KSN 2020
FULLY VIRTUAL MEETING

Abstract Type : Poster
Abstract Submission No. : PO-1250

A prospective study on association between ultrafiltration rate and clinical outcome in hemodialysis patients: the effect modification by muscle mass

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Objectives:

The association between ultrafiltration rate (UFR) and mortality may be affected by muscle mass or volume status in maintenance hemodialysis (MHD) patients. However, there are no prospective data about those association in patients receiving MHD. Therefore, we sought to examine that the association between UFR and their clinical outcome in HD patients is affected by their muscle mass and body fluid status.

Methods:

This was a prospective observational study on the patients (≥ 18 years old) who have been on MHD for at least three months and gave informed consent. A portable whole body bioimpedance spectroscopy device (BCM) was used for bioimpedance analysis (BIA) measurement at baseline. The primary composite outcome was the time to death or to the first cardiovascular event.

Results: Among 177 patients, mean (SD) age was 61 ± 12 years and male were 59%. Median (interquartile range, IQR) UFR was 11.2 (8.0–15.0) mL/h/kg. Median (IQR) overhydration volume by BCM was 2.4 (1.4–4.0) L. Median (IQR) lean tissue index (LTI) (calculated as lean tissue mass/height^2) was 12.4 (10.4–14.5) kg/m^2. During a median of 2.1 years, the primary outcome occurred in 46 of 177 patients (26%). In an adjusted Cox regression analysis, higher UFR was associated with an increased composite of death or cardiovascular event; HR (95% CI) was 1.041 (1.003–1.081). This association remained consistent even after adjusting for overhydration status. However, the association between UFR and mortality was modified by LTI ($P_{interaction}$=0.01); the association was significant in patients with LTI of less than 12 kg/m^2; HR (95% CI) was 1.154 (1.050–1.269).

Conclusions:

Higher UFR was associated with an increased death or cardiovascular composite event regardless of volume status in MHD patients. However, muscle mass may modify the association with higher UFR and an increased composite event.