Evaluation of the nutritional status of children in the municipality of Piracicaba-SP and its relationship with child obesity

Avaliação do estado nutricional de escolares do município de Piracicaba-SP e sua relação com obesidade infantil

Evaluación del estado nutricional de niños del municipio de Piracicaba-SP y su relación con la obesidad infantil

RESUMO

Objetivo: Identificar a condição nutricional de crianças na faixa etária de 0 aos 11 anos regularmente matriculadas no Ensino Infantil e Fundamental I do ensino público do município de Piracicaba, no período de 2014, 2016 e 2018. Métodos: A amostragem contemplou 17.170 crianças, com dados coletados separadamente entre menores e maiores de 5 anos, utilizando-se cálculos de score Z (peso/idade, altura/idade, IMC/idade), classificação do estado nutricional conforme critérios da Organização Mundial de Saúde e posteriormente comparados entre o período de 2014, 2016 e 2018. Resultados: Entre as 11.425 crianças maiores de 5 anos evidenciou-se sobrepeso/obesidade em 36,3%, 34,8%, 37,3% (p=0,008); seguido de 5.745 crianças menores de 5 anos que apresentaram sobrepeso em 37,1%, 34,8% e 36,5% (p<0,045), nos períodos de 2014, 2016 e 2018. Conclusão: Observou-se uma elevada prevalência de excesso de peso (sobrepeso/obesidade) entre as crianças nas faixas etárias analisadas, considerando os padrões de normalidade da OMS.

DESCRITORES: Obesidade pediátrica; Atenção primaria a saúde; Estado nutricional.

ABSTRACT

Objective: To identify the nutritional condition of children aged 0 to 11 years regularly enrolled in Kindergarten and Elementary School I of public education in the city of Piracicaba, in the period 2014, 2016 and 2018. Methods: The sample included 17.170 children, with data collected separately between children under and over 5 years old, using Z-score calculations (weight/age, height/age, BMI/age), classification of nutritional status according to World Health Organization criteria and subsequently compared between the period of 2014, 2016 and 2018. Results: Among the 11.425 children over than 5 years old, were overweight/obesity in 36.3%, 34.8%, 37.3% (p=0.008); followed by 5.745 children under 5 years old who were overweight in 37.1%, 34.8% and 36.5% (p<0.045), in the periods of 2014, 2016 and 2018. Conclusion: There was a high prevalence of excess of weight (overweight/obesity) among children in the analyzed age groups, considering the WHO normality standards.

DESCRIPTORS: Pediatric obesity; Primary health care; Nutritional status.

RESUMEN

Objetivo: Identificar el estado nutricional de los niños de 0 a 11 años matriculados regularmente en la educación primaria pública en la ciudad de Piracicaba, en los período 2014, 2016 y 2018.Métodos: La muestra incluyó 17.170 niños, con datos recolectados por separado entre niños menores y mayores de 5 años, se utilizaron cálculos de Z-score (peso/edad, talla/edad, IMC/edad), clasificación del estado nutricional según criterios de la Organización Mundial de la Salud y posteriormente comparados entre el periodo 2014, 2016 y 2018. Resultados: De los 11.425 niños mayores de 5 años, 36,3%, 34,8%, 37,3% tenían sobrepeso/obesidad (p=0,008); seguido de 5.745 niños menores de 5 años que presentaban sobrepeso en 37,1%, 34,8% y 36,5% (p<0,045), en los periodos 2014, 2016 y 2018. Conclusión: Hubo una alta prevalencia de exceso de peso (sobrepeso/obesidad) entre los niños de los grupos de edad analizados, considerando los estándares de normalidad de la OMS.

DESCRIPTORES: Obesidad pediátrica; Atención primaria en salud; Estados nutricionales.

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Andreza Fabiana Begnami
Student of the 9th semester of Medicine at Universidade Anhembi Morumbi-Campus Piracicaba-SP. Master and Doctor in Pharmacology, Anesthesiology and Therapeutics from the State University of Campinas (UNICAMP). Specialization in Clinical Pharmacology from the Methodist University of Piracicaba (UNIMEP).
ORCID: 0000-0002-9414-4499

DOI: https://doi.org/10.36489/saudecoletiva.2022v12i78p11129-11138

Márcia Juliana Cardoso
Student of the 9th semester of Medicine at Universidade Anhembi Morumbi-Campus Piracicaba-SP. Master and Doctor in Pharmacology, Anesthesiology and Therapeutics from the State University of Campinas (UNICAMP). Specialization in Clinical Pharmacology from the Methodist University of Piracicaba (UNIMEP).
ORCID: 0000-0002-1289828X

Ana Paula Vioto Ferraz
Nutritionist. Master in Food and Nutrition from the Universidade Estadual Paulista Júlio de Mesquita Filho (UNESP). Postgraduate in Clinical Nutrition at Universidade Gama Filho. Nutritionist at the Municipal Health Department of Piracicaba-SP, Coordination of Food and Nutrition Programs (CPAN) and the Clinic for Attention to Metabolic Diseases (CADME).
ORCID: 0000-0001-5395-9846

Eleonora do Nascimento Dias
Nutritionist. Postgraduate in Clinical Nutrition at Centro Universitário Central Paulista (UNICEP). Postgraduate in Sports Nutrition at the Methodist University of Piracicaba (UNIMEP). Nursing technician course teacher
ORCID: 0000-0003-1760-8074

Anay Ferrer
Physician. Master in Social Dentistry, emphasis in Collective Health. Title of Specialist in Family Health by the Brazilian Society of Family and Community Medicine (SBMFC). Postgraduate in Multiprofessional Family Health at the State University of Campinas (UNICAMP). Coordinator of the Primary Care Department of the Municipal Health Department of Piracicaba-SP. Coordinator of the Family and Community Medicine Residency Program of the Municipal Health Department of Piracicaba.
ORCID: 0000-0003-0906-6981

Ana Cláudia de Oliveira
Gastro/Hepatologist Physician. Master and PhD from the Federal University of São Paulo. Postdoctoral fellow at Yale University-New Haven CT. Part-time professor at Universidade Anhembi Morumbi-Campus Piracicaba/SP.
ORCID: 0000-0002-1148-72353

INTRODUCTION

Obesity is considered by the World Health Organization (WHO) as a multifactorial chronic metabolic condition, characterized by excessive accumulation of fat and an important risk factor for chronic non-communicable diseases (NCDs). Population surveys have shown an alarming growth in recent decades, being considered a worldwide epidemic, reaching different age groups, social classes, sex and, in particular, the child age group. [1] In Brazil, the results obtained through the Household Budget Survey (POF - Pesquisa de Orçamentos Familiares) 2002-2003 and the Brazilian Institute of Geography and Statistics (IBGE - Instituto Brasileiro de Geografia e Estatística), detected between the years 1974-75, an increase in the proportion of overweight of 3.9% among boys and 7.56% among girls, between 10 and 19 years old; while in the years 2002-2003, the rates rose to 18.0% and 15.4%, respectively, showing an increase in overweight, especially among boys. [2,3]

Subsequently, results presented by the IBGE/POF in partnership with the Ministry of Health (2008-2009) showed that the weight of Brazilians continued to increase, symbolizing that one in three children aged 5 to 9 years was overweight. The prevalence of overweight among boys increased from 3.8% (1974-1975) to 21.7% (2008-2009), while for girls this increase went from 7.6% to 19.4%. An increase in the prevalence of overweight among adult men was also observed, which tripled from 18.5% in 1974-1975 to 50.1% in 2008-2009, compared to women, which went from 28.7% to 48% in the same period. Simultaneously, obesity also grew significantly among men, with a fourfold increase (2.8% to 12.4%), and more than doubled among women (8% to 16.9%). Thus, this research demonstrates that overweight and obesity are found with great frequency from 5 years of age, in all age groups, income level and in all Brazilian regions. [4]

Facing children, the scenario of overweight and obesity has been equally worrisome. Data from the IBGE (2015) show a prevalence of 24% of overweight among students in the 9th year of Elementary School, and obesity rates among children aged 5 to 9 years were multiplied by 4 in males (4.1% to 16.6%) and almost 5 times in females (2.4% to 11.8%). Projection studies estimate that, if measures are not taken to reverse this scenario, 70% of the child population will be overweight by the year 2030. [5]

According to data from the Brazilian Society of Pediatrics (2019), Brazil follows the global trend with a high prevalence of overweight among adolescents (15.3% and 29.1%) considering different diagnostic criteria. [7]

In this context, the present study aimed to identify the nutritional status of preschoolers and schoolchildren, regularly enrolled in Kindergarten and Elementary School I in the city of Piracicaba. It is expected that the results found here will

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serve as a basis for the implementation of intervention measures and action plans, respecting the guidelines of the Ministry of Health, through the recommendations of the National Food and Nutrition Policy (PNAN - Política Nacional de Alimentação e Nutrição), adjusted to the loco-regional reality, as well as it can serve as an instrument in the training of Primary Health Care workers and municipal managers in addressing childhood obesity in the municipality, strengthening the care network in Primary Health Care.

METHOD

This is a prospective, longitudinal study, belonging to a large municipal project, with a time frame of 2014, 2016 and 2018. For the assessment of nutritional status, data on weight, height, age, sex were collected from a sample totaling 17,170 children aged 0 to 11 years regularly enrolled in public schools in the city of Piracicaba-SP, corresponding to Kindergarten and Elementary School I, within the period of 2014, 2016 and 2018.

The classification of nutritional status was performed according to WHO/MH recommendations (2006 and 2007) 6 that considers children under and over 5 years of age separately, through the collection of anthropometric measurements, which were plotted on graphs with distribution in percentiles or Z scores, according to sex and age (0 to 19 years). The data were compared with those of the WHO, using the WHO Anthro Survey Analyzer (WHO/UNICEF) software, according to the age of the children. [7]

For statistical analysis, the results were expressed as frequency, percentage and mean ± standard deviation of the mean, following the Z-score calculations (weight/age, height/age and BMI/age) and the classification of the children's nutritional status using the parameters recommended according to the World Health Organization-WHO Guidelines (2006). In comparing the averages observed between the years 2014, 2016 and 2018, the non-parametric one-way ANOVA test was used and in the comparison of frequencies (%) the Chi-square was used. For statistical analysis, the IBM SPSSv20 software was used, with $p<5\%$ or $p<0.05$ being considered significant. Approval of the Research Ethics Committee (CEP) under Opinion Number: 3,296,691 and Certificate of Presentation for Ethical Assessment (CAAE) No. 11819019.0.0000.5492.

RESULTS

A total of 17,170 children were evaluated, corresponding to 5,745 children under 5 years of age in 2014 (n=1,679), 2016 (n=1,921) and 2018 (n=2,145), and 11,425 children over 5 years old, in 2014 (n=3,709), 2016 (n= 3,424) and 2018 (n=4,292), respectively. Considering the WHO recommendations and classification, we analyzed children under 5 years of age separately from those over 5 years of age.

NUTRITIONAL STATUS ASSESSMENT - CHILDREN OVER 5 YEARS OLD (N=11,425):

The Z scores for BMI/Age found were 0.67±1.4 (2014); 0.60±1.4 (2016) and 0.71±1.4 (2018) showing a reduction in the mean values of BMI and Z-score for BMI/age between the years 2014 and 2016, however, there was a recovery in 2018. This variation reached statistical significance (p=0.008), but there were no changes in the general nutritional classification over the years analyzed (p=0.182). The overweight rates were 36.3%, 34.8% and 37.3%; followed by obesity of 11.7%, 11.1% and 13.0%, respectively, demonstrating a non-significant variation between the years 2014, 2016 and 2018 (p=0.182),

TABLE 1: General and anthropometric characteristics of children over five years old separated according to the year of analysis (comparative analysis between the years 2014, 2016 and 2018) (N=11,425 children)

	2014	2016	2018	P (valor)
Frequency (percentage)				
Children	3709 (32,5)	3424 (30,0)	4292 (37,6)	
Gender				
Male	1873 (50,5)	1727 (50,4)	2109 (49,1)	0,386
Female	1836 (49,5)	1697 (49,6)	2183 (50,9)	
Mean (±mean standard deviation)				
Age (days)	3014,5 (646,0)	3011,6 (669,2)	2984,4 (674,9)	0,081
Age (months)	99,3 (21,2)	98,9 (21,9)	98,1 (22,2)	0,081
Weight (kg)	30,95 (10,7)	30,78 (10,7)	31,01 (10,8)	0,614
Height (m)	1,30 (0,12)	1,30 (0,12)	1,30 (0,12)	0,436
BMI (kg/m2)	17,78 (3,6)	17,67 (3,6)	17,89 (3,7)	0,042*
ZHA	0,39 (1,7)	0,37 (1,3)	0,37 (1,3)	0,793
ZWA	0,77 (1,8) *	0,67 (1,5)*	0,75 (1,4)	0,038*
ZBMI/A	0,67 (1,4)*	0,60 (1,4)*	0,71 (1,4)*	0,008*
Frequency (percentage)				
Pronounced thinness	7 (0,2)	14 (0,4)	11 (0,3)	
Thinness	27 (0,7)	38 (1,1)	41 (1,0)	
Eutrophic	2329 (62,8)	2177 (63,6)	2685 (61,6)	
Overweight	689 (18,6)	630 (18,4)	785 (18,3)	0,182
Obesity	433 (11,7)	381 (11,1)	556 (13,0)	
Severe Obesity	223 (6,0)	183 (5,3)	257 (6,0)	
Not classified	1	1	0	

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as shown in Table 1.

ASSESSMENT OF NUTRITIONAL STATUS - CHILDREN UNDER 5 YEARS OLD (N=5,745).

When we evaluated children under 5 years of age, we found mean values of the BMI/age Z score of 0.74±1.22 (2014); 0.67±1.16 (2016) and 0.76±1.19 (2018), showing statistically significant differences between the evaluated periods (p<0.045) shown in Table 2.

We could observe that over the years analyzed there was a significant reduction in the average values of the BMI/age Z score between the years 2014 and 2016, followed by a recovery of the values in the year 2018. The overweight rates found were 37.1%, 34.8% and 36.5%; followed by obesity in 3.5%, 2.4% and 3.7%, in the years 2014, 2016 and 2018, respectively.

By comparing our findings with the weight curves for sex and age considered by the WHO for both older and younger children, we were able to demonstrate that our children have significantly higher rates than expected.

DISCUSSION

The increase in the prevalence of overweight and obesity in children has been highlighted in recent years, representing an important public health problem, as it is a potential risk factor for the early development of arterial hypertension, diabetes, hypercholesterolemia, insulin resistance and cardiovascular diseases. However, during childhood the presence of these risk factors may not be noticeable, but they contribute to the silent development of chronic diseases in adulthood. [8]

The present study, which evaluated more than 17,000 school-age children, showed an overall prevalence of 36% of overweight and 11.7% classified as obesity in the age group > 5 years and 3.5% below that age. Our findings demonstrate a higher prevalence of overweight (overweight and obesity), when compared to other studies carried out in different regions of Brazil, but with smaller series.

When specifically referring to obesity in the age group >5 years, its frequency becomes evident, reaching worrying figures nationally, which is in line with our findings. In this context, a study carried out in Brazilian macro-regions mentions that the level of education of parents associated with differences in regional culture is a limiting factor to favor different rates of obesity. [9]; as well as the socioeconomic factor associated with childhood overweight. [10]

A study carried out in Diamantina (MG) with 110 children aged > 5 years showed a rate of 14.3% of obesity and 33.5% of overweight associated with low-income families, sedentary lifestyle and

Thinness	34 (0,9)	52 (1,5)	52 (1,3)	
Eutrophic	2329 (62,8)	2177 (63,6)	2685 (61,6)	0,182
Overweight/Obesity	1345 (36,3)	1194 (34,8)	1598 (37,3)	

Results are expressed as frequency, percentage; mean, ±standard deviation of mean. Abbreviations: kg: kilograms; m: meters; m2: meters squared; BMI – body mass index; ZWH: weight-for-height Z-score; ZHA: height-for-age Z-score; ZWA: weight-for-age Z-score; ZBMI/A: BMI-for-age Z-score.

TABLE 2: General and anthropometric characteristics of children under five years old separated according to the year of analysis (comparative analysis between the years 2014, 2016 and 2018) (N=5,745 children).

	2014	2016	2018	P (valor)
Frequency (percentage)				
Children	1679	1921	2145	
Gender				
Male	820 (48,8)	910 (47,4)	1027 (47,4)	0,696
Female	819 (51,2)	1011 (52,6)	1118 (52,1)	
Mean (±mean standard deviation)				
Age (days)	1083,8 (444,7)	1107,1 (533,1)	1103,3 (439,9)	0,292
Age (months)	35,6 (14,6)	36,37 (17,5)	36,2 (14,4)	0,292
Weight (kg)	15,1 (4,2)	15,11 (4,7)	15,1 (4,0)	0,901
Height (m)	0,94 (0,11)	0,94 (0,13)	0,94 (0,11)	0,832
BMI (kg/m2)	16,8 (1,9)	16,7 (1,89)	16,8 (1,9)	0,246
ZWH	0,69 (1,20)	0,62 (1,13)	0,71 (1,17)	0,057
ZHA	0,002 (1,69)	-0,05 (1,14)	-0,09 (1,0)	0,076
ZWA	0,51 (1,58)	0,42 (1,08)	0,46 (1,13)	0,119
ZBMI/A	0,74 (1,22)	0,67 (1,16)	0,76 (1,19)	0,045*
Frequency (percentage)				
Pronounced thinness	8 (0,5)	5 (0,3)	4 (0,2)	
Thinness	9 (0,5)	10 (0,5)	5 (0,2)	
Eutrophic	1041(62,0)	1189 (61,9)	1354 (63,1)	
Overweight risk	421(25,1)	468 (24,4)	522 (23,8)	<0,001*
Overweight	142 (8,5)	154 (8,0)	192 (9,0)	
Obesity	58 (3,5)	46 (2,4)	79 (3,7)	
Not classified	0	49	0	
Thinness	17 (1)	15(0,8)	9 (0,4)	
Eutrophic	1041(62,0)	1189 (61,9)	1354 (63,1)	<0,001*
Overweight/Obesity	621(37,1)	668 (34,8)*	793 (36,5)*	

The results are expressed: frequency, percentage; mean, ±standard deviation of mean. Abbreviations: BMI: body mass index; ZWH: weight-for-height Z-score; ZHA: height-for-age Z-score; ZWA: weight-for-age Z-score; ZBMI/A: BMI-for-age Z-score. a mean±SD.

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moderate consumption of processed and ultra-processed products. [11]

Bringing this analysis to the interior of São Paulo, our study corroborates another carried out in 2012 also in the city of Piracicaba, but in a different age group. In this study, 269 adolescents aged between 10 and 14 enrolled in public schools were evaluated, showing a prevalence of overweight in 35.7% among boys and 26.2% among girls, which identified the high consumption of carbohydrates as a determining factor for this excess weight. [12]

On the other hand, considering obesity in children < 5 years, it becomes evident that this rate of excess weight is the result of the parents' eating habits, a reflection of the lifestyle to which they submit their children. Therefore, the collaboration of parents is essential and their lack of awareness and awareness of the nutritional status of their children is one of the factors that hinders the success of prevention, treatment and consequent decrease in the prevalence of obesity. [13]

Our results showed that children < 5 years old showed a Z score for BMI/age above those recommended by the WHO. Other authors also mention the prevalence of overweight and obesity in children < 5 years old, corroborating our results. [14,15,16]

Thus, it is essential that the prevention of obesity occurs from an early age, and the engagement of parents in this sense is essential, a factor that is pointed out as one of the main barriers cited by health professionals in this confrontation. [17]

A strength of the present study is related to the number of children analyzed, whose anthropometric data were collected and not reported through a questionnaire, combined with this, its prospective and comparative characteristic, over the years 2014, 2016 and 2018. The main limitation was the impossibility of measuring the same children over the years, due to the logistics of this measurement, as well as the lack of an instrument that could identify the causes related to the findings.

CONCLUSION

The results presented will serve as a basis for the planning and implementation of intervention measures, showing that public health policies are urgent in facing the scenario of overweight and obesity in the municipality, which is certainly not different in the rest of the country, as well as the current world scenario. However, these measures must be individualized and targeted by age group, with the aim of reversing the situation of the indicators pointed out in this study.

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