FLUID STATUS ASSESSMENT USING BIOELECTRICAL IMPEDANCE ANALYSIS IN ELDERLY HEMODIALYSIS PATIENTS

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Introduction

The amount of elderly patients undergoing hemodialysis (HD) is steadily increasing. Therefore age related problems are gaining more relevance in hemodialysis patients care, one of them is chronic fluid overload. **Aims** of the study were to compare fluid status between young and elderly patients using bioelectrical impedance analysis (BIA) and to evaluate possible risk factors associated with fluid overload in these patients.

Methods

Fluid state post HD of 99 patients

BIA data:
Intracellular (ICW)
Extracellular water (ECW)
ECW/total body water (TBW) ratio
Phase angle (PA)

Routine laboratory results
Subjective Global Assessment scale
Comorbidities

Patients were divided into 2 age groups

young (<65 years) | elderly (>65 years)

Multivariate regression analysis

Risk factors of fluid overload

We conducted an observational study in a tertiary reference hospital. Fluid state of 99 ESRD patients was examined post HD procedure using BIA data, such as intracellular (ICW) and extracellular water, extracellular water (ECW)/total body water (TBW) ratio and phase angle (PA). In addition, routine laboratory results, Subjective Global Assessment scale and various comorbidities and demographics were collected. Patients were divided into 2 age groups: young (<65 years) and elderly (>65 years). Multivariate regression analysis was used to establish risk factors of fluid overload in these groups. **Fluid overload was defined as ECW/TBW ratio above 0,4.**

Results

Mean age of the patients was 58,7 ± 14,4 years, half of them were men 51 (51,4%) with mean time on HD for 4,5 [2,0-8,5] years. 37 (37,4%) of the patients were elderly (Figure 1).

Figure 1. Pie chart of patients distribution by age

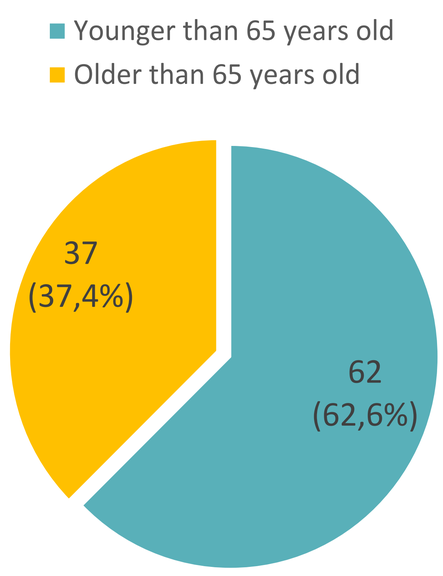


Figure 2. Scatterplot of ECW/TBW ratio to age in years

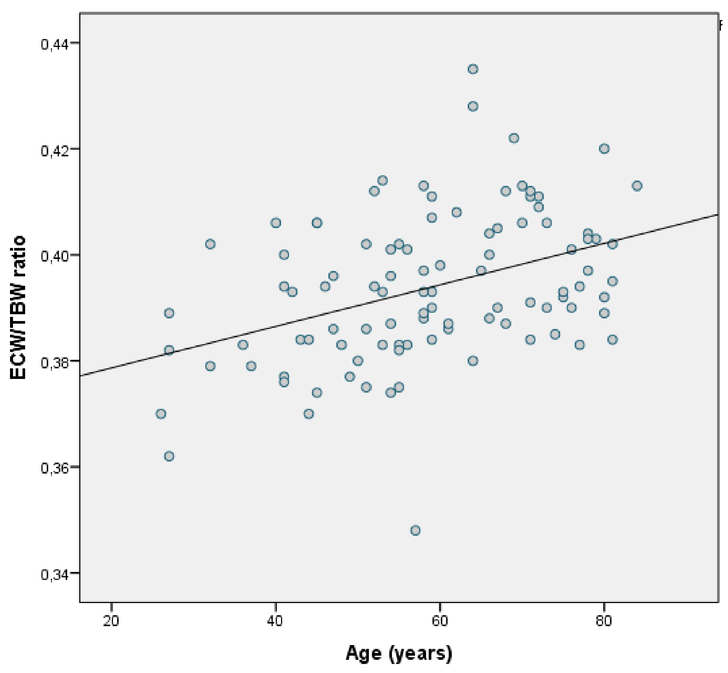


Table 2. Multivariate regression analysis of fluid overload predictors

Factor	Odds ratio (Univariate) Estimate	95% CI	P-value	Odds ratio (Multivariate) Estimate	95% CI	P-value
Patients < 65 years old						
Phase angle	0,014	0,001-0,146	<0,001	0,015	0,001-0,161	< 0,001
Albumin	0,747	0,612-0,912	0,004	n.s.		
Hemoglobin	0,941	0,893-0,993	0,025	n.s.		
Systolic blood pressure after HD	0,952	0,912-0,994	0,025	n.s.		
Patients > 65 years old						
Phase angle	0,001	0,000-0,138	0,005			

n.s., not significant with p value > 0,05;
CI, Confidence interval.

Results

Fluid overload was found in 17 (27,4%) young patients and in 19 (51,4%) elderly patients (p=0,019). Comparison of fluid status among young and elderly patients is presented in Table 1.

Table 1 . Comparison of fluid status among young and elderly patients

	Young	Elderly	P value
ECW/TBW ratio	0,39 ± 0,015	0,40 ± 0,011	0,002
ECW	15,22 ± 3,575	13,61 ± 2,30	0,008
ICW	23,72 ± 5,34	20,45 ±3,37	<0,001
Phase angle	5,22 ± 1,05	4,30 ± 0,86	<0,001
Fluid overload	17 (27,4%)	19 (51,4%)	0,019

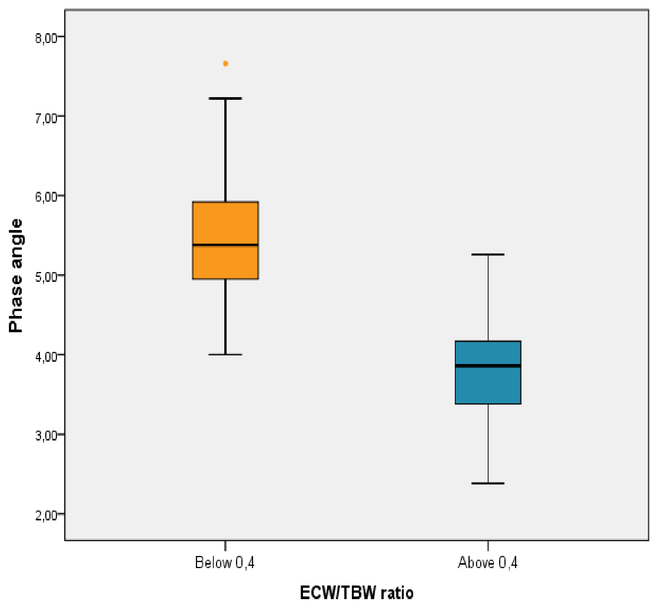
Multivariate regression analysis (Table 2) revealed that fluid overload in both young and elderly patients is best predicted by PA (OR 0,015 per 1 degree, CI 95% 0,001- 0,161, p< 0,001 and OR 0,001 per 1 degree, CI 95% <0,001- 0,138, p= 0,005 respectively).

Conclusion

Fluid overload is more common in elderly HD patients compared to young HD patients.

Phase angle was found as an independent risk factor of fluid overload in both analyzed patient groups.

Figure 3. A boxplot of fluid overload predictor phase angle



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