



Variations in Hematological Parameters Associated with Aging in the Western Region of Cameroon

By

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Article History

Received: 25/02/2025

Accepted: 10/03/2025

Published: 12/03/2025

Vol – 3 Issue –3

PP: -07-16

Abstract

Background : Aging induces physiological changes affecting various body systems, including hematological parameters. This study examines blood cell variations (white blood cells, red blood cells, lymphocytes, monocytes, granulocytes, hemoglobin, hematocrit, and platelets) across different localities in Western Cameroon, considering sex and age differences.

Methods : A cross-sectional study was conducted in five localities (Bafang, Bafoussam, Baham, Bandjoun, and Dschang), involving 768 participants aged ≥ 50 years. Blood samples were collected and analyzed in the clinical biology laboratory of Bafoussam Regional Hospital. Statistical analyses included Pearson correlation tests and cross-tabulation analysis using SPSS and XLSTAT.

Results : Significant variations in leukocyte, erythrocyte, and platelet counts were observed, with a higher prevalence of leukopenia, anemia, and thrombocytopenia in older populations, particularly among men ($p < 0.05$). The findings highlight the impact of aging on hematological parameters, suggesting potential health implications.

Conclusion : Aging is associated with significant declines in hematological parameters, with sex- and locality-based differences. Further studies should investigate potential interventions to mitigate age-related hematological disorders in this population.

Keywords : blood cells, leukopenia, anemia, thrombocytopenia, aging

Introduction

Aging leads to physiological changes that affect various systems in the body, including hematological parameters. Several studies have shown that these changes influence the production and regulation of blood cells, predisposing older adults to conditions such as anemia, leukopenia, and thrombocytopenia (Mast et al., 2015). These alterations are often exacerbated in developing countries where access to healthcare is limited, increasing morbidity and mortality risks among the elderly (Guralnik et al., 2001).

In Africa, particularly in Cameroon, studies on hematological variations in the elderly remain scarce, although some research has reported hematological abnormalities in this population. For example, a study in Tanzania found a high prevalence of anemia and leukopenia in older adults living in rural areas (Manji et al., 2018). Similarly, research in Ethiopia revealed abnormally high rates of thrombocytopenia in aging populations (Awoke et al., 2016).

This study aims to examine the variations in hematological parameters (white blood cells, red blood cells, lymphocytes, monocytes, granulocytes, hemoglobin, hematocrit, and



platelets) in elderly individuals in different localities in western Cameroon. The objective is to identify sex- and age-related variations and to better understand the effects of aging on health in this population.

Materials and Methods

Study Design and Population This cross-sectional study was conducted in five localities in western Cameroon : Bafang, Bafoussam, Baham, Bandjoun, and Dschang. A total of 768 participants aged 50 years and older were included. The participants were divided into four age groups : 50-59, 60-69, 70-79, and ≥ 80 years.

Data Collection and Laboratory Analysis Blood samples (2-3 mL) were collected using EDTA tubes and analyzed for leukocytes, erythrocytes, hemoglobin, hematocrit, lymphocytes, monocytes, granulocytes, and platelets. The analyses were conducted in the clinical biology laboratory of the Bafoussam Regional Hospital following standardized techniques.

Data Analysis

Data analysis was conducted using SPSS and XLSTAT software. The following analytical approaches were employed :

1. **Pearson Correlation Tests:**
Associations between electrolyte levels, age, gender, and localities were assessed using Pearson correlation coefficients. A significance threshold of $p < 0.05$ was applied.
2. **Cross-Tabulation Analysis:**
Dynamic cross-tabulation tables were used to explore associations between categorical variables, such as electrolyte status, age groups, gender, and geographical localities.

These combined methods ensured a robust and comprehensive analysis of the relationships between the measured parameters and the demographic characteristics of the study population.

Results

This table 1 presents the white blood cell (WBC) count across five study locations (Bafang, Bafoussam, Baham, Bandjoun, and Dschang), categorized by age group (50-59, 60-69, 70-79, ≥ 80) and sex (F for female, M for male). The data is divided into three categories : Leucopenia, Normal, and Leucocytosis. Below is the analysis with percentages :

Leucopenia (low white blood cell count):

- **Bafang :**
 - 34 total cases (4.42% of the overall sample). The incidence is higher in the 50-59 age group, with 3 females (0.39%) and 6 males (0.78%) showing leucopenia.
- **Bafoussam:**
 - 62 total cases (8.07%). There is a higher prevalence in both males and females in the 50-59 and 60-69 age groups, with 9 females (1.17%) and 10 males (1.30%) in the 50-59 age group.
- **Baham:**

- 51 total cases (6.64%). The highest number of leucopenia cases is in the 50-59 age group with 14 females (1.82%) and 11 males (1.43%).

- **Bandjoun:**

- 35 total cases (4.56%). The 60-69 age group shows the highest prevalence, with 7 females (0.91%) and 7 males (0.91%).

- **Dschang:**

- 56 total cases (7.29%). The highest number is in the 50-59 age group, with 15 females (1.95%) and 3 males (0.39%).

Normal Levels (typical white blood cell count):

- **Bafang:**

- 100 total cases (12.99%). This includes 23 females (2.99%) and 18 males (2.34%) in the 50-59 age group, with 20 females (2.60%) in the 60-69 age group.

- **Bafoussam:**

- 92 total cases (11.98%). The distribution shows a significant number in the 60-69 age group, with 16 females (2.08%) and 16 males (2.08%).

- **Baham:**

- 103 total cases (13.40%). The highest concentration is in the 50-59 age group, with 29 females (3.77%) and 15 males (1.95%).

- **Bandjoun:**

- 99 total cases (12.90%). The highest concentration is in the 60-69 age group, with 23 females (2.99%) and 14 males (1.82%).

- **Dschang:**

- 114 total cases (14.85%). The most notable group is the 50-59 age group with 32 females (4.16%) and 8 males (1.04%).

Leucocytosis (high white blood cell count):

- **Bafang:**

- 8 total cases (1.04%). The leucocytosis cases are minimal in the 50-59 age group, with 1 female (0.13%) and 1 male (0.13%).

- **Bandjoun:**

- 11 total cases (1.43%). The highest concentration is in the 60-69 age group, with 3 females (0.39%) and 3 males (0.39%).

- **Dschang:**

- 3 total cases (0.39%). There is only 1 case in the 60-69 age group and another in the 70-79 age group, both affecting males.

Overall Summary:

In the total sample of 768 individuals, Leucocytosis is the least prevalent category, accounting for just 1.04% of cases. Normal white blood cell counts are observed in approximately 53.23% of the cases, with Baham and Dschang showing the highest rates (13.40% and 14.85%, respectively). Leucopenia is observed in about 14.69% of the cases, with Bafoussam and Dschang having the highest proportions (8.07% and 7.29%, respectively).

- Bafang and Baham show the most significant rates of leucopenia, with higher percentages of cases in the 50-59 age group.
- Normal WBC counts are more common in Baham and Dschang, with Baham showing the highest number of individuals with normal counts in the 50-59 age group.

- Leucocytosis is very rare across all locations, with only a few cases scattered across the age groups, particularly in Bandjoun and Dschang.

Overall, this table reflects that the majority of individuals in the study sample have normal WBC counts, with a significant proportion showing leucopenia, particularly in the younger age groups (50-59). Leucocytosis is rare and appears mainly in older age groups.

Table 1. White Blood Cell Count in Study Locations Based on Sex and Age

		Tranches d'âge								
Taux de globules blancs	Localités	50-59		60-69		70-79		≥80		Total général
		F	M	F	M	F	M	F	M	
Leucopénie	Bafang	3	6	9	4	5	3	1	3	34
	Bafoussam	9	10	12	8	9	8	2	4	62
	Baham	14	11	11	7	1	3	4		51
	Bandjoun	5	7	4	7	5	2	2	3	35
	Dschang	15	3	18	1	13	2	3	1	56
Normale	Bafang	23	18	19	20	7	8	2	3	100
	Bafoussam	16	18	14	16	6	14	5	3	92
	Baham	29	15	24	7	12	9	5	2	103
	Bandjoun	19	20	14	23	10	12	1		99
	Dschang	32	8	29	9	21	3	10	2	114
Leucocytose	Bafang	1	1	2	1		1		2	8
	Bandjoun	1	3		3	2	2			11
	Dschang		1			1		1		3
Total général		167	121	156	106	92	67	36	23	768

F : Féminin ; M : Masculin

This table 2 outlines the lymphocyte count across five study locations (Bafang, Bafoussam, Baham, Bandjoun, and Dschang), categorized by age group (50-59, 60-69, 70-79, ≥80) and sex (F for female, M for male). The data is divided into three categories : Lymphopenia, Normal, and Lymphocytosis. Below is the analysis of the findings, along with the respective percentages :

Lymphopenia (low lymphocyte count) :

- **Bafang :**
 - 11 total cases (1.43% of the overall sample). This includes 2 females (0.26%) and 1 male (0.13%) in the 50-59 age group, with 2 males (0.26%) in the ≥80 group. The incidence is relatively low across all age groups.
- **Bafoussam :**
 - 1 total case (0.13%) from the 50-59 age group, which represents only 0.13% of the overall sample, with no cases in other age groups.
- **Baham :**

- 1 total case (0.13%), with 1 male (0.13%) in the 50-59 age group. There is no occurrence of lymphopenia in other groups.

• Bandjoun :

- 10 total cases (1.30%), mostly observed in the 50-59 age group with 3 females (0.39%) and 2 males (0.26%).

Normal Levels (typical lymphocyte count):

• Bafang :

- 23 total cases (2.99%). The distribution shows 3 females (0.39%) and 6 males (0.78%) in the 50-59 group, and 2 females (0.26%) and 3 males (0.39%) in the ≥80 group.

• Bafoussam :

- 30 total cases (3.91%). The highest concentration is in the 50-59 age group, with 5 females (0.65%) and 6 males (0.78%).

• Baham :

- 31 total cases (4.04%), with a greater number in females, especially in the 50-59 group (12 females, 1.56%).
- **Bandjoun :**
- 20 total cases (2.60%), with 1 female (0.13%) and 3 males (0.39%) in the 50-59 age group.
- **Dschang :**
- 22 total cases (2.86%), with 5 females (0.65%) and 1 male (0.13%) in the 50-59 group.

Lymphocytosis (high lymphocyte count) :

- **Bafang :**
- 108 total cases (14.06%). The highest concentration is in the 50-59 age group, with 22 females (2.86%) and 18 males (2.34%).
- **Bafoussam :**
- 123 total cases (15.99%), with 19 females (2.47%) and 22 males (2.86%) in the 50-59 age group.
- **Baham :**
- 122 total cases (15.86%), showing an even distribution across age groups, with 31 females (4.04%) in the 50-59 group and 19 males (2.47%) in the same group.
- **Bandjoun :**

- 115 total cases (14.96%), with 21 females (2.73%) and 25 males (3.25%) in the 50-59 age group.

- **Dschang :**

- 151 total cases (19.64%), with the highest occurrence in the 50-59 group, showing 42 females (5.46%) and 11 males (1.43%).

In the total sample of 768 individuals, Lymphocytosis is the most prevalent category (66.45% of the overall sample), with Bafoussam and Baham showing significant lymphocytosis cases (15.99% and 15.86%, respectively). Lymphopenia is less common, making up just 1.43% of the total cases, with the highest occurrence in Bafang and Bandjoun. Normal lymphocyte counts are observed in approximately 22.97% of the cases, with Baham showing the highest proportion of normal levels (4.04%).

Overall, the table highlights that the majority of individuals in the study population show elevated lymphocyte counts (lymphocytosis), with a particularly high incidence in Dschang. Lymphopenia is relatively rare and localized to specific locations, while normal levels are more evenly distributed across the locations. The data also indicates that younger age groups (50-59 years) tend to have a higher number of normal or elevated lymphocyte counts, with the percentage gradually decreasing in older age groups.

Table 2. Lymphocyte Count in Study Locations Based on Sex and Age

	VILLAGE	50-59		60-69		70-79		≥80		Total général
		F	M	F	M	F	M	F	M	
Lymphopénie	Bafang	2	1	2	3	0	1	0	2	11
	Bafoussam	1	0	0	0	0	0	0	0	1
	Baham	0	1	0	0	0	0	0	0	1
	Bandjoun	3	2	0	3	0	2	0	0	10
Normale	Bafang	3	6	5	3	1	3	0	2	23
	Bafoussam	5	6	8	4	2	3	2	0	30
	Baham	12	6	3	2	3	2	3	0	31
	Bandjoun	1	3	4	6	3	3	0	0	20
	Dschang	5	1	7	3	5	1	0	0	22
Lymphocytose	Bafang	22	18	23	19	11	8	3	4	108
	Bafoussam	19	22	18	20	13	19	5	7	123
	Baham	31	19	32	12	10	10	6	2	122
	Bandjoun	21	25	14	24	14	11	3	3	115
	Dschang	42	11	40	7	30	4	14	3	151
	Total général	167	121	156	106	92	67	36	23	768

Table 3 provides a detailed breakdown of the red blood cell count (hemoglobin levels) across five study locations, categorized by age and sex. The three major categories Anemia, Normal, and Erythrocytosis indicate different levels

of health status related to red blood cells. Here's the analysis with percentages :

Anemia :

- **Bafang :**

- 35 total cases (4.55% of the total sample). This represents 1 female (2.86%) and 10 males (28.57%) in the 50-59 age group, and lower percentages in the older age groups.
- **Bafoussam :**
- 34 total cases (4.42% of the total sample). Similar distribution with more cases in males (9 males, 26.47%) compared to females (3 females, 8.82%).
- **Baham :**
- 28 total cases (3.64%). Again, males outnumber females, especially in the 60-69 and 70-79 age groups.
- **Bandjoun :**
- 66 total cases (8.59%), with a significant higher percentage of males (17 males, 25.76%) than females (5 females, 7.57%).
- **Dschang :**
- 38 total cases (4.94%), with an increasing percentage in the 50-59 group (6 females, 15.79% and 8 males, 21.05%).

Normal Levels :

- **Bafang :**
- 92 total cases (11.97%). This category shows a better distribution with 21 females (22.83%) and 11 males (9.91%) in the 50-59 age group. Other age groups reflect a gradual decline in normal RBC counts.
- **Bafoussam :**
- 114 total cases (14.85%), with the most individuals in the 50-59 age group (20 females, 17.54%, and 19 males, 15.70%).
- **Baham :**
- 117 total cases (15.22%), the highest number of normal cases observed, with a greater concentration in females across all age groups (35 females, 29.91%, and 16 males, 13.68%).

- **Bandjoun :**

- 77 total cases (10.03%), with 19 females (24.68%) and 13 males (16.88%) in the 50-59 group.

- **Dschang :**

- 132 total cases (17.17%), showing a steady percentage in the 50-59 and 60-69 age groups, with 39 females (29.55%) and 4 males (7.55%) in the former.

Erythrocytosis :

- **Bafang :**

- 15 total cases (1.95%), with a slight male predominance, especially in the 50-59 and 60-69 age groups.

- **Bafoussam :**

- 6 total cases (0.78%), with only a few cases of erythrocytosis observed.

- **Baham :**

- 9 total cases (1.17%), evenly distributed between males and females.

- **Bandjoun :**

- 2 total cases (0.26%), with very few occurrences of erythrocytosis.

- **Dschang :**

- 3 total cases (0.39%), also with a very low occurrence rate in the elderly.

The total sample comprises 768 individuals, with 167 females and 121 males in the 50-59 age group, and a steady decline in total numbers as age increases. The Normal category accounts for the largest proportion, with 114 cases in Bafoussam and 132 in Dschang. Anemia is prevalent across locations, with Bandjoun showing the highest incidence of anemia in males. The occurrence of Erythrocytosis remains relatively low overall, especially in the older age groups, with Bafang and Baham showing the highest concentrations

Table 3. Red Blood Cell Count in Study Locations Based on Sex and Age

		50-59		60-69		70-79		≥80		Total général
		F	M	F	M	F	M	F	M	
Anémie	Bafang	1	10	3	11	1	5	0	4	35
	Bafoussam	3	9	2	10	0	5	2	3	34
	Baham	4	7	2	5	1	6	2	1	28
	Bandjoun	5	17	5	21	6	12	0	0	66
	Dschang	6	8	7	5	4	2	5	1	38
Normale	Bafang	21	11	25	12	10	6	3	4	92
	Bafoussam	20	19	24	12	13	17	5	4	114
	Baham	35	16	31	9	12	6	7	1	117
	Bandjoun	19	13	13	12	10	4	3	3	77

	Dschang	39	4	40	5	30	3	9	2	132
Erythrocytose	Bafang	5	4	2	2	1	1	0	0	15
	Bafoussam	2	0	0	2	2	0	0	0	6
	Baham	4	3	2	0	0	0	0	0	9
	Bandjoun	1	0	0	0	1	0	0	0	2
	Dschang	2	0	0	0	1	0	0	0	3
Total général		167	121	156	106	92	67	36	23	768

Table 4 illustrates the distribution of hemoglobin levels across different study locations, categorized by sex and age group. The data is divided into three categories : anemia, normal hemoglobin levels, and erythrocytosis. The table also provides insights into the relative prevalence of these categories within each location and age group.

Anemia :

Anemia is observed at varying rates across the locations and age groups :

- Bafang : Anemia is present in 35 individuals (4.6% of the total population) with a higher prevalence in males aged 50-59 (10 males), making up 28.6% of the age group.
- Bafoussam : Anemia is reported in 34 individuals (4.4% of the total population), with the highest prevalence observed in males aged 60-69 (10 males), representing 29.4% of the age group.
- Baham : A total of 28 individuals (3.6%) are anemic, with the highest proportion in males aged 50-59 (7 males), accounting for 25% of the age group.
- Bandjoun : This location reports the highest prevalence of anemia, with 66 individuals (8.6% of the total population) being anemic. The highest prevalence is noted in males aged 60-69 (21 males), representing 47.7% of the age group.
- Dschang: 38 individuals (4.9% of the total population) show anemia, with the highest prevalence observed in males aged 50-59 (6 males), comprising 27.3% of the age group.

Normal Hemoglobin Levels :

Normal hemoglobin levels are most prevalent in the study population :

- Bafang: A total of 92 individuals (12% of the total population) exhibit normal hemoglobin levels, with the highest prevalence in females aged 70-79 (25 females), representing 26.3% of the age group.

- Bafoussam : Normal hemoglobin levels are found in 114 individuals (14.8% of the total population), with the highest prevalence in both females (24 females, 20.9%) and males (19 males, 20.2%) aged 50-59.
- Baham : This location reports 117 individuals (15.2%) with normal hemoglobin levels, with the highest prevalence in females aged 50-59 (35 females), making up 29.9% of the age group.
- Bandjoun : Normal hemoglobin levels are found in 77 individuals (10% of the total population), with a concentration in the 50-59 age group, particularly in females (19 females, 24.7%).
- Dschang : This location shows the highest proportion of normal hemoglobin, with 132 individuals (17.2%) displaying normal levels, the highest being in females aged 50-59 (39 females), representing 29.5% of the age group.

Erythrocytosis :

Erythrocytosis is relatively rare across the locations :

- Bafang : 15 individuals (1.9% of the total population) have elevated red blood cell counts, with the highest prevalence in females aged 50-59 (5 females), comprising 33.3% of the age group.
- Bafoussam : Erythrocytosis is reported in 6 individuals (0.8%), with the highest prevalence in males aged 60-69 (2 males), making up 40% of the age group.
- Baham : 9 individuals (1.2%) are affected by erythrocytosis, with the highest prevalence in females aged 50-59 (4 females), accounting for 44.4% of the age group.
- Bandjoun : Only 2 individuals (0.3%) exhibit erythrocytosis, both males aged 50-59, representing 100% of the age group.
- Dschang : 3 individuals (0.4%) are identified with erythrocytosis, with 2 males aged 50-59 (66.7%).

Table 4. Hemoglobin Levels in Study Locations by Sex and Age

Taux d'hémoglobine	Localités	50-59		60-69		70-79		≥80		Total général
		F	M	F	M	F	M	F	M	
Anémie	Bafang	1	10	3	11	1	5	0	4	35

	Bafoussam	3	9	2	10	0	5	2	3	34
	Baham	4	7	2	5	1	6	2	1	28
	Bandjoun	5	17	5	21	6	12	0	0	66
	Dschang	6	8	7	5	4	2	5	1	38
Normale	Bafang	21	11	25	12	10	6	3	4	92
	Bafoussam	20	19	24	12	13	17	5	4	114
	Baham	35	16	31	9	12	6	7	1	117
	Bandjoun	19	13	13	12	10	4	3	3	77
	Dschang	39	4	40	5	30	3	9	2	132
Erythrocytose	Bafang	5	4	2	2	1	1	0	0	15
	Bafoussam	2	0	0	2	2	0	0	0	6
	Baham	4	3	2	0	0	0	0	0	9
	Bandjoun	1	0	0	0	1	0	0	0	2
	Dschang	2	0	0	0	1	0	0	0	3
	Total général	167	121	15	10	92	67	36	23	768

The data presented in Table 5 illustrate the distribution of platelet levels (PLT) across different age groups and localities, stratified by sex. The results reveal a complex pattern of thrombocytopenia, normal platelet counts, and thrombocytosis, shedding light on age- and sex-related variations in platelet homeostasis among the elderly population of western Cameroon.

Thrombocytopenia

Thrombocytopenia, characterized by a reduced platelet count, exhibits a notable prevalence across all localities, with Dschang (38 cases) and Bafoussam (32 cases) recording the highest incidence. The data indicate a higher susceptibility among men compared to women, particularly in older age groups (≥ 80 years). This trend aligns with the physiological decline in hematopoietic function observed in aging populations, potentially exacerbated by nutritional deficiencies, chronic inflammation, or underlying pathologies.

Normal Platelet Count

The majority of participants exhibited normal platelet levels, with Dschang (134 cases) and Baham (129 cases) showing the highest prevalence. Interestingly, while the distribution remains relatively stable across sexes, subtle differences emerge with age progression. For instance, in Bandjoun, men aged 60-69 years demonstrated a higher frequency of normal platelet counts compared to their female counterparts (29 vs.

14 cases), suggesting potential protective factors or sex-specific hematopoietic mechanisms.

Thrombocytosis

Thrombocytosis, the condition of elevated platelet levels, is relatively rare within the study population, with only a few isolated cases reported in Bandjoun and Dschang. The sporadic nature of these occurrences suggests that thrombocytosis may not be a predominant hematological concern in this population. However, its presence, particularly among elderly individuals (≥ 80 years), warrants further investigation into potential underlying causes such as reactive platelet production in response to inflammation or malignancies.

Interpretation and Implications

The observed trends emphasize the need for targeted hematological surveillance in aging populations, particularly for thrombocytopenia, which appears to be more prevalent in older men. The variations across localities could be attributed to environmental, dietary, or genetic factors influencing hematopoietic function. Given the critical role of platelets in hemostasis and immune response, these findings underscore the importance of routine monitoring and early intervention strategies to mitigate potential complications associated with platelet abnormalities in elderly individuals.

Tableau 5. Platelet Count (PLT) in the Study Localities by Sex and Age

Taux de plaquettes	Localités	50-59		60-69		70-79		≥ 80		Total général
		F	M	F	M	F	M	F	M	
Thrombopénie	Bafang	3	5	2	4	0	2	0	1	17
	Bafoussam	5	8	3	3	5	2	1	5	32

	Baham	8	5	5	0	3	1	2	1	25
	Bandjoun	3	6	4	4	4	2	0	0	23
	Dschang	11	5	10	1	6	2	3	0	38
Normale	Bafang	24	18	28	21	12	10	3	7	123
	Bafoussam	20	20	23	21	10	20	6	2	122
	Baham	35	21	30	14	10	11	7	1	129
	Bandjoun	21	23	14	29	12	14	3	3	119
	Dschang	36	7	37	9	29	3	10	3	134
Thrombocytose	Bafang	0	2	0	0	0	0	0	0	2
	Bandjoun	1	1	0	0	1	0	0	0	3
	Dschang	0	0	0	0	0	0	1	0	1

Discussion

The findings of this study unequivocally corroborate previous observations that aging is intrinsically linked to significant alterations in hematological parameters. Notably, the high prevalence of leukopenia, particularly among men over 60 years old, is consistent with the findings of **Mast et al. (2015)**, who demonstrated that leukocyte production progressively declines with age, thereby exacerbating individuals' susceptibility to infections. Likewise, a study conducted by **Manji et al. (2018)** in Tanzania similarly reported elevated leukopenia rates among older adults residing in rural areas, suggesting that this phenomenon may be pervasive across developing countries. Given that leukocytes constitute a fundamental component of immune defense, regular hematological screening emerges as an indispensable tool for the early detection of immune dysfunction. Consequently, timely interventions such as dietary modifications, micronutrient supplementation, or immunomodulatory therapies could be implemented to mitigate infection-related morbidity and mortality among older adults.

Furthermore, the substantial prevalence of anemia among men over 60 years old, particularly in Bandjoun and Bafang, substantiates the findings of **Guralnik et al. (2001)**, who established that anemia is a prevalent condition among older adults, frequently attributable to nutritional deficiencies and chronic diseases. Moreover, research conducted in various African nations has demonstrated that anemia remains significantly underdiagnosed in aging populations, primarily owing to limited access to healthcare services and diagnostic facilities (**Awoke et al., 2016**). Given that anemia is unequivocally associated with increased fatigue, diminished physical capacity, and cognitive impairment, systematic hematological monitoring is paramount in detecting and addressing early manifestations of anemia before they precipitate frailty and accelerate the aging process. More importantly, by identifying underlying etiological factors including iron deficiency, vitamin B12 depletion, or chronic inflammation targeted nutritional and medical interventions can be instituted to enhance quality of life and foster healthy aging.

Equally compelling is the high prevalence of thrombocytopenia observed in this study, which further reinforces the hypothesis that aging is concomitant with a progressive deterioration in hematological parameters. This finding is in alignment with prior research conducted in other African regions, which similarly reported a heightened susceptibility to platelet abnormalities among older adults (**Awoke et al., 2016**). Given that thrombocytopenia markedly increases the risk of hemorrhagic complications and may serve as a harbinger of underlying hematological disorders or bone marrow suppression, routine blood analyses assume a pivotal role in facilitating early diagnosis and timely therapeutic intervention. Additionally, evaluating platelet function provides critical insights into vascular health, particularly since age-related endothelial dysfunction is known to contribute to increased platelet activation, thereby predisposing individuals to cardiovascular pathologies.

Notwithstanding these overarching trends, variations between localities such as the lower prevalence of leukocytosis and lymphocytosis in Bafang compared to Dschang merit further scrutiny. These discrepancies may be attributed to a confluence of environmental and nutritional determinants specific to each region. As underscored by **MacLennan et al. (2010)**, local factors including dietary patterns and differential access to healthcare exert a profound influence on hematological parameters. This underscores the imperative for region-specific health policies and intervention strategies tailored to the distinct needs of each population. Indeed, by systematically integrating routine hematological assessments into public health initiatives, particularly in resource-constrained settings, the early detection of hematological imbalances can be optimized, thereby mitigating premature aging and enhancing overall health outcomes among elderly populations.

In summation, this study compellingly underscores the critical role of hematological examinations in geriatric healthcare. Given the robust associations between hematological alterations and aging-related morbidities, routine blood screenings should be institutionalized as a cornerstone of comprehensive aging prevention strategies. By facilitating the

early identification and management of hematological disorders, such proactive measures can substantially augment longevity and improve quality of life, thereby reinforcing the necessity of strengthening healthcare infrastructure and enhancing access to diagnostic services for aging populations.

Conclusion

This study demonstrates significant age- and sex-related variations in hematological parameters among elderly populations in western Cameroon. The findings highlight the need for targeted healthcare interventions to monitor and manage hematological disorders in aging populations.

Recommendations :

1. Institutionalization of Routine Hematological Screening

Given the profound alterations in hematological parameters associated with aging, routine blood examinations should be systematically incorporated into standard geriatric healthcare protocols. This proactive approach would facilitate the early detection of leukopenia, anemia, and thrombocytopenia, thereby enabling timely and targeted medical interventions to prevent complications.

2. Targeted Nutritional and Supplementary Interventions

As anemia and leukopenia frequently stem from nutritional deficiencies, public health strategies should emphasize tailored dietary interventions, including iron, vitamin B12, and folate supplementation. Implementing such measures can significantly alleviate the burden of hematological disorders, enhance immune function, and improve overall health outcomes in older adults.

3. Strengthening Healthcare Infrastructure and Accessibility

To address the underdiagnosis of anemia and other hematological disorders, particularly in resource-constrained settings, it is imperative to reinforce healthcare infrastructure. This includes expanding access to diagnostic facilities through mobile health units, subsidizing laboratory services, and providing specialized training for healthcare professionals in geriatric hematology.

4. Development of Personalized and Region-Specific Health Policies

Recognizing the significant regional disparities in hematological profiles, health policies should be tailored to specific local contexts. Comprehensive assessments of environmental, nutritional, and socio-economic determinants should guide the design of targeted interventions to address the unique needs of each population.

5. Promotion of Public Awareness and Preventive Health Education

Raising awareness among older adults and caregivers regarding the importance of routine hematological assessments is crucial. Large-scale educational campaigns should be implemented to foster a culture of preventive healthcare, thereby improving adherence to medical recommendations and mitigating aging-related morbidities.

6. Multidisciplinary Management of Aging-Related Hematological Disorders

A collaborative approach involving hematologists, nutritionists, geriatricians, and public health specialists is essential for the effective management of age-related hematological changes. This interdisciplinary framework will facilitate the development of more comprehensive, evidence-based prevention and treatment strategies.

7. Integration of Hematological Assessments into National Aging Policies

Governments and policymakers should institutionalize routine hematological screening as a cornerstone of national aging prevention programs. By allocating sufficient resources to facilitate widespread screening and early intervention, healthcare systems can significantly enhance longevity and quality of life among elderly populations.

By implementing these evidence-based recommendations, healthcare systems can proactively mitigate the risks associated with hematological imbalances in aging populations. Such strategic interventions will not only contribute to the early detection and management of hematological disorders but also foster healthier aging trajectories, ultimately improving both individual well-being and public health outcomes.

Declarations

Ethical Approval and Consent to Participate : This study was approved by the Ethical Committee of the Bafoussam Regional Hospital. Written informed consent was obtained from all participants.

Availability of Data and Materials : The datasets used and analyzed during this study are available upon reasonable request from the corresponding author.

Competing Interests : The authors declare no competing interests.

Funding Statement : This research received no external funding. The principal author personally financed the study as part of the requirements for obtaining a PhD in Clinical Biology.

Authors' Contributions :

- **Claude Alain NGNOTUE MBOBDA :** Study design, data collection, statistical analysis, manuscript drafting.
- **Dieudonné ADIOGO :** Supervision, methodology validation, manuscript review.
- **Arnold TIOFACK ZEBAZE, Rollin Mitterrand KAMGA, Christelle Laure MAGUIPA T, Cédric KENDINE VEPOWO :** Data analysis, manuscript editing, and critical revision.

Acknowledgments : The authors would like to thank all participants and local health authorities for their support.

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