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Status of Vit D in Ambulatory Consulting Patients in the City of Meknes

El Bahraoouy Rabii[1*], Belaouni Mourad[2], Malki El Houcine[3], BalouchL Houcine[4], Bamou Youssef[4], El Boukhrissi Fatima[4]

[1]Department of Bacteriology of the Military Hospital Moulay Ismail of Meknes, Specialty in Medical Biology Analyses
[2]Department of Parasitology-Mycology of the Military Hospital Moulay Ismail of Meknes, Specialty in Medical Biology Analyses
[3]Department of Hématology of the Military Hospital Moulay Ismail of Meknes, Doctorate in Pharmacy
[4]Department of Biochemistry and Toxicology of the Military Hospital Moulay Ismail of Meknes, Professor of Biochemistry

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***Corresponding author:** El Bahraoouy Rabii
Department of Bacteriology of the Military Hospital Moulay Ismail of Meknes, Specialty in Medical Biology Analyses

Abstract **Original Research Article**

Introduction*:** Vitamin D (vit D) is both a vitamin and a hormone whose needs are covered by skin photosynthesis (UVB) and secondarily by diet. It plays an important role in the regulation of phosphocalcic homeostasis. Insufficiency in this vitamin exposes to several bone and extra-bone adverse effects. The objectives of this work are to evaluate the status of vit D in ambulatory consulting patients at the Meknes HMMI and to establish correlations between the 25OHD rate and demographic, clinical and biological parameters. ***Materials and Methods: This is a prospective monocentric observational study carried out over a 4-month period from February 1 to May 4, 2017 of 300 patients (274 female, 26 male) who are ambulatory consultants with a prescription for Vit D dosage. All patients completed a questionnaire and received an electrochemiluminescence (ECLIA) 25OHD assay using the Roche Diagnostics Cobas® 6000 analyzer. The normal rate is defined by [Vit D] > 30ng/ml, hypovitaminosis by [Vit D] < 30ng/ml. Patients also benefited from an assay for calcium, phosphoremia, intact PTH and other parameters. ***Results***: The average age of our patients was 51.75±12.95 years with a sex ratio M/F of 0.01. Hypovitaminosis is found in 91.3% of our population. Indeed, 29.3% of patients suffered from moderate vit D deficiency, 17.3% from severe deficiency, 44.7% from vit D deficiency. Hypovitaminosis D is positively and significantly correlated with sex, BMI, veil, sunscreen use, muscle pain, fractures and vit D treatment. On the contrary, it is not correlated with age, phototype, asthenia, bone pain and high blood pressure. Concerning the relationship between hypovitaminosis and the biological parameters studied: hypovitaminosis is associated in 95.3% (p=0.191 r=0.212) of cases with normocalcemia, in 95% of cases with normophosphatemia (p=0.09 r=0.183) in 94% (p=1 r=1) of cases with hyperparathyroidism, in 97.7% of cases to thyroid disorders (p=0.331 r=0.331) and in 94.4% to diabetes (p=0.596 r=0.596) and finally in 64.7% to renal failure (0.0001 r=0.0001). ***Conclusion***: At the end of this study, we concluded that hypovitaminosis D was very common in the HMMI consulting population, which was consistent with the literature. Hypovitaminosis D causes several diseases, which is a major public health problem.

Keywords: Vit D, Hypovitaminosis D.

INTRODUCTION

Vit D is both a vitamin and a hormone with a specific receptor whose needs are covered endogenously via cutaneous photosynthesis under the action of UVB solar rays or exogenously via food [3]. Vit D plays an important role in the regulation of phosphocalcic homeostasis, it has an action on bone metabolism and an extra-bone protective role in multiple pathologies.

The Vit D status of an individual is generally assessed only by the determination of the plasma level of 25-hydroxy (OH)-Vit D whose threshold for the time being considered optimal is 75 nmol/L or 30 ng/mL. Below 75 nmol/L or 30 ng/ml, we speak of insufficiency and deficiency below 25 nmol/L or 10 ng/mL [4].

Deficiency of this vitamin exposes to several bone and extra-bone side effects.

OBJECTIVES

The objectives of this work are to evaluate the status of vit D in ambulatory consulting patients at the Meknes HMMI and to establish the risk factors for hypovitaminosis D and the correlations between the 25OHD level and demographic, clinical and biological parameters.

MATERIALS AND METHODS

This is a prospective monocentric observational study carried out over a 4-month period from February 1 to May 4, 2017 of 300 patients (274 women, 26 men) admitted externally to the sampling department of the HMMI with a prescription for vit D dosage. Each included patient gave his or her consent and answered a questionnaire on identity, medical and surgical history, the main risk factors or protectors of vit D deficiency and finally the different clinical manifestations of this deficiency.

The plasma level of vit D ([Vit D]) was determined in the HMMI biochemistry and toxicology laboratory by electrochemiluminescence (ECLIA technique) using Roche Diagnostics' Cobas® 6000 analyzer. The normal level is > 30ng/ml, deficiency is defined by [Vit D] < 10ng/ml, moderate deficiency 20-30 ng/ml, severe deficiency 10-20 ng/ml.

For each patient, an assay of intact parathormone, calcium and phosphoremia, renal function, fasting blood glucose and HbA1c, and ultrasensitive CRP, performed by the cobas6000 analyser, was included.

For the descriptive part, the quantitative variables were expressed by their means and standard deviation, as well as by their minimum and maximum values. The qualitative variables were expressed by their numbers and frequencies. The significance level (p) used was 5% and the data were entered and analysed using the SPSS software (version 13.0).

RESULTS

The General Population

Over a 4-month period, from February1, 2017 to May 30, 2017, 300 patients (274 females, 26 males) were included with a sex ratio of 0.01 (M=8.7% F=91.3%). the age of the population was 15 to 86 years, with an average age of 51.75±12.95 years. 33.6% of our patients have a light skin phototype (between I and III), 40.7% have a matt skin phototype (IV) and 25.7% have a dark skin phototype (V and VI). Among the 274 women, 259 (94.52%) wear a veil and 15 (5.48%) do not wear one. Also, 99 of the women (36.13%) use sunscreen. In the study population, the average BMI was 28.36±5.22 kg/m2. For women, it was 28.30 ±5.23 kg/m2, significantly higher than for men 25.88±4.60 kg/m2. Clinically, 69% of the population had symptoms including 88.33% of bone pain, 71% fatigue and 49% muscle pain.

The history of our study population was as follows: 55 (18.33%) with diabetes, 54 patients (18%) with hypertension, 44 (14.66%) with thyroid disorders, 19 (6.33%) with osteoporosis and 17 (5.66%) with chronic kidney disease (CKD).

Live Status D

Hypovitaminosis is found in 91.3% of our population. Indeed, 29.3% of patients suffered from moderate vit D deficiency, 17.3% from severe deficiency, 44.7% from vit D deficiency.

15% (45) of the population were taking vit D-based treatment: 40 (88.88%) are still vit D deficient and 5 patients are at normal levels (p=0.0001 r=.0001)

93.43% of women have hypovitaminosis D versus 77% of men with a significant correlation with sex (p=0.001 r=0.001).

The highest rate of hypovitaminosis is found in patients over 60 years of age (94.44%) followed by patients between 15 and 40 years of age (91.66%) and finally patients between 40 and 60 years of age (90.27%) (p=0.593 r=0.529).

Hypovitaminosis is high in patients who are overweight (95%) and obese (93%) compared to patients with normal BMI (85%) (p=0.012 r=0.013)

Light-skinned patients (phototype II and III) have hypovitaminosis D at 88% compared to 84% in dark-skinned patients (phototype IV, V and VI) (p=0.07 r =0.078). Women who use sunscreen have 95% hypoD compared to 90% for women who do not use it (p=0.02 r=0.02)

Veiled women represented 93.3% higher hypovitaminosis D compared to unveiled women (80%) (p=0.0001 r=0.001)

Hypovitaminosis is associated in 88.32% of the cases with bone pain (p=0.241 r=0.241), in 69.70% of the cases with asthenia (p=0.411 r=0.411) and finally in 50.72% of the cases with muscle pain (p=0.013 r=0.012).

Hypovitaminosis is associated in 73.68% of cases with osteoporosis. 78% of patients with fractures have hypovitaminosis D (p=0.036 r= 0.094). Hypovitaminosis D is associated with hypertension in 90.6% of cases (p=0.329 r=0.329).

Concerning the relationship between hypovitaminosis and other biological parameters: hypovitaminosis is associated in 95.3% (p=0.191 r=0.212) of cases with normocalcemia, in 95% of cases with normophosphatemia (p=0.09 r=0.183),in 94% (p=1 r=1) of cases with hyperparathyroidism, in 97.7% of cases to thyroid disorders (p=0.331 r=0.331), in 94.4% to diabetes (p=0.596 r=0.596) and finally in 64.7% to chronic renal failure (CRI) (0.0001 r=0.0001).

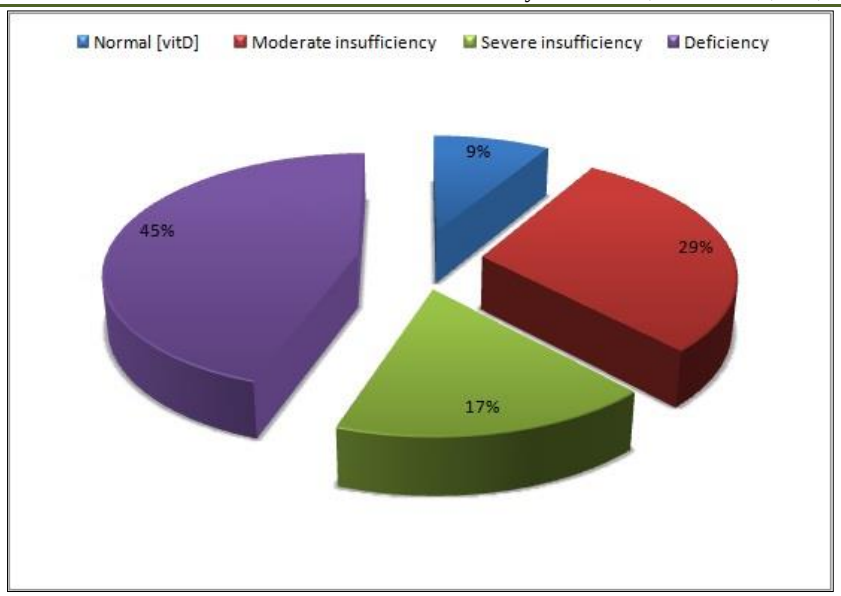

Figure 1: Distribution of the studied population by Vit D status

Table 1: Relationship between the status of Vit D and the different risk factors

	Sex		**Age (years)**			**IMC**			**Phototype**		**Veil**		**Sun screen**	
	M	F	15-40	40-60	>60	**Normal**	**Over-weight**	Obese	Clear	Dark	Yes	No	Yes	No
Hypo-vitaminosis	93.43	77	91.66	90.27	94.4	85	95	93	88	84	93.3	80	95	90
[vit D] normal	6.57	33	8.34	9.73	5.56	15	5	7	12	16	6.7	20	5	10
p(<0,05)	0.001		0.593			0.012			0,07		0.0001		0.02	
Correlation with hypo-vitaminosis	Significant		Not Significant			Significant			Not Significant		Significant		Significant	

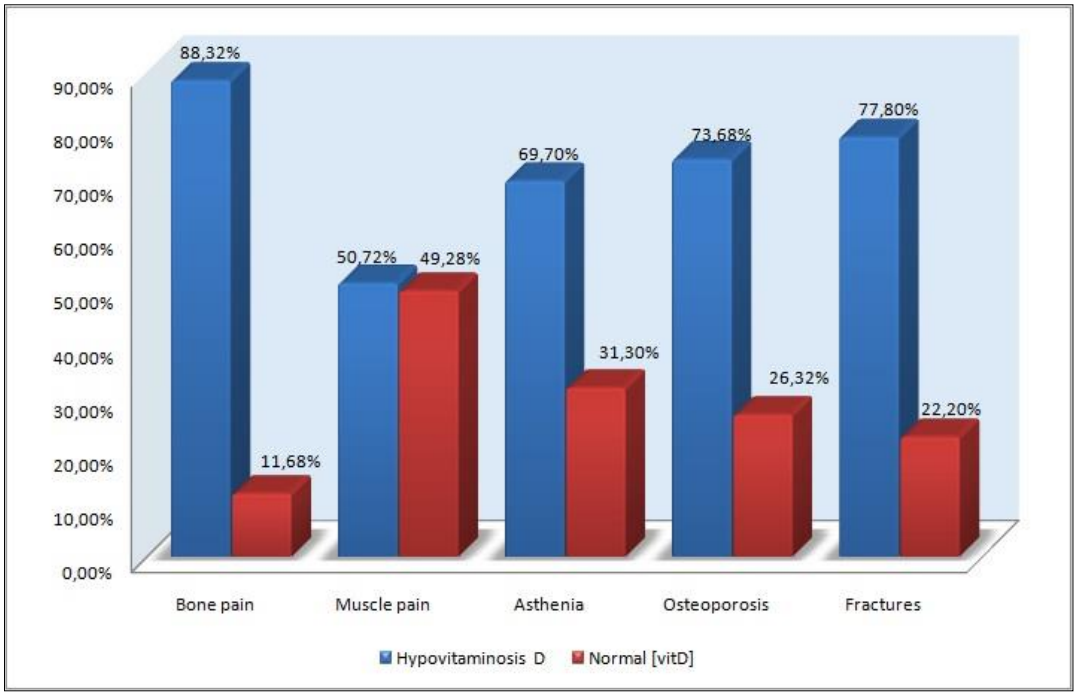

Figure 2: Relationship between the status of vit D and the different clinical manifestations

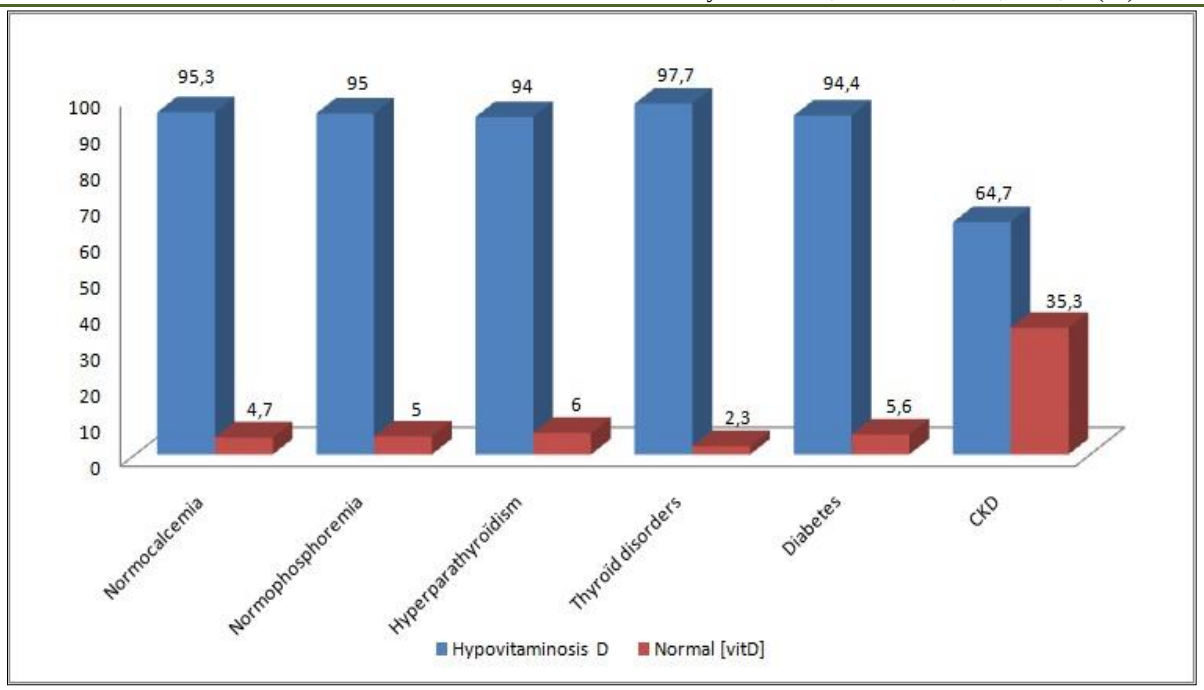

Figure 3: Biological parameters studied according to the status of vit D

DISCUSSION

For the assessment of the prevalence of hypovitaminosis (deficiency or insufficiency), the 25(OH) level is determined by a threshold of less than 30ng/ml.

Regardless of the threshold used, all studies show a high prevalence of vit D deficiency in different populations [1]. The results of our study are consistent with those in the literature regarding the high prevalence of hypovitaminosis (91.3%).

The high prevalence of hypovitaminosis in our population even if we are in a sunny country may be due to several factors: clothing habits, lack of exposure to the sun due to ignorance of these effects on vit D status or intolerance to sunlight.

Epidemiological studies show that serum 25OHD levels are generally lower in women than in men [6]. Our result was consistent with his studies.

The elderly area population at risk, the age limit being 65 years in most studies [4]. This is the case for our population, the highest rate was found in the over-60 age group.

verweight and obesity are found as risk factors for deficiency in our study as in other studies. A high BMI is associated with lower concentrations of 25(OH) vit D. This can be explained by a decrease in the bioavailability of vit D sequestered in hyperplastic fat cells in the case of obesity [9].

The phototype according to the Fitzpatrick classification (I and II = red and blond; III = brown; IV, V and VI = matt skin). Indeed, melanin, which is in greater quantity in dark skinned subjects, absorbs UVB rays and thus prevents the synthesis of vit D. The matt phototype was not a risk factor for vit D deficiency ($p > 0.05$) compared to light phenotypes, which did not correspond to the data in the literature [3-9].

The skin pigment (melanin) is a natural sunscreen and the increase in this melanin pigmentation can reduce vit D synthesis under the effect of UVB rays as effectively as a protective sunscreen [11]. For this reason, women in our population who use a protective cream have a high rate of hypovitaminosis.

A comparative Turkish study showed that there is an increased risk of vit D deficiency in young girls wearing covering clothing [3]. For our study, hypovitaminosis is positively and significantly correlated with veil ($p=0.0001$).

Hypovitaminosis D causes pain, fatigue, poor quality of life and biological hyperparathyroidism. Erkal *et al*., in a prevalence study, observed a strong correlation between a low rate of 25(OH)D and a high prevalence of generalized pain, muscle and bone[9] which is consistent with our results, which show a high prevalence of muscle, bone and asthenia pain in association with hypovitaminosis D.

Muscle function decreases when the 25(OH)D rate is lowered, resulting in an increased risk of falling [1]. In the Women's Health Initiative (WHI) study, the risk of hip fracture is increased in patients with low 25(OH)D rates [1]. For our population, there is a high

rate of fracture in association with hypovitaminosis D with a significant correlation which is consistent with the WHI study.

Studies have shown a negative correlation between BMD (bone mineral density) and vitamin status, suggesting that vit D deficiency is responsible for bone fragility and can induce osteoporosis in young adults in the long term [3], which explains the high rate of osteoporosis in our patients with hypovitaminosis D.

Vit D controls the renin gene, which gives it antihypertensive properties. The study by (Whitam *et al*., 2009), showed the effect of vit D on blood pressure in hypertensive patients [6]. This explains the association of hypertension with hypovitaminosis in 90% of cases in our population but without a significant relationship may be due to the choice of our patients.

The classic roles of Vit D in the regulation of phosphocalcic metabolism and modulation of bone health have been confirmed [8].

Prolonged vit D deficiency reduces intestinal calcium absorption and is associated with secondary hyperparathyroidism associated with bone loss and increased risk of fractures [7]. The main physiological actions of 1.25 (OH) 2D are the increase in digestive absorption of calcium (from 10 to 40%) and phosphorus (from 60 to 80%).

In hypovitaminosis, secondary elevation of parathormone activates bone release and renal reabsorption of calcium and phosphorus, resulting in calcium and normal phosphoremia [5]. For this reason, our series has high levels of normo-calcaemia, normophosphoremia and secondary hyperparathyroidism.

The thyroid disorders found in our series are associated in 97.7% of cases with hypovitaminosis. Several studies highlight the relationship between vit D deficiency and thyroid disease. This can be explained by the binding of vit D to receptors similar to those of thyroid hormones called steroid hormone receptors [2].

Epidemiological studies have shown that vit D supplementation in childhood reduces the risk of developing type 1 diabetes [11]. Hypovitaminosis D is associated with increased insulin resistance, decreased insulin production, and the development of metabolic syndrome [11].

Vit D has a possible effect on the risk of type 2 diabetes via an improvement in insulin sensitivity and glucose intolerance [6]. For these reasons hypovitaminosis is associated without 94.4% of cases with diabetes but with an insignificant correlation this could be explained by the choice of our population.

Data suggest that patients with advanced chronic kidney disease (CKD) may have a reduced ability to synthesize cholecalciferol by photo production at the skin level [10].

However, it is important to remember that in the case of CRMs, the substrate of the [1.25] Vit D, i.e. 25VIT D, is also decreased. The causes of a 25VIT D deficiency in patients with CKD are multiple and the CKD, in itself, promotes a 25VIT D deficiency [10].

Based on the data in the literature, it is quite clear that the prevalence of vit D deficiency in RCMs, and even more so in terminal RCMs, is very high. This explains the high rate of hypovitaminosis D in patients with CKD in our series.

CONCLUSION

At the end of this study, we concluded that hypovitaminosis D was very common in the HMMI consulting population, which was consistent with the literature. These results need to be confirmed by more powerful multicentre studies encompassing various socio-cultural levels and regions of the kingdom.

In view of the epidemiological data, it seems necessary to consider a preventive approach to systematic supplementation in the population with an extremely high probability of vit D deficiency in order to prevent the complications that may result.

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