



## Nutritional status of students in public schools

Estado nutricional de escolares na rede pública de ensino

Estado nutricional de escolares de la red pública de enseñanza

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The study assessed the nutrition status of public school students in the city of Carinhanha, state of Bahia, Brazil. It was a cross-sectional study made in 2012, with 224 students from 6 to 9 years of age, of both sexes, mostly from families of low socioeconomic level. The nutrition status was assessed by checking weight and height According to the body mass index per age, malnutrition was observed in 3.6% of the students, overweight in 7.6% and obesity in 5.8%. A tendency towards overweight was observed in 13.4% of the students. Concerning the relation height/age, it was adequate in 218 students (97.3%). These results indicate that the public elementary school students assessed showed a tendency towards overweight, and strategies that promote their health through adequate nutrition must be implemented.

**Descriptors:** Nutritional Status; Obesity; School Health.

Objetivou-se avaliar o estado nutricional em escolares da rede municipal de ensino em Carinhanha, Bahia, Brasil. Trata-se de um estudo transversal realizado em 2012 com 224 escolares, de ambos os gêneros, entre 6 a 9 anos de idade, predominantemente de classe socioeconômica baixa. O estado nutricional foi avaliado por meio da aferição de peso e altura. Conforme o índice de massa corporal por idade, a prevalência de desnutrição foi de 3,6%, sobrepeso de 7,6% e obesidade de 5,8%. Foi observada tendência de excesso de peso entre os escolares, com prevalência de 13,4%. Quanto à classificação de estatura por idade, 218 escolares (97,3%) apresentaram a estatura adequada para idade. Esses resultados indicam prevalência de excesso de peso em escolares do ensino fundamental da rede pública, portanto, deve-se implementar estratégias para promoção da saúde por meio do estímulo à nutrição adequada.

**Descritores:** Estado Nutricional; Obesidade; Saúde Escolar.

El objetivo fue evaluar el estado nutricional de escolares de la red municipal de enseñanza en Carinhanha, Bahia, Brasil. Estudio transversal, realizado en 2012, con 224 escolares, de ambos los géneros, entre 6 y 9 años, predominantemente de clase socioeconómica baja. El estado nutricional ha sido evaluado a través de las medidas de peso y altura. Conforme el índice de la masa corporal por edad, el predominio de la desnutrición ha sido de 3,6%, sobrepeso de 7,6% y obesidad de 5,8%. Se ha observado la tendencia al exceso de peso entre los escolares (13,4%). Cuanto a la clasificación de estatura por edad, 218 escolares (97,3%) presentaron la estatura adecuada para edad. Los resultados señalaron predominio del exceso de peso en escolares de la enseñanza primaria de la red pública, por lo tanto, se debe implementar estrategias para promover la salud mediante incentivo a la nutrición adecuada.

**Descritores:** Estado Nutricional; Obesidad; Salud Escolar.

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## Introduction

Obesity is considered a disease of multifactorial character which involves from biological matters to historical, genetic, ecological, economical, social, cultural and political ones<sup>(1-2)</sup>. The increase of child obesity is worrying and represents a big problem of public health, once it can bring damages to health such as hyperlipidemia, diabetes mellitus type 2, high blood pressure and cardiovascular disease in adult life<sup>(2-3)</sup>.

As in other countries under development, Brazil is experiencing an important epidemiological transition, marked by demographical and nutritional changes<sup>(4)</sup>. In the Brazilian society, the nutritional transition is happening very fast: from a country that showed high rates of malnutrition, it became a country with high proportion of overweight. Estimates show that in 2009, one in each three children from five to nine were overweight. However, the deficit in height, an important indicator of malnutrition, fell from 29.3% (1974-75) to 7.2 % (2008-09) among boys and 26.7% to 6.3% among girls. In 2008, overweight reached 33.5% of children from five to nine years old, and 16.6% of the total number of boys were also obese; among girls, obesity was present in 11.8 %<sup>(5)</sup>.

The interest for the diagnosis of child obesity is justified by the increase of its prevalence during the adult life, especially for the potentiality as a risk factor for the development of non transmissible chronic diseases<sup>(6)</sup>. Besides that, it is in this age range that the food habits are formed as well as the habits of physical activities and that is why the worry on prevention, diagnosis and treatment of obesity in childhood<sup>(7-8)</sup>.

The scope of primary attention, the assistance of the nutritional status of the children is essential to evaluate their quality of life and identify possible nutritional disorders early. So, the work of the health professionals should be highlighted, especially the nurse, when developing actions together with the

teaching institutions through the follow-up of health conditions and nutrition of the school children and of the promotion of healthy environment<sup>(9)</sup>.

The anthropometric evaluation, checking the measures of weight and height, is an important instrument for the nutritional diagnosis. They are able to present information on the prevalence and the gravity of the nutritional changes in the child and so, the intervention can be established earlier<sup>(10)</sup>.

Therefore, the present study is aimed at assessing the nutritional status in students of the public schools in an urban area in the city of Carinhanha, BA, Brazil.

## Method

It is a cross-sectional study of descriptive type, made with students in public schools in the urban area of the city of Carinhanha, Bahia, Brazil. The county is located in the southwest of the state of Bahia, 900km of the capital city Salvador and is located on the left bank of the São Francisco River on the border of the state of Minas Gerais. The estimated population is 28,265 inhabitants.

All the students (no. 968) are enrolled from the 1<sup>st</sup> and the 4<sup>th</sup> year of grade school in the urban area, age range between 6 and 9 years 11 months and 29 days, and both sexes invited to participate in the project. The school principal sent to the student's parents an explanatory letter on the aims of the research, attached to two copies of the Informed Consent Form (ICF) to be signed by the responsible subjects. The sample chosen was made with the delivery of the signed ICF within one week. The disabled students were excluded of the study and the also the ones with temporary disability.

The data collection was made in the second semester of 2012, by two university students of nutrition, previously trained. It was made through the use of a structured questionnaire divided into

two parts. The first one investigated the profile of the students, with the identification of these variables: gender, age, ethnic group or color and schooling, obtained based on the register of the Secretaria Municipal de Educação (the County Department of Education) and from information collected from the schools. There was also the evaluation of the socioeconomic condition, based on an instrument proposed by the Critério de Classificação Econômica Brasil (Brazilian Economical Status) (CCEB) validated by the Associação Brasileira de Empresas de Pesquisa (Brazilian Research Association)<sup>(11)</sup>. The socioeconomic condition was evaluated from a score which takes into consideration the possession of consumer goods (television, refrigerator, radio, car, maid, washing machine, VCR and freezer) and the schooling of the family head. The families were classified in A, B, C, D and E, being 'A' the highest economical class and 'E', the lowest.

In the second part of the questionnaire, the anthropometric data of the students were registered. The weight and height collecting of the children was made in an adequate room at the school. One university student was responsible for checking the weight, and the other one for the height using a portable anthropometric scale with capacity of 130 kg and a precision of 100g, the scale was placed on a leveled area. To evaluate their weight, the students should be dressed with light clothes and remain on the scale in the erect position, with the feet together and the arms placed along the body. Another university student measured the height, using a non elastic tape measure, 150cm long and 1mm of sensibility, fixed on a vertical surface without skirting board and 50cm away from the floor.

This measures were used to calculate the indicators Height per age (H/A) and the Body Mass Index by Age (BMI/A). The data were analyzed in graphics of percentiles, using as reference the values

proposed by the World Health Organization<sup>(12)</sup>.

For the classification of the nutritional status according to the index H/A the points of cuts were: score  $Z < -2$  = low height; score  $Z$  between  $-2$  and  $-1$  = risk of low height and score  $Z > -1$  = eutrophia. For the classification based on the index BMI/A, the following points of cut were adopted: score  $Z < -3$  = extreme thinness; score  $Z$  between  $-3$  and  $-2$  = thinness; score  $Z$  between  $-2$  and  $+1$  = eutrophia; score  $Z$  between  $+1$  and  $+2$  = overweight; score  $Z$  between  $+2$  and  $+3$  = obesity; and score  $Z > +3$  = serious obesity.

The analysis of the quantitative data was made through the *Statistical Package for the Social Sciences (SPSS) for Windows* version 18.0. The characteristics of the subjects of the research were described by the simple frequency of the variables, average and standard deviation. The differences between the genders were established with the application of the chi-squared test or Fisher's exact test (proportions) and the test t of Student (averages), with level of significance of 5% ( $p < 0.05$ ).

This research was approved by the Committee of Ethics in Research of the Faculdades Unidades do Norte de Minas Gerais, under Protocol 67037/2012 and it was made according to the ethical principles of non maleficence, beneficence, justice and autonomy according to the resolution 196/96 of the National Council of Health.

## Results

The population studied was 224 students, of those 52.7% were female. The minimum age was 6 years and the maximum 9 years and 9 months. According to the Brazilian Economical Status, 49.1% of the children belong to classes D and E. The dark-skinned was predominant (68.3%), according to Table 1.

**Table 1** - Socio and demographic characteristics of the students

Variable	n (%)
Gender	
Male	106 (47.3)
Female	118 (52.7)
Age (years)	
6	28 (12.5)
7	59 (26.3)
8	67 (29.9)
9	70 (31.3)
Social class	
B	6 (2.7)
C	108 (48.2)
D	73 (32.6)
E	37 (16.5)
Ethnic group/color	
Yellow	4 (1.8)
White	28 (12.5)
Indian	8 (3.6)
Dark-skinned	153 (68.3)
Preto	31 (13.8)

Table 2 presents the anthropometric values classified by gender, including age, weight, height and BMI. There were no statistic differences by gender for the presented variables.

**Table 2** - Average and standard deviation of the characteristic of age, weight, height and BMI of the students stratified by gender

Variables	Female	Male	Total	p
	Average ± SD	Average ± SD	Average ± SD	
Age (years)	7.79±1.02	7.82±1.02	7.80±1.02	0.764
Weight (Kg)	26.83±6.49	27.38±7.29	27.09±6.87	0.545
Height (m)	1.30±0.08	1.31±0.09	1.30±0.09	0.439
BMI (Kg/m <sup>2</sup> )	15.93±2.48	15.89±2.15	15.91±2.32	0.902

According to the nutritional evaluation through the BMI/A, the prevalence of malnutrition was 3.6%, overweight 7.6% and obesity 5.8% among

the students. There was no statistical difference in the analysis of nutritional status by gender. As to the classification of the nutritional status according the criteria of percentile of Height per Age (H/A), 218 students of both genders (97.3%) presented adequate height for their ages and only 6 (2.7%) had low height (Table 3).

**Table 3** - Nutritional status of the students, according to the criteria of Body Mass Index by age (BMI/A) and height by age (H/A), stratified by gender

Nutritional status	Female	Male	Total	P
	n (%)	n (%)	n (%)	
Body Mass Index by age				
Malnutrition	5 (4.2)	3 (2.8)	8 (3.6)	0.725
Eutrophia	96 (81.4)	90 (84.9)	186 (83.0)	-
Overweight	10 (8.5)	7 (6.6)	17 (7.6)	0.783
Obesity	7 (5.9)	6 (5.7)	13 (5.8)	1.000
Height by age				
Low height	3 (2.5)	3 (2.8)	6 (2.7)	1.000
Adequate height	115 (97.5)	103 (97.2)	218 (97.3)	-

## Discussion

Among the 224 students, with age from 6 to 9 years, of both genders, there was a predominance of a population of low socio-economical status. These are factors which influence the vulnerability of the children to nutritional problems, and reinforce the urgent need of nutritional evaluation as a strategy for the promotion of health to be adopted by the health professionals<sup>(13)</sup>.

There is a tendency of change in the nutritional profile of the population in general, being obesity a matter of public health, for the child health<sup>(14)</sup>. Such situation of obesity may be a result of economical, cultural and demographical factors which became evident from the last decades of the 20<sup>th</sup> century<sup>(9)</sup>.

Evaluating the variables of body composition, the tendency, according the analysis of the BMI/A indicator, the overweight had the higher proportion (13.4%) for the age range under study when

compared to malnutrition (3.57%). It was identified that the malnutrition condition among the students presents an epidemiological situation similar to the national data. The results obtained in the Family Budget Research (FBR) made in 2008-2009 showed an important increase in the number of children overweight in the country, especially in the age range from 5 to 9 years of age<sup>(5)</sup>. Other studies made in the country showed that the number of children and adolescents overweight and obese increased along the years<sup>(15-16)</sup>, reproducing a worldwide scenario.

Despite the reduction of child malnutrition, its prevalence must still be monitored in the countries under development. In a research made with students from 5 to 10 years of age in public schools in Feira de Santana, Bahia, Brazil, the prevalence of low weight (5.8%) and low height (3.5%) was higher than expected, and according to the BMI for this age, from six years on, an increase in the prevalence of low weight was noticed. The authors suggest that the process of nutritional transition is dynamic and heterogeneous in the country, especially among children of low socio-economical level<sup>(17)</sup>. The data referring the nutritional profile confirms the need of local diagnosis for the implementation of intervention proposals.

This age range, the prevalence of height deficit reflects the dimension of child malnutrition. In the sample analyzed, the adequate relation H/A (height/age) prevailed in both genders (97.32%). Students of public schools in the northeast of the country still present higher percentages of malnutrition shown by the indicator of height/age, which also show that the socio-economical level and the condition of under development influence in the nutritional status<sup>(18)</sup>. However, in this study, despite the low economical conditions of the students, when compared to the results of FBR (2008-2009)<sup>(5)</sup>, the frequency of participants with height deficit (2.7%) was lower than the national average in the age range from 5 to 9 years (6.8%).

Implementing measures of prevention of the nutritional diseases according to diagnosis of the

nutritional profile of the students has been outstanding in public health<sup>(19-20)</sup>. Especially the prevention of overweight and obesity in childhood, which presented relevant prevalence in this study, would justify the need of the elaboration and implementation of a program of primary prevention in this age range. In order to have an effective action, the joint work among the health professionals, the school and the family are extremely important. Other investigations which embody information on the level of regular physical activity and regular eating habits concerning the students can contribute to a more selective analysis of the process of development of overweight and obesity in young population.

## Conclusion

The students of the public schools of Carinhanha (BA), predominantly those of lower classes, follow the tendency of nutritional transition experienced in the country, in which there is a reduction in the deficit indicators of malnutrition and overweight. This is a reflex of the process of urbanization which has resulted in the increase of ingestion of caloric food and reduction of physical activities.

A limitation of the study is the fact that it represents the specific reality of students selected from a sample of convenience, which makes the generalization of the results impossible. And, that is why, wider studies must be made from the hypotheses raised.

The findings in this research are important, once they provide the nurses and other health professionals the possibility to visualize the vulnerability of the students facing nutritional transition, and from a reflexive attitude, implement strategies of whole attention to the child health. Such strategies must be turned to the promotion of health, through the stimulus of an adequate nutrition for the whole population, especially for the children in their school age.

The Nutritional Education in the school

environment is a good start for the adoption of healthy food habits which will remain along the lives of these students. However, it is important to highlight the need to develop studies which provide the knowledge of social determinants concerning child health in order to better plan the proposed actions.

## Collaborations

Carvalho IL and Carneiro MLM contributed for the conception of the work, data collection, analysis, interpretation of the data, writing of the article and final approval of the version to be published. Pinho L contributed in the orientation for the research and for the writing of the article. Reis TC contributed for the writing of the article and final approval of the version to be published.

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