COMPARISON OF THE SUPPRESSIVE EFFECTS ON FIBROBLAST GROWTH FACTOR 23 BETWEEN FERRIC CITRATE AND LANTHANUM CARBONATE

Akira Fujimori[1], Satoshi Ohkawa[1], Shioko Okada[1], Noriko Mizobuchi[2], Makoto Sakai[2], Yukiko Hasuike[3], and Takeshi Nakanishi[3]

[1]Blood Purification and Kidney Center, and [2]Department of Internal Medicine, Konan Hospital, Kobe, Japan
[3]Hyogo College of Medicine, Nishinomiya, Japan

INTRODUCTION AND AIMS

Fibroblast growth factor 23 (FGF 23) is related to increased mortality in patients with chronic kidney disease (CKD) (1,2), probably via its effects on cardiac hypertrophy, anemia, and/or inflammation (3-5). Since phosphorus load stimulates secretion of FGF 23 (6), phosphate binders, ferric citrate (FC) and lanthanum carbonate (LC), suppress FGF 23 levels in patients with CKD (7,8). Since FGF 23 is also stimulated by iron deficiency (9), we compared the effects of FC and LC on FGF 23 levels in dialysis patients with hyperphosphatemia.

METHODS

Nineteen patients on hemodialysis with inorganic phosphate (IP) levels over 6.0 mg/dL were enrolled in this study. They were randomly assigned to either FC or LC group. In the first month, the dosage of FC was 250 mg just after each meal, then followed by 500 mg. The dosage of LC was 250 mg just after each meal. Replenishment of iron was prohibited in the LC group during the study period. The effects of FC and LC were observed in three months. Measurements of biochemical parameters, including inorganic phosphate (IP) and FGF 23 (intact FGF 23, CLEIA), were performed at 0, 1, and 3 months. Parameters concerning anemia were also measured.

RESULTS

Baseline characteristics of the patients are shown in Table 1. Dialysis vintage was longer in the FC group, while Whole PTH was higher in the LC group. Ferritin levels were relatively low in both groups. Although all nine patients in the LC group completed the three months of study period, four dropped out of the study in the FC group, three because of overshoot of hemoglobin (Hb), and one because of gastrointestinal adverse effects. Therefore, data from five remaining patients in the FC group were analyzed. IP levels decreased in both groups (Figure 1). while significant decrease of FGF 23 levels were observed only in the FC group (Figure 2). The increase in ferritin levels was not significant in both groups (Figure 3). Hb levels decreased significantly only in the LC group (Figure 4). The decrease in the dosage of erythropoiesis stimulating agents (ESA) observed in the FC group was not statistically significant (Figure 5).

Table 1. Baseline Characteristics of the Patients (*p<0.05)

	Ferric Citrate	Lanthanum Carbonate
Age (y)	66.2±11.7	65.8±17.6
M:F	4:5	7:2
Dialysis Vintage (y)	13.1±9.9	3.4±2.2*
Primary Disease	DM 4/CGN 4/Nscl 1	DM 6/Nscl 2/Gout 1
IP (mg/dL)	6.4±0.5	6.1±1.0
Ca (mg/dL)	8.4±1.0	8.5±0.9
FGF 23 (pg/mL)	1772±2053	2495±2389
Whole PTH (pg/mL)	66.6±28.9	138.4±82.5*
1,25VitD (pg/mL)	11.0±4.3	9.5±5.9
Ferritin (ng/mL)	29.7±8.8	36.0±28.0
TSAT (%)	17.8±10.2	25.2±13.1
Hb (g/dL)	11.3±1.2	11.7±0.8
ESA (DA:μg/w)	19.9±18.2	16.4±16.0

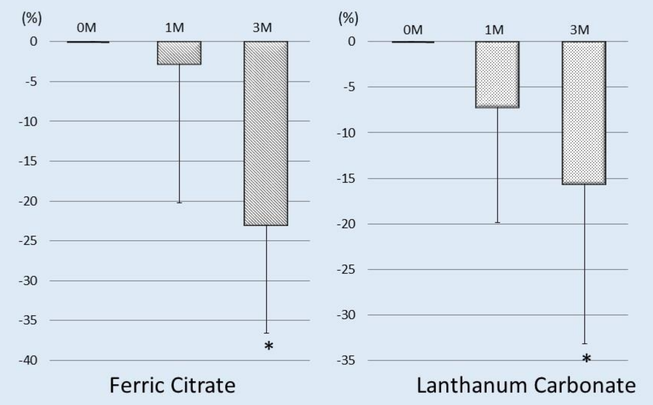

Figure 1 .
Percent changes of IP levels at 0, 1 and 3 months are shown. Significant decrease was observed in both groups. * *P*<0.05 vs 0M

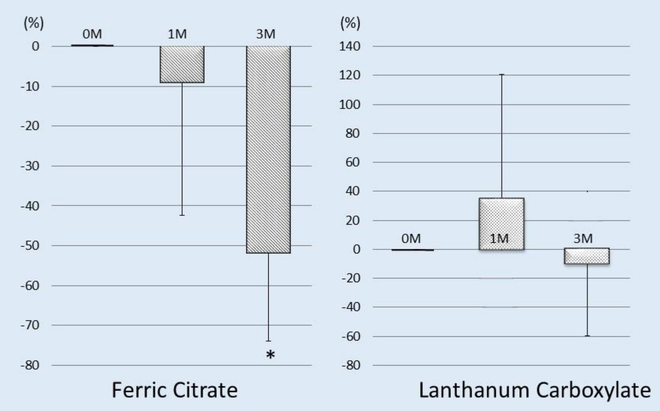

Figure 2.
Percent changes of FGF 23 levels at 0, 1 and 3 months are shown. Significant decrease was observed only in the ferric citrate group. * *P*<0.05 vs 0M

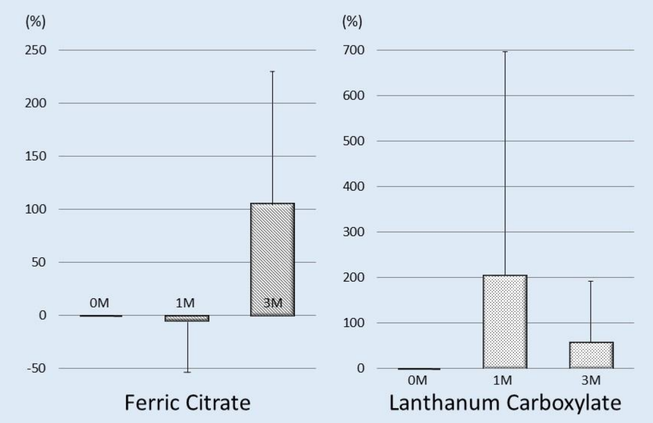

Figure 3.
Percent changes of ferritin levels at 0, 1 and 3 months are shown.

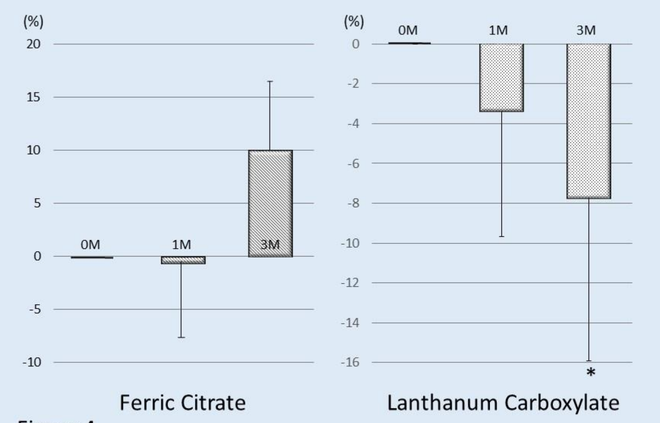

Figure 4.
Percent changes of Hb levels at 0, 1 and 3 months are shown. Significant decrease was observed only in the lanthanum carbonate group. * *P*<0.05 vs 0M

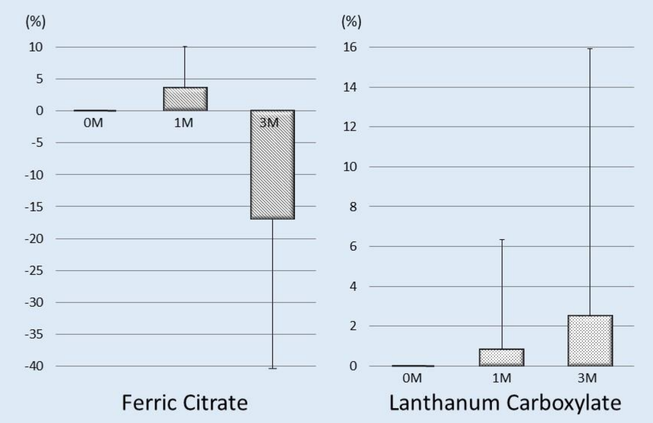

Figure 5.
Percent changes of ESA dosage at 0, 1 and 3 months are shown.

CONCLUSION

The suppressive effects of FC on FGF 23 levels were stronger than LC, though the effects on IP were equal. It appeared that FC suppressed FGF 23 by the addition of its effects on phosphorus and iron.

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