Anemia prevalence in children and adolescents from educational centers in the outskirts of Londrina, PR, Brazil

Prevalência de anemia em crianças e adolescentes de unidades educacionais na periferia de Londrina, PR

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A B S T R A C T

Iron deficiency anemia is the world most prevalent nutritional problem. To investigate anemia prevalence and its relation to nutritional status, 526 children and adolescents, 284 males and 242 females, aged 7 to 14 years old, were evaluated. The studied subjects take part in a program of the Social Action Department of the city of Londrina, state of Paraná, and attend Public Educational Centers which provides them three daily meals and pedagogic assistance. These individuals belong to deprived areas in the city outskirts, where the per capita income is lower than US$500 a year. The hemoglobin dosage was determined by digital puncture and read by Hemocue portable photometer. Anemia prevalence was verified in 41.3% of the assessed population, with no significant statistical differences between males and females (p=0.412). No association between anemia and malnutrition was found. In conclusion, high prevalence of anemia was observed in this population.

Index terms: anemia, nutritional status, students.

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R E S U M O

A anemia ferropriva é a deficiência nutricional mais encontrada no mundo. Com o objetivo de detectar a prevalência de anemia e sua relação com o estado nutricional, foram avaliadas 526 crianças e adolescentes, na faixa etária de 7 a 14 anos, sendo 284 do sexo masculino e 242 do sexo feminino. A população estudada participou de um programa da Secretaria de Ação Social do Município de Londrina, PR, e freqüenta Unidades Educacionais Públicas que fornecem três refeições diárias e atendimento pedagógico. Estes indivíduos vivem em áreas carentes na periferia da cidade, onde a renda **per capita** *anual é inferior a US$500. A dosagem de hemoglobina foi realizada mediante punção digital feita por fotômetro portátil. Verificou-se uma prevalência de 41,3% de anemia, sem diferença significativa entre os sexos (p=0,412). Não houve associação entre anemia e desnutrição. Observou-se, portanto, alta prevalência de anemia nesta população.*

Termos de indexação: *anemia, estado nutricional, estudantes.*

I N T R O D U C T I O N

According to the United Nations Nutrition Committee (Lönnerdal & Dewey, 1996), anemia caused by iron deficiency is estimated to affect one billion individuals worldwide and is the most predominant form in both developing and developed countries (Yip, 1994). Studies performed in developing countries have demonstrated values around 51% and 46% for the anemia prevalence in 0-4 and 5-12 age groups, respectively. Even in regions with higher income in Brazil (Southern and Southeast), the results are of great concern. In São Paulo (the largest city in South America), anemia was detected in 80% of the children under 5 years of age (Vannucchi *et al.*, 1992). Various nutrient deficiencies are involved in nutritional anemia, but iron is the most important, being responsible for 90% of the cases (Vannucchi *et al.*, 1992).

Iron deficiency results in important physical and mental disorders, such as: increase of cardiac output, decrease in aerobic metabolism, decrease in mental concentration, increase in infection susceptibility, and cognitive functions damage in young children (Walter, 1996). Its relation to children mental retardation has also been discussed (Hurtado *et al.*, 1999).

Thus, the aim of this study was to describe the prevalence of anemia related to nutritional status in a low income population, aged 7-14 years old, attending Public Educational Centers in Londrina, PR.

S U B J E C T S   A N D   M E T H O D S

This study, approved by the University of Londrina Ethical Committee, is part of a major nutritional intervention project using iron fortification, developed from August, 1998 to August, 1999. The assessed population belongs to Public Educational Centers in Londrina, PR, and comes from families living in extreme poverty. The annual income is lower than US$500 *per capita*, and most of the children's parents (68.7%) had no more than one year of schooling (data from the local Government Social Department, 1990). The evaluation involved nine Centers, seven in the outskirts of the town (União da Vitória, Vila Ricardo, Fraternidade, Mister Thomas, Novo Amparo, José Belinati and Nossa Senhora da Paz), and two in the rural area (Guaravera and Paiquerê).

The Centers, sponsored by the local Government, provide recreation, pedagogic assistance, cultural activities and meals for the individuals under 14 years old. In general, the meals provided by these Centers are this population only access to food.

A cross sectional study was conducted with 526 subjects, aged 7 to 14 years old, who had formal consent signed by their parents.

To evaluate nutritional status, body weight (W) and height (H) values were verified. The weight was obtained from a Urano PS 180

anthropometric scale with accuracy of 0.1 kg. Height was assessed by a steel anthropometer, attached to the scale, with accuracy of 0.5 cm. All individuals were barefoot and wore only T-shirts and shorts during the measurements.

A Hemocue portable photometer (Angholm, Sweden) was used for hemoglobin dosages (Von Schenck *et al.*, 1986). Samples were collected by digital puncture after a 4-hours fasting period. Anemia was defined at Hb <120 g/L, according to the World Health Organization criteria (DeMaeyer *et al.*, 1989).

Weight and height data were categorized in percentiles according to National Center for Health Statistics (NCHS), considering the sex and age of the individuals (National..., 1981). To evaluate the homogeneity of the distribution of the anemic children and adolescents regarding sex, weight and height ranges, a Chi-square or Exact Fisher test were used, at a significance level of 5%.

RESULTS

Of the 526 school aged (7 to 14) studied individuals 54.0% (n = 284) were male and 46.0% (n = 242) were female. In the surveyed population, 217 were anemic (41.3%), being 44.4% males and 37.6% females, indicating a homogeneous distribution regarding sex (p = 0.138). In order to evaluate the anemic children and adolescents, the National Center for Health Statistics percentile intervals for weight and height were chosen considering the amplitude in the age range according to sex. The results of this analysis (Tables 1 and 2) indicate that the distribution of the anemic children and adolescents regarding weight and height percentiles is homogeneous (p = 0.894 and p = 0.573, respectively).

Table 1. Anemia frequency of children and adolescents according to NCHS weight percentile intervals.

| | Anemia | | | | |
| | Yes | | No | | Total |
Weight	n	%	n	%	
Below 3ºP	16	7.4	16	5.2	32
3ºP ⊢── 10ºP	19	8.8	33	10.7	52
10ºP ⊢── 50ºP	111	51.1	159	51.5	270
50ºP ⊢── 90ºP	64	29.5	91	29.4	155
90ºP ⊢── 97ºP	5	2.3	8	2.6	13
Above 97ºP	2	0.9	2	0.6	4
Total	217	100.0	309	100.0	526

χ^2 = 1.658 with d.f.=5; p-value = 0.894.

Table 2. Anemia frequency of children and adolescents according to NCHS height percentile intervals.

| | Anemia | | | | |
| | Yes | | No | | Total |
Height	n	%	n	%	
Below 3ºP	21	9.7	30	9.7	51
3ºP ⊢── 10ºP	27	12.4	40	12.9	67
10ºP ⊢── 50ºP	110	50.7	156	50.5	266
50ºP ⊢── 90ºP	53	24.4	76	24.6	129
90ºP ⊢── 97ºP	5	2.3	2	0.7	7
Above 97ºP	1	0.5	5	1.6	6
Total	217	100.0	309	100.0	526

Exact Fisher test p-value = 0.573

DISCUSSION

In the 1980s, studies showed 26% of anemia prevalence among Latin American children between 5 and 12 years old (DeMaeyer & Adiels--Tegman, 1985).

Most of the anemia epidemiological researches in Brazil were specifically related to pregnant women and children under 6 years of age, both groups considered of high vulnerability (Stefanini *et al.*, 1995).

Therefore, studies about anemia prevalence using school age populations are relatively rare in Brazilian community. In the present survey, 41.3% of the evaluated children and adolescents had anemia. This rate is inferior to the one found by a research conducted in São Paulo (Cesar, 1990), but it is similar to the numbers showed found by a study carried out in the Metropolitan area of the same city, around 41.7% (Stefanini *et al.*, 1995). The anemia prevalence found in the present study was distinctly superior to that verified in the Northeastern region of Brazil, but it was similar to the prevalence observed in the Northern (Pará), Middle Western (Mato Grosso) and Southern (Rio Grande do Sul) regions (Vannucchi *et al.*, 1992). These data comparison was limited by the definition of anemia used, 110 g/L or 120 g/L. However, it is important to emphasize that, by and large, the high anemia rate verified by this study was due to extremely precarious socioeconomic patterns, added to the low educational levels of the studied families.

As for the nutritional status, 6.1% of the surveyed population was underweight, below the 3rd percentile for acute malnutrition, and 9.7% was short, below the 3rd percentile for chronic malnutrition. Both indexes were superior to the index found in the Osasco (SP) public schools, where 3.97% had chronic malnutrition and no children had acute malnutrition (Stefanini *et al.*, 1995).

As in previous researches (Cesar, 1990; Stefanini *et al.*, 1995), this survey did not find any association between anemia and malnutrition, since the distribution of weight and height was homogeneous among the anemic and non-anemic individuals. This association, however, was observed in studies carried out in Africa (Tatala *et al.*, 1998).

In conclusion, there is a high prevalence of anemia among the school age population in the Public Educational Centers in Londrina, Paraná. Special attention should be given to this particular population in terms of developing and supplying iron fortified foods, increasing the bioavailability and evaluating food intervention efficacy.

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