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Clinics and Para clinics aspects of micronutrients deficient in elderly at General Reference Hospital of Niamey (Niger)

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Abstract

Introduction: Micronutrients are made up of vitamins, minerals and trace elements, their deficits in geriatrics patients are responsible for non-specific clinical signs leading to diseases or functional disabilities. The purpose was to describe the clinical and biology aspects of patients with micronutrient deficiency in the internal medicine and geriatrics department of the Niamey General Reference Hospital.

Patient and methods: This was a longitudinal type cross-sectional study involving 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 old [65 – 100 years old]. Common micronutrient deficiencies were: vitamin D (22.73%), hyponatremia (45%) and hypocalcemia (23%). The frequent clinical signs were of the musculoskeletal system in 63.6%, digestive system (45.4%). The denutrition rate was 36.3%, 61.3% loss of ability, 15.9% probable depression and 63.6% risk of falling. 37.5% had anemia including 30.6% microcytic and 35.2% hypochromic. There was a moderate alteration of renal function in 43.1% of cases.

Conclusion: micronutrient deficiencies are characterized by a frequent Musculo skeletal signs, anemia and kidney disorders with non-specific etiology in context of limited micronutrient evidence in laboratory. So, this group of population should be sensibilize about appropriate nutrition to prevent those deficient.

Keywords: Micronutrient deficit; Geriatrics; Clinic; Biology Niamey (Niger); HGR

1. Introduction

The World Health Organization (WHO) defines an elderly person as a person whose age is over or equal to 65 years [1]. Several events contribute to the deterioration of the nutritional status in the elderly, which fuels their fragility and accentuates the risks of illness and mortality in this population, leading to the spiral of denutrition [2]. Macronutrients provide the energy needed to function, while micronutrients provide the necessary cofactors for refueling especially during the aging process [3][4]. Micronutrient deficiency is one of the major contributors to disease and disability among poor older people. Despite this, there are no nutrition programs targeting the elderly. This is partly explained the absent of priority given to them in the nutritional policies of countries in sub-Saharan Africa [5,6]. Data on the nutritional status of older people in Africa are scarce. The clinical signs are non-specific polymorphs due to cofactors function of micronutrients with several other elements of the increased organism. Nevertheless, some symptoms like musculoskeletal system remain characteristic of one or more micro nutrient deficits. The majority of research activities on aging and health are carried out in developed countries [7,8] and rare or even non-existent in developing countries,

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hence the interest of this study entitled “ Clinics and Para clinics aspects of micro nutriment deficient in elderly at General Reference Hospital of Niamey (Niger) ”

2. Material and methods

This was a longitudinal 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 consisted of people aged 65 and over, seen in consultation and hospitalized during the study period and in whom the dosage of available micronutrients was performed. We used a survey sheet. The geriatric register, the department register and the archives of hospitalized patient files served as sources of information. Data were entered and analyzed using Epi info software, version 7.2.4. The variables studied were clinical signs affected devices or systems affected, the geriatric syndroms like denutrition determining by the Mini Nutrition Assessment (MNA) tool ; the Activity of Daily or Instrumental Living (ADL/IADL) scale for lost of autonomy; probable depression is assessed by the Global Depression Scale (GDS), the risk of falling was assessed by the unipodal support test and neurocognitive disorders assessed by the cognitive Disorder examination (Codex); micronutrients with their standards: 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 magnesium=0.7-1.05 mmol/l. Anemia is defined by a hemoglobin level (severe<7 g/dl; moderate= 7-10 g/dl and mild= greater than 10 g/dl), impaired renal function was assessed using Cockcroft and Gault formula measured in milliliters per minute (normal=90-120 ml/min)

3. Results

3.1. Epidemiologic aspect of micro nutrient

The prevalence of micronutrient deficiency was 79.5% and the most common were hyponatremia (45%), hypokalemia (30.6%), blood vitamin D deficiency (22.7%) and hypomagnesemia (3.1%)

Table 1 Device and systems affected by micro nutriment deficient

Systems affected	N=effectif	Percentage (%)
Locomotor	56	63.6%
Digestive	40	45.4%
Neurologic	25	28.4%
Respiratory	23	26.1%
Skin	11	12.5%
Cardiovascular	8	9%
General (asthenia/anorexia)	68	77.2%
Geriatrics syndrom		
Denutrition	32	36.3%
Loss of autonomy	54	61.3%
Probable depression	14	14.9%
Risk of falling	56	63.6%
HPDNCM	25	28.4%

HPDNCM= Hight Probability of Disorder Neurocognitive Major

The signs of the musculoskeletal, digestive and neurological systems are the most frequent in micronutrient deficiency. The risk of falling, partial-total loss of functional independence and protein-energy denutrition are the geriatric syndroms often encountered.

Table 2 Biologics aspects of patient with micronutrient deficient

Biologics test	N= effectif	Percentage (%)
Hemogramme		
Anemia	32	37.5
Normocytair	60	68.1
Microcytair	27	30.6
Macrocytair	1	1.14
Hypochrom	31	35.2
Blood sugar		
Hyperglycemia	33	37.5
Hypoglycemia	3	3.4
Renale clearance (creatinin)		
Legere Kidney deficient	38	43.1
Moderate Kidney deficient	9	10.2
Severe moderate	2	2.2

We note a frequency of 37.5% of normocytic anemia in majority, fasting hyperglycemia (37.5%) and a slight alteration of renal function in 43.1% of cases.

Table 3 Distribution micro nutrient deficit symptoms

	Hypo Vit D	Hypo Vit B9	Hypo Vit B12	Hypo Natremia	Hypo kalemia	Hypo Calcemia	Hypo Mg2+	Hypo ferritin
Symptoms								
Neurologic	-	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 and calcemia deficiencies in blood; patients with hyponatremia had neurological signs while hypokalaemias were manifested by cardiac signs

4. Discussion and comments

In our study, anorexia/asthenia (77.27%), locomotor disorders (63.63%) and digestive disorders 45.41% of cases were the most represented among the clinical signs. Our results are different from those of Coumé M. and al.[8] in Senegal who had found moderate anorexia with a rate of 53.3% and Belghith A. et al.[9] in Tunisia who had found digestive disorders in 88% of cases and neurological disorders in 67% of cases.

The average vitamin D level was 35.35 ± 27.98 with extremes of 7.97 and 150 in our study. Safi S. and al.[10] in Morocco and Belghith M.[11] in France had respectively collected an average rate of 10.95 ± 6.99 ng/ml and 25 ± 15.4 ng/m which are lower than our results. This could be explained by greater exposure to the sun. The sun is essential for the

metabolism of vitamin D in our patients compared to Europeans and North Africans. In our series, 12.5% of patients with vitamin deficiency had signs related to the musculoskeletal system. Vitamin D is involved in many clinical events such as falls, fractures, cognitive disorders, the occurrence of certain cancers and certain inflammatory diseases during aging [12].

Hyponatremia was found in 45.45% in our serie. The average sodium level was 135.85 ± 6.39 with extremes of 111 and 148. Our results are higher than those of Paul LPS.[13] in France which had found 130.9 ± 2.0 mmol/L and similarly to Boyer S.[14] in France (130.8 ± 6.3 mmol/L). This could be explained by the fact that the sodium levels of some of our patients had been corrected in the emergency department. We found central neurological signs in 11.4% of cases in our study. Hyponatremia is the hydro electrolyte disorder frequently encountered in geriatric practice and thus appears as a factor of fragility in the elderly [15].

Cardiovascular signs were found in 1.1%. In our series in patients who realized folic acid in blood (n=40 (45,5%%)), 10 patient (11.36%) had vitamin B9 deficiency with an average of 9.83 ± 6.55 with extremes of 1.91 and 28.5. Our results are inferior to those of Belghith A. and al. [9] in Tunisia who had objectified an average rate of 10.8 ± 6.2 (6.1 – 16.2).

Digestive signs were found in 2.2% of patients with vitamin B12 deficiency. The determination of vitamin B12 was carried out in 38 patients and 3.41% had a low vitamin B12 rate. The average was 926.67 ± 1224 with extremes of 50 and 7009. Belghith A. and al.[9] in Tunisia and Berri MA. and al [16] in Morocco had found results clearly inferior to ours with respectively an average of 74 ± 42 (20-200pg/ml) and 85.56 pg/ml (25-157 pg/ml).

In our study 26.14% had moderate anemia with an average hemoglobin level of 11.46 ± 2.32 g/dl with extremes of 5.4 and 16.6g/dl. Our results are different from those of Belghith A. and al. [9] in Tunisia and those of Belghith M.[11] in France who had respectively found an average hemoglobin level of 7.2 ± 2.2 and 12.5 ± 1.9 with extremes of 3.5 - 12.3 g/dl and 11-16.6 g/dl.

The prevalence of denutrition was 36.36% In our study. Dandakoye A [17] in Niger and Sandji O. [18] in Mali had found respectively 50.58% and 95.7% of clinical denutrition, which was clearly higher than the results of the European literature [19][20]. It often associated with micro nutrient deficient and could be explained by the absent of rich, varied and balanced diet in our patient.

The probable depression was 15,9% in our study, our results are lower than those of Boyer S.[14] and Aliamus V. et al.[20] in France who found 28.7% and 23.3% respectively. Depression is underestimated in our context and furthermore the Mini GDS score used is not adapted to our socio-cultural context.

The 38.64% of non-autonomous elderly patient however were lower than those of the European literature [21][20] and could be explained by a higher quality of tertiary treatment in European countries.

We found 28.41% of high probability of major neurocognitive disorders in our study. Our results are lower than those of Zolnowski V. and al.[21] in France which had found a rate of 64.7%. Neuro cognitive disorders in our context is underestimated and the scores are adapted to the socio-cultural level.

5. Conclusion

Elderly micronutrient deficient symptoms is not specific and evidence exploration is limited in our context so, it important to sensibilize Niger elderly's people about appropriate nutrition in order to prevent micronutrient deficient.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

The present research work does not contain any studies performed on animals/humans subjects by any of the authors'.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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