity[36].

In this study, the association between maternal height greater than or equal to 163cm and childhood obesity was detected; however, it was not possible to find studies relating only mother's height to the presence of obesity. However, the positive correlation between the nutritional status of parents and children is known, as they share genetic information regarding socioeconomic and environmental conditions, as pointed out by Sichiere *et al.*[37,38].

A significant association was found between the prevalence of childhood obesity and the mother's nutritional status. Being a child of an obese mother, according to BMI, added in 137% the prevalence of obesity in the adjusted model, thus demonstrating the familial character of obesity[3]. However, we did not find a statistically significant association between the prevalence of obesity in the sample in relation to maternal education and family income, factors associated with childhood obesity reported by several studies in the literature. This can be explained by the epidemiological transition and demonstrates that the prevalence of obesity may be developing in all socioeconomic extracts.

One of the limitations of our study is related to the cross-sectional design that, although useful for the diagnosis of child health, does not allow us to evaluate the temporal sequence between exposure and outcome of interest. Cross-sectional studies may present difficulty in interpreting the outcome studied and the variables analyzed since there is the possibility of reverse chance bias, which occurs when apparent exposure is a consequence of the outcome, as reported by other studies[39-43]. Based on the results presented, it is suggested that measures to control

and prevent health risks associated with childhood obesity are necessary, taking as an incentive action for a healthy lifestyle.

Thus, health diagnoses derived from a population-based study are fundamental to the planning of interventions aimed at changing the scenario of inequalities between regions of the country. The results show that the prevalence of obesity in children under five years old in the city of Rio Branco is linked to socioeconomic factors and well-defined maternal characteristics such as: place of residence in the urban area, type of electric lighting with meter, height of the mother larger and equal to 163cm and maternal obesity. Therefore, intervention is needed so that the most important current challenge is the prevention of childhood obesity through the promotion of a healthy lifestyle and the promotion of public policies aimed at food orientation programs. Promotion and prevention actions should begin in childhood, taking into account the influence of parents on the formation of eating habits and a healthy lifestyle.

Collaborators

D. D. Silva participated in the data analysis and final writing of the article. M. V. M. Lima guided and revised the data analysis. P. T. Muniz, A. Monteiro, M N Netherlands, The House, and R Wajnsztejn collaborated in the writing and critical revision of the article.

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Resumo

Introdução: O estado nutricional de crianças é considerado um instrumento importante na aferição das condições de saúde e qualidade de vida de uma população. A prevalência crescente da obesidade em crianças é um problema de saúde pública significante, pois é um fator de risco importante para a obesidade na vida adulta.

Objetivo: Avaliar a prevalência e os fatores associados à obesidade infantil no município de Rio Branco – Acre.

Método: Realizou-se análise de banco de dados provenientes do Inquérito de Fatores de Risco e Morbidade por Doenças Não-Transmissíveis no Município de Rio Branco / Saúde e Nutrição de Adultos e Crianças em 2008. Trata-se de um estudo transversal onde foram examinadas 687 crianças na faixa de 0 a 60 meses nas zonas urbana e rural. A análise estatística considerou a expansão e o desenho da amostra. A prevalência da obesidade infantil segundo os índices antropométricos P/I (peso-para-idade), P/E (peso-para-estatura), e IMC/I (Índice de Massa Corporal-para-idade) foram respectivamente de 6,85% (IC95% = 5,30 – 8,80), 6,66% (IC95% = 3,22 – 13,27) e 6,61% (IC95% = 3,25 – 12,98).

Resultados: O modelo final apresentou maior prevalência de obesidade para o índice IMC/I nas seguintes condições: local de domicílio na zona urbana (RP=6,81; IC95% = 1,27 – 36,38), iluminação elétrica sem medidor (RP=2,10; IC95% = 1,22 – 3,59), altura da mãe maior que 163cm (RP=2,24; IC95% = 1,12 – 4,47) e obesidade materna (RP=2,37; IC95% = 1,19 – 4,72).

Conclusão: A prevalência da obesidade do índice IMC/I foi elevada e está relacionada à fatores socioeconômicos e características maternas específicas. É necessária a promoção de ações que levem a formação de um estilo de vida saudável ainda na infância.

Palavras-chave: obesidade infantil, antropometria, epidemiologia nutricional.