Selenium Levels in Dimethylnitrosamine Induced Hepatic Fibrosis in Rats

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Selenium is an integral component of glutathione peroxidase, a potent scavenger of free radicals and reactive oxygen species (ROS) that damage cellular membrane integrity. A decreased anti-oxidant status and diminished serum selenium levels were observed in patients with alcoholic liver cirrhosis. The aim of the present investigation was to evaluate serum and liver selenium levels as well as glutathione peroxidase in experimentally induced hepatic fibrosis in rats. Hepatic fibrosis was induced by intraperitoneal injections of dimethylnitrosamine (DMN) in doses of 1 mg/100 g body weight on 3 consecutive days of each week over a period of 21 days. A set of control and treated animals were sacrificed on days 7, 14, and 21 after the start of DMN administration. The liver sections were subjected to histopathological examination to evaluate the degree fibrosis. Glutathione peroxidase activity was assayed in serum and liver homogenate. Selenium present in serum and liver samples was quantified by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) after acid digestion and hydride generation of selenium with sodium borohydride. Histopathological examination demonstrated intense neutrophilic infiltration, bile duct hyperplasia, Mallory's hyaline within cytoplasm, apoptosis of hepatocytes, dysplasia, bridging necrosis and extreme centrilobular necrosis. Masson's trichrome staining depicted well developed fibrosis with deposition of collagen fibers and early cirrhosis. A marked decrease was observed in glutathione peroxidase activity in both serum and liver tissue on all days studied. Similarly, selenium levels were significantly reduced in both serum and liver tissue on days 7, 14, and 21 during the study. The maximum decrease of selenium was observed on day 21 in both serum and liver. A highly significant correlation was observed between decreased glutathione peroxidase and reduced selenium levels in both serum and liver tissue. The results of the present study indicate that glutathione peroxidase and selenium play significant roles in pathogenesis of hepatic fibrosis.

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