Malnutrition assessment in hemodialysis patients: the phase angle as a marker of nutritional status

[1]Cvetka Krel, [2]Jožica Tomažič, [1]Nejc Piko, [3]Robert Ekart, [1]Sebastjan Bevc

[1]Clinic for Internal medicine, Department of Nephrology, University Medical Centre Maribor, Maribor, Slovenia
[2]Clinic for Internal medicine, University Medical Centre Maribor, Maribor, Slovenia
[3]Clinic for Internal medicine, Department of Dialysis, University Medical Centre Maribor, Maribor, Slovenia

Background

Phase angle (PA) obtained from bioimpedance analysis (BIA) has been proposed as a nutritional status marker, with low values ($\leq 4.7°$ in women, $\leq 5°$ in men) associated with malnutrition, higher morbidity and mortality. Malnutrition is common in hemodialysis (HD) patients, some studies showed that the prevalence increases with the duration of HD.

Body impedance analysis (BIA) is the most commonly used method:
- to calculate body composition;
- provides information on fat mass, muscle mass and hydration status, which is especially useful in chronic kidney disease patients (Caravaca et al. 2011, Kyle et al. 2013).

Phase angle (PA) value determined by BIA:
- is an indicator of cell membrane damage and body cell mass;
- lower PA values are associated with increased nutritional risk, higher morbidity and mortality in chronic diseases, cancer and surgical patients (Norman et al. 2012, Varan 2016).
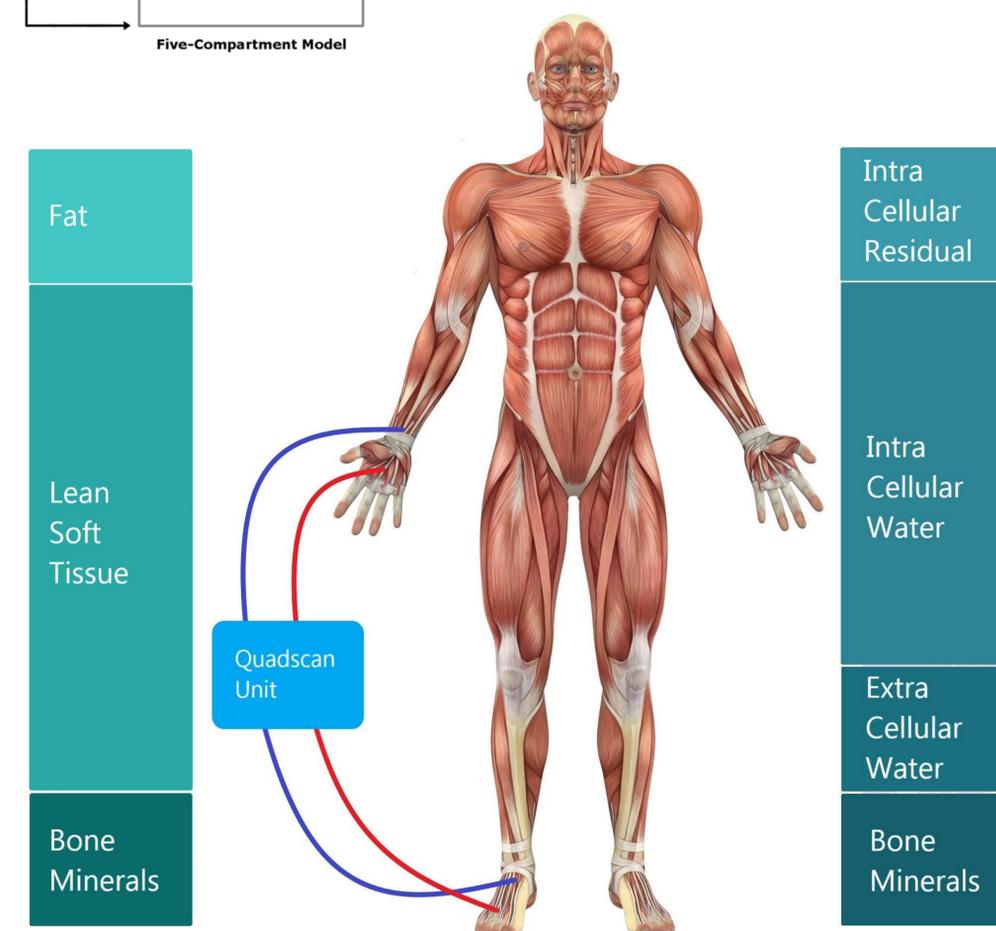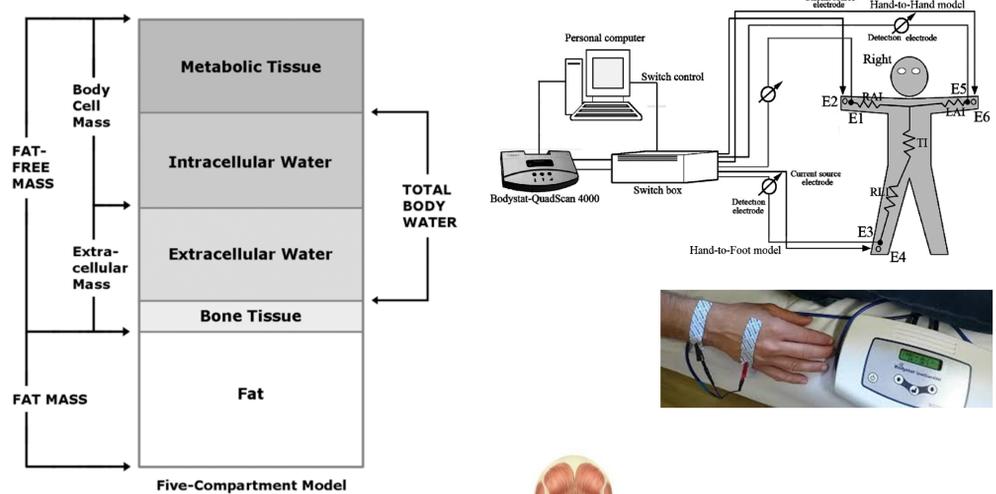
Objectives

The aim of the study was to determine the correlation between different nutritional status markers (PA, body mass index (BMI), serum albumin and Nutritional Risk Screening (NRS) 2002 questionnaire) in HD patients.

Methods

Patients from our outpatient dialysis centre were included in the study. BIA measurements were made in the supine position, 10 minutes before the start of HD. All measurements were made between January 1st, 2018 and February 15th, 2018. Statistical analysis was performed with the SPSS software; values ≤ 0.05 were statistically significant.

Results

40 HD patients (21 men and 19 women, average age 65.4 ± 15.9 years) were included in the study. Lower PA values correlated with lower serum albumin levels (p<0.001), a higher score on the Nutritional Risk Screening (NRS) 2002 questionnaire (p<0.001) and higher age (p<0.001), but not with BMI (p=0.306). We divided our patients into two groups: patients on HD up to 1 year (group 1; N=20) and patients on HD over 10 years (group 2; N=20). Both groups were similar in demographic data, BMI, serum albumin and NRS 2002 score. Patients in group 2, however, had lower values of PA compared to group 1 **(4.8 vs 4.5; p=0.027)**.

Parameter	Patients on HD up to 1 year N = 20 Mean value ± SD	Patients on HD over 10 years N = 20 Mean value ± SD
Age (years)	63.8±19.2	67.2±12.0
NRS 2002	0.95±1.15	1.00±0.80
Serum albumin level (g/L)	38.3±6.1	39.7±3.0
Body mass index (kg/m²)	27.8±5.1	24.8±6.2
Phase angle (°)	4.8±0.3	4.5±0.5

Table 1: Basic descriptive statistics of our included patients.
Legend: SD – standard deviation; NRS- Nutritional Risk Screening

Figure 1: Total body composition and Quadscan unit (https://www.bodystat.cz/quadscan.pdf)

Conclusions

BIA with PA is helpful in identifying malnourished HD patients, and could be routinely performed in every dialysis centre. More attention should be given on recognition, prevention and treatment of malnutrition in HD patients.

Corresponding author: Cvetka Krel
University Medical Centre Maribor, Clinic for Internal Medicine, Department of Nephrology
Ljubljanska 5, SI-2000 Maribor, Slovenia
e-mail: cvetka.krel@gmail.com