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Effects of the melatonin on the kidney of high fat diet fed obese rats: A stereological and histological approach

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ABSTRACT

Obesity has become a major global health concern, and its incidence has increased sharply in recent years. It has been shown that obesity or metabolic syndrome is a strong and independent risk factor for cardiovascular disease that causes mortality and for the development of micro albuminuria and end-stage renal disease. Also, obesity should be considered the most important risk factor for chronic kidney disease because of its strong association with diabetes and hypertension, the two most common etiologies of end stage kidney disease. Melatonin has very close direct and indirect correlation with kidney functions. The aim of this study; was to examine effects of fatty diet induced obesity and melatonin on kidney in female rats by histological and stereological methods. This study was including 4 groups: Non-obese control, obese control, non-obese melatonin and obese-melatonin groups. Kidneys of all animals of groups were prepared and staining with Hematoxylin-eosin for stereological and light microscopic analysis. The volume of kidney was calculated Cavalieri methods and the number of glomeruli was analyzed by physical dissector. The volumes of the kidney cortex and medulla of control and obese groups were not seen significant difference among the groups. The mean numerical density of glomeruli for the obese group was significantly decreased in comparison to the control group. But melatonin treatment leads to a significant increase of glomeruli number in obese-melatonin group after fatty diet induced obesity. Glomeruli, vessels, tubules and interstitial structures were normal in the nonobese-control and nonobese-melatonin group. However, in the obese-control group, there was eosinophilic cytoplasm in distal and proximal tubules in the cortex. The hydropic degeneration in distal and proximal tubules was widely observed. Also the lumens of the tubules and Bowman's space were enlarged and mononuclear cell infiltration was seen in the renal cortices of the obese rats. Degeneration in nephrons, including glomerulosclerosis and segmental necrosis was found. There was cellular debris in the cortex of the kidneys removed from the obese control group. After melatonin application no pathological finding was detected in light microscopical section of obese-melatonin group. Histological structure of kidneys of the rats in the obese-melatonin group was smilar to those of the healthy control ones in the nonobese-control group. These study provided that melatonin has a protective effect on the kidney structure in terms of morphometrical parameters which are number of glomeruli and glomerular morphology in fatty diet induced obese rat model.

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