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Natural Course of Muscle Mass Change and Related Factors in Patients Undergoing Hemodialysis

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Background: Muscle wasting is a common feature found in patients undergoing dialysis. In addition to its impact on quality of life, muscle mass is known to significantly affect mortality and morbidity in hemodialysis (HD) patients. Although measurement of muscle mass has been noticed as a prognostic factor in HD patients, the natural course of muscle mass change over time and related factors are not fully elucidated in this patient group. Therefore, muscle mass alteration was prospectively evaluated and the relationship with demographic and clinical variables was investigated in patients undergoing HD.

Methods: 93 prevalent HD patients were enrolled. The patients were followed-up from January 2011 to December 2015. Total body muscle mass index (MMI) was evaluated by multifrequency bioimpedance using a four-paired electrode bioimpedance device (InBody 720; Biospace, Seoul, South Korea). Bioimpedance analysis was performed after dialysis on a mid-weak dialysis session every 3 months during the study duration. Biochemical and clinical data were also collected. The rate of MMI change over time was determined using least squares linear regression of MMI. The slope was expressed as the regression coefficient.

Results: The mean age of the enrolled patients was 62.2 ± 13.3 years, and 52 (55.9%) patients were male. Diabetes was accompanied in 34 (36.6%) patients. At baseline, the mean MMI was 9.15 ± 1.17 kg/m². During the mean follow-up duration of 49.2 ± 9.9 months, the rate of MMI change was -0.02 kg/m²/month. MMI decrease was found in 63 (67.7%) patients, while MMI increased in 30 (32.3%) patients over time. Multiple linear regression analysis revealed that baseline CRP ($\beta = 0.1$, $P = 0.01$) and albumin ($\beta = -0.28$, $P = 0.04$) levels were significantly associated with the rate of MMI change after adjustments were made for confounding factors. However, no significant relationship was found with normalized protein catabolic rate ($\beta = -0.38$, $P = 0.08$), urea reduction ratio ($\beta = 0.01$, $P = 0.47$), or dialysis vintage ($\beta = 0.02$, $P = 0.24$).

Conclusion: The rate of MMI change over time differs among patients. Chronic inflammation and nutritional status may affect MMI change, while the amount of protein intake or dialysis adequacy may not.

Keywords: Albumin, CRP, Hemodialysis, Muscle mass