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Correlation between nutritional markers and phase angle in patients with end-stage renal disease on hemodialysis

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Objectives:

This study aimed to assess the association between nutritional markers and bioelectrical impedance analysis (BIA)-derived phase angle (PA) in patients with end-stage renal disease (ESRD) and to investigate whether PA can be utilized as a marker reflecting the nutritional status of these patients.

Methods:

We performed a cross-sectional study with 64 adult patients undergoing hemodialysis (HD) for ≥6 months, 42% females, 55% diabetics, with mean age of 61.6±13.7 years and the mean HD duration of 42.8±33.7 months. These patients were categorized into either the lower PA (PA <5.0° for male and PA <4.5° for female) (Group I, n=38) or normal PA groups (Group II, n=26). We measured complete blood count, biochemical markers, dialysis adequacy, geriatric nutritional risk index (GNRI), and hand grip strength (HGS) in both groups.

Results: Group I exhibited significantly higher mean age (p=0.004) and longer dialysis period (p=0.037). The normalized protein nitrogen appearance (nPNA) (p=0.019) and GNRI (p<0.001) were lower in Group I. All of the following parameters were lower in Group I: blood urea nitrogen (p=0.017), creatinine (p=0.003), total cholesterol (p=0.016), total lymphocyte count (TLC) (p=0.001), albumin (p=0.003), prealbumin (p<0.001), transferrin (p=0.003), and insulin-like growth factor-1 (IGF-1) (p<0.001). Although extracellular water/total body water (ECW/TBW) ratio (p<0.001) was higher in Group I, body fat mass (p=0.007) and body mass index (p=0.013) were higher in Group II. PA was positively correlated with TLC (r=0.415, p<0.001), albumin (r=0.555, p<0.001), prealbimin (r=0.721, p<0.001), transferrin (r=0.380, p<0.001), IGF-1 (r=0.550, p<0.001), nPNA (r=0.413, p=0.001), and GNRI (r=0.593, p<0.001). In contrast, a significant negative correlation was found between PA and C-reactive protein (r=−0.353, p=0.004). On multiple regression analysis, prealbumin (p<0.001) and GNRI (p=0.011) were significant independent factors associated with PA.

Conclusions:

These results suggest that PA can be a useful marker for evaluating the nutritional status in patients with ESRD on HD.