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Reliability of appendicular muscle mass assessment by BIA versus DXA in hemodialysis patients

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Objectives: Loss of skeletal muscle mass (MM) increases the risk for morbidity and mortality in hemodialysis (HD) patients. Dual energy X-ray absorptiometry (DXA) is a valid tool for assessing skeletal MM but limited by cost and radiation exposure. In contrast, bioelectrical impedance analysis (BIA) is cheap and has no radiation exposure risk. Aim of this study was to assess the concordance between MM measured by BIA and DXA in HD patients.

Methods: We enrolled 50 HD patients between June 2016 and Feb 2018. The body composition, including appendicular lean muscle mass(ALM) was evaluated by BIA and whole body DXA . Hand grip strength (HGS) was performed to evaluate muscle performance. Agreement between tools was assessed by means of the Bland Altman method. Multiple linear regression was used to develop an ALM value by BIA closed to that by DXA.

Results: The mean age was 63.9 years and 66% were men. The prevalence of diabetes and hypertension was 50% and 94%, respectively. There was a significant association between muscle mass index which determined via DXA and BIA. The mean value of ALM divided by the height^2 (AMMI) was found to be 5.95 kg/m^2 and 7.86 kg/m^2 by DXA and by BIA, indicating overestimation of ALM in BIA method. Bland-Altman plots for differences in AMMI between BIA and DXA showed large bias (Mean= 1.91kg/m^2), with significant mean differences ([0.25, 3.57], P<0.001). After adjusting for sex, age and BMI, AMMI by BIA was significantly correlated with those measure by DXA (R^2=0.735, P<0.001). Using the formula, we can estimate the AMMI by DXA with AMMI by BIA (DXA=1.060+0.370BIA+0.081BMI, R^2=0.735, P<0.001). Mean HGS was 24.4 kg and AMMI showed no correlation with the HGS.

Conclusions: Our results showed that AMMI by BIA is reliable but overestimated values were derived from DXA warranting a proper adaptation to obtain accurate measurement.