DO HYDRATION STATE FLUCTUATIONS AFFECT HEMODIALYZED PATIENTS’ RISK OF COMPLICATIONS AND MORTALITY RATE?

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Introduction and Aims: One of the crucial kidney functions significantly impaired in end-stage renal disease (ESRD) is the role in water balance maintenance. Patients undergoing chronic hemodialysis (HD) compose a unique group whose proper hydration state depends both on the residual kidney function as well as the intensiveness of excessive fluid reduction with ultrafiltration. The aim of the study was to analyze the effect of hydration state changes in time on body composition, laboratory markers of poor prognosis and mortality rate among the cohort of patients on chronic HD therapy.

Method: The study was performed on a cohort of 202 patients with ESRD undergoing HD (130 M, 72 F) followed-up for the median time 36.1 months. It was divided into 3 subgroups according to the degree of hydration state changes (expressed as overhydration to total body weight ratio (OH%)) at a distance of 9 months. GrA (56 subjects, 37 M, 19 F, mean age 61,4±15,2) was composed of patients with OH% increase >1%, GrB contained HD recipients with OH%±1% (80 subjects, 56 M, 24 F; mean age 65,7±17,3) and GrC (66 subjects, 37 M, 29 F; mean age 60,5±17,1) with OH% decrease <1%. Serum laboratory indicators measured in parallel with second hydration state analysis featured cardiac troponin T (cTnT) and N-terminal pro-brain natriuretic peptide (NT-proBNP). Body composition including overhydration, body mass index, lean tissue index and fat tissue index was assessed with bioimpedance device. Other considered parameters featured HD ultrafiltration rate (UF), residual daily diuresis (DD) and mean blood pressure (MBP) determined before each HD session.

Results: Our study revealed significant differences in two parameters commonly used as markers of cardiovascular injury - cTnT (GrA 0,082±0,083 vs GrB 0,060±0,074 vs GrC 0,092±0,100 [ng/ml]; p<0,05) and NT-proBNP (17990,7±14850,0 vs 8976,3 ±1104,5 vs 13525,0±13597,0 [pg/ml]; p<0,05). There was no statistically significant difference in mortality rate between studied groups during the follow-up (13 vs 24 vs 21). Traditional risk factors such as age and mean blood pressure (101,5±12,4 vs 101,2 ±11,5 vs 101,4±12,4 [mmHg]) appeared to be independent of the hydration state fluctuations. Moreover, the parameters directly affecting water balance featuring DD (847,2±890,5 vs 938,7±767,5 vs 714,3±715,2 [ml]) and UF (2401,1±1266,6 vs 2392,3 ±995,66±6751 vs 2361,7±1045,3 [ml]) also showed no statistically significant influence on hydration changes. Water balance fluctuations were connected with minor changes in other body composition parameters such as BMI (26,4±4,7 vs 26,9±4,5 vs 25,0±5,3 [kg/m2]; p=0,05), LTI (11,6±3,0 vs 11,9±2,8 vs 12,1±2,9 [kg/m2]; NS) and FRT (15,5 ±5,2 vs 14,2±4,9 vs 12,5±5,7 [kg/m2]; p=0,08).

Conclusions: Our study did not deliver direct proofs of hydration state fluctuations influence on mortality among HD population. We showed no significant benefits of either increase or decrease of hydration. The lowest cardiovascular markers concentration in subgroup with stable water balance (GrB) indicated positive influence of avoiding hydration fluctuations. Maintaining stable in repeated measurements and as low as possible level of overhydration connected with low UF requirement and long-term DD preservation should be recommended.