



Mineral and Bone Disorders in Chronic Hemodialysis and Evaluation of Adherence to the KDIGO 2017 Recommendation: Multicenter Study of 658 Patients

Ezzaki S*, Failal I, Mtioui N, Khayat S, Zamed M, Medkouri G, Benghanem M and Ramdani B

Department of Nephrology, Hemodialysis and Kidney Transplantation, CHU Ibn Rochd, Casablanca, Morocco

Abstract

Introduction: Phosphocalcic metabolism disorders are frequent in chronic hemodialysis; their clinical complications and their impact on the vital prognosis justify appropriate prevention and treatment. Our objective is to determine the phosphocalcic status and the prevalence of BMD in our hemodialysis patients and to assess the degree of adherence to the KDIGO 2017 recommendations.

Methods: We conducted a retrospective multicenter study in the... region, including 658 hemodialysis patients.

Results: Bone pain was present in 47.6% of patients. 15.6% of patients suffering from pruritus, while 24.3% of patients had conjunctivitis. Biologically, the mean serum calcium was 87.77 mg/l, the average serum phosphorus was 46.85 mg/l, the average PTH was 489.29 pg/ml. Therapeutically, calcium supplementation was prescribed in 78.8% of the cases, 30.5% of patients received the derivatives of vitamin D, of phosphorus chelators without calcium were prescribed in 15% of patients, 5% of patients were treated with a calcimimetic. And 7% by parathyroidectomy.

The average age of our patients was 49 ± 14.6 years, with a male predominance, the causal nephropathy was undetermined in 48.3%, the average duration of hemodialysis was 85 ± 54 months. Bone pain was present in 47.6% of patients. 15.6% of the patients suffered from pruritus, while 24.3% of the patients had conjunctivitis. Biologically, The mean calcemia was 87.77 mg/l, the mean phosphatemia was 46.85 mg/l, The mean PTH was 489.29 pg/ml. Therapeutically, calcium supplementation was prescribed in 78.8% of the cases, 30.5% of the patients received the derivatives of vitamin D, phosphorus binders were prescribed in 15% of the patients, 5% of the patients were treated with a calcimimetic. And 7% by parathyroidectomy. The 3 targets recommended by the KDIGOs were achieved in only 29.3% of patients.

Conclusion: It appears from this multicenter study that the recommendations concerning the BMD are far from the targets recommended by the KDIGO.

Introduction

Phosphocalcic metabolism disorders are frequent in chronic hemodialysis; they are associated with high morbidity and mortality [1]. These disorders start early during the insufficiency Chronic Renal Disease (CRF), they are seen from stage 3 of the chronic kidney disease. They include at least one of these three components which are often associated: Abnormalities of the metabolism of calcium, phosphorus, Parathyroid Hormone (PTH) or vitamin D, abnormalities in bone turnover, mineralization, its volume, its growth and its solidity and vascular calcifications or other soft tissue [2]. These complications and their impact on the vital prognosis justify appropriate prevention and treatment. The objective of our study is to determine the phosphocalcic status and the prevalence of OMT in our chronic hemodialysis patients and to assess the degree of adherence to the KDIGO 2017 recommendations.

Methods

We carried out a retrospective multicenter study in nine hemodialysis centers (2 CHP, 6 private, 1 CHU) in the region of CASABLANCA, including 658 hemodialysis patients on a 12-month urea (03/01/2017 to 02/28/2018).

We collected our patient data from medical records and dialysis notebooks as well as history and

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*Correspondence:

Ezzaki S, Department of Nephrology,
Hemodialysis and Kidney
Transplantation, CHU Ibn Rochd,
Casablanca, Morocco,
E-mail: ezzakisanae@gmail.com

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physical examination.

The socio-demographic and clinical parameters used were as follows: Age, sex, length of hemodialysis, the different hemodialysis parameters: weight sec, Systolic and Diastolic Blood Pressure (SBP, DBP), dialysis dose (Kt/V) and number of sessions/week. The presence of functional signs including pain bone pain, arthralgia, muscle fatigue, pain during walking, itching, and the presence of a red eye, with a detailed osteoarticular examination.

Radiological signs of hyperparathyroidism or a dynamic osteopathy have been researched on standard radiographs by stereotypes profile skull, hands, lumbar spine and pelvis. The cardiac ultrasound allowed us to assess the condition heart and also to look for valvular calcifications. Parathyroid ultrasound was performed in all patients who had hyperparathyroidism. Parathyroid scintigraphy was not systematic; indicated in patients who had tertiary hyperparathyroidism requiring treatment surgical. Statistical analyzes were carried out with SPSS 10.0 software for Windows.

Results

The average age of our patients was 49 ± 14.6 years, with a predominance of men, and an M/F sex ratio of 1.3. Causal nephropathy was undetermined in 48.3%, diabetic in 19.3% of cases (Figure 1). The length of time in hemodialysis was 12 years ± 9.05. 89.7% of patients were hemodialysis 3 sessions per week on arteriovenous fistulas in 95.8% of cases. The average dry weight was 58.5 kg (+/- 10.7), with an average PAS of 120 ± 20 mmHg and a kt/v at 1.2 ± 0.2 (Table 1).

Bone pain was present in 47.6% of patients. Arthralgia in 43.3% of cases, 15.6% of patients suffered from pruritus, while 24.3% of patients presented conjunctivitis.

Osteoarticular abnormalities were found in 40.2% of patients. Dominated by limitation of movement and bone deformities (Table 2).

Biologically, the mean calcium level was 87.77 mg/l, with

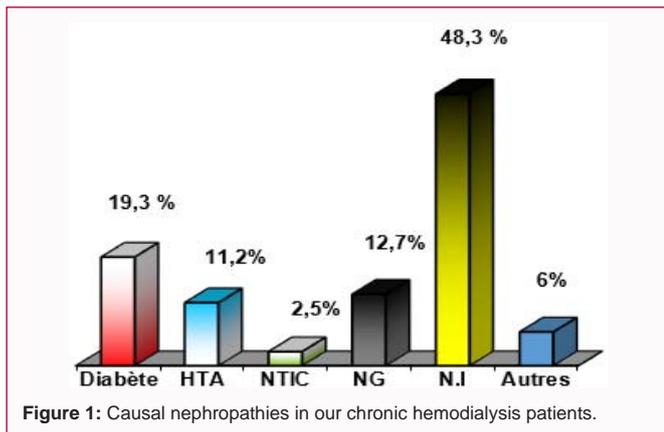


Figure 1: Causal nephropathies in our chronic hemodialysis patients.

Table 1: dialysis parameters in our patients.

	Average	Standard deviation
Dry weight (kg)	58.5	± 10.7
BMI	20.8	± 1.2
SBP (mmHg)	120	± 20
DBP (mmHg)	71	± 13
Kt /v	1.2	± 0.2

Table 2: Different osteoarticular abnormalities discovered in hemodialysis patients.

Osteoarticular abnormalities	Percent (%)
Limitation of movement	64
Bone deformity	16
Drum stick fingers	12
Mass opposite a joint	8

Table 3: Phosphocalcic biological data in our patients.

Phosphocalcic parameters	Mean ± Standard deviation
Parathyroid hormone intact 1-84 (PTHi) pg/ml	489.29 ± 380
Calcemia (mg/l)	87.77 ± 10.56
Phosphoremia (mg/l)	46.85 ± 21.85
25 OH vit D (ng/ml)	33.4 ± 20.6
Alkaline Phosphatase (PAL) (IU/l)	199.18 ± 173.6

63% of patients having Ca in the KDIGO targets and 31% having hypocalcemia and 6% having hypercalcemia, the mean phosphatemia was 46, 85 mg/l, 60% of patients had Ph in KDIGO targets, 30% of patients had hyperphosphatemia and 10% had hypophosphatemia, mean PTH was 489.29 pg/ml, 48% of patients had PTH in the standards recommended by KDIGO, hyperparathyroidism was observed in 29% of patients, against 23% in hypoparathyroidism, the average of 25 OH vitamin D is 33.4 ng/ml and Alkaline Phosphatase (ALP) is at 199.18 IU/L, with 47% and 61% of patients having 25 OH vitamin D and PAL respectively in KDIGO targets.

Standard X-rays revealed signs of secondary hyperparathyroidism consistent with biological data. In patients with hyperparathyroidism aspects the most frequently found radiological following:

- Diffuse bone demineralization found in 40%.
- Vascular calcifications (excluding those objectives by the choeur) were found in 20%.
- The resorption under periosteum of the phalanges present in 15% of cases.
- Geodes in 21% of cases.
- 7 cases of spontaneous fracture during minimal trauma.

Cervical ultrasound routinely performed in patients with hyperparathyroidism, returning pathological in 60% of cases: parathyroid adenoma in 34% and a thyroid nodule in 25% of cases. Cardiac ultrasound is performed systematically in all our patients, systolic ejection fraction mean was 65.8% ± 10.2, a left ventricular hypertrophy found in 48.6% of cases, valvular calcifications in 10% of cases.

From a therapeutic standpoint, calcium supplementation based on calcium carbonate was prescribed in 78.8% of cases with an average dose of 1.8 ± 1.3 g/d, 30.5% of patients received active vitamin D derivatives at an average dose of 1.45 ± 2.29 µg/wk and 6% of native vitamin D, calcium-free phosphorus chelating treatments were prescribed in 15% of patients, at an average dose of 2.4 g/d ± 1.6, 5% of patients were treated with a calcimimetic, and 7% of patients underwent parathyroidectomy. with an average age of 39.1 years ± 15, an average length of service in dialysis of 8 years ± 6.4, and 3 times per week for 50% of patients. The indications for surgery were dominated by treatment-resistant secondary hyperparathyroidism in 90% of

cases. 60% of the patients underwent a 3/4 parathyroidectomy and 40% a 7/8 parathyroidectomy.

The compliance of phosphocalcic balance indicators at our chronic hemodialysis patients compared to recommendations KDIGO is of the order of 63% for calcemia, 60% for phosphoremia, 48% for PTH1-84. The 3 targets recommended by the KDIGOs were achieved in only 29.3% of patients, compared to 43% who met two targets, and only 6% who did not meet any KDIGO target.

Discussion

Mineral and bone disorders result of the combination of bone turnover abnormalities. These disorders lead to the occurrence of serious systemic complications such as vascular calcifications and complications localities such as fractures, which game the functional and vital prognosis of patients hemodialysis [3,4]. We are just starting to understand the pathophysiological relationships complexes existing between these different modes clinical expression of disorders metabolic rate in hemodialysis patients [5].

In our series the average rates of the parameters of the phosphocalcic balance join that of the several series studied. In our study, patients responding to KDIGO targets for serum calcium were 63%. This rate is similar to that of the series studied in Mauritania, Tunisia and Senegal [6-8], while the patients responding to the KDIGO targets for phosphoremia is 60%, which matches the targets found in the series studied in Senegal, with lower rates observed in the series from Mauritania and Tunisia, and 48% of our patients meet the KDIGO targets for THA. This rate is higher compared to what is found in the series for Mauritania and Senegal and lower compared to that of Tunisia [6-8]. Simultaneously adherence to three criteria recommended by the KDIGO were only 29.3%, this matches the data of many studies where the Most patients do not meet the 3 targets of recommendations cited above [9,10].

This can be explained largely due to the fact that the new targets of serum calcium and of PTH have been enlarged and appear more easily achievable.

Moreover, these observed results remain unsatisfactory. This is easily explained by the low socio-economic level. economic benefit of our patients, who lack social security the vast majority of cases; making a support therapy based on non-calcium phosphorus chelators and/or calcimimetics often difficult or even inconceivable given their high cost, associated with non-compliance therapeutic not evaluated but certainly important in terms of taste unpleasant calcium chelators [11].

Conclusion

At the end of our work, which focused on 658 chronic hemodialysis patients, we underline the high frequency of mineral and bone disorders, the management of which remains a complex and constantly evolving field.

The latest recommendations make it possible to apply an individualized therapeutic strategy in order to optimize the management of these disorders. However, in a delicate socio-economic context, such as ours, the percentage of patients who meet all the criteria remains unsatisfactory.

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