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Title: Oxidative stress and urinary system damage in fructose-induced rat model of metabolic syndrome: Effect of calorie restriction and exercise

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Abstract: The aim of this study was to investigate the effects of calorie restriction (CR) and swimming exercise (SW) on oxidative injury in kidney and bladder tissues, in rats with metabolic syndrome (MS). 3-months old rats were divided into five; Control, MS, MS+CR, MS+SW, MS+CR+SW. The metabolic syndrome model was created using 10% fructose solution in drinking water for three months. Afterwards, SW and 40% CR were applied for six weeks. Blood glucose measurements were performed at the beginning, the third month and the end of experiment. After decapitation, blood, kidney and bladder samples were collected. Cytokine levels, antioxidant and oxidative stress parameters were examined. There was a remarkable change in blood glucose levels in MS+CR+SW group. Fructose-induced increased TNF-alpha and decreased ADP levels in plasma were reversed in CR, SW, and CR+SW groups. MDA levels were increased, while SOD and ADP levels were decreased in renal and bladder tissues in MS group. CR and SW significantly reversed all parameters in both tissues. Moreover, caspase activity increased in both tissues in MS group. CR decreased the caspase activity in kidney tissue, and in bladder tissues caspase activity significantly decreased with both CR and SW. Western blot analysis showed an increased caspase-3 protein expression in both tissues which was reversed by CR, SW, and CR+SW. The results of our study showed that MS disrupts the balance of pro/anti-inflammatory cytokines in plasma and causes oxidant damage in urinary tissues. Calorie restriction and exercise are protective against the damage caused by MS.

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