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Introduction & Objectives: High-protein and -fat diets correlate positively with the occurrence of glomerular damage. However, there is little information on the effects of the association between lipids and simple carbohydrates (in a cafeteria diet - CAF) on the ultrastructure of kidneys. We aimed to evaluate, by quantitative and qualitative methods, the glomerular ultrastructure in Wistar rats fed a cafeteria diet.

Materials & Methods: Male Wistar rats were divided into two groups at 21 days of age: control (C, n=10) and cafeteria diet (CAF, n=8). The animals were followed up until five months of age, followed by euthanasia. The blood, kidneys, and fat deposits - epididymal, retroperitoneal, and subcutaneous - were extracted and analyzed. Fragments of kidneys' cortex were analyzed by scanning electron microscopy (SEM) and by transmission electron microscopy (TEM). Data were analyzed by Student's t test and $p < 0.05$ was considered statistically significant.

Results: Food intake was similar between the groups and the groups showed no difference in weight gain throughout the experiment. However, the CAF diet increased the deposits of retroperitoneal fat (8.91 ± 3.40 g) when compared to the control (5.02 ± 1.26 g, $p = 0.0036$). The CAF diet promoted glucose intolerance and hyperglycemia at 5 months of age. Moreover, serum glucose levels remained significantly higher in the CAF group (16.22 ± 5.62 mmol/L) compared to the control (10.47 ± 4.32 mmol/L, $p = 0.0361$). However, cafeteria diet did not modify the serum levels of total cholesterol HDL-C, triacylglycerol, and insulin of the CAF group compared to controls. The qualitative analysis of the length of the feet of the podocytes by SEM showed a similar result between the two groups, which was corroborated by the statistical analysis (C: 0.19 ± 0.09 μ m; CAF: 0.14 ± 0.06 μ m, $p = 0.2200$). MET measurements showed a marked reduction of glomerular basement membrane thickness in the CAF group (126.50 ± 6.76 nm) and a tendency to reduce the length of the feet of the podocytes by glomerular basement membrane segment (273.60 ± 12.69 nm) when compared to control (147.40 ± 10.41 nm, $p = 0.0159$; 328.30 ± 30.50 nm, $p = 0.1359$; respectively).

Conclusions: The cafeteria diet promoted glucose intolerance, hyperglycemia ($p < 0.0001$), and deposition of retroperitoneal fat ($p < 0.005$). The quantitative analyses by transmission electron microscopy revealed that the cafeteria diet reduced the thickness of the glomerular basement membrane ($p < 0.05$). The intake of lipids and simple carbohydrates were found to be associated with alteration in the glomerular ultrastructure.

Supported by CNPq and Faperj grants