INFLUENCE OF ESSENTIAL AMINO ACIDS KETOANALOGS AND PROTEIN RESTRICTION ON MORPHOGENETIC PROTEINS (FGF-23 AND SOLUBLE KLOTHO) IN CKD PATIENTS

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OBJECTIVES: **The aim of the study was to evaluate the effect of essential amino acids ketoanalogs (EAAK) and low protein diet (LPD) on FGF-23 and Klotho serum levels in CKD patients.**

***METHODS*: The study included 50 nondiabetic CKD stage 3B-4 patients which were divided into 2 groups depending on the type of diet. Group 1 (n=25) got LPD - 0.6 grams of protein/kg of body weight/day and took EAAK - Ketosteril 1 tab./5 kg of body weight /day within 12 observation months; Group 2 (n=25) was comparable to the 1st group by age, sex and GFR reduction degree, also received LPD, but did not take EAAK. Characteristics of the studied CKD patients are presented in Table 1 . FGF-23 (Human ELISA FGF-23 kit with using antibodies to full FGF-23 molecule), alpha – Klotho (Human ELISA alpha KI kit with using anti Klotho antibodies), phosphorus, total calcium and parathyroid hormone (PTH) serum levels were examined, bioimpedance analysis, echocardiography, abdominal aorta radiography in lateral projection and pulse wave velocity were hold to all patients at the screening time and after 12 months follow.**

RESULTS: *After 12 months of the observation none patient of the Group 1 were recorded nutritional status disorders, while in Group 2 five patients marked nutritional disorders: decrease in muscle mass and body mass index (Tabl.1). In addition, CKD patients in Group 1 had lower serum PTH, phosphorus and FGF-23 levels and higher alpha-Klotho serum levels (p<0,05), than Group 2 patients – Tabl.1, fig.1. Heart and aorta calcification, as well as blood vessels damping function violation were detected significantly more [16% vs 8%, p<0,05 and 20% vs 8%, p<0,05 respectively] in 2nd Group patients than in the 1st. Wherein, there was a significant concentric left ventricular hypertrophy degree increase (32% vs. 16%) in Group 2 patients, that was inversely correlated with GFR (r= -0,540; p <0,01).*

	Group 1 (n=25) **LPD + EAAK**		**Group 2** (n=25) **LPD**	
	screening	**past 12 months**	**screening**	**past12 months**
BMI кг/м^2, (M±σ)	19,0±5,7	20,4±6,1	19,5±	18,3±11,4
Body fat mass, %	M18,9±8,9 F 24±9,6	M± 18,6±7,8 F 25±11,2	M 19,0±8,1 F 25±9,6	M 17,7±9,5 F 20±8,9
Body muscle mass, %	M 35±7,3 F 26±9,6	M 35,2±8,2 F 26,3±8,9	M 34,8±8,1 F 25,4±7,9	M 31,6±11,5 F 22±12,1
SBP,mm Hg (M±σ)	150±11,7	140±10,9	145±9,6	155±12,3
DBP, mm Hg (M±σ)	90±9,8	80±8,6	90±9,9	98±9,4
Phosphorus serum level, mg/dl, (M±σ)	5,8±0,9	5,9±0,7	5,2±1,1	6,3±1,0
Calcium total serum level, mg/dl, (M±σ)	9,5±0,8	9,8±0,9	9,6±1,3	8,5±1,9
PTH, pg/ml, (M±σ) FGF-23, pg/ml, (M±σ)	70±11,1 520±11,8	110±12,9 670±13,6	68±15,1 512±15,3	140±16,5* 1025±23,1*
α-Klotho, pg/ml, (M±σ)	322±12,7	645±11,2*	393±15,4	220±9,8
Calcifications in heart valves / person, %	1(4)	2(8)*	1(4)	4(16)**
Violation of the damping function of the arteries, person,%	1(4)	2(8)*	1(4)	5 (20)**
LVG concentric type, person, %	3(12)	4 (16)	4 (16)	8 (32)*

Tabl.1

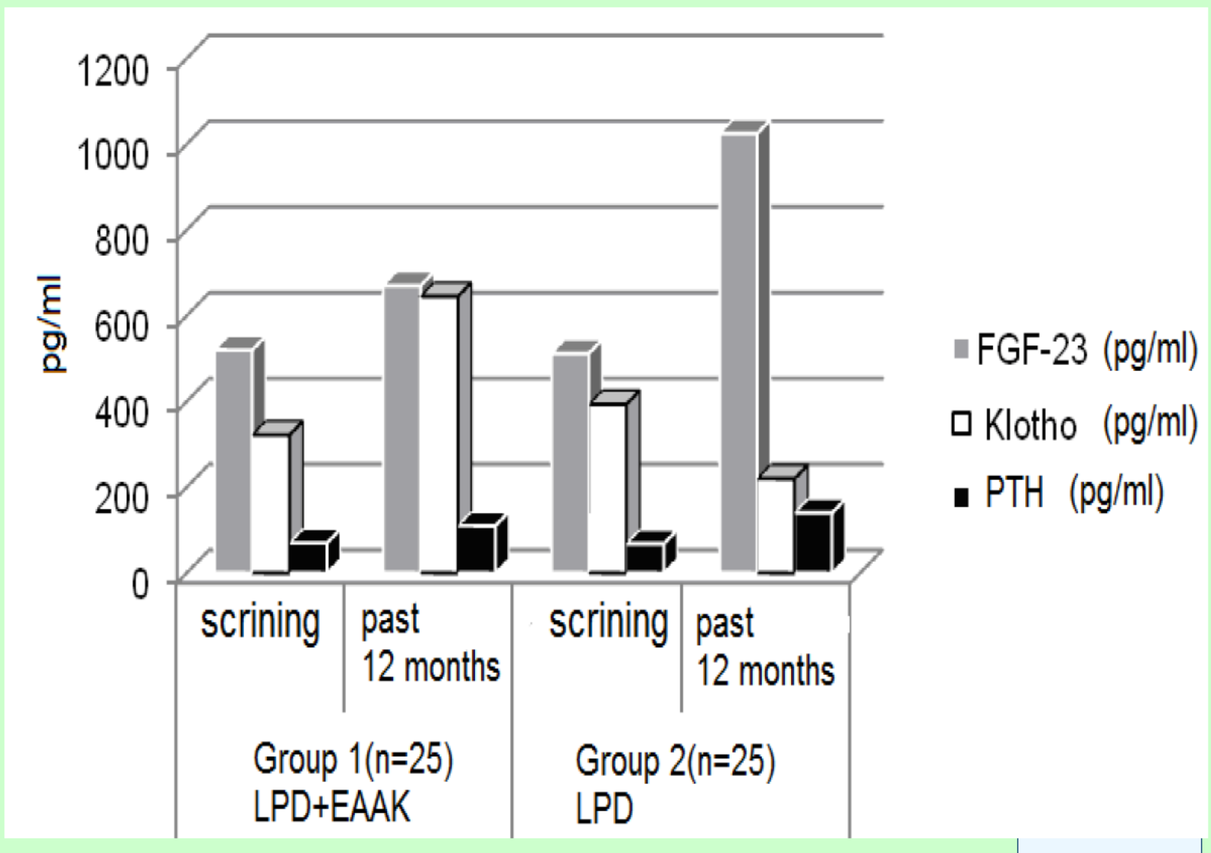

Fig.1

In multivariate analysis, which included such indicators as LPD, LPD+EAAK, calcium carbonate, sevelamer hydrochloride intake, independent factors correlated with increased production of Klotho were LPD+EAAK (Beta=0,47;t=2,39;p= 0,02).

***CONCLUSIONS*: EAAK application in CKD stages 3B-4 patients receiving LPD provides not only prevention of nutritional status violations, but also contributes to a more effective correction of hyperphosphatemia, hypocalcemia, decreasing of FGF-23 and increasing of alpha-Klotho production that led to reduction in both heart and blood vessels calcification and concentric remodeling of the heart.**

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