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EVALUATION OF THE HEPATOTOXICITY OF CYLINDROSPERMOPSIN IN WISTAR RATS

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Abstract

A naturally derived cyanotoxin, cylindrospermopsin (CYN) present in freshwater systems is considered as a threat to human health due to its ability to induce hepatotoxicity. The present study aims to determine the hepatotoxicity of CYN on mammalian liver by using male Wistar rats, as the experimental model. Thirty-five healthy eight-week-old male Wistar rats were used for the study. The rats were divided into five groups (n=7 in each), including the control group. Test groups were orally treated with three doses of CYN (0.175 µg kg^{-1}, 0.140 µg kg^{-1} and 0.105 µg kg^{-1}). Well water, collected from Padaviya area (0.161 µg kg^{-1}) was given to the environmental exposure group (EN) and distilled water was administered to the control group. Body weight was recorded at every week throughout the experiment. The total duration of exposure of the rats was 90 days, once a day. Blood samples were collected at 0, 7, 14, 28, 42, 60, 90 days. Aspartate Amino Transferase (AST) and Aspartate Alanine Transferase (ALT) were analysed. Following the completion of 90-day dosing, animals were anaesthetized, weighed (g) and the liver resected out with minimum trauma. The rats were later euthanized. According to the results, the mean body weight of the treated and the control groups of rats gradually increased until the 90th day. A statically significant reduction ($p<0.05$) in increment of bodyweights was observed in treated groups at 12 and 13 weeks in comparison to the control. The absolute and relative weights of liver of the treated groups were significantly lesser ($p<0.05$) than the control group. The highest AST and ALT concentrations were recorded in rats treated with CYN at the dose of 0.175 µg kg^{-1}. The hepatocytes showed ballooning degeneration, kupffer cell hyperplasia, lobular haemorrhage and necrosis, dilated central vein with perivenous inflammation in EN (0.161 µg kg^{-1}). Lobular haemorrhage and necrosis, lobular inflammation, Lobular haemorrhage, sinusoidal congestion and centrilobular haemorrhage and necrosis were prominent in 0.175 µg kg^{-1} group. The lobular inflammation and necrosis were in 0.140 µg kg^{-1}. Lobular inflammation and central vein dilatation and surrounding inflammation were in 0.105 µg kg^{-1} group. All histological features were normal in the control group. The results of this study suggest that prolonged exposure to CYN is associated with histologically subtle and variable liver injury.

Keywords: *Cylindrospermopsin (CYN), Wistar Rats, AST, ALT, histopathology*