

Epidemiology of Anemia at the Internal Medicine Department in Borgou Departmental Hospital Center (DHC) in Parakou (Benin)

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Abstract

Objective: To describe clinical and biological characteristics of anemia in the Internal Medicine department of Borgou Departmental Hospital Center (DHC). **Methods:** This was a transversal and descriptive study for an analytic purpose. All patients hospitalized in the Internal Medicine department of Borgou DHC who had a hemogram for their care were included in the study. Anemia was defined as a hemoglobin level lower than 12 g/dL for men and lower than 11.5 g/dL for women. **Results:** Frequency of anemia was 61.8% (76 of 123 patients). Anemia was moderate in 47.4% of the cases and severe in 27.6% of the cases. Basing on the mean corpuscular volume, microcytic anemia accounted for 36.8%, anemia was normocytic in 46.1% and macrocytic in 17.1% of cases. According to the mean corpuscular hemoglobin concentration, normochromic anemia accounted for 81.6% of the series and hypochromic in 18.4%. The most common pathologies found in anemic patients came from digestive origin (17%), the renal causes were also found in 17% of the cases. Cardiac pathologies were responsible for anemia in 13% of cases. Malaria and pulmonary pathologies were responsible for anemia in respectively 12% and 9%. The main factors associated with anemia were young age (young adult) and neurological pathologies. **Conclusion:** Anemia hospital prevalence is very high in the Internal Medicine Department of Borgou DHC. Awareness of populations and practitioners for the early management of various pathologies which provide anemia could improve this presentation.

Keywords

Anemia, Internal Medicine, Parakou

1. Introduction

Anemia is a public health problem according to World Health Organisation. Anemia is defined as a condition in which there is less than the normal hemoglobin (Hb) level in the body, which decreases oxygen-carrying capacity of red bloodcells to tissues. World Health Organization (WHO) definitions for anemia differ by age, sex and pregnancy status as follows: children 6 months to 5 year anemia is defined as a Hb level < 11 g/dl, children 5 - 11 years Hb < 11.5 g/dl, adult males Hb < 13 g/dl; nonpregnant women Hb < 12 g/dl and pregnant women Hb < 11g/dl. Anemia could be classified as mild, moderate and severe. The Hb level for each class of anemia in pregnancy are 10.0 - 10.9 g/dl (mild), 7 - 9.9 g/dl (moderate) and <7 g/dl (severe) [1] [2] [3]. In fact, Anemia is associated with a high rate of morbidity and mortality [4] [5]. More than two milliard people are affected in the world with a high share in developing countries [6] [7] [8]. Thirty three percent (32.9%) of the world population were anemic in 2010 [1]. In hospitalized patients, this prevalence varies between 40% and 50% [9]. Anemia has many effects on individual health like a reduction in the productivity and the physical capacity [10] [11]. It is also linked to the elevation of morbidity in hospital. Anemia may be due to a single factor such as a nutritional deficiency or its cause may be multifactorial. Anemia results from one or more of the following events: loss of red blood cells, reduction in the production of red blood cells, increased destruction of red blood cells, and shorter life span of red blood cells. Multiple factors may contribute to the development of complex anemia in hospitalized patients, including nutritional deficiencies, suppression of RBC production by medications, inflammatory cytokines (inflammatory anemia or anemia of chronic disease), and chronic or acute bleeding [12]. In northern Benin, the problem extent is unknown. The goal of this study was to describe anemia clinical and biological characteristics in the Internal Medicine Department of Borgou Departmental Hospital Center.

2. Patients and Methods

This transversal and descriptive study is aimed at analyzing with a prospective data collection covering the period between the 1 st January 2017 and 31st March 2017. The inclusion criteria were: to be over 15 years of age, to be hospitalized in the Internal Medicine Department, having performed a hemogram and to have provided their informed consent to participate in the study. The data collection was conducted via a questionnaire and a medical examination record elaborated for this purpose. The questionnaire contained sociodemographic characteristics, clinical and biological characteristics of the patients.

Anemia has been defined as a hemoglobin level under 12 g/dL in men and under 11.5 g/dL in women. The severity of the anemia has been assessed according to the following degrees: mild when hemoglobin level is at 10 g/dL or higher, moderate when the hemoglobin level is less than 10 g/dL and superior or equal to 7g/dL, severe when the haemoglobin level is less than 7 g/dL and de-

compensated when the haemoglobin level is inferior to 7 g/dL and the patient has at least one sign of intolerance. The anemia is normocytic if the mean corpuscular volume (MCV) is between 80 and 90 fL, microcytic if MCV is inferior to 80 fL and macrocytic if MCV is higher than 90 fL. The anemia is normochromic if the mean corpuscular hemoglobin concentration (MCHC) is between 30 and 36 g/dL and/or the Mean corpuscular hemoglobin (MCH) is between 25 and 32 pg, hypochromic if the MCHC is lower than 30 g/dL and/or MCH is inferior to 25 pg. According to the Body Mass Index (BMI) the three following classes have been retained: normal if BMI is between 18.5 and 25 kg/m², over weight if BMI is superior to 25 kg/m² and thin or cachectic if BMI is under 18.5 kg/m². The softwares EPI INFO version 3.5.3. and Epi-7 have been used for the processing and analysis of the data. The statistical tests Chi-square and z-score transformation have been used to investigate the significance level of the suspected associations between the study factors.

3. Results

3.1. Sociodemographic Characteristics

The average age of the anemic patients was 40.62 ± 16.91 years with the extremes 16 years and 92 years. The median age was 39 years. Whereas the average age of the non-anemic patients was 49.19 ± 18.81 with the extremes 21 and 85 years and the median age was 45 years. Out of 123 patients included in this study, 68 were male. Ninety three were married, a prevalence of 75.60%; 76 patients came from Parakou, 18 lived more than 10 km from Parakou and 29 came from others departments of Benin or from the neighbouring countries.

3.2. Clinical and Biological Characteristics

Seventy eight patients had a normal nutritional status, 26 were under nourished and 19 were overweight out of 123 patients included in the study; 76 suffered from anemia, or a prevalence at 61.8%.

According to the anemia severity, 19 patients (25%) had mild anemia, 36 (47.4%) suffered from moderate anemia, 21 (27.6%) from severe anemia and 8 (10.5%) from decompensated anemia.

According to the type of anemia, using the MCV for the classification: microcytic anemia represented 36.8%, normocytic anemia 46.1% and macrocytic anemia accounted for 17.1%. On the basis of the MCHC: The normochromic anemia represented 81.6% and hypochromic anemia 18.4%.

The pathologies most encountered in anemic patients are digestive pathologies (17%), the nephropathies (17%), cardiac pathologies (13%), malaria (12%) and pulmonary pathologies (9%).

3.3. Risk Factors Associated with Anemia

Sex was not associated with anemia.

The younger age was associated with anemia ($p = 0.043$) (**Table 1**).

Table 2 and **Table 3** show respectively anemia prevalence according to the nutritional status and the diagnosis on leaving. The nutritional status was not associated with anemia (**Table 2**). According to the diagnosis on leaving, neurological pathologies were associated with anemia (**Table 3**).

4. Discussion

The lack of technical capacity means didn't allow to determine the reticulocyte rate in order to identify a regenerative or a non-regenerative anemia and the small sample of echantillon. This study allowed the description of anemia epidemiology according to the conditions for exercising in the developing countries like Benin.

Table 1. Patients distribution by age.

Age (years)	Anemic Patients n (%)	Non-anemic Patients n (%)	<i>p</i>
[16 - 20]	6 (100)	0 (0)	0.043
[21 - 40]	35 (64.8)	19 (35.2)	
[41 - 60]	26 (63.4)	15 (36.6)	
61 et more	9 (40.9)	13 (59.1)	

Table 2. Patients distribution by the nutritional condition.

	Size	Anemic Patients n (%)	non-anemic Patients n (%)	<i>p</i>
Normal	78	45 (57.7)	33 (42.3)	0.213
Weight loss and cachexia	26	20 (76.9)	6 (23.1)	
Overweight	19	11 (57.9)	8 (42.1)	

Table 3. Anemia prevalence by the retained diagnostic on leaving.

	Size	Anemic Patients n (%)	Non-anemic Patients n (%)	<i>p</i>
Digestive pathologies	24	17 (70.8)	7 (29.2)	0.357
Malaria	20	12 (60.0)	8 (40.0)	1.000
Pulmonary pathologies	13	9 (69.2)	4 (30.8)	0.764
Sepsis	7	6 (85.7)	1 (14.3)	0.249
Opportunistic infections	8	5 (62.5)	3 (37.5)	1.000
Neoplasia	5	5 (100)	0 (0)	0.155
Blood diseases	6	5 (83.3)	1 (16.7)	0.405
Neurological diseases	24	21 (87.5)	3 (12.5)	<i>p</i> < 0000
Others	18	9 (50.0)	9 (50.0)	0.533

Among the main causes of hospitalization in Benin, Anemia was in second position (12.3%) after malaria (32.2%) [13]. Adingni reported a hospital frequency at 25.4% in Cotonou [14]. The anemia frequency in the internal department of Borgou DHC was 61.8%. That very high frequency was due to our study method. Over 3 months period, we realized a complete blood count in all the patients hospitalized in the service without prejudice of the reason for hospitalization. That method allowed us to diagnosis a larger number of anemic patients even the subclinical cases. That frequency is superior to 25.4% reported by Adingni [14] in Cotonou during a retrospective study on the records of the patients registered as the ones suffering from anemia in CNHU-HKM internal medicine department in Cotonou from 2006 to 2010. The high frequency of anemia in internal medicine department of Borgou DHC could be also justified by the fact that hospitalized patients come from several specialities: Nephrology, Cardiology and Infectiology. Shill [3] and Terrier [15] have reported a similar prevalence at respectively 53.3% and 65%. In people living with HIV, 44% of them are anemic in Tanzania. In Bangladesh, 32% of patients suffering from pulmonary diseases are anemic [16]. In United States, the prevalence of anemia in hospitalized patients is low at 22.8% [12]. That variance is due to socio-economic difference between developed countries and the developing ones [1].

The number of the patients suffering from a mild anemia was 19 (25%). The ones who had a moderate anemia were 36 (47.4%) and 21 (27.6%) had a severe anemia. Adingni [14] reported a higher number of severe anemia (40.4%), followed by mild anemia (31.4%) and moderate anemia (28.2%). In Maroc, El Hioui *et al.* [17] rather noted in their series that almost half of the investigated patients (45%) had a hemoglobin level inferior to 6.5 g/dL.

Classifying anemia according to MGV, microcytic anemia represented 36.8%, normocytic anemia at 46.1% and macrocytic anemia represented 17.1%. According to Adingni [14], microcytic anemia represented 30.4%, normocytic anemia 40.8% and macrocytic anemia 28.8%. According to El Hioui *et al.* [17] microcytic anemia represented 39% followed by macrocytic anemia 37.8% and normocytic anemia 23.2%.

On the basis of the MCHC, normochromic anemia represented 81.6% and hypochromic anemia 18.4%. Adingni [14] found the same general trend: 54.6% of normochromic anemia and 45.4% of hypochromic anemia. According to Sellam *et al.* [10], hypochromic anemia was the more frequent (88.6%) than normochromic anemia (11.4%).

In our series, the pathologies found in anemic patients were digestive pathologies (22.4%), nephropathies (22.4%), cardiac pathologies (17%) and malaria (15.8%). The high rate of nephropathies found in our sample could be explained by the fact that in Borgou DHC, nephrology is attached to internal medicine department. According to Diallo *et al.* [18] in Mali, the pathologies most often encountered were tuberculosis (21.8%), liver cirrhosis (14.3%) and diabetes (7.5%). But his study was on people living with HIV. In Cotonou and Parakou, hepato-digestive pathologies and HIV infection are encountered in

anemic patients. The factors associated with anemia were young age neurological pathologies. Sellam and *et al.*, Leite *et al.* and Makubi *et al.* have reached the same association [8] [10] [19]. This association between anemia and youngest patients could be explained by the lower average of the anemic patients. In this study, the average age of the anemic patients was 40.62 ± 16.91 years where as the one of the non-anemic was 49.19 ± 18.81 years. Adingni, El Hioui *et al.* have reported a similar average age with respectively 42.8 years and 41 ± 18.33 years [14] [17]. Anani and al [20] confirm their studies at the Blood Diseases Department that most of the anemic patients (74.6%) were under 40 years old. Whereas according to Bach *et al.* and Pilgrim *et al.* studies, anemia prevalence is higher in the old patients [4] [21].

Patients suffering from neurological problems are more anemic. The loss of autonomy and the alteration of consciousness could explain that association.

5. Conclusion

The frequency of anemia is high in the internal medicine department at Borgou DHC. Normocytic, normochromic and moderate anemia are the most encountered. The pathologies encountered the most in anemic patients were digestive, renal, cardiac, pulmonary and infectious and especially malaria. Awareness of populations and practitioners for early health care of the pathologies that create anemia could improve this presentation in order to avoid its harmful effects.

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Appendix

Data Collection Sheet

Name
Age (years)
Sex
Ethnicity
Religion
Profession
Marital status
Education
Residence
Weight (kg)
Height (m)
Body Mass Index
Diabetes mellitus Yes No
Hypertension Yes No
Sickle cell disease Yes No
HIV Yes No
Chronic kidney failure Yes No
Tobacco use Yes No
Alcohol intake Yes No
Reason for consultation
Functional signs
Condition
State of consciousness
Respiratory rate
Pulse
Blood pressure
Diagnosis retained:
Hemogram data:Hemoglobin level
- MCV
- MCHC