Ineffectiveness of Cholic Acid and Cyprinol Sulfate on the Toxicity of Streptozotocin in Rats

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ABSTRACT

The possible effects of bile acid and bile alcohol on the visual acuity of streptozotocin (STZ)-induced hyperglycemia male Wistar rats were investigated. Forty-eight rats were divided into two groups, STZ and non-STZ, and intraperitoneally injected with STZ (60 mg/kg body weight in 0.6 mL of saline) and saline (0.6 mL) on day 1, respectively. After 4 days of STZ treatment, all the rats were tested for glycosuria and then divided into four groups. Each group had 6 rats and the rats were treated orally every 3 days with saline and the nontoxic dosages of cholic acid (37 mg/kg) and cholic acid (74 mg/kg) combined with cyprinol sulfate (37 mg/kg). At the end of the 29-day experiment, the results revealed that the relative ratios of liver and kidney weight to body weight, the concentrations of RBC, hemoglobin and hematocrit in the blood, as well as the levels of AST, ALT, ALP, BUN and creatinine in the plasma of the rats were not significantly different. However, the levels of plasma glucose and liver thio- and other indicators (plasma glucose, liver TBARS and vitamin A) related to visual acuity were not significantly influenced when the rats were treated with cholic acid alone or combined with cyprinol sulfate in the STZ or non-STZ group. The results indicated that both cholic acid and cyprinol sulfate could not influence the toxicity of STZ in rats.

Key words: cholic acid, cyprinol sulfate, bile acid, streptozotocin, toxicity

INTRODUCTION

In traditional Chinese medicine, the gallbladder is an important crude drug, which includes the bile of bears, cows, grass carp (Ctenopharyngodon idella), common carp (Cyprinus carpio), snakes and chickens. The bile is thought to induce antitussive and hypotensive actions and enhance visual acuity. However, a survey of toxic fish in China by Ng and Kum(1) showed that the number of cases of food poisoning from the ingestion of fish gallbladders is only second to eating pufferfish. Fresh-water fish are bred in many areas of the world as a source of food. In many areas of the world as a source of food is a concern for people eating fish gallbladders. The extraction of toxic substances from grass carp bile has been performed(2-5) and it is generally agreed that poisoning occurs through the action of a group of bile alcohols or acids found in the bile of this family of fish(6). There have been many studies on the structures and pharmacological effects of bile and gallstone components, especially the bile of bear and snake, in which C-24 bile acids such as cholic acid and chenodeoxycholic acid are major components(7). In contrast, less work has been done on the chemical elucidation of bile alcohol, such as cyprinol, which is a major component of the Cyprinidae family(6,8). The major component by weight (> 94%) in the bile of common carp and grass carp was cyprinol sulfate, while cholic acid, chenodeoxycholic acid and lithocholic acid accounted for less than 5%(6,13). It has been reported that the ingestion of bile juices, especially carp bile juice, causes severe toxic effects in humans(3). In some severe cases, the ingestion of raw carp bile causes death of experimental animals, due to a decrease in blood pressure and an increase in plasma potassium, hydrogen ions, blood urea nitrogen and hematocrit(14). The toxin in carp bile is identified as 5α-cyprinol sulfate (5α-cholestane-3α, 7α, 12α, 26, 27-pentol 26-[or 27]-sulfate), an alcohol specific to carp bile(10). Cyprinol sulfate is suggested to be the causative agent of...