

## ORIGINAL ARTICLE

## Epidemiological profile of anemia in hematology outpatient clinic in private health sector

### *Perfil epidemiológico da anemia em ambulatório de hematologia da rede privada de saúde*

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Silva JBCB, Vieira GM. Epidemiological profile of anemia in hematology outpatient clinic in private health sector / *Perfil epidemiológico da anemia em ambulatório de hematologia da rede privada de saúde*. Rev Med (São Paulo). 2021 Jan-Feb;100(1):20-7.

**ABSTRACT:** In the context of anemias, it is estimated that its prevalence in Brazil and in the world is around 30%, which is higher than regarded as acceptable by the World Health Organization. Due to the lack of official Brazilian records on the epidemiological distribution of the disease, this study aims to demonstrate the prevalence of anemia in a private hematology outpatient clinic, and to verify its distribution in terms of sex, age, severity, and etiology. Thus, it was performed a cross-sectional descriptive analysis, with secondary data collection, of the medical records of patients in their first consultation of a hematology outpatient clinic in the private sector of Campinas/SP. A total of 1422 patients were selected, 456 diagnosed with anemia (32%), with a predominant age range between 40-49 years (21.7%), and with women representing 77% of the sample. In the evaluation of blood counts, the mean hemoglobin was 10.52 g/dL, in most cases being normocytic and mild anemias. Regarding the etiology, 62.7% of the sample had iron deficiency anemia, and of this, 78.7% were of hemorrhagic origin. The second most prevalent cause was anemia of inflammation (14.4%). In view of the results obtained, it was possible to draw an epidemiological profile of anemia in the referred clinic, with people with anemia being mostly women of childbearing age, with mild and microcytic anemia; and infer that, in most cases, anemia is a preventable disease, making it possible to decrease its prevalence.

**Keywords:** Anemia; Prevalence; Epidemiology.

**RESUMO:** No contexto das anemias, estima-se que sua prevalência no Brasil e no mundo seja em torno de 30%, acima do esperado como aceitável pela Organização Mundial da Saúde. Devido a carência de registros oficiais brasileiros sobre a distribuição epidemiológica da doença, esse estudo tem como objetivo demonstrar a prevalência de anemias em um ambulatório de hematologia do sistema privado, e verificar sua distribuição quanto ao sexo, idade, gravidade e etiologia. Assim, foi feita uma análise transversal descritiva, com coleta de dados secundários, dos prontuários de pacientes em primeira consulta de um ambulatório de hematologia da rede privada de Campinas/SP. Foram selecionados 1422 pacientes, sendo 456 diagnosticados com anemia (32%), de faixa etária predominante entre 40-49 anos (21,7%), e com mulheres ocupando 77% da amostra. Na avaliação dos hemogramas, a média de hemoglobina foi de 10,52 g/dL, sendo na maioria dos casos anemias normocíticas e leves. Em relação à etiologia, 62,7% da amostra era ferropênica, e desta, 78,7% de origem hemorrágica. A segunda causa mais prevalente foi a anemia da inflamação (14,4%). Diante dos resultados obtidos, foi possível traçar um perfil epidemiológico da anemia no referido ambulatório, sendo que os anêmicos são em sua maioria mulheres em idade fértil, com anemia leve e microcítica, e inferir que, em grande parte dos casos, a anemia é uma doença evitável, tornando possível a diminuição de sua prevalência.

**Palavras-chave:** Anemia; Prevalência; Epidemiologia.

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## INTRODUCTION

Anemia is a public health problem that is still neglected worldwide<sup>1-6</sup>. With prevalence figures of around 30% worldwide<sup>7</sup>, it is a topic that is rarely addressed in medical discussions.

According to the World Health Organization (WHO), in 2010, more than two billion people were anemic, which corresponds to almost a third of the world's population (32.9%)<sup>7,8,9</sup>. Preschoolers, women, especially those of childbearing age, and the elderly are at risk for anemia<sup>10,11,12</sup>. Also according to the WHO, anemia is defined as "low hemoglobin concentration"<sup>8,10,11,13,14</sup>. The causes for this situation vary, such as: nutritional deficiencies, blood loss, early destruction of red blood cells in the bloodstream, inflammatory diseases and renal failure<sup>4,7,10,11,15,16</sup>. The WHO criteria for diagnosing anemia is hemoglobin below 13 g/dL in men and below 12 g/dL in women<sup>1,6,11,14,16</sup>.

Another relevant data is the mean corpuscular volume (MCV), because using it makes it possible to classify anemia into microcytic (low MCV), normocytic (normal MCV) and macrocytic (high MCV), thus one can establish clinical reasoning regarding the most likely etiologies, since there is a correlation between such values and the causes of anemia<sup>11</sup>.

According to WHO recommendations, the population significance of the prevalence of anemia is classified as normal or acceptable (below 5% of anemics in relation to the total population), mild (5 to 19.9%), moderate (20 to 39.9%) and severe (greater than or equal to 40%)<sup>2</sup>. Another classification instituted by that same Organization considers the severity of anemia: mild (hemoglobin above 10 g/dL), moderate (hemoglobin between 8 and 10 g/dL) and severe (hemoglobin below 8 g/dL)<sup>4</sup>.

The Pan-American Health Organization states that Brazil is in second place among the countries of Latin America and the Caribbean with the highest prevalence of anemic patients (30%); only Peru has higher numbers (57%)<sup>8,17</sup>. According to the Brazilian Ministry of Health, in 2006, the general estimate of the prevalence of anemia in the country is 25-30%<sup>18</sup>. In Brazil there is no official record of prevalence of the disease, there are only regional studies<sup>10,13,15</sup>.

Among the causes of anemia, iron deficiency is the most common<sup>12,17,19,20</sup>, responsible for 50% of cases<sup>5,6,8</sup>. In developing countries such as Brazil, diet is essential in the onset of iron deficiency anemia<sup>13</sup>, mainly because iron, although present in cereals and legumes (foods that are easier to access), is in its low availability<sup>9,19</sup>. Therefore, in risk groups, it is necessary to stimulate the consumption of animal iron, its active form, in order to prevent the most prevalent cause of anemia. Currently, iron deficiency in Brazil is more found than other deficiencies, such as hypovitaminosis A, primary iodine deficiency and protein-energy malnutrition<sup>21</sup>. However, iron deficiency

can also result from blood loss. While menstrual loss is the major non-nutritional cause of iron deficiency in women of childbearing age, in men and postmenopausal women bleeding from the gastrointestinal tract is the most common cause<sup>19</sup>.

As a differential diagnosis of iron deficiency anemia, it is important to mention hemoglobinopathies<sup>22</sup>, whose main examples are thalassemia and sickle cell anemia. Another fundamental concept is anemia of inflammation, formerly called anemia of chronic disease, also considered a differential diagnosis of iron deficiency anemia<sup>23</sup>. It is known that there is a blockage in the use of iron promoted by the interaction of inflammatory cytokines with hepcidin, which leads to a functional decrease in iron, followed by anemia. This mechanism can be triggered by autoimmune diseases, infections, obesity, neoplasms and chronic diseases<sup>23</sup>.

With the decrease in hemoglobin, regardless of the etiology, there is less tissue oxygenation<sup>5,6,24</sup> so an individual with anemia may have his or her mental and psychomotor development impaired<sup>3,12</sup>, in addition to presenting a decrease in performance of work and quality of life<sup>4,6,25</sup>. In 1990, there was a meeting organized by the United Nations, and at that time, goals were drawn up to reduce the prevalence of anemia in the world, but until today it has not been possible to achieve the objectives set<sup>21</sup>. Therefore, the control of anemia is a global challenge<sup>18</sup> and everyone's effort is needed to control this problem.

## OBJECTIVE

*This article aims to: 1) demonstrate the prevalence of anemia in patients seen at Clínica Medeiros, a hematology outpatient clinic in the private health sector in Campinas/SP, and 2) verify the distribution of this disease, according to sex, age and severity, and its most common etiologies.*

## METHOD

This is a cross-sectional descriptive study, with secondary data collection. The electronic medical records (filed in the Doctor's Office 2014 program - review 2 DO130814-6966/1) of all patients who registered their first consultation at *Clínica Medeiros* hematology outpatient clinic from September 2014 to September 2017 were analyzed.

The patients were all seen by the same professional and the data collected, also by only one person, related to anamnesis: sex, age, reason for the consultation; and complementary exams: hemoglobin value (in g/dL, being considered anemic men with values below 13 g/dL and women below 12 g/dL), MCV (in phenoliters - fL, being the red blood cell microcytic when below 82 fL, normocytic when between 82 and 98 fL, and macrocytic when above

98 fL), ferritin value (being considered iron deficiency when below 30 ng/mL), vitamin B12 (low when less than 200 pg/mL), folic acid (decreased when below 3.5 ng/ml), reticulocyte screening, lactic dehydrogenase and indirect bilirubin when necessary to assess hemolysis (considered normal at 0.5-1.5%, less than 400U/L and up to 0.8 mg/dL, respectively) and interpretation of bone marrow biopsy when necessary to search for bone marrow diseases in cases of anemia of a cause not explained by the routine laboratory tests mentioned above. The WHO criteria for the severity of anemia in terms of hemoglobin value was also adopted: if it is above 10g/dL, it is mild; if between 8 and 10 g/dL, it is moderate; and if below 8 g/dL, it is severe.

In this clinic, only patients from the age of 14 and above are admitted, so we did not have any data from the pediatric age group. We considered women of childbearing age from 14 to 49 years old, and elderly people over 65 years old.

The study included all patients who registered their first visit in the period above and who had anemia, according to the hemoglobin criteria of anemia. We excluded those without clinical or laboratory findings of anemia in the first visit.

This study was approved by the Institutional Ethics Committee, under number 4.284.932, CAAE 35401220.5.0000.5374.

## RESULTS

A total of 1422 patients registered their first visit during the study period. According to their main diagnoses, 423 patients were found to have anemia as the main diagnosis. In addition, we found 33 individuals who had other main diagnoses, but also had anemia in their first visit. The total number of patients for both groups together was 456, 32% of the total - prevalence of anemia in this study and this sample was studied.

During assessment, anemic patients were distributed according to age: 16 under 20 years old, 49 between 20-29 years old, 90 between 30-39 years old, 99 between 40-49 years old, 64 between 50-59 years old, 38 between 60-69 years old, 49 between 70-79 years old, 41 between 80-89 years old and 10 over 89 years old.

It was found that 353 (77%) of the anemic patients were women, and most of the 456 individuals were in the 40-49 age group (99 patients = 21.7%). Regarding the evaluated complementary tests, about the blood count of patients with anemia, we found the following distribution of hemoglobin (Table 1). As for MCV, there were 221 patients with microcytic anemia, 212 with normocytic and 23 with macrocytic.

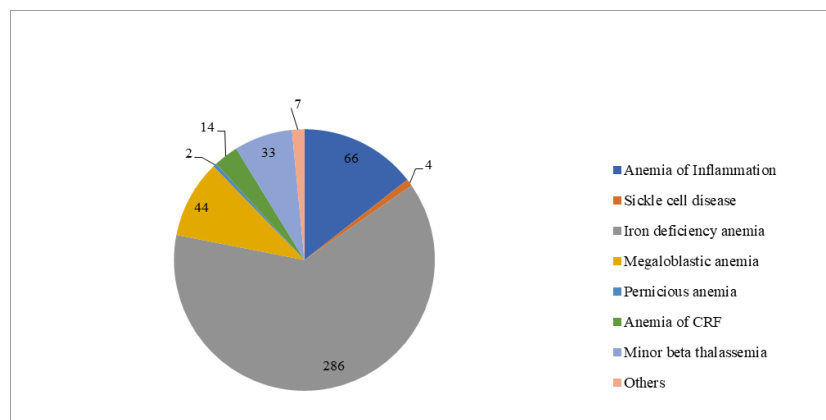
**Table 1:** Hemoglobin of individuals with anemia (in g/dL)

	Total anemic (including elderly)	All women (including elderly)	All men (including elderly)	Anemic elderly	Elderly anemic women	Elderly anemic men
<b>Mean</b>	10.52	10.4	10.92	10.72	10.44	11.23
<b>Maximum</b>	12.9	11.9	12.9	12.9	11.9	12.9
<b>Minimum</b>	5.5	5.5	6.0	6.7	6.7	6.8

Considering the severity of anemia according to the hemoglobin value, we found that most patients had mild anemia (306 individuals, 67.1%), while moderate anemia

affected 122 people and severe anemia only 28 patients.

As for the etiologies of anemia of the evaluated patients, we obtained the following distribution (Figure 1).



Abbreviation: CRF (chronic renal failure)

**Figure 1:** Distribution of the causes of anemia of the evaluated patients (in absolute numbers)

We assessed that the mean age of anemic individuals in general was 50.71 years old, being 48 years old for women and 60 years old for men (Table 2). The age groups most affected in women were the 30-39 years old and the 40-49 years old, both with 23.5% of cases. In men, the age groups most affected were the 50-59 years old and the 70-79 years old, both with 17.5% of cases (Table 2).

**Table 2:** Distribution of anemics, according to sex and age - n (%)

	Women	Men	Total
<b>Mean age</b>	48 y-o	60 y-o	
<20 years old (y-o)	14 (4)	2 (1.9)	16 (3,5)
20-29 y-o	41 (11.6)	8 (7.7)	49 (10,7)
30-39 y-o	83 (23.5)	7 (6.8)	90 (19,8)
40-49 y-o	83 (23.5)	16 (15.5)	99 (21,7)
50-59 y-o	46 (13)	18 (17.5)	64 (14,1)
60-69 y-o	23 (6.5)	15 (14.6)	38 (8,3)
70-79 y-o	31 (8.8)	18 (17.5)	49 (10,7)
80-89 y-o	27 (7.7)	14 (13.6)	41 (9)
>89 y-o	5 (1.4)	5 (4.9)	10 (2,2)
<b>Total</b>	<b>353 (77)</b>	<b>103 (23)</b>	<b>456</b>

Among the risk groups of women, women of childbearing age and the elderly, we had an anemia prevalence of 36.3%, 36.3% and 43.9%, respectively

**Table 3:** Anemia in the different groups evaluated – n (%)

	Women	Women in childbearing age	Men	Elderly
<b>Prevalence of anemia</b>	36.3%	36.3%	22.9%	43.9%
Mean Hb (g/dL)	10.4	10.39	10.92	10.72
Minimum Hb (g/dL)	5.5	5.5	6.0	6.7
Maximum Hb (g/dL)	11.9	11.9	12.9	12.9
Mild Anemia	237 (67.2)	143 (64.7)	69 (67)	88 (74.6)
Moderate Anemia	95 (26.9)	64 (29)	27 (26.2)	25 (21.2)
Severe Anemia	21 (5.9)	14 (6.3)	7 (6.8)	5 (4.2)
Mean MCV (fL)	79.63	78	84.34	85
Microcytic MCV	185 (52.4)	133 (60.2)	36 (35)	38 (32.2)
Normocytic MCV	160 (45.3)	85 (38.4)	52 (50.5)	70 (59.3)
<b>Macrocytic MCV</b>	<b>8 (2.3)</b>	<b>3 (1.4)</b>	<b>15 (14.5)</b>	<b>10 (8.5)</b>

(Table 3). Of the total anemic patients (456), 77% were women, 48.5% were women of childbearing age and 25.9% were elderly. The mean hemoglobin in women, women of childbearing age and the elderly (g/dL) was 10.4; 10.39 and 10.72 respectively and their respective MCV (fL) were 79.63; 78 and 85 (Table 3).

According to the hemoglobin value, we classify anemia as mild, moderate, and severe. In women (general and elderly group) and men (general and elderly group), mild anemia was predominant (Table 4). As for MCV, in the group of women, regardless of age, microcytic anemia predominated (52.4%). Among elderly women and men (regardless of age group), the most common anemia was normocytic (60.5% and 50.5%, respectively) - Table 4. In elderly men, this number was 57.1 %.

Of the 456 anemics, the most common etiology was iron deficiency (286 patients, 62.7%), followed by anemia of inflammation (66 patients, 14.4%). Among those with iron deficiency, bleeding totaled 225 cases (78.7%) and low intake, 49 cases (17.1%). The main cause of anemia in women was iron deficiency, which affected 242 patients (68.6%), and the most common site was menorrhagia - in 157 women. The main age group for iron deficiency etiology was the 40-49 years old. The second most common etiology in women was anemia of inflammation (42 cases, 11.9%) and the main age group with this type of anemia was the 70-79 years old (table 5). In the elderly, the main etiology found was also iron deficiency in 52 cases (44%), and the most common site was the gastrointestinal tract: 25 cases. Anemia of inflammation came in second with 29 cases (24.6%) - Table 6.

**Table 4:** Parameters evaluated in the groups (general and elderly, both by gender) – n (%)

	Women	Elderly women	Men	Elderly men
Mild Anemia	237 (67.2)	55 (72.4)	69 (67)	33 (78.6)
Moderate Anemia	95 (26.9)	17 (22.4)	27 (26.2)	8 (19)
Severe Anemia	21 (5.9)	4 (5.2)	7 (6.8)	1 (2.4)
Mean MCV (fL)	79.63	84.48	84.34	85.88
Microcytic MCV	185 (52.4)	25 (32.9)	36 (35)	13 (31)
Normocytic MCV	160 (45.3)	46 (60.5)	52 (50.5)	24 (57.1)
Macrocytic MCV	8 (2.3)	5 (6.6)	15 (14.5)	5 (11.9)
Percentage iron deficiency anemia	68.6%	42.1%	42.7%	47.6%
Percentage anemia of inflammation	11.9%	25%	23.3%	23.8%

**Table 5:** Cause of anemia in women, by age group – n (%)

	Iron deficiency (242 patients)	Inflammation (42 patients)
<b>Mean age (years old; y-o)</b>	43.71	60.04
<20 y-o	11 (4.5)	0
20-29 y-o	37 (15.3)	0
30-39 y-o	63 (26)	9 (21.4)
40-49 y-o	66 (27.3)	6 (14.3)
50-59 y-o	31 (12.8)	3 (7.1)
60-69 y-o	8 (3.3)	9 (21.4)
70-79 y-o	12 (5)	10 (23.9)
80-89 y-o	12 (5)	3 (7.1)
>89 y-o	2 (0.8)	2 (4.8)
<b>TOTAL</b>	<b>242</b>	<b>42</b>

**Table 6:** Cause of anemia in the elderly – n (%)

	Iron deficiency (52 patients)			Inflammation (29 patients)		
	All elderly	Women	Men	All elderly	Women	Men
<b>Mean age (years old; y-o)</b>		78,76			76,76	
66-69 y-o	7 (13.5)	6 (18.75)	1 (5)	6 (20.7)	4 (21.1)	2 (20)
70-79 y-o	19 (36.5)	12 (37.5)	7 (35)	15 (51.8)	10 (52.6)	5 (50)
80-89 y-o	21 (40.4)	12 (37.5)	9 (45)	5 (17.2)	3 (15.8)	2 (20)
>89 y-o	5 (9.6)	2 (6.25)	3 (15)	3 (10.3)	2 (10.5)	1 (10)
<b>Total patients by type of anemia</b>	<b>52</b>	<b>32</b>	<b>20</b>	<b>29</b>	<b>19</b>	<b>10</b>
66-75 y-o	19 (36.5)	14 (43.8)	5 (25)	12 (41.4)	9 (47.4)	3 (30)
76-85 y-o	25 (48.1)	15 (46.9)	10 (50)	12 (41.4)	7 (36.8)	5 (50)
>85 y-o	8 (15.4)	3 (9.3)	5 (25)	5 (17.2)	3 (15.8)	2 (20)
<b>Total patients by type of anemia</b>	<b>52</b>	<b>32</b>	<b>20</b>	<b>29</b>	<b>19</b>	<b>10</b>

## DISCUSSION

According to the present study, the prevalence of anemia was much higher than that recommended by WHO as acceptable (32% vs. 5%)<sup>2,21</sup>. However, this number is close to the Organization's estimates for Brazil (approximately 30%).

We had already expected that because we had evaluated a sample of patients in an outpatient clinic specific for hematology, there would be a higher value than that found in literature, since anemia is the most prevalent disease in the specialty. When we compare the data found with another study that also evaluated a hematology clinic, we see that Rodrigues et al.<sup>1</sup> identified that 56.7% of the patients had anemia. Their rates were probably higher than ours because Rodrigues's is a study of an outpatient clinic in the public health system, where often the socioeconomic level is lower, which increases the prevalence of anemia.

However, despite this study pointing to a high prevalence, it is worth emphasizing that in the total number of anemic patients, 67.1% (306 patients) had mild anemia. In the subgroups, this percentage of mild anemia was 67.2% in women, 64.7% in women of childbearing age and 74.6% in the elderly.

In the anemic sample, women are the majority, and their prevalence of anemia was 36.3%. If we consider only the group of women of childbearing age, this value remains the same, being above the general prevalence of this study and that recommended by WHO as acceptable. Fabian et al.<sup>12</sup> found anemia in 19.2% of the women evaluated and the most common age group, in that study, was the same found by us (the 40-49 years old group), with 21.4% being the prevalence in women of childbearing age. Bezerra et al.<sup>20</sup> found a prevalence of 18.6% in women of childbearing age. Silla et al.<sup>18</sup> showed a prevalence of 36.4% in the women studied, a number similar to ours, and the most common type was the iron deficiency anemia, also in agreement with our data. It is interesting to see how the distribution of the etiologies of anemia behaved in women in this study: while 73.1% of the cases of iron deficiency anemia are in the age groups corresponding to the childbearing age, 64.3% of the cases of anemia of inflammation are in the age groups after this. None of the articles found mentioned the severity of anemia regarding the hemoglobin value in women.

In women of childbearing age, there is a high demand for iron due to menstrual losses<sup>20</sup> and, therefore, this group is naturally at risk for the development of anemia, of the microcytic type, as found. Thus, due to the possibility of individuals in this group becoming pregnant, having anemia is even more critical. In the clinical evolution of an anemic pregnant woman, the risk of adverse gestational outcome is greater, including low birth weight, hence the need to reduce the percentage of anemics among women of childbearing age<sup>4,6</sup>.

The prevalence data are even more accentuated in

our sample when we consider only the elderly, in which the prevalence of anemia reached 43.9%, a serious population significance according to the WHO criteria. Studies with the elderly conducted by Corona et al.<sup>10</sup> in the city of São Paulo, Sousa et al.<sup>26</sup> in the city of Campina Grande - Paraíba, Sgnaolin et al.<sup>11</sup> in Porto Alegre - Rio Grande do Sul and Callera et al.<sup>27</sup> in São José dos Campos - São Paulo identified a prevalence of anemia in the elderly of 7.7%, 12.5%, 12.8% and 18.6%, respectively, all of which are much lower than the figures in our study. Once again, it is important to highlight that those studies were not performed in a specific outpatient clinic, like ours, but with the general population.

If we divide anemic elderly people by gender, the majority were female (76 patients, 64.4%). Their average hemoglobin was 10.44 g/dL, while the male was 11.23 g/dL. Of the studies cited in the previous paragraph, only that by Sgnaolin<sup>11</sup> found more anemia in women. More than 70% of our elderly people presented with mild anemia, which agrees with those found by Callera<sup>27</sup> and Tettamanti<sup>25</sup>. As for the MCV of the elderly in the present study, both male and female, there was predominance of normocytic (59.3%), as well as in the studies by Sgnaolin<sup>11</sup> and Tettamanti et al.<sup>25</sup>. Lacerda et al.<sup>28</sup> evaluated an elderly population in Diadema - São Paulo - and found, among the anemic ones, a slight decrease in hemoglobin and normal MCV in most of them. Few previous studies evaluated the etiology of anemia. Barbosa et al.<sup>24</sup> studied only the elderly and found anemia of inflammation as the main etiology, which differs from what we have seen, since we identified iron deficiency anemia as the most common cause in the elderly of both sexes; anemia of inflammation was the second cause.

It cannot be overlooked that anemia should not be considered a condition resulting from aging<sup>16,29</sup>. It is necessary to look for the cause, remembering that the elderly have a higher frequency of chronic and neoplastic diseases, which favors the onset of anemia. In the elderly, having low hemoglobin worsens their comorbidities, increasing mortality<sup>27,30</sup>. The factor that can justify why the anemia rate was higher in the elderly is that, proportionally, we had more anemia of inflammation in this group than in others (example: the percentage of anemia due to inflammation in the elderly was 24.6% and in women 11.9%).

Considering the average hemoglobin value, both in the group of women and in the elderly, a slight decrease in the values, 10.4 and 10.72 g/dL, was observed, respectively. In women of childbearing age this number was 10.39 g/dL. In women, due to genital bleeding, MCV was more compatible with microcytic anemia than in the elderly (52.4% vs 32.9%). Another fact that contributed to this finding was that iron deficiency anemia and anemia of inflammation had close values in the elderly group, which may explain the higher MCV, although considered normocytic, in this last group.

Regarding the most common etiology, iron deficiency affected 62.7% of patients. Souza et al.<sup>15</sup> also found menstrual bleeding in women as the main cause of anemia, and gastrointestinal bleeding in the elderly, as in this study. As it is a private service, nutritional deficiency (17.1% of our cases of iron deficiency anemia) was not more prevalent than bleeding, as in other studies carried out in Brazil<sup>1</sup>. Incidentally, since anemia caused by nutritional causes is of simpler solution, it would not need to be followed up in a specialty clinic, which contributes to greater numbers of anemic patients, which may be one more explanation for our high prevalence. In this study, there was 24.6% of elderly people with anemia of inflammation, whereas in women this rate was 11.9%. This number reinforces even more, as we have already said, the fact that in the elderly the MCV was higher than in women.

## CONCLUSION

Our study made it possible to know the reality of the patients seen at *Clínica Medeiros* hematology outpatient clinic, drawing an epidemiological profile of anemia and its most prevalent causes. Anemic patients are mostly women

**Author's participation:** *Silva JBCB* - participation in the following steps: study design formulation, data collection, data tabulation, article text elaboration, particularly the discussion. *Vieira GM* - participation in the following stages: bibliography survey, data tabulation, text elaboration, abstract elaboration, and text review.

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Received: 2020, July 30

Accepted: 2021, January 04