

Serum zinc values, ankle brachial index and mortality of hemodialysis patients

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Background

Changes in heavy metals may affect the atherosclerotic state of patients on maintenance hemodialysis (HD). The aim of our study was to determine relationship between serum Zinc (Zn) values, ankle brachial index (ABI) as non-invasive diagnostic marker for atherosclerosis and mortality in chronic HD patients.

Material and methods

62 HD patients were enrolled in our study (mean age 61.2 ± 13.8 years, ranged from 30 to 85 years). The ABI was determined using a non-invasive, automated ankle-brachial index measuring device (ABPI MD, MESI[®], Slovenia), based on oscillometric method. Serum Zn values were measured by standard laboratory methods. The patients were divided into two groups using the median value of Zn (14.1 $\mu\text{mol/l}$) as a cut-off and observed until their death or September 5th, 2020 (average time of observation was 2.8 years). Comorbidities, such as arterial hypertension (AH), diabetes mellitus (DM), dyslipidemia, smoking and use of oral nutritional supplements (ONS) were recorded. Survival rates were analyzed using Kaplan-Meier survival curves. The Cox regression model was used to assess the influence of Zn, ABI, AH, DM, smoking, dyslipidemia and ONS.

Results

The Zn values ranged from 9.2 to 23.5 $\mu\text{mol/l}$ and the ABI values ranged from 0.8 to 1.4; majority of enrolled patients (82.3%) had arterial hypertension, 15 (24.2%) patients had diabetes and 23 (37.1%) of them smoke. Using t-test statistically significant difference of ABI values between the groups was found ($p=0.036$). The patients with lower Zn values had lower ABI. Mean survival time of patients with higher Zn values was 985 ± 277 days and in patients with lower Zn values 1055 ± 143 days. Six (19.4%) patients with lower Zn values and five (16.7%) patients with higher Zn values died. Surprisingly, Kaplan-Meier survival analysis showed higher risk of death for patients with higher Zn values in observed period, but statistically insignificant. Moreover, in Cox multivariable regression model, including Zn values, ABI, AH, DM, smoking, dyslipidemia and use of ONS we failed to find any predictor of all-cause mortality in our patients. However, we found that more than 50% of our patient used ONS continuously and independently from Zn values.

Conclusions

The results of our study showed that lower serum Zn levels are associated with lower ABI in HD patients, but we found no impact of Zn values on patient survival. We can assume that the survival of our patients is probably affected by the consumption of Zn-containing ONS. Therefore, further prospective research is needed to confirm our prediction.