Nutrition, inflammation and survival of chronic hemodialysis patients

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AIM AND OBJECTIVES

Nutritional status is associated with clinical outcomes in dialysis patients. Inflammation may cause malnutrition and increases the risk of poor outcomes.

Aim of the study – to investigate the relationship between body composition, cellular health, nutritional and inflammatory markers, and 2 years survival of chronic hemodialysis patients.

Objectives:

1)To evaluate dynamic of hydration status during 2 years using BIA in chronic hemodialysis patients.

2)To assess relation of cellular health according to phase angle and 2 years survival of chronic hemodialysis patients.

3)To compare nutrition and inflammation markers in survivors and non- survivors.

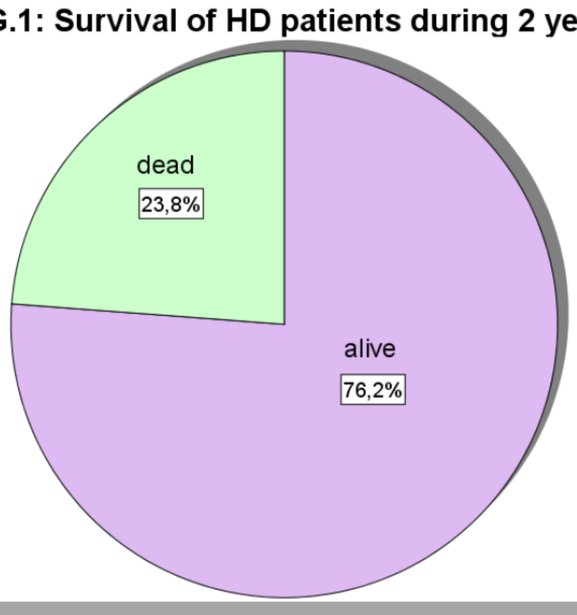
METHODS

Cross-sectional study included all adult chronic hemodialysis (HD) patients (n=63) dialysed in Hospital of Lithuanian University of Health Sciences in October 2013. Bioimpedance analysis (BIA) was performed after dialysis session in all study patients, also main laboratory markers for evaluation of nutrition and inflammation (C-reactive protein (CRP), albumin, transferin, hemoglobin) were performed in October 2013, and patients were followed for outcomes for two years.

Volemia status was evaluated according to ratio of extracellular and total body water – hypervolemia being higher than 39%. Phase angle at 50kHz was used as an indicator of cellular health and integrity. Statistical analysis was performed using SPSS packages. Student‘s t-test, Pearson Chi-Sqare test were used to compare the groups of dead and alive patients. Relative risk of death was estimated using Cox regresion analysis. Statistical significance assumed at $p<0.05$.

RESULTS

FIG.1: Survival of HD patients during 2 years



We analysed data of 63 ambulatory HD patients (32 men and 31 women), mean age 62,9±16,3 years. During 2 years of study 15 (24%) patients died (Fig.1). Patients who survived during this period had lower enrollment CRP (6.3 ±7.7mg/l vs 15±15.2mg/l, p=0.046) (Fig.2), higher phase angle (5.35 ± 1.27^0 vs 4.3 ± 1.17^0, p=0.008) (Fig.3), and were younger (61±17 vs 70 ±13 years, p=0.045) compared to non-survivors. Also 73% of dead patients and only 38% of survivors were hypervolemic during enrollment (p=0.019). Although in our intermediate analysis after one year of follow up survivors had higher body mass index and lower mineral mass than non-survivors, after 2 years of follow-up we did not find relation between body mass index, percent of body fat, fat-free mass, skeletal muscle mass, protein mass, and mineral mass of survivors and non-survivors. Hypervolemia during enrollment increased relative risk of death by 3.3 times (95% CI 1.02-11, p=0.046) (Fig.4). Increase in phase angle by 1^0 lowered relative risk of death by 42% (95% CI 0.24-0.77, p=0.005). There was no difference in serum hemoglobin, albumin, transferin level during enrollment between survivors and non-survivors. Increase in CRP by 1 mg/l increased relative risk of death by 5% (95% CI 1.01-1.09, p=0.006).

FIG.3: Phase angle differences between survival and non-survival groups

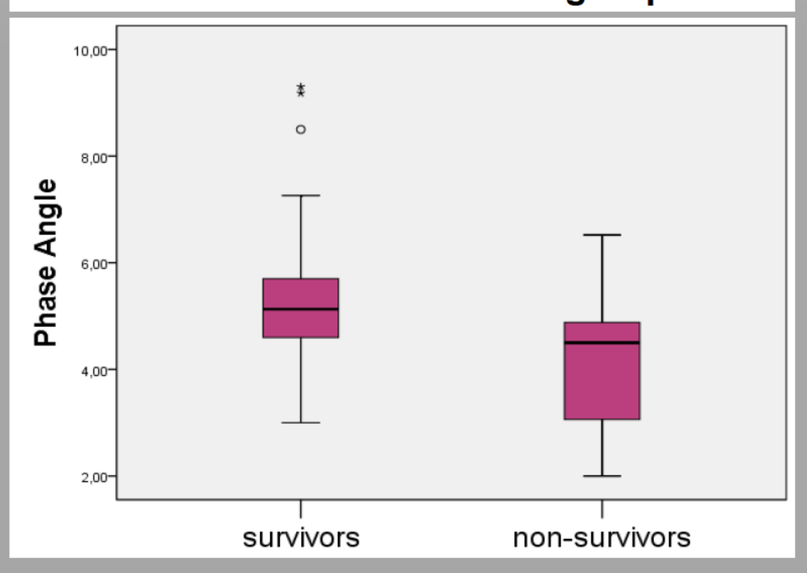


FIG2: CRP differences between two groups

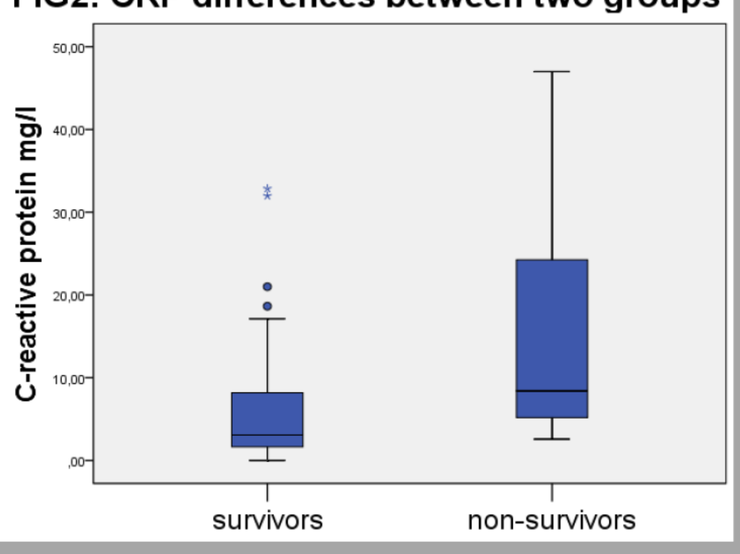
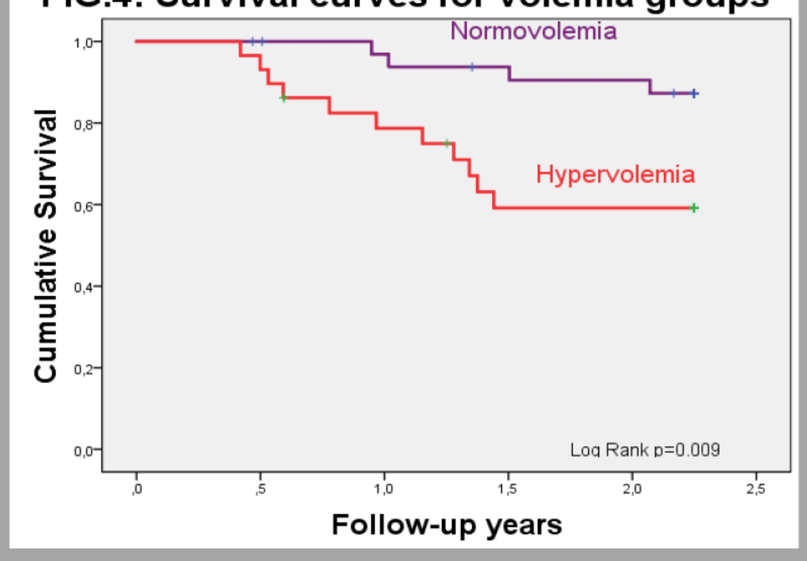


FIG.4: Survival curves for volemia groups



CONCLUSIONS

1. Hypervolemia determined higher risk of death in hemodialysis patients during two years of follow-up, no other body composition parameters were significant;
2. Phase angle, which reflect cellular health, was directly related to survival of chronic hemodialysis patients;
3. C-reactive protein was important indicator of 2-years survival.

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