10. Abstract

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Title of Doctoral Thesis:

Analysis of the effect of pharmacotherapy on serum Na^+, K^+, Cl^- in a cohort of patients accepted on the internal clinic of VFN Motol in the term from 11.4. 2004 to 25.1. 2005

Background: The electrolyte imbalance is an effect, which is often measured at patients. Pharmacotherapy and factors connected with health of patients can be a source of these imbalances.

Aim: To consider the clinical significancy of the pharmacotherapeutic effect on serum Na^+, K^+, Cl^- of patients and to take into cosideration of health of a patient.

Methods: Biochemical parameters measured at entrance, pharmacotherapy used by patients before entrance into the hospital and health complications were noted from dismissory reports of 557 patients (306 women, 251 men, mean age 71,6 years). We used two statistical methods– Multivariate General linear models and Regress trees - for the statistical evaluation of dependence of serum Na^+, K^+, Cl^- on pharmacotherapy and diagnosis measured at entrance.

Conclusions: Medians of biochemical parameters registered at entrance were: 141,0 mmol/l Na^+, 4,4 mmol/l K^+ a 105,0 mmol/l Cl^-. The most frequent electrolyte disturbance was hyperchloremia (28,7 % of patients), next hyponatremia (17,8 % of patients) and hypokalemia (13,8 % of patients). Hypernatremia was occured in 10,1 % of patients, hyperkalemia in 5,5 % of patients and hypochloremia in 9,6 % of patients.

Evaluation of the relationship between drugs and serum Na^+, K^+ a Cl^- by methods GLM indicated the significant effect of pottasium-sparing diuretics on serum sodium (Sig.= 0,015, η^2=0,011) and serum pottasium (Sig.= 0,002,

η^2=0,018), the significant effect of pottasium-sparing and thiazide diuretics in a combination on serum sodium (Sig.= 0,001, η^2=0,023) and on serum chloride (Sig.= 0,002, η^2=0,018), but not on serum pottasium levels. Derivates of purine had the statistical significant effect on the value of serum chloride (Sig.= 0,026 mmol/l, η^2=0,010), but literary sources don´t refer it. Thiazide diuretics had the significant effect on serum chloride levels (Sig.= 0,044, η^2=0,088). Low molecular weight heparins had the statistical significant effect on serum sodium levels (Sig.= 0,026, η^2=0,009), but literary sources don´t refer this effect. But the effect of low molecular weight heparins on serum Na^+, K^+ a Cl^- generally didn´t evaluate as significant by the method GLM (Sig.= 0,151, η^2=0,01). Antianemics had the statistical significant effect on serum Na^+, K^+ a Cl^- generally (Sig.= 0,035, η^2=0,016), but next evaluation on particular ionts did´t prove significant effects.

Vomiting was the statistical significant factor on the change of levels of all three ionts (effect on Na^+: Sig.= 0,009, η^2=0,030, effect on K^+: Sig.= 0,005, η^2=0,034, effect on Cl^-: Sig.= 0,000, η^2=0,056), if health complications was measured by the method GML. Hepatic cirrhosis was evaluated as significant on serum sodium (Sig.= 0,000, η^2=0,058). So, hyponatremia is often developed at patients with cirrhosis. Renal insufficiency was evaluated as statistical significant on changes of serum chloride levels (Sig.= 0,021, η^2=0,023).

Regress trees compered to GLM can evaluate influences of drug combinations with diagnosis together and select a factor with the strongest effect on the level of the concrete ion. Hepatic cirrhosis had the strongest effect on serum sodium (P-value=0,000), pottasium-sparing and thiazide diuretics in the combination at patients without cirrhosis (P-value=0,001) and pottasium-sparing diuretics at patients without the previous combination and without cirrhosis (P-value=0,000). Breathlessness is the next factor, which influenced serum sodium at patients taking pottasium-sparing and thiazide diuretics in the combination (P-value=0,014). Pottasium-sparing diuretics had the strongest effect on serum pottasium (P-value=0,000) and hyperkalemia was exacerbated by renal insufficiency with elevated blood urea at patients taking these diuretics (P-value=0,006). Vomiting had the most marked effect at other patients (P-value=0,006) and elevated serum creatinine at patients without complication of vomiting (P-value=0,006). Vomiting was evaluated as the most significant factor on serum chloride (P-value=0,001) and derivates of purine at patiens without this complication (P-value=0,004), at who hypochloremia was intensified by taking pottasium-sparing diuretics (P-value=0,004). Pottasium-sparing and thiazide diuretics in the combination had the significant effect on serum chloride at patients without vomiting and derivates of purine (P-value=0,001).

Conclusion: Results demonstrate that the electrolyte imbalance in an organism isn´t the rare phenomenon. Pharmacotherapy and health complications participate on the origin these imbalances. Diuretics often invoke changes of serum electrolyte levels, pottasium suplements can invoke hyperkalemia. These facts are known and our results confirm it. We found the relationship between changes of certain serum electrolyte levels and taking medications from groups of antianemics, low molecular weight heparins (by methods GLM) and derivates of purine (by methods GLM and Regress trees). But this finding does´t correspond to literary sources (Micromedex, AISLP). But the number of patients was small and relationships need further study.