

RESEARCH ARTICLE

# Micronutrient Deficient in Elderly Patient at General Reference Hospital of Niamey (Niger)

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Received: 02 April 2024 Accepted: 30 April 2024 Published: 04 June 2024

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## Abstract

**Introduction:** Micronutrients are constituted of vitamins, minerals and trace elements, their deficiencies in patients's elderly are responsible for disease or functional disability. Our purpose was to describe epidemiologic, sociodemographic and clinical aspect of micro nutrient deficiency in internal medicine and geriatrics department of the Niamey's General Reference Hospital

**Methods:** This was a prospective cross-sectional study about 88 patients during 15 months from June 30, 2021 to September 31, 2022.

**Results:** A total of 88 patients, the average age was 78 years [65 – 100 years], the age group between 65 to 75 years was the most represented in 38.6% of cases with a female sex predominance in 53.4%. Frequent comorbidities were hypertension and diabetes with monotherapy each in majority. The denutrition rate was 36.3%. In patients who dosed the assay, there was a prevalence of vitamin D deficiency (22.7%) common in women, hyponatremia (45%) and hypocalcemia (23%). Mortality was about 17%. The loss of functional independence was about 40%. The frequent symptoms were digestive disorders in 45.4% , locomotor disorders in 63.6% and anorexia/asthenia in 77.2% of cases

**Conclusion:** The micronutrient deficit is represented by the deficit in minerals and vitamin D often associated with denutrition and functional disability.

**Keywords:** Micronutrient deficit, geriatric, prevalence, clinical, Niamey, HGR.

## 1. Introduction

The World Health Organization (WHO) defines an elderly person as a person whose age is over than or equal to 65 years [1]. Population aging may seem less relevant for sub-Saharan Africa. Yet this region already has twice the number of older people compared to Northern Europe, and projection will grow faster than anywhere else, from 46 million in 2015 to 157 million by 2050[2]. After 60 years old, the main burden of organic deficiencies and mortality results from multifactorial alterations [1]. Nutrients

are the nutritional components contained in food. Macronutrients provide the energy needed to function, while micronutrients provide the cofactors needed for metabolism [3]. After the age of 65, deficiencies in micronutrients (vitamins, trace elements and minerals) are frequent, adding to the many risk factors accumulated by the elderly, especially at old age [4]. Food behavior experiences at a young age contribute to the deterioration of nutritional status in the elderly, aggravating their fragility and accentuating the risks of illness and mortality [5]. Micronutrient deficiency

**Citation:** Andia A, Amadou S R, Barga M, *et al.* Micronutrient Deficient in Elderly Patient at General Reference Hospital of Niamey (Niger). Open Journal of Geriatrics. 2024;6(1): 10-14

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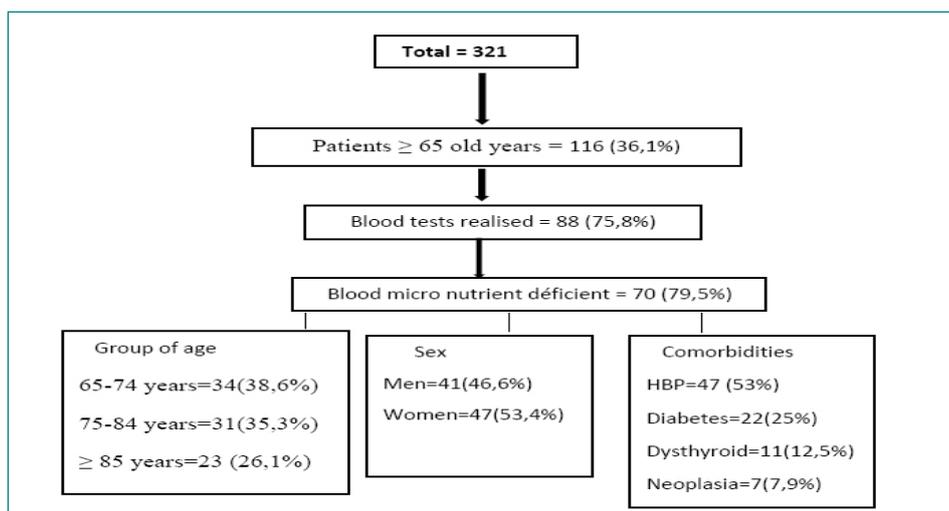
is one of the major contributors to illness and disability among poor older people. Despite this, there are no nutrition programs specifically targeting the elderly. This is partly explained by the low priority given to them in the nutritional policies of sub-Saharan African countries [6,7]. Data on the nutritional status of older people in Africa are scarce and non-existent in Niger. Poverty, the indirect impact of HIV/AIDS and complex humanitarian emergencies are major determinants of denutrition among older people. The majority of research activities on aging and health are carried out in developed countries [8,9]. The lack of research and data on micro nutrients deficiency in the elderly motivated us to conduct this study.

## 2. Methods

This was a prospective study during 15 months from June 30, 2021 to September 30, 2022, carried out in

the Internal Medicine and Geriatrics Department of the Niamey General Reference Hospital. The study population concerned people aged 65 and over, seen in consultation and/or hospitalized during the study period and in whom the dosage of available micro nutrients was carried out. We used a survey sheet. The register archives of hospitalized patient files served as sources of information. Data were entered and analyzed using Epi info software, version 7.2.4; Epidemiologic aspect concerned the prevalence, mortality; the micro nutrients norms and units were: vitamin (D=30-40 mg/ml, B9= 5,2-20 pg/ml, B12=200-1100 pg/ml), minerals (natremia=135-145 mmol/l, kaliemia=3,5-5 mmol/l, calcium=2,25-2,65 mmol/l, Ferritin= 13-350 ng/ml) and trace element(magnesium=0,7-1,05 mmol/l) , comorbidities were high blood pressure, diabetes , toxic habit.

## 3. Results



**Figure 1.** Patient flow chart of elderly patient and socio demographics aspects

On a total of 321 admissions, geriatrics patients were 116 (36.1%). 88 of the 116 patients (75.8%) realized a micro nutrients blood test. Female sex was major and in 53,4% the most represented age group was 65-

74 years then 75-84 years old. Hight blood Pressure, diabetes and dysthyroid was the most comorbidities found respectively 53%, 25% and 12,5%. The global mortality was 17%

**Table 1.** Profile of micro nutrients deficiency

Micro nutrients	n=effective	Percentage (%)
Vitamins		
Vitamin D	20	22,7%
Vitamin B9	10	11,3%
Vitamin B12	3	3,4%
Minerals		
Sodium	40	45,5%
Potassium	27	30,6%
Chlore	18	25%
Calcium	21	23,8%
Ferritin	2	2,2%
Trace element		
Magnesium	3/14	3,1%

The most frequent micro nutrients deficiency was represented by minerals then vitamins

**Table 2.** Clinical aspects of elderly patients HPTNCM= High Probability of Major neurocognitive disorders

Organs or systems affects	N=number	Percentage (%)
Locomotor	56	63,6%
Digestive	40	45,4%
Nervous	25	28,4%
Respiratory	23	26,1%
Cutaneo-mucosa (bedsores)	11	12,5%
cardiovascular	8	9%
Others (asthenia/anorexia)	68	77,2%
Geriatric syndrom		
Malnutrition	32	36,3%
Partial-total loss of autonomy	54	61,3%
Probable depression	14	14,9%
Risk of falling	56	63,6%
HPDNCM	25	28,4%

Locomotor device, digestive and nervous signs the most representatives in micronutrient deficient. The risk of falling, loss of partial or total autonomy malnutrition were the frequently geriatrics signs in elderly.

**Table 3.** Repartition of micro nutrient deficiency by age, sex and symptoms

	Hypo vit D	Hypo vit B9	Hypo vitB12	Hypo Natremia	Hypo kalemia	Hypo Calcemia	Hypo Mg2+	Hypo ferritin	P value
Aged									
65-74 years	7	5	2	22	14	9	1	1(1,1%)	P=0,2
75-84 years	8	3	1	15	9	7	2	1(1,1%)	
≥85 years	5	2		5	4	5			
Sex									
Female	7(8%)	4	2	16	18	13	2	1	P=0,4
Male	13(14,7%)	6	1	26	9	8	1	1	

**Table 4.** Repartition of micro nutrient deficiency by age, sex and symptoms

	Hypo vit D	Hypo vit B9	Hypo vitB12	Hypo Natremia	Hypo kalemia	Hypo Calcemia	Hypo Mg2+	Hypo ferritin
Aged								
65-74 years	7	5	2	22	14	9	1	1(1,1%)
75-84 years	8	3	1	15	9	7	2	1(1,1%)
≥85 years	5	2		5	4	5		
Sex								
Female	7(8%)	4	2	16	18	13	2	1
Male	13(14,7%)	6	1	26	9	8	1	1
Symptoms								
Nervous	-	7	2(2,2%)	10(11,3%)	1	3(3,4%)	-	-
Cardiovascular	-	1(1,1%)	-	5	6	2	-	-
Digestive	2	-	-	5	3	8(9%)	1	-
Locomotor	11(12,5%)	3	1	13	11	8	2	-
Respiratory	-	-	-	2	2	-	-	-
Skin	3	-	-	5	-	-	-	-
Asthenia/anorexia	4	2	1	2	3	-	-	-

Musculoskeletal symptoms are common in patients with vitamin D, calcemia, sodium and potassium deficiencies in blood; Nervous symptoms are majority among patients with hyponatremia

#### 4. Discussion and Comments

In our study, the average age was 78.60 ± 9.40 with extremes of 65 and 100 years. Authors such as Berri MA. and al. [10] in Morocco and Andia A and al. [11] in Niger reported respectively an average age of 57 and 72 years with extremes of 45 to 73 years and 60 to 100 years. This difference could be explained by

the fact that our study was conducted in a geriatric's unit while Berri MA and al. and Andia A and al studies Were carried out respectively in neurology department and at home population [10,11]. Frequent comorbidities were hypertension in 53% and diabetes in 25% of cases under mono therapy. Hypertension was found in 15.67% of patients in the Dandakoye

study [12]. Andia and al in Niger found 38.4% in medical emergencies and 12.3% in medical hospitals with in particular 6.6% for hypertension and 8.8% for diabetes [13][14]. In Nigeria, hospital studies reported a prevalence of hypertension and type 2 diabetes as predominant conditions in the elderly [15-16].

The average vitamin D level was  $35.3 \pm 27.9$  with extremes of 7.97 and 150. Safi S. et al.[17] in Morocco and Belghith M.[18] in France had respectively obtained an average rate of  $10.95 \pm 6.99$  ng/m and  $25 \pm 15.4$  ng/m which are lower than our results. This could be explained by a greater exposure to the sun of our patients compared to Europeans and North Africans in general. The deficiency of folic acid in blood was 11.3% with an average of  $9.83 \pm 6.55$  with extremes of 1.91 and 28.5. Our results are lower than those study of Belghith and al [19] in Tunisia who had obtained an average rate of  $10.8 \pm 6.2$  (6.1 – 16.2). The vitamin B12 blood test in our series was carried out in 38 patients and 3.41% had a low vitamin B12 rate; The mean was  $926.67 \pm 1224$  with extremes of 50 and 7009. Belghith A. and al.[19] in Tunisia and Berri MA. and al.[10] in Morocco found results significantly lower than ours with an average of  $74 \pm 42$  (20-200pg / ml) and  $85.56$  pg / ml (25-157 pg / ml) respectively. Our reduced sample could explain the difference in results. Hyponatremia was found in 45.45% in our series with an average sodium level of  $135.85 \pm 6.39$  and extremes of 111 and 148. Paul LPS and al and Boyer S and studies found respectively  $130.9 \pm 2.0$  mmol/l and  $130.8 \pm 6.3$  mmol/L both in France [20][21]. The higher level of sodium rate in our study could be explain by initial correction of hyponatremia at emergency and also a trend of using several sodium in women cooking habit in our context. Hyponatremia is the most frequent hydro electrolytic disorder, thus justifying the high rate of hypo osmolarity encountered in geriatric practice. It also appears to be a factor of fragility in the elderly [22]. In our series, hypokalemia was found in 30.6% of cases, the mean was  $3.87 \pm 0.79$  with extremes of 2.17 and 6.53. Our results are lower than those of Roirand H. [23] in 2013 in France which had found  $4.13 \pm 0.58$ . The frequent clinical disorders affected systems in micro nutrient deficiency were digestive in 45.4%, locomotor disorders in 63.6% and anorexia/asthenia in 77.27% of cases. Our results are different from Coumé M. and al [9] results in Senegal for moderate anorexia (53.3%) and Belghith A. and al [19] in Tunisia for digestive (88 %) and nervous systems (67%). The mortality rate was 17% with prognostic

factors like the group age of 75-84 years and the female sex; This result is almost similar to Andia and al study in Niger about patients with a geriatric profile in internal medicine department which was 18.2%. In this study the prognostic factors were female sex, age group age of 75-84 years and the presence of hypertension [24].

## 5. Conclusion.

Micro nutrient deficiency predominated in minerals and vitamins in elderly, it was frequently associated with Musculoskeletal signs. Nutrition program could recommend a large micro nutrient blood test among elderly to screen maximum deficiency.

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