

## Study of the Prevalence of Iron-deficient Anemia in the Group for the Defense of Child with Cancer - GRENDACC in Jundiaí-SP

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### Resumo

**Objetivo:** Comparar os três níveis da anemia ferropriva em crianças por sexo e por estágio da doença, bem como identificar a terapêutica recomendada no tratamento da doença. **Métodos:** O estudo foi conduzido na Instituição Grupo em Defesa da Criança com Câncer, GRENDACC, Jundiaí-SP, no qual foram analisados 21 prontuários de crianças de 0 a 4 anos com anemia ferropriva. Para realizar a análise dos dados, estes prontuários foram divididos por sexo e por estágio da doença. **Resultados:** A análise por sexo revelou uma prevalência de 61,9% (13) de indivíduos anêmicos do sexo masculino. Em relação ao estágio da doença, 3 crianças estavam no primeiro estágio, 5 no segundo estágio e 13 no terceiro estágio. Após a correção alimentar, 76,2% (16) dos pacientes que apresentavam anemia ferropriva já não apresentavam mais a doença. **Conclusões:** A anemia ferropriva mostrou-se com maior prevalência no sexo masculino em crianças de 0 a 4 anos de idade, sendo o principal fator de risco o estado nutricional. A partir dos dados obtidos no presente estudo, é possível concluir que com o acesso a uma alimentação adequada e balanceada, o índice de anemia ferropriva infantil tende a diminuir.

**Descritores:** Hemoglobinas, etiologia, sangue, terapia, prevenção & controle.

### Abstract

**Objective:** Compare the three levels of iron deficiency anemia in children by sex and stage of disease, as well as to identify the recommended therapy in the treatment of the disease. **Methods:** The study was conducted at the Institution Group in Defense of the Child with Cancer, GRENDACC, Jundiaí-SP, in which 21 medical records of children aged 0 to 4 years with iron deficiency anemia were analyzed. To perform the data analysis, these medical records were divided by sex and stage of the disease. **Results:** The analysis by sex showed a prevalence of 61.9% (13) of anemic male subjects. In relation to the stage of the disease, 3 children were in the first stage, 5 in the second stage and 13 in the third stage. After dietary correction, 76.2% (16) of patients with iron deficiency anemia no longer had the disease. **Conclusions:** Iron deficiency anemia was found to be more prevalent in males in children 0 to 4 years of age, being the main risk factor the nutritional status. From the data obtained in this study, it is possible to conclude that with access to adequate and balanced food, the incidence of childhood iron deficiency anemia tends to decrease.

**Keywords:** Hemoglobins, Etiology, Blood, Therapy, Prevention and Control.

### Introduction

Anemia is defined by the World Health Organization (WHO) as a condition in which the hemoglobin content is below the values considered normal for the physiological state, age, sex and height of the patient<sup>1,2</sup>. Hemoglobin dosage is the parameter used to determine anemia. The reference values for children under six years are 11 g / dl<sup>3</sup>. For the determination of anemia, the hematocrit reading and hemoglobin dosage follow certain standards, but factors such as age, sex, hydration status and patient height may vary from the normal values of this test. In order to avoid this, laboratories were recommended to standardize reference values according to the type of population and the regions studied<sup>4</sup>.

There are several types of anemia, and the most prevalent in the world is iron deficiency anemia, a nutritional disease caused by iron deficiency<sup>5</sup>. Despite its significant prevalence

in developed countries, the disease mainly affects the population of developing countries<sup>6</sup>. In Brazil, 35% of children aged 1 to 4 years are anemic. Studies indicate that the age group of 6 to 23 months is considered to be at greater risk for the development of the disease<sup>7</sup>. In the etiology of iron deficiency anemia, iron from food may be in a chemical form that is unsuitable for absorption or may not be supplied in sufficient quantity to meet the body's metabolic needs. The level of iron in the diet is determined by its bioavailability and quantity in food. Iron deficiency anemia occurs due to the prolonged deficiency of dietary iron intake or blood loss, especially in periods of greater demand, such as in children with a high growth rate<sup>8</sup>.

Due to the lack of iron in the organism occur gradually and progressively, several hematological parameters (hemoglobin, hematocrit, mean corpuscular volume and mean corpuscular hemoglobin) and biochemical parameters (iron, ferritin) reflect the three stages of the deficiency and

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can be assessed alone or in combination in the diagnosis in individuals or populations"<sup>3,7</sup>. The first stage of anemia (iron deficiency) occurs when the supply of iron is unable to meet the needs, occurring reduction of its physiological deposits; this stage is characterized by serum ferritin below 12 micrograms per liter, but without functional changes of red blood cells. The second stage (mild anemia) is characterized by a decrease in serum and bone marrow and transferrin saturation below 16%, which may increase the binding capacity of iron used to evaluate circulating iron.

The third stage (installed iron deficiency anemia) occurs when hemoglobin falls below the age-standard, characterized by the appearance of functional alterations of the red blood cells (microcytosis and hypochromia)<sup>9</sup>.

Iron deficiency anemia can in many cases cause skin and mucosal changes (pallor, glossitis), gastrointestinal (stomatitis) changes, palpitation, fatigue, loss of ability to maintain body temperature on exposure to cold, impairment of muscle performance and growth, including damage to school performance and neurological development, as well as behavioral disorders such as attention deficit, irritability, apathy, learning difficulties, and even anatomical disorders such as cranial changes<sup>10,11</sup>.

In addition, it may also affect immunity and long-term iron deficiency anemia can lead to abnormalities in the development of long bones<sup>9</sup>.

The increased prevalence of iron deficiency anemia in children may be due to changes in dietary habits, which accompany the nutritional transition in the country<sup>9</sup>. In Brazil, the trend of increased iron deficiency anemia was evidenced by studies in which the prevalence of the disease increased from 35.6% in the 1980s to 46.9% in the 1990s in the city of São Paulo<sup>12</sup>.

Treatment of iron deficiency anemia is aimed at correcting the value of circulating hemoglobin and restoring iron

deposits in tissues where it is stored. The investigation of the cause is fundamental for the treatment of this type of anemia, since the lack of evaluation can mask another disease such as chronic anemia, for example, which also has a decrease in iron<sup>8</sup>. Therefore, the objectives of the present study were to compare the three levels of iron deficiency anemia in children by sex and stage of the disease, as well as to identify the recommended therapy in the treatment of the disease.

## Methods

From September to October 2014, 21 medical records of children with iron deficiency anemia of both sexes, aged 0 to 4 years, were analyzed.

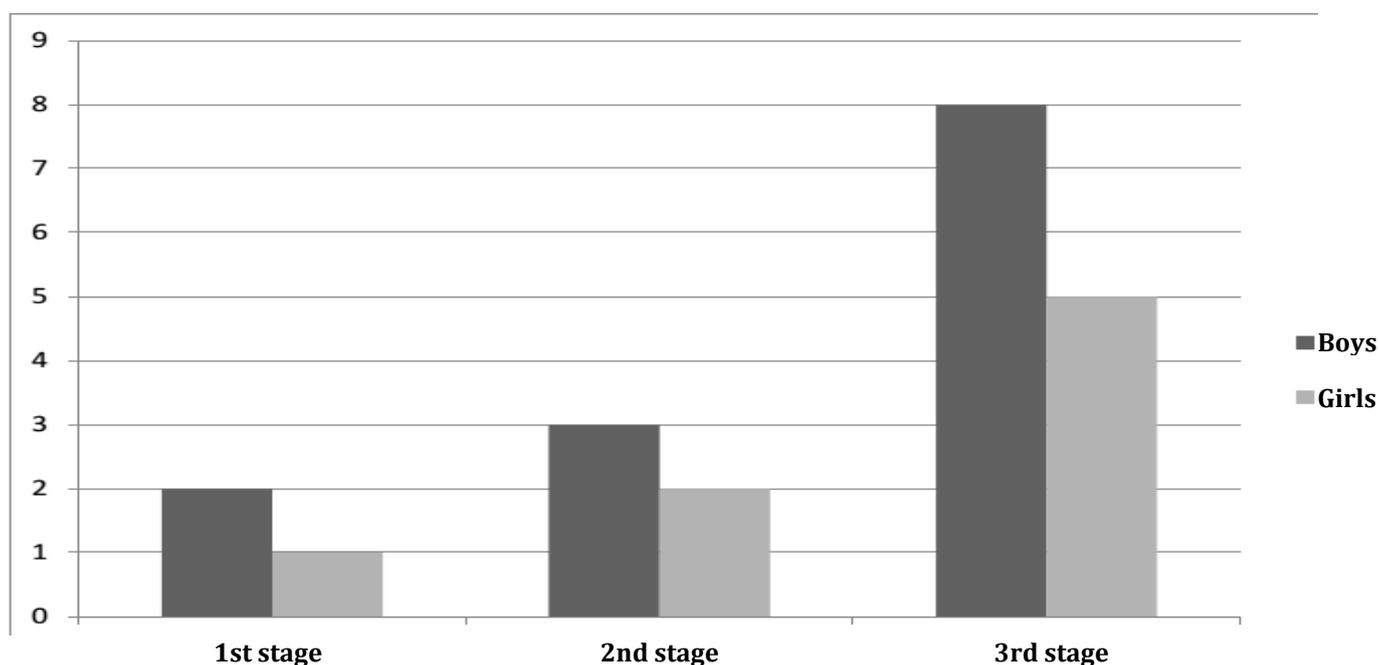
In the data collection the following parameters were analyzed:

- Hematological levels (hemoglobin, hematocrit, mean corpuscular volume and mean corpuscular hemoglobin).
- Biochemical levels (serum iron, ferritin, and total iron binding capacity (CTLF).
- Blade readings (analysis of presence or absence of hypochromic and microcytic cells).

The main therapeutic measure recommended for the treatment of the disease has also been identified. This study was submitted and approved by the Research Ethics Committee of the Paulista University nº 35236514.7.0000.5512 and opinion no. 1,017,521.

## Results

To perform the data analysis, the 21 charts were divided by stage of the disease and by sex. The analysis revealed a prevalence of 61.9% (13) of male anemic individuals (Graph 1).



**Graph 1:** Index of children with iron deficiency anemia

Since iron deficiency is characterized by low hematological and biochemical parameters in comparison to the reference value<sup>3</sup>, all the anemic children analyzed have one or more low parameters, the values of which allowed them to be classified in the three stages of anemia. From the analysis of the medical records, it was possible to observe that of the 21 children, 3 were in the first stage (iron deficiency), 5 in the second stage (mild anemia) and 13 in the third stage (iron deficiency anemia installed).

In the first stage, 9.5% (2) of the analyzed anemic children were male and 4.8% (1) female, in the second stage, 14.3% (3) of the analyzed anemic children were males and 9.5% (2) female, and in the third stage, 38% (8) of the anemic children analyzed were male and 23.8% (5) were female.

Table 1 shows the mean of the results of the exams of the patients involved.

**Table 1:** Mean of anemic children's test results

Stage	Examination	Boys	Girls	Reference value
1st stage	Ferritin	6,0 µg/l	6,0 µg/l	Above 12 µg / l
2nd stage	Serum iron	35,3 µg/dl	20,3 µg/dl	Men: 65-175 µg / dl Women: 50-170 µg / dl
	Transferrin	9,90%	9,80%	20-50%
3rd stage	Hemoglobin	9,2 g/dl	8,8 g/dl	Above 11 g / dl
	Hematocrit	28,50%	30,60%	Men: 41% - 54% Women: 36% - 48%
	Mean corpuscular volume	59,5 fl	64,4 fl	80-100 fl
	Mean corpuscular hemoglobin	27,6 pg	18,8 pg	25-35 pg

The main therapeutic measure recommended to patients for the treatment of iron deficiency anemia was basically a dietary correction, since the anemia probably resulted from an inadequate diet. Table 2 shows the menu of patients involved before and after the consultation. After food

correction and parents' knowledge of how much iron is essential not only for growth but also for the development of their children, 76.2% (16) of patients with iron deficiency anemia no longer had the disease.

**Table 2:** Patient's menu with pre-consultation and post-consultation iron deficiency anemia

	Pre-consultation menu	Post-consultation menu
<b>Breakfast</b>	Cow's milk with thick flour	raw milk / biscuit without filling (corn / milk) or bread with margarine
<b>Morning snack</b>	Milk of cow with thick flour / corn cracker	Fruit
<b>Lunch</b>	Rice / bean / meat broth (possibly "sucks and does not swallow") or egg. Dessert: petit suisse "Danoninho"	- rice, pasta, potato or cassava / mandioquinha -Wine, lentils or chickpeas -Carnes or egg (viscera 1 X week) -Legumes (2 types) -Hold greenery
<b>Afternoon snack</b>	Milk of cow with thick flour / corn cracker. During the afternoon, snacks and sweets (bullet, lollipop)	Fruit / biscuit without filling (corn / milk) or bread with margarine
<b>Dinner</b>	Rice / bean / meat broth (possibly "sucks and does not swallow") or egg.	- rice, pasta, potato or cassava / mandioquinha -Wine, lentils or chickpeas -Carnes or egg (viscera 1 X week) -Legumes (2 types) -Hold greenery After the meal offer natural juice
<b>Before bedtime</b>	Cow's milk with thick flour	raw milk

## Discussion

The present study confirms the high prevalence of anemia in children under 4 years of age, as 61.9% (13) of the medical records of children diagnosed were boys. In a group similar to this study - children aged 2 to 6 years old from Macuabal, São Paulo State, from a total of 11.4% of anemic children, 6.13% were male and 5.26% were female )<sup>13</sup>. In the Cantinho do Fiorello Nursery in the municipality of Natividade - RJ, lower anemia rates were found, but the male

prevalence was maintained (69.4% of the anemic children, 38.7% of whom were male and 30.7% female)<sup>3</sup>.

Iron deficiency anemia affects in particular children from 0 to 4 years of age, a period in which iron requirements are high and both growth and development are accelerated. At this stage, the diet is usually predominantly dairy and the introduction of food in general is not done adequately<sup>14</sup>. The prevalence of the disease in developing countries is almost 4 times higher than in developed countries, and up

to 4 years of age the disease in developing countries exceeds 50% of children and in developed countries affects about 20% of children<sup>13</sup>.

According to Spinelli *et al.* (2005), in this age group the occurrence of iron deficiency anemia occurs mainly due to the low iron density in the diet and the early introduction of cow's milk associated with the iron depletion of body reserves<sup>15</sup>.

According to Castro *et al.* (2011), human milk is highly bioavailable, since approximately 50% of it is absorbed, while the non-fortified cow's milk or cow's milk formula has only 10 to 20 % absorption. In this study, when evaluating the dietary pattern of the children, it is noted that iron deficiency anemia was acquired through the excess of cow's milk, that is, the iron reserve was not sufficient to meet the needs<sup>6</sup>.

Therefore, prevention is of great importance and should be established based on the following aspects: nutritional education, encouragement of breastfeeding, infection control, drug supplementation, food fortification and improvement of the diet offered<sup>16</sup>.

## Conclusions

Iron deficiency anemia is detected not only by low hemoglobin, but also by the mean corpuscular volume, mean corpuscular hemoglobin, ferritin and serum iron which are low, in addition to the children being able to present alterations in the red blood cells (microcytic and hypochromic)<sup>17</sup>.

The studies reviewed describe childhood iron deficiency anemia as the most common disease worldwide. According to the researched literature and the results obtained in this research, it was concluded that iron deficiency anemia was more prevalent among males in children aged 0 to 4 years, being the main risk factor the nutritional status.

Most patients have a predominantly dairy diet and generally the introduction of food in general is not done properly, as a consequence of parents' lack of information about the importance of iron for their children and in which foods iron is most concentrated. Observing Table 2, it is possible to observe that the children did not receive an iron-rich diet so that the organism could supply the needs of this nutrient.

Therefore, it is necessary to carry out projects and campaigns so that everyone can know how much iron is important for our organism, and in which foods it is in greater quantity. From the data obtained, it is possible to conclude that, with the access of children in the older age group to an adequate and balanced diet, the index of childhood iron deficiency anemia tends to decrease.

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