FGF23 KINETICS AND REMOVAL ON HAEMODIAFILTRATION

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INTRODUCTION AND AIMS

Blood levels of the 32 kDa-phosphaturic hormone fibroblast growth factor 23 (FGF23) rise early in patients with renal failure [1] in order to keep phosphatemia within the normal range; however, this compensatory mechanism itself contributes to chronic kidney disease-mineral bone disorder [2]. High FGF23 is also associated to left ventricular hypertrophy, vascular calcifications and then increased cardiovascular disease and mortality [3]. The aim of this study was to evaluate the effects of a single Acetate-Free Biofiltration (AFB) haemodialysis session on FGF23 serum concentrations.

METHODS

Nine patients (mean age 61 ± 16 years) with end-stage renal disease receiving haemodiafiltration with AFB technique three times a week were enrolled in a cross-sectional study. Haemodialysis procedure was performed using the Integra® monitor (Hospal, Bologna, Italy) and a polyacrylonitrile membrane. Peripheral venous blood samples were taken before (pre-HD), at middle and after treatment (post-HD); dialysate samples were collected by the Quantiscan™ monitoring system. FGF23 was measured by a Human FGF23 ELISA Kit (Millipore Ltd). Middle- and post-HD values were expressed after correction for haemoconcentration and FGF23 reduction ratio was calculated.

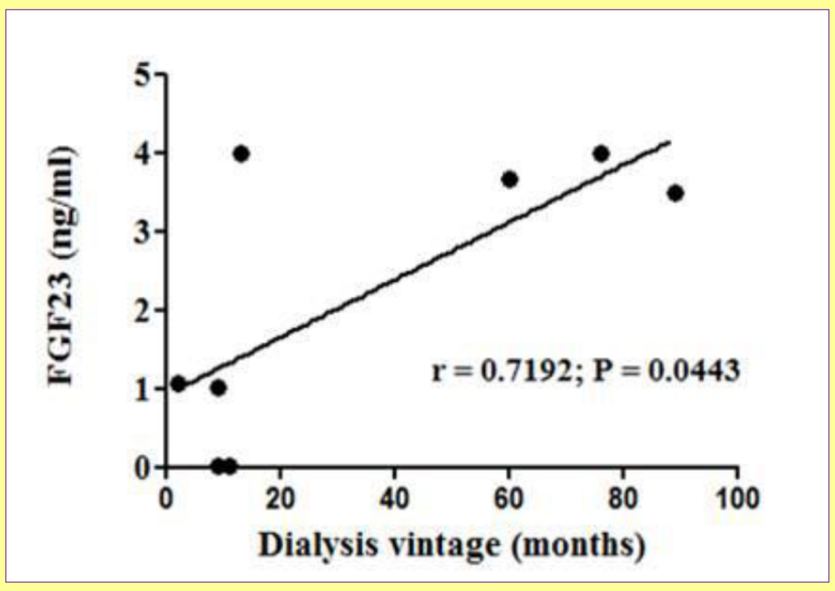

Figure 1. Correlation between baseline fibroblast growth factor 23 (FGF23) serum levels and dialysis vintage.

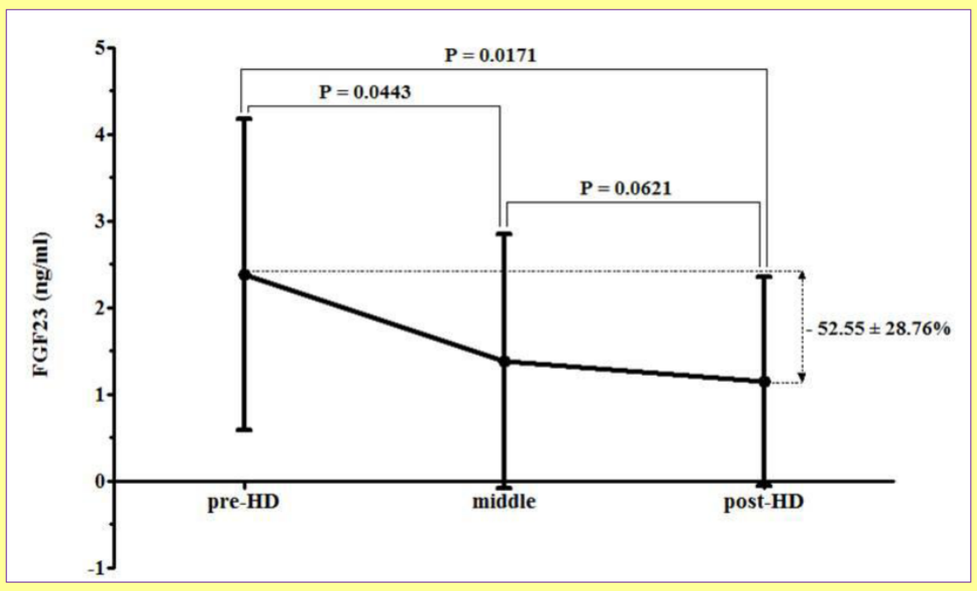

Figure 2. Fibroblast growth factor 23 (FGF23) circulating levels during a single Acetate-Free Biofiltration (AFB) haemodialysis session before, at middle and at the end of the treatment.

RESULTS

FGF23 pre-HD levels positively correlated with dialysis vintage (r = 0.7192; P = 0.0443) (Figure 1). They were significantly reduced by the haemodialysis session (from 2.38 ± 1.80 to 1.15 ± 1.21 ng/ml, P = 0.0171); this mainly happened during the first half of the treatment (2.38 ± 1.80 vs 1.38 ± 1.47 ng/ml, P = 0.0443), while FGF23 removal was not statistically relevant in the course of the second part (P = 0.0621). FGF23 reduction ratio was 52.55 ± 28.76% (Figure 2). Post-HD FGF23 was directly related to pre-HD FGF23 (r = 0.7360; P = 0.0238). The presence of FGF23 was detected in the dialysate samples.

CONCLUSIONS

The present study showed a positive correlation between baseline FGF23 serum levels and dialysis vintage, suggesting the usefulness of FGF23 determination as a biomarker of chronic phosphate imbalance over time. With regard to the kinetics of the molecule, FGF23 underwent a significant reduction during haemodiafiltration with AFB technique. Such removal was greater than that induced by conventional haemodialysis as reported in the literature (19%-decrease using modified cellulosic membranes) [4]. This difference may be attributed to the ability of AFB to efficiently remove middle molecules by convection. Whether a better clearance of FGF23 during haemodialysis may result in improved cardiovascular outcomes in the long term needs to be confirmed by randomized controlled trials.

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