LOW-PROTEIN DIETS SUPPLEMENTED WITH SOY PROTEIN OR ESSENTIAL AMINO ACIDS AND KETOANALOGUES IN EXPERIMENTAL RENAL FAILURE IN WISTAR RATS

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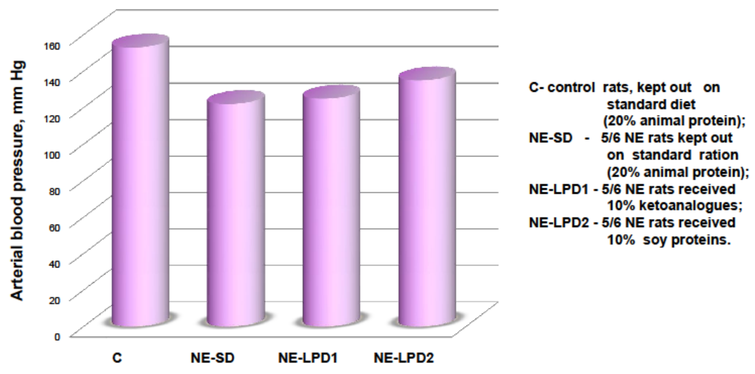
OBJECTIVES

The goal of the study to evaluate the effects of the low-protein diets (LPD), supplemented with soy proteins or essential amino acids/ketoanalogues on blood pressure (BP) level, myocardial hypertrophy and biochemical indices of the severity of uremia in Wistar rats with experimental reduction of renal mass.

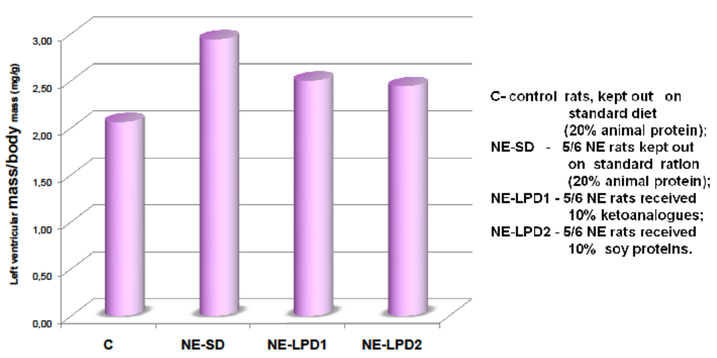
METHODS

The study was performed on adult male Wistar rats (body mass 200-300 g). Model of the renal failure (RF) created by 5/6 nephrectomy (NE). Four groups experimental animals were studied: (1) shame operated rats (control - C) received 20% animal protein (standard diet; n=10); (2) NE rats kept out on standard ration (n=12); (3) NE rats received LPD1 (10% essential amino acids/ketoanalogues; n=9) and (4) NE rats received LPD2 (10% soy protein; n=7). Animals were taken out of the experiment, two mo after NE or sham operation. Blood pressure (BP, mm Hg) was measured in awaked rats by tail cuff method. In blood serum concentrations of urea (Ur, mmol/l), creatinine (Cr, mmol/l), total cholesterol (TC, mmol/l), inorganic phosphorus (Pi, mmol/l), total calcium (Ca, mmol/l) and albumin (Alb, g/l) were determined. The degree of myocardial hypertrophy was assessed by the left ventricular mass index (LVMI): left ventricular mass/body mass (mg/g).
Data are presented as mean±SE. Unpaired Student t-test was used.

Arterial blood pressure in rats with experimental renal failure, received different types diets.



The degree of myocardial hypertrophy in rats with experimental renal failure, received different types diets.



RESULTS

Two mo after NE in rats received a standard diet the levels of Ur (1.60±0.16), Cr (0.06±0.004, Pi (2.59±0.09), TC (1.60±0.12), BP (153.0±3.0) and LVMI (2.94±0.12) were significantly higher than in C (5.64±0.07, $p<0.001$; 0.034±0.004, $p<0.001$; 1.72±0.1; $p<0.001$; 1.34±0.08, $p<0.01$; 122.0±5.0, $p<0.001$; 2.06±0.13, $p<0.01$, respectively). By contrast, the level of Ca (1.92±0.09) in group (2) was lower than in C (2.35±0.15, $p<0.05$). In the NE rats kept out on LPD1 or LPD2 Ur (7.5±0.75 and 11.49±0.69, respectively) and Pi (2.09±0.07; 2.10±0.006, respectively) were significantly lower than in C ($p<0.001$ in all cases). In the same groups Ca did not differ from C (2.39±0.15, p=NS and 2.43±0.07, p=NS, respectively). In group (3) Ur value was less than in group (4); $p<0.01$. In NE animals received LPD1 or LPD2 levels of TC (1.44±0.17 and 1.49±0.07, respectively) were comparable with C (p=NS in both cases). The same was observed in respect Alb (LPD1 *vs* C: 29.0±1.59 and 26.44±1.18, p=NS; LPD2 *vs* C: 27.4±0.87 and 26.44±1.18, p=NS). BP in groups (3) and (4) were significantly lower in comparison the NE rats kept out on standard diet (125.0±5.0 and 135.0±3.0; $p<0.01$ in both cases). LVMI in groups (3) and (4) were less than in C.

CONCLUSIONS

Our results suggest that LPD, supplemented with soy proteins or essential amino acids/ketoanalogues in experimental RF exhibit cardioprotective and antihypertensive effects, prevent secondary hyperparathyroidism, lipid metabolism disturbances and not induce the protein-energy wasting. LPD, supplemented with essential amino acids/ketoanalogues more effective for prevention serum urea level rise than LPD, supplemented with soy proteins.

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