Impact of FGF-23 on the Evolution of Left Ventricular Hypertrophy in Incident Dialysis Patients: A Prospective Study

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Introduction

Patients undergoing haemodialysis (HD) are well known to suffer from high rates of cardiovascular mortality. Amongst the structural and functional cardiac abnormalities common in this population is a high incidence of left ventricular hypertrophy (LVH). FGF-23 is one of a family of proteins regulating cell proliferation and has been implicated in the development of LVH in chronic kidney disease. We performed a prospective study to investigate the relationship between FGF-23 levels, left ventricular mass and their progression over 12 months in incident HD patients.

Methods

41 incident HD patients were recruited for a prospective study. Patients had intact FGF-23 levels taken prior to dialysis at baseline and after 12 months and tested by ELISA according to manufacturer's instructions (Kainos Laboratories, Tokyo). All patients underwent tagged cardiac MRI scanning at baseline and 12 months to determine cardiac structure and function using the gold standard investigation.

Results

The mean age of the cohort was 60.1 years ± 15.1, 66 % were male and mean dialysis vintage at baseline was 128 days ± 69. At baseline, the median serum phosphate level was 4.8 mg/dl with a mean serum calcium level of 9.2 mg/dl ± 0.6. There was a wide variation in FGF-23 levels across the cohort with a mean serum FGF-23 level was grossly elevated at 3528 pg/ml ± 8784.

Table 1. Baseline Cohort Descriptive Statistics

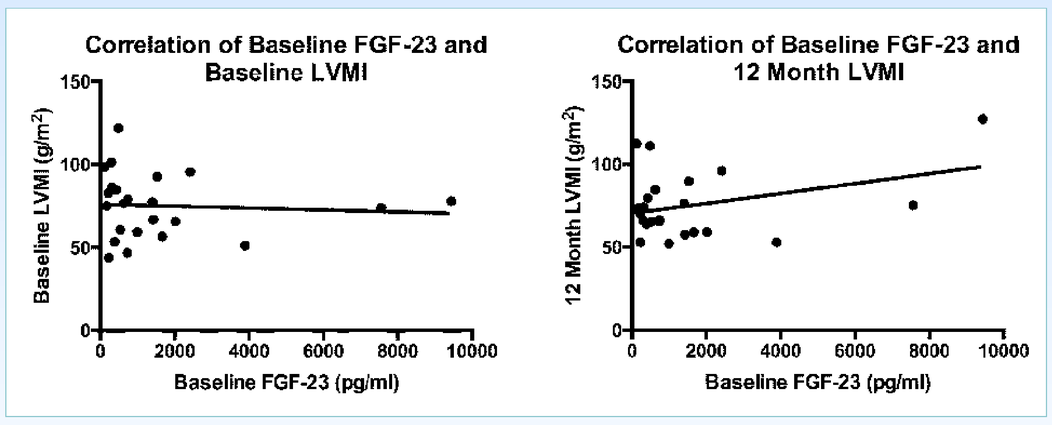
Variable	Baseline
Mean Age (years)	60.1 ± 15.1
Male Gender	66 %
Dialysis Vintage (days)	128 ± 69
Serum Calcium (mg/dl)	9.2 ± 0.6
Serum Phosphate (mg/dl)	4.8
FGF-23 (pg/ml)	3528 ± 8784
Left Ventricular Mass Index (g/m^2)	79.6 ± 21.4

All data are presented as mean ± SD, except gender (%) and serum phosphate (median)

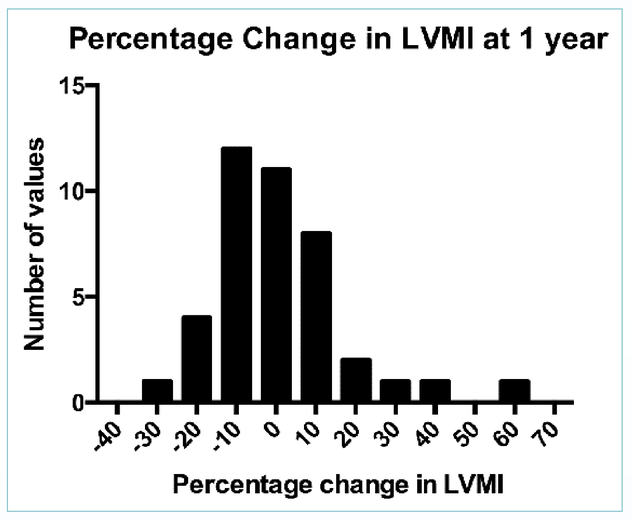
At 12 months, serum FGF-23 had increased further to mean serum levels of 5048 pg/ml ± 9307 (p = 0.46). Left Ventricular Mass Index (LVMI) at baseline was 79.6 g/m^2 ± 21.4 and stayed relatively constant at 79.2 g/m^2 ± 21.6 at 12 months. Mean change in FGF-23 at 12 months was 1025 pg/ml ± 3682 with a mean change in LVMI of -0.43 g/m^2 ± 13.4.

Results

There was no correlation between FGF-23 levels and LVMI at either baseline (r = -0.11 p = 0.95) or 12 months (r = 0.17, p = 0.39), (Figure 1.) nor was there any correlation between the change in FGF-23 and the change in LVMI over 1 year (r = -0.02, p = 0.90).



Overall, the majority of participants evidenced little change in LVMI over the 12 month study period (between -10% to 10%). (Figure 2.).



Conclusions

We found no correlation between left ventricular mass and FGF-23 levels in dialysis patients in their first year suggesting that, in dialysis patients, FGF-23 is not predictive of the development of left ventricular hypertrophy. While FGF-23 may have important prognostic implications in chronic kidney disease, it may be that in HD the presence of other treatment related factors overwhelms the potential causal effect and prognostic value of FGF-23 on the development and progression of LVH. Alternatively, longer follow-up periods may be required to detect significant changes in left ventricular mass.

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