CORRELATION BETWEEN HYPERVOLEMIA, LEFT VENTRICULAR HYPERTROPHY AND FIBROBLAST GROWTH FACTOR 23 IN HEMODIALYSIS PATIENTS

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OBJECTIVES

Left ventricular hypertrophy (LVH) is a significant risk factor for cardiovascular complications in hemodialysis (HD) patients. Hypervolemia has been accepted as an independent risk factor for progressive LVH in HD patients. Additionally, high FGF23 levels have been a significant predictor of cardiovascular mortality and morbidity in chronic kidney disease and HD patients. The aim of our study is to investigate the correlation among LVH, interdialytic volume increase and FGF-23 in the patients on a chronic hemodialysis program.

METHODS

A total of 97 chronic hemodialysis patients (64,43±11,28 years old, M/F:47/50) were included in the study. Human FGF-23 ELISA kit was used for FGF-23 analysis of predialysis blood samples. Echocardiographic evaluation was performed in all of the patients after dialysis. Left Ventricular Mass Index (LVMI) was calculated by using Devereux Formula. We collected the following data: LVMI, FGF-23 levels, interdialytic fluid gain, blood pressure changes, and the other biochemical and clinical parameters.

RESULTS

Mean LVMI of the patients was 184,41±48,62g/m2. LVMI of the patients with daily urine output>250mL was found significantly lower. Statistically significant positive correlation was found between predialysis systolic blood pressure, predialysis diastolic blood pressure, predialysis mean arterial blood pressure and LVMI measurements (p<0,01). Mean interdialytic volume excess was correlated with LVMI measurements of the patients (r=0,459; p<0,01). Increased FGF-23 levels (159,79±134,99ng/L) predicted increased LVMI measurements of the patients (r=0,322; p<0,01). In addition, FGF-23 levels were also
increased as the interdialytic fluid volume increased (r=0,326; p<0,05). A positive correlation was also found between FGF-23 levels and interventricular septum thickness (r=0,238; p<0,05). Predialysis mean arterial blood pressure, predialysis volume overload and presence of diabetes were determined to be independent risk factors on LVMI on multivariate regression analysis.

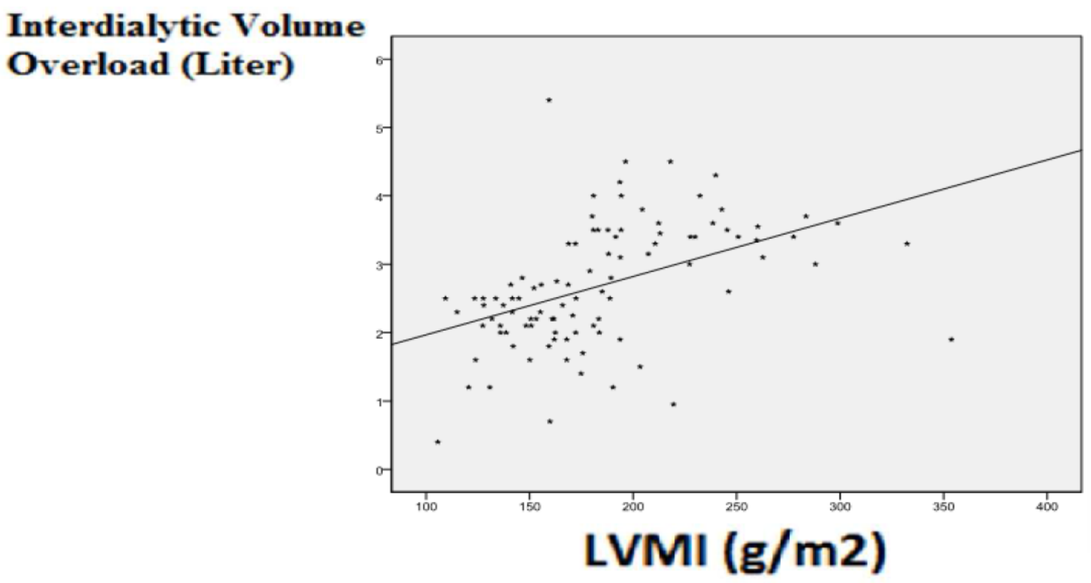

Figure-1: The Correlation between Interdialytic Volume and LVMI Measurements

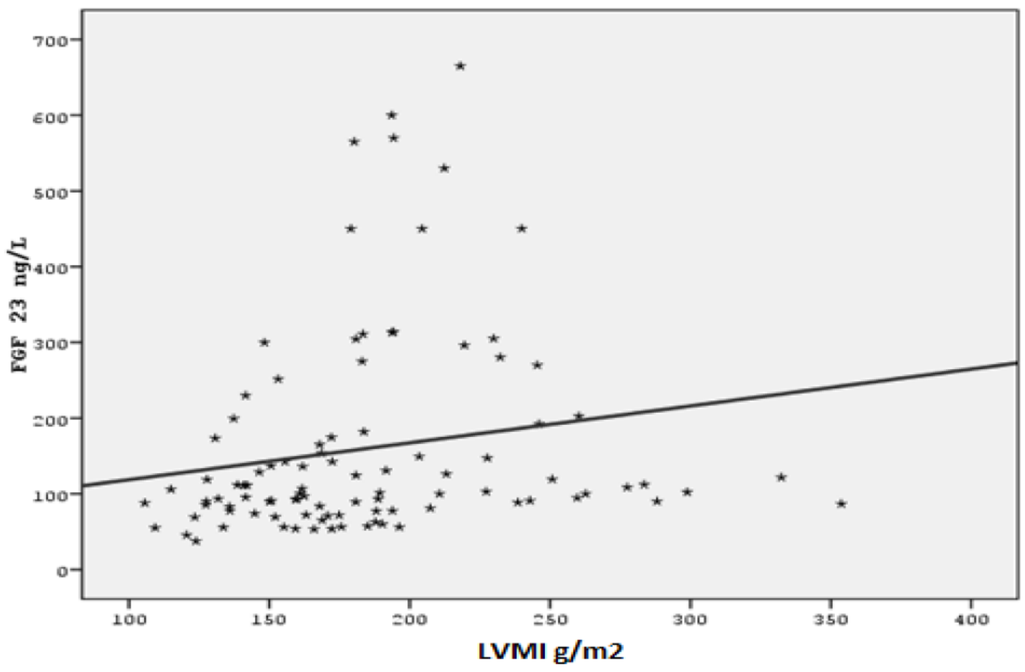

Figure-2: The Correlation between FGF-23 Measurements and LVMI Measurements

DISCUSSION AND CONCLUSIONS

Although 75% of patients who start HD have LVH, unfortunately the frequency significantly increases by the HD duration (1,2,3). Higher LVH percentage in our study population was correlated with the longer mean HD duration. One of the promising results of our study is the definitive relation between hypervolemia and LVH (Figure-1). LVH frequency significantly increases with the increasing interdialyctic volume load of the patients. Charytan also reviewed that volume control with more frequent HD programs may regress LVH (3). In Davenport's seminar, the progressive loss of residual renal function in dialysis patients has been associated with increased mortality (4). In our study, LVMI has been significantly great in predialysis patients with a 24-hour urine output of <250mL. We also investigated the relationship between recently discovered FGF23 concentrations with cardiovascular risk factors i.e. hypervolemia and LVH. In the study of Sany et al, FGF23 was identified as a weakly associated factor with LVMI in 90 consecutive long-term HD patients without cardiac symptoms (5). In our study, the serum FGF23 levels were significantly correlated with both LVMI and interventricular septum thickness (Figure-2). In this study comprising a cohort of patients with chronic HD, we identified that FGF23 was significantly correlated with predialysis systolic BP and increased interdialyctic volume overload. Our study showed that interdialyctic volume overload increased both LVMI and FGF-23 values. We can consider that interdialytic volume control exerts positive effects on increased FGF-23 levels which predicts the negative cardiovascular outcomes. This study is the first in the current literature that investigated the significant relationship between increased FGF23 levels and hypervolemia in HD patients. Therefore, FGF23 may be accepted as a volume marker.

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