Bioimpedance analysis and survival of chronic hemodialysis patients

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AIM AND OBJECTIVES

To evaluate relation between body composition, cellular health and 1 year survival of chronic hemodialysis patients:

1. To evaluate differences in 1 year survival between hypervolemia and normovolemia groups;
2. To assess relation of phase angle and one year survival in chronic hemodialysis patients;
3. To analyse body composition and 1 year outcomes in chronic hemodialysis patients.

METHODS

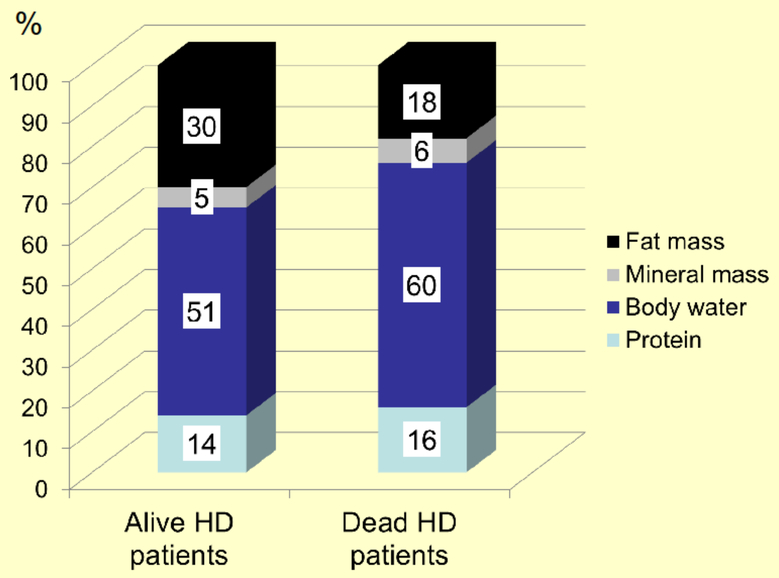
Cross-sectional study included all adult chronic hemodialysis (HD) patients with more than 3 months dialysis vintage dialysed in Hospital of Lithuanian University of Health Sciences in October 2013. Exclusion criteria: amputated limb, electrocardiostimulator, big metal implants. Bioimpedance analysis (BIA) was performed after dialysis session in October 2013 and then patients were followed 1 year for outcomes. Volemia status was evaluated according to ratio of extracellular (ECW) and total body water (TBW) – hypervolemia being higher than 39%, also TBW ratio with weight was evaluated. Phase angle at k50Hz was used as an indicator of cellular health and integrity. Statistical analysis was performed using SPSS packages. Student's t-test, Mann- Whitney -Wilcocson test, Pearson Chi-Sqare test were used to compare the groups of dead and alive patients. Relative risk of death was estimated using Cox regression analysis. Statistical significance assumed at $p<0.05$.

RESULTS

Comparison of dead and alive HD patients groups

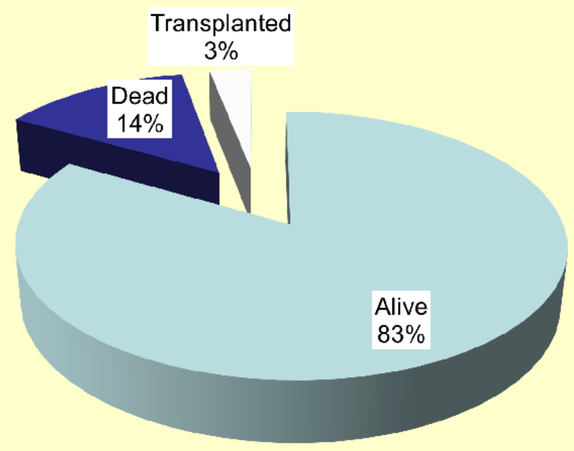
Factor	Alive HD patients	Dead HD patients	p
Age (years)	62.3±17	67.5±14	0.4
Phase angle 50Hz (^{0})	5.2±1.3	4.1±1.5	**0.03**
ECW/TBW (%)	39±1.2	39.4±2.5	0.4
Hypervolemic (ECW/TBW >39%) (%)	42	75	0.08
TBW/body weight (%)	51±10	60±2.5	**0.015**
ECW/body weight (%)	20±4	24±1.7	**<0.01**
BMI (kg/m^2)	26±4.7	22±4.3	**0.017**
Fat mass (%)	30±13	18±9	**0.009**
Fat free mass (%)	70±14	82±9	**0.02**
Mineral mass (%)	5±1	6±0.9	**0.02**

Body composition of dead and alive HD patients



We analysed data of 63 ambulatory hemodialysis patients (32 men and 31 women), mean age 63±16 years. Mean ECW/TBW ratio was 39±1%, TBW/weight 53±1%, phase angle - 5.2±1.02^0, mean fat mass was 29%, protein mass – 14%, mineral mass - 5%, body mass index (BMI) - 25±5 kg/m^2. During 1 year after BIA test 9 patients died, 2 were transplanted. Cox regression curves showed that relative risk of death increased by 1.9 with 1% increase of ECW/TBW ratio (95% CI 1.1-3.3, p=0.02). There were higher percentage of total body water, lower phase angle, lower BMI in dead patient's group as compared to alive. Increase in phase angle by 1^0 lowered relative risk of death by 40% (95% CI 0.22-0.85, p=0.015). Increase of BMI by 1kg/m^2 lowered relative risk of death by 30% (95% CI 0.6-0.9, p<0.01). Survivors had signifficantly higher percentage of body fat and slightly lower percentage of fat free mass as compared to dead patients but this significance was not confirmed by cox regression analysis when evaluating time to death. One percent increase in body mineral mass increased relative risk of death by 2.2 (95% CI 1.3-3.9, p<0.01). Assumption of possibility of lower calcification in survivors could be made but not confirmed in our study.

Outcomes of HD patients after 1 year



CONCLUSIONS

1. Hypervolemia elevated relative risk of death during one year in hemodialysis patients;
2. Phase angle was directly related to survival of chronic hemodialysis patients;
3. Lower body mass index and higher body mineral mass were risk factors for death in chronic hemodialysis patients.

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52 ERA 756--FP

L7) Dialysis. Epidemiology, outcome research, health services research.

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DOI: 10.3252/pso.eu.52era.2015

ePosters supported by F. Hoffmann- La Roche Ltd.

52 ERA EDTA CONGRESS London 2015 UNITED KINGDOM MAY 28 - 31

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