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Anemia in the Internal Medicine Department of the Borgou-Alibori Departmental University Hospital Center: A 2025 Study

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Abstract

Introduction: Anemia remains a major challenge in medical care, particularly in developing countries. This study aimed to investigate anemia in the Internal Medicine Department of the Borgou-Alibori Departmental University Hospital Center (CHUD/BA) in 2025. **Methods:** This was a descriptive cross-sectional study with an analytical component and prospective data collection conducted from January 1 to August 31, 2025. The study population consisted of adult patients hospitalized in the Internal Medicine Department of CHUD/BA who provided informed consent, either personally or through a relative. Anemia was the dependent variable. Binary logistic regression was used to identify factors associated with anemia. A p-value < 0.05 was considered statistically significant. **Results:** A total of 369 patients were included, with a mean age of 44.81 ± 16.98 years and a male predominance (56.91%). The prevalence of anemia was 72.63%. Anemia was moderate and microcytic in 57.46% and 42.91% of cases, respectively. Infectious causes accounted for 54.10% of anemia cases, predominantly bacterial infections. Among non-infectious causes, chronic kidney disease and solid malignant tumors were the most frequent, representing 53.66% and 30.08%, respectively. In multivariate analysis, factors independently associated with anemia were asthenia, conjunctival pallor, melena, and malnutrition. **Conclusion:** The majority of patients hospitalized in the Internal Medicine Department in Parakou were anemic. The causes of anemia were multiple and heterogeneous.

Keywords

Anemia, Internal Medicine, Parakou, Benin

1. Introduction

Anemia is a major public health problem and affects nearly one quarter of the global population [1] [2]. Its prevalence is higher in developing countries, exceeding 40%, making it an indicator of malnutrition, poverty, and poor dietary hygiene [3]. Several mechanisms are involved in the development of anemia, including red blood cell loss, increased destruction, or impaired bone marrow production. The causes of anemia are multiple, diverse, and often interrelated. Among hospitalized patients, anemia may result from inadequate intake of proteins and micronutrients, such as iron, folic acid, and vitamin B12; impaired erythropoiesis related to bone marrow disorders; or the effects of inflammatory cytokines in infections, cancer, or systemic diseases [4]. Acute or chronic bleeding, frequently encountered in hospitalized patients, as well as certain treatments, also contributes to anemia [5]. Nutritional deficiencies, particularly iron deficiency, remain the leading cause of anemia worldwide [6]. Anemia is a significant risk factor for morbidity and mortality in the general population and especially among hospitalized patients due to its severe consequences [7] [8]. In the general population, anemia reduces productivity by decreasing physical performance and increasing morbidity. In hospitalized patients, anemia is associated with organ dysfunction, prolonged hospital stays, frequent readmissions, and increased mortality [9]. To prevent the deleterious effects of anemia, it is essential to determine its magnitude and identify its most frequent causes. In Benin, particularly in the northern region, several hospital-based studies have focused on anemia; however, most targeted pregnant women or children, with few studies involving adults. The most recent study conducted among adults in the Internal Medicine Department of Parakou dates back to 2017 and reported an anemia prevalence of 61.8% [10]. That study did not investigate the causes of anemia, which are fundamental to its management. This study was therefore conducted to update the data and address the limitations of previous studies. The objectives were to determine the prevalence of anemia, classify it according to type and severity, and identify associated factors and causes.

2. Study Setting and Methods

Study design: This was a descriptive and analytical cross-sectional study with prospective data collection conducted from January 1 to August 31, 2025.

Study population: The study included adult patients hospitalized in the Internal Medicine Department of CHUD/BA during the data collection period who provided informed consent, either directly or through a relative. Pregnant women, patients unable to answer questions, and those who did not undergo a complete blood count were excluded.

Sampling: An exhaustive recruitment of all eligible patients meeting the inclusion criteria was carried out.

Variables: The dependent variable was anemia, defined as hemoglobin < 13 g/dL in men and < 12 g/dL in women. Anemia was classified as mild (10 - 12

g/dL in men and 10 - 11.5 g/dL in women), moderate (7 - 10 g/dL), or severe (< 7 g/dL). Microcytosis was defined by a mean corpuscular volume (MCV) < 80 fL, normocytosis by an MCV of 80 - 90 fL, and macrocytosis by an MCV > 90 fL. Independent variables included sociodemographic characteristics and clinical and paraclinical data. Undernutrition was defined as a body mass index < 18.5 kg/m^2.

Data analysis: Data were entered using EPIDATA software and analyzed with EPI INFO version 3.7.2.1. Pearson's chi-square test or Fisher's exact test was used as appropriate. Binary logistic regression was performed to identify factors associated with anemia. A p-value < 0.05 was considered statistically significant.

Ethical considerations: Informed consent and data confidentiality were respected. Authorization was obtained from political and administrative authorities. The study was approved by the Local Ethics Committee for Biomedical Research (CLERB) of the University of Parakou (Approval No. 892/2024/CLERB-UP/P/SP/R/SA).

3. Results

General characteristics: A total of 369 patients were included. The mean age was 44.81 ± 16.98 years (range: 18 - 85 years). Patients aged 25 - 49 years accounted for 41.15% of the study population. There was a male predominance (56.91%), with a sex ratio of 1.32.

Prevalence of anemia: Among the 369 patients, 268 were anemic, yielding a prevalence of 72.63%. The mean hemoglobin level was 9.03 ± 2.95 g/dL (range: 1.30 - 19.50 g/dL) (Figure 1).

Severity of anemia: Among anemic patients, 17.54% had mild anemia, 57.46% moderate anemia, and 25.00% severe anemia (Figure 2).

Morphological classification: Microcytic anemia was observed in 42.91% of cases, normocytic anemia in 36.94%, and macrocytic anemia in 20.15% (Figure 3).

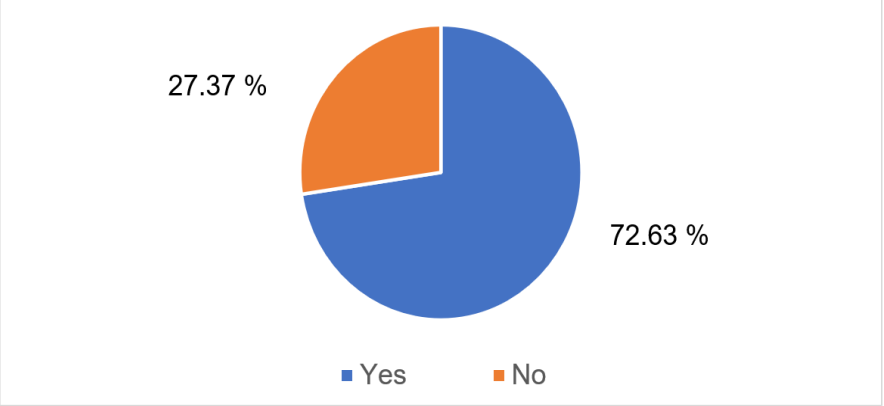

Figure 1. Distribution of study participants according to the presence or absence of anemia (n = 369).

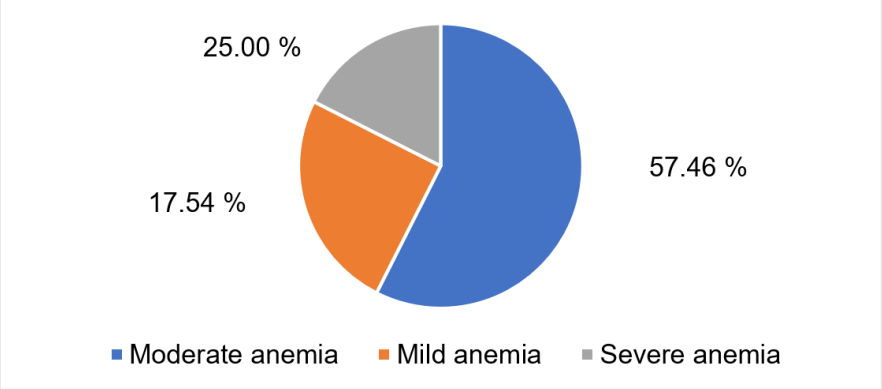

Figure 2. Distribution of anemic patients according to anemia severity (n = 268).

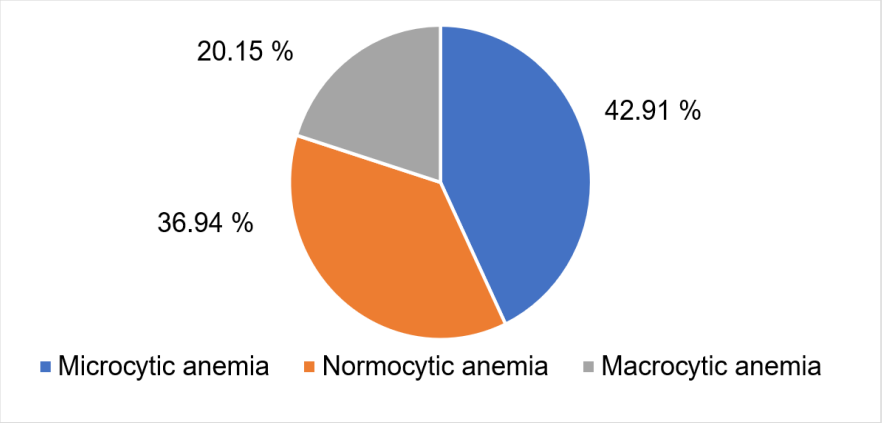

Figure 3. Distribution of anemic patients according to the type of anemia (n = 268).

Table 1. Causes of anemia among hospitalized patients in the Internal Medicine Department, Parakou, 2025 (n = 268).

	n	%
Infectious causes (n = 145)		
Bacterial	103	71.03
Parasitic	23	15.87
Viral	16	11.03
Fungal	03	02.07
Non-infectious causes (n = 123)		
Chronic kidney disease	66	53.66
Solid malignant tumors	37	30.08
Sickle cell disease	11	8.95
Hematologic malignancies	08	6.50
Nutritional deficiencies	01	0.81

Table 2. Factors associated with anemia among hospitalized patients in the Internal Medicine Department, Parakou, 2025 (multivariate analysis).

	OR	95 % CI	p-value
Asthenia			
No	1		
Yes	3.21	1.81 - 5.35	0.031
Conjunctival pallor			
No	1	-	
Yes	3.40	2.27 - 6.51	0.000
Melena			
No	1	-	
Yes	5.22	3.03 - 9.38	0.019
Undernutrition			
No	1		
Yes	3.11	1.85 - 5.28	0.001

Causes of anemia: Infectious causes accounted for 54.10% of anemia cases, with bacterial infections predominating (71.03%). Among non-infectious causes, chronic kidney disease and solid malignant tumors represented 53.66% and 30.08%, respectively (Table 1).

Factors associated with anemia: In multivariate analysis, factors independently associated with anemia were asthenia (OR = 3.21; 95% CI: 1.81 - 5.35; p = 0.031), conjunctival pallor (OR = 3.40; 95% CI: 2.27 - 6.51; p < 0.001), melena (OR = 5.22; 95% CI: 3.03 - 9.38; p = 0.019), and malnutrition (OR = 3.11; 95% CI: 1.85 - 5.28; p = 0.001) (Table 2).

4. Discussion

This study is one of the few to have focused on anemia among hospitalized adult patients over the past decade. Its cross-sectional design combined with prospective data collection helped minimize limitations related to incomplete medical records commonly encountered in retrospective studies. The main limitation of this study was the absence of reticulocyte count assessment, which would have allowed determination of whether the anemia was regenerative or non-regenerative, thereby improving etiological interpretation. Despite this limitation, the findings remain reliable and are likely representative of patients hospitalized in the Internal Medicine Department of Parakou, Benin.

At the end of this study, the main findings were compared with those reported by other authors. The prevalence of anemia was 72.63%, which is higher than the 61.8% reported by Dovonou *et al.* in 2017 within the same population [10]. This finding highlights not only the magnitude of anemia but also an increasing trend

over time, likely related to the rising burden of inflammatory conditions such as cancer and systemic diseases, along with the persistence of infectious diseases. Similar prevalences were reported by Mehtab *et al.* in Pakistan [11] and Abaynew *et al.* in Ethiopia [12], with rates of 72.5% and 73%, respectively. In the general population, anemia prevalence varies according to the target group but remains lower than that observed in hospitalized settings, as reported by Krishnapillai *et al.* among elderly individuals in Malaysia (35.3%) [13] and by Akbarpour *et al.* in Iran across all age groups (10.5%) [14].

Anemia was classified as mild in 17.54% of cases, moderate in 57.46%, and severe in 25.00%. In the study by Aryal *et al.* in Nepal [15], moderate anemia predominated (79.3%), whereas severe and mild anemia accounted for only 17.1% and 3.6%, respectively. Ngouadjeu *et al.* in Cameroon [16] reported proportions of 66.3%, 29.1%, and 4.6% for mild, moderate, and severe anemia, respectively, among hospitalized elderly patients.

Regarding morphological type, anemia was microcytic, normocytic, and macrocytic in 42.91%, 36.94%, and 20.15% of cases, respectively. Similar distributions were reported by several authors, including Aryal *et al.* in Nepal [15] and Lohmror *et al.* in India [17], who found that 50.3% and 49.5% of anemia cases, respectively, were microcytic. The predominance of microcytic anemia reflects not only iron deficiency but also the major contribution of inflammatory causes such as infections, malignancies, and systemic diseases.

In the present study, 54.10% of anemia cases were attributed to infectious causes. Youssoufa *et al.* in Niger [18] reported that infections, malignancies, and nutritional deficiencies accounted for 55.05%, 10%, and 35% of anemia cases, respectively. In contrast, other authors reported a lower prevalence of infectious causes. Gara *et al.* in India [19] found that 54% of anemia cases were due to chronic kidney disease, while Haroon *et al.* [20] reported that more than 80% of anemia cases were related to nutritional deficiencies, particularly iron, folic acid, and vitamin B12.

Factors associated with anemia in this study included asthenia, conjunctival pallor, melena, and malnutrition. These associations are not unexpected, as asthenia is one of the most common symptoms of anemia, particularly in moderate and severe forms. Similarly, conjunctival pallor, although non-specific, remains a simple and useful clinical indicator in resource-limited settings. Malnutrition has also been identified as a factor associated with anemia in studies conducted in Ethiopia, Pakistan, and Italy [21]-[23].

5. Conclusion

The majority of patients hospitalized in the Internal Medicine Department in Parakou were anemic. The causes of anemia were multiple, predominantly bacterial infections, chronic kidney disease, and solid malignant tumors. Systematic screening and early management of anemia should be implemented in all hospitalized patients.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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