THE IMPACT OF DIETARY FRUCTOSE INCREASE ON MARKERS OF KIDNEY INJURY AND INFLAMMATION IN UNINEPHRECTOMIZED RATS.

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OBJECTIVES

Excessive intake of fructose, primarily from added sugars, has emerged as a risk factor for hyperuricemia, hypertension, metabolic syndrome and kidney disease. Proximal tubular cell in response to fructose release pro-inflammatory mediators such as monocyte chemoattractant protein (MCP-1), which lead to macrophage infiltration of tubulo-intersitial tissue. Thus fructose consumption may contribute to the progression of chronic kidney disease (CKD).
This study was designed to evaluate effects of diet containing 10% or 60% fructose on markers of kidney injury and serum pro-inflammatory cytokines in rats with experimental model of CKD induced by unilateral nephrectomy.

METHODS

Male Wistar rats (386±40 g) underwent one-side kidney nephrectomy to induce experimental model of CKD. Animals were further assigned to 3 different diets protocol: RD – regular with fructose concentration <3%, F10 - 10% fructose in drinking water and F60 – 60% fructose as pellets (Harlan). After 8 weeks of experiment serum concentration of creatinine (Cr), fructose (F), uric acid (UA), soluble intercellular adhesion molecule (sICAM) and homocysteine (HCY) were measured. Additionally protein to creatinine ratio (PCR), N-Acetyl-(D)-Glucosaminidase (NAG) to urinary creatinine ratio (NAG) and MCP-1 to urinary creatinine ratio (MCP-1), urinary uric acid excretion (UAE), sodium excretion (NaE) and creatinine clearance (CrCl) in a 24-hour urine collection were assessed.

RESULTS

Animals did not differ in total calories intake per day between groups at the end of diet protocol.
Results are presented as mean ± SD in Table.

	RD	F10	F60	P Anova
Fructose [mg/dl]	0,68±0,20	0,81±0,32	0,87±0,61	NS
Urine output [ml/day]	15,8±5,23	55±28,20	24±10,97	<0,05
CrCl [ml/min]	2,24±0,34	2,73±0,72	2,32±0,40	NS
Uric Acid [mg/dl]	1,53±0,30	1,48±0,19	1,31±0,20	NS
sICAM [ng/ml]	19,29±8,20	20,2±5,10	16,54±4,50	NS
HCY [µmol/l]	5,7±1,54	5,91±1,62	8,16±1,46	<0,01
UAE [mg/day]	1,45±0,42	1,82±0,47	2,54±0,95	<0,05
NaE [mg/day]	23,3±8,16	56,4±42,12	70±12,90	<0,05
PCR [mg/mg of Cr]	15±5,10	22,5±1,87	27,71±2,69	<0,05
MCP-1 [ng/mg of Cr]	3,1±1,70	1,2±0,90	3,6±2,10	ns
NAG [U/g of Cr]	19,9±6,90	17,46±4,81	23,48±10,19	ns

CONCLUSIONS

Increasing dietary fructose consumption in uninephrectomized rats was associated with prominent increase of systemic inflammatory mediators as HCY, proteinuria and increased uric acid and sodium excretion in urine. These factors may contribute in further progression of CKD.