Full Length Research Paper

Prevalence of anemia in the diabetic elderly: Clinical correlation and comorbidities

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This was a prospective, cross-sectional study with descriptive and analytical purpose that was carried out over a twelve-month period. A sample of 181 diabetic elderly was selected. Data were collected in the Department of Internal Medicine and Geriatrics at the Treichville University Hospital, using a survey form coupled with standardized geriatric assessment (SGA) cards. The parameters of anemia and diabetes were quantified and assessed. The comparison of the qualitative variables was done using the Chi² test and a P≤0.05 value considered to be significant. The prevalence of anemia is very high in the population of the elderly with diabetes (79.56%). We find a male predominance with a proportion of 60.77%, and a sex ratio of 1.54. The type of anemia was dominated by microcytic hypochromic anemia and macrocytic normochronic anemia, both with the same proportion of 42.36%. Factors in correlation with anemia were renal failure The most common risk factor was hypertension (72.92%) while the specific comorbidities of the elderly were malnutrition (40.88%), depression (72.38%) and cognitive impairment (69.61%).This study allowed us to know the prevalence of anemia, the correlations and the comorbidities commonly observed in the diabetic elderly.

Keywords: Elderly people, diabetes, anemia, standardized Geriatric assessment, correlation.

INTRODUCTION

Anemia is a commonly unknown complication in the diabetic elderly. Its prevalence varies according to the clinical, paraclinical features and especially the standardized geriatric assessment.

The aim of this work was to study the prevalence in elderly patients with diabetes and to compare the clinical and paraclinical data of anemic non-anemic patients.

The specificity of the elderly is explained by the association of physiological aging and the frequent occurrence of poly-pathology, hence the need for a standardized geriatric assessment (SGA).

The SGA is a multidimensional and interdisciplinary approach whose aim is to assess the medical and psychosocial changes of the elderly as well as their functional disabilities. It is a screening and not a diagnosis. This screening provides an overall picture of the elderly person, the best way to define his / her life and care plan, and possibly to direct him/her to more in-depth examinations or aids. **(SOMME D and ROUSEAU C).**

PATIENTS AND METHODS

1. Material

1.1 Setting and site of the study

The study was carried out at the University Hospital of Treichville in the Department of Internal Medicine and Geriatrics. The Department of Internal Medicine and Geriatrics is a department of Multi-purpose medicine.

1.2 Period of Study

This is a study carried out over a18-month period, from

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July 2015 to December 2016.

1.3 Patient

1.3.1 Population

The study population consisted of all diabetic patients aged at least 65 years who were hospitalized in the Department of Internal Medicine and Geriatrics at the University Hospital of Treichville.

1.3.2 Inclusion Criterion

All diabetic patients at least 65 years of age hospitalized in the two aforementioned departments.

1.3.3 Criteria for non-exclusion

Any diabetic patient aged at least 65 years followed as an outpatient or coming in consultation and patients with hemorrhagic manifestations.

2. Method

2.1 Type of study

This is a prospective cross-sectional study with descriptive and analytical purpose.

2.2 Conduct of the study

Data were collected from a pre-established survey form coupled with standardized geriatric assessment forms.

3. Study Parameters

• Epidemiological and sociological parameters: age, gender, ethnic group and nationality.
• Anthropometric parameters: weight and height.
• Clinical parameters: reason for admission; Medical history (associated pathologies: hypertension, HIV, heart disease, renal failure and others); the date and place of admission.
• Socioeconomic lifestyle and socio-economic status parameters: alcohol, tobacco and socio-economic standard of patients.

• **Diabetes parameters**: date of discovery, follow-up, classification, date of onset of treatment and type of treatment, compliance and progress under treatment and, finally, the type of complication found in the patient.
• **Para-clinical parameters:**
☐ Anemia
☐ Normochromia, hypochromia
☐ Microcytosis; Normocytosis, macrocytosis
☐ Glucose
Normal uremia (that is between 2.5-7 mmol/ l)

☐ Normal uricemia:
☐ Normal serum creatinine<14 mg / l

• **Monitoring, evolutionaryand prognosis parameters:**
☐ Glycatedhemoglobin, is the glycated form of the hemoglobin molecule. In the elderlythe normal value: 4 <HbA1c <7.5 to 8%.
☐ Clearance of creatinine by the Cockcroft and Gault formula:
☐ In men = 1.23 x Weight (kg) x (140-age) / creatinine (µmol / l).
☐ In women = 1.04 x Weight (kg) x (140-age) / creatinine (µmol / l).
The normal value is 80 to 120 ml / min.
☐ Microalbuminuria: Its value in the 24-hour urine is: 30-300 mg / 24 hours.
☐ Glycosuria and ketonuria: screening is done by ketodiastix strips. The normal value is zero crosses.
☐ The length of hospital stay and evolutionary modalities: The time each patient has spent in the Department of Internal Medicine and Geriatrics at the University Hospital of Treichville. We will determine two groups at the end of hospitalization: live or death. We will call live all patients who are either transferred to another department or who have left for home or who have left against medical advice and death all patients who died during hospitalization.
• SGA **(POUSSEAU. C)**parameters: they allow a more efficient management of the elderly person. We retain for this study the assessment grids which are the ADL, the IADL, the mini GDS, the MNA and the test of Senegal.

RESULTS

1.1 Epidemiological features
1.1 Gender

1.2 Anemia
1.2.1 Hemoglobin Level

1.2.3 Treatment of anemia

1.3 Diabetes
1.3.1 Type of diabetes

DISCUSSION

At the end of our study, we recorded one hundred and eighty-one patients with diabetes in both inpatient departments.
Analysis of the general features of our study population revealed a clear male predominance (sex ratio = 1.54). Our findings do not agree with those of ABODO (ABODO and Al) who in his study did not show a difference in the distribution according to the gender with a sex ratio of 0.97; on the other hand in Europe and North

Gender
(n=181)

[REFCELL]

[REFCELL]

Female
Male
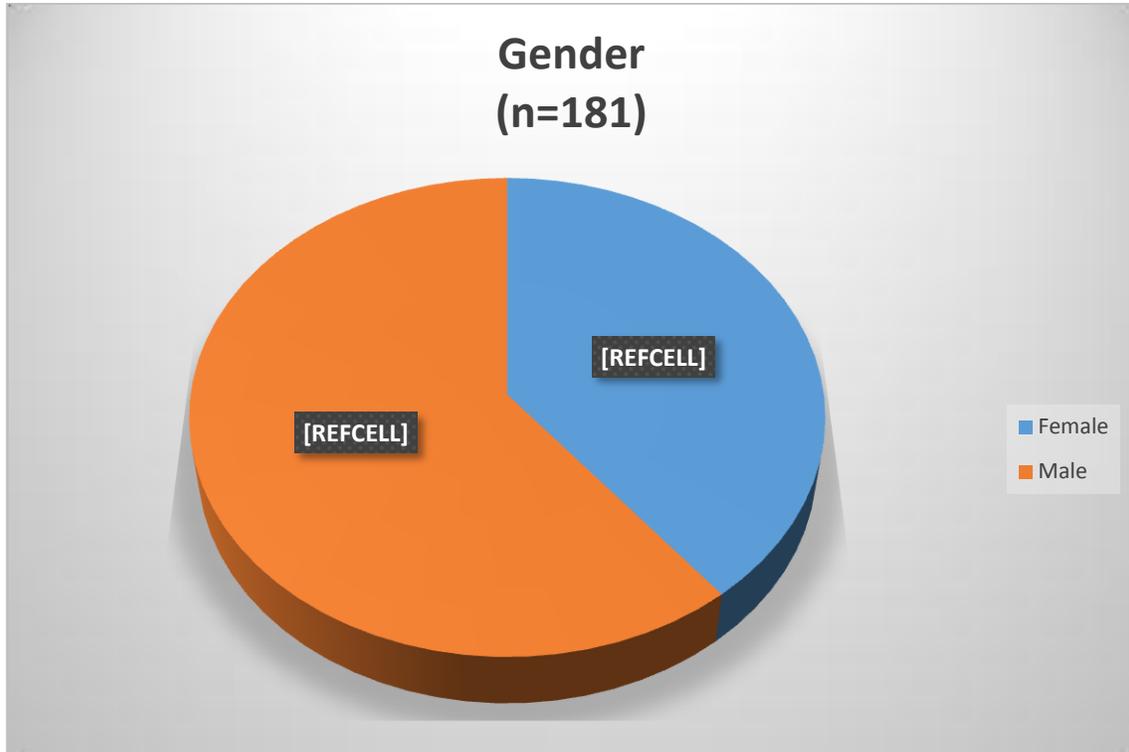
Fig 1. Distribution of patients according to the gender.
We note a male predominance with a proportion of 60.77% and a sex ratio of 1.54

hemoglobine level
(n=181)

[REFCELL]

[REFCELL]

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< 7 g/dl

from 7 to 12 or 13 g/dl

> 12 or13 g/dl
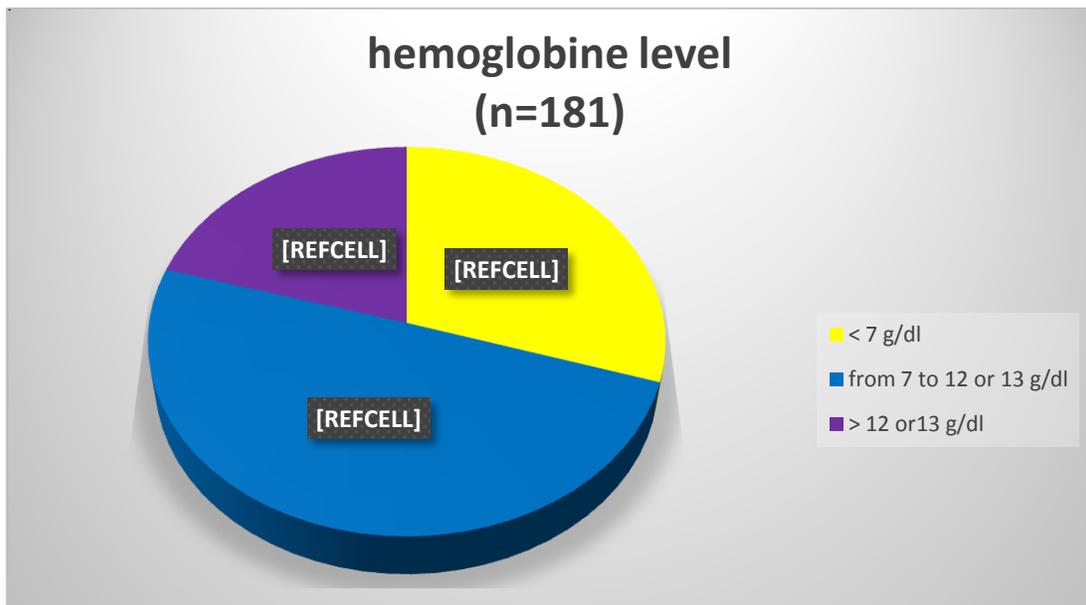
Fig 2. Distribution of Patients according the hemoglobin level.
The majority of our patients (79.56%) were anemic patients.

Africa, women are the most affected. (OUHDOUCH F and al; The decode study group).

The prevalence of anemia in our series is 79.56%. The type of anemia is dominated by microcytic hypochromic

1.2.2 Type of anemia
Table 1: Distribution of patients according to the type of anemia.

TYPES OFANEMIA	NUMBER (n)	PERCENTAGE (%)
Microcytic Hypochromatic anemia	61	42.36
Microcytic Normochromic anemia	04	02.78
Normocytic Hypochromic anemia	02	01.39
Normocytic Normochromic anemia	16	11.11
Macrocytic Normochromic anemia	61	42.36
TOTAL	144	100

Prevalence of macrocytic hypochromic and microcytic normochromic anemia with a proportion of 42.36% for each type.
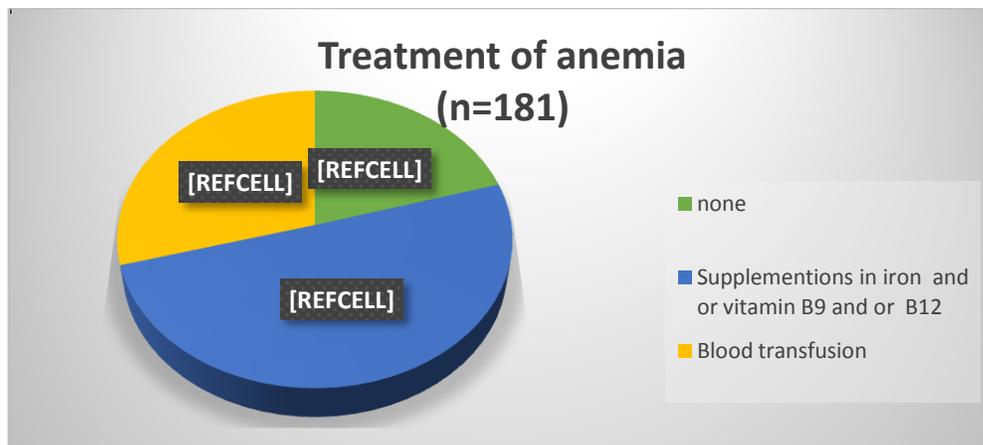
Fig 3. Distribution of Patients according to the treatment of Anemia.
The treatment of anemia during hospitalization was dominated by oral supplementation in iron and / or vitamin B9 and / or vitamin B12 in 50.28%.

Table 2. Relationship between anemia and renal failure, between anemia and glycated hemoglobin, between anemia and length of hospital stay, between anemia and death.

			Anemia [+]	Anemia [-]	Total
			n (%)	n (%)	n (%)
Creatinine clearance	Rf [+]	n (%)	102 (93.6)	7 (6.4)	109 (100)
	Rf [-]	n (%)	42 (58.3)	30 (41.7)	72 (100)
	Total	**n (%)**	**144 (79.6)**	**37 (20.4)**	**181(100)**
		p-value	0.0000001		
HbA1c	>8 %	n (%)	80 (72.1)	21 (27.9)	111 (100)
	4 – 7.5 %	n (%)	64 (91.4)	6 (8.6)	70 (100)
	Total	**n (%)**	**144 (79.6)**	**37 (20.4)**	**181(100)**
		p-value	0.0008310		
Length of hospital stay	≥ 15 jrs	n (%)	70 (90.9)	7 (9.1)	77 (100)
	< 15 jrs	n (%)	74 (71.2)	30 (28.8)	104 (100)
	Total	**n(%)**	**144 (79.6)**	**37 (20.4)**	**181(100)**
		p-value	0.0005603		
Death	[+]	n (%)	15 (93.8)	1 (6.2)	16 (100)
	[-]	n (%)	129 (78.2)	36 (21.8)	165 (100)
	Total	**n (%)**	**144 (79.6)**	**37 (20.4)**	**181(100)**
		p-value	0.07073		

anemia andmacrocytic normochromic anemia, both with the same proportion of 42.36%. Indeed, AMANI (AMANI K and al)found inflammatory and deficiency-related causes and renal failure (RF) in his study of anemia in diabetics.
Treatment of anemia was twofold: transfusion for severe

Table 3. Association between anemia and the test of Senegal, Association between anemia and MNA, Association between anemia and depression.

			Anemia [+]	Anemia [-]	Total
			n (%)	n (%)	n (%)
Test of Senegal	Suspicion of cognitive impairment	n (%)	115 (91.27)	11 (8.73)	126 (100)
	Probable absence of cognitive impairment	n (%)	29 (52.73)	26 (47.27)	55 (100)
	Total	**n (%)**	**144 (79.56)**	**37 (20.44)**	**181(100)**
			p-value	0.0000001	
MNA	Poor nutritional status	n (%)	70 (94.6)	4 (5.4)	74 (100)
	Risk of malnutrition	n (%)	53 (88.3)	7 (11.7)	60 (100)
	Good nutritional status	n (%)	21 (44.7)	26 (55.3)	47 (100)
	Total	**n (%)**	**144 (79.6)**	**37 (20.4)**	**181(100)**
			p-value	0.0000001	
Depression	[+]	n (%)	40 (80)	10 (20)	50 (100)
	[-]	n (%)	104 (79.4)	27 (20.6)	131 (100)
	Total	**n (%)**	**144 (79.56)**	**37 (20.44)**	**181(100)**
			p-value	0.4637	

and / or decompensated anemia and empirical oral treatment of iron and / or vitamin B9 and / or vitamin B12. Analysis of factors associated with anemia indicates a more or less significant correlation with:

Renal failure(RF)(OR = 10.41 / RR = 1.604 / p = 0.0000001). One of the causes of anemia of the elderly that is identified is RF. In fact a significant decrease of the glomerular filtration rate (GFR)leads to a decrease in the synthesis of the EPO.

HbA1c (OR = 0.2419 / RR = 0.7883 / p = 0.0008310). Hemolytic anemia and acute hemorrhage may be the cause of abnormally low assays also the presence of reticulocytes, new erythrocytes whose hemoglobin has not yet been glycated and after the treatment of anemia by iron, Erythropoietin or vitamin B12 may underestimate the value of HbA1c . (NEVANEN S).In fact in our series, RR <1 suggests that anemia leads to an increase in the probability of having normal HbA1c.

Length of hospital stay (OR = 4.054 / RR = 1.278 / p = 0.0005603). An anemic patient has a longer length of hospital stay because of his/her treatment requires compensation for hi/her anemia in addition to diabetic treatment.

Death (OR = 4.186 / RR = 1.199 / p = 0.07073). Anemia is associated with a high morbidity and mortality. It can be in the elderly subject the cause of decompensations in particular cardiac, cerebral or postural locomotor decompensations which can cause fall or death (GURALNIK J and *al*).

The Senegal Test (OR = 9.373 / RR = 1.1731 / p = 0.0000001), mentioned among the risks associated with anemia and the increase in cognitive decline is well identified (TOURÉ K. and *al.*)

MNA (p = 0.0000001); A poor diet is likely to lead to deficiencies and therefore deficiency-related anemia.

Autonomy (ADL) (LAWTON MP and al) (OR = 1.98 / RR = 1.136 / p = 0.04978). In our series it appears that the presence of anemia increases the likelihood of dependence.

Depression (OR = 1.038 / RR = 1.008 / p = 0.4637), our study did not show an influence of anemia on depression. The mean duration of hospital stay of our patients (15.37 days) is higher than that of ABODO (ABODO and al) (11.7 days) and LOUIS FRANCOS in France (10.5 days) (LOUIS-FRANCOS C).

In our study the mortality rate (8.84%) is superimposable to that found in France by PEQUIGNOT(PEQUIGNOT and al) (8.3%) but is lower than that of ABODO [80] (13%). Causes of death are dominated by infections (50%), which is close to the percentage of ABODO, (47%)(ABODO and al) [80]. In the Western countries, cardiovascular diseases are the main causes. They represent 70% of the cases [99] (GU K and al). In the series of PEQUIGNOT [98] (PEQUIGNOT and al)cardiovascular diseases account for one death in two.

The comorbidities that emerge from the SGA are depression, malnutrition and cognitive impairment.

In our study, the mini GDS (CLÉMENT JP)made it possible to note that in 72.38% of the cases the patients had a high probability of depression. Also in our study, the close RR 1 (1.008) indicates that the presence of anemia is not correlated with the onset of depression.

The Mini Nutritional Assessment(BOURDEL-MARCHASSON I) noted that 31.15% of patients had a risk of malnutrition and 40.88% had poor nutritional status. This state of malnutrition is statistically related to anemia ($p = 0.0000001$).

The test of Senegal revealed that 69.61% of patients had a strong suspicion of cognitive impairment.

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