Protective Effect against D-galactosamine Induced Acute Liver Injury by *Lactobacillus rhamnosus* HPR-1™ and Its Subacute Oral Toxicity Assessment in ICR Mice

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Background and Aims: Acute liver injury is serious clinical conditions that are sometimes observed in patients with multiple organ failure. A number of genera *Lactobacillus* have been reported to demonstrate hepato-protective activity both *in vivo* and clinically. This study was to evaluate the influence of pretreatment with *Lactobacillus rhamnosus* HPR-1™ to mice with acute liver injury induced by the injection of D-galactosamine. *Silybum marianum* and LGG were used as positive control and reference control respectively in this study. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were test as the sensitive markers of hepatic damage.
Methods: Twenty-five female ICR mice (6 weeks old, weighted from 20 to 25 gm) were average randomly divided into five groups. *L. rhamnosus* HPR-1™ and *L. rhamnosus* ATCC53103 (LGG) was previously prepared as 1×10^9 cells /ml. ICR mice in HPR-1 group, ATCC 53103 group, and positive control group received 0.4 ml of HPR-1 （4×10^8 cells /mice/day）, LGG（4×10^8 cells /mice/day）, and *Silybum marianum* （150 mg/kg/day）respectively. Negative control which was not inducing liver damage by D-galactosamine and normal control both received 0.4 ml sterile water. All groups were orally treated with the test materials once daily for one week via intragastric gavages. Diet and water were given *ad libitum* during the study period. Acute liver injury was induced on the 8th day by intraperitoneal injection of 400 mg/kg D-galactosamine. Blood samples were collected from each mouse 24 h after induction of liver injury. After centrifugation of the blood (1000 g, 10 min), serum alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels in aortic blood were measured.
Results and Discussion: Pretreatment with *Lactobacillus rhamnosus* HPR-1™ significantly suppressed the increased ALT level when compared with negative control（$p<0.05$）. Mice in HPR-1 group demonstrated the tendency of less increase in the levels of ALT and AST than those in silymarin group and LGG group insignificantly. Probiotics exerted hepatoprotective influence on acute liver injury [3]. *Lactobacillus rhamnosus* HPR-1™ may decreased the enteric bacteria translocation and exerted nitric oxide defense mechanism in clearance of the translocated bacteria; and moreover inhibited the production of pro-inflammatory cytokines [1-4]. These effects could have worked in harmony to produce the general protective influence against acute liver injury which we have observed in this study.