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Hepatoprotective activity of a polyherbal formulation against CCl_4 induced acute hepatotoxicity in ICR mice

A M Abeysekera[1*], K A A U Karunarathna[1], U G Chandrika[2], B Senevirathna[3], C Padumadasa[1] and T M S G Tennakoon[4]
[1]*Department of Chemistry, University of Sri Jayewardenepura, Nugegoda*
[2]*Department of Biochemistry, University of Sri Jayewardenepura, Nugegoda*
[3]*Department of Pathology, University of Sri Jayewardenepura, Nugegoda*
[4]*Link Natural Products (Pvt) Ltd, Colombo 02*

Hepatoprotective efficacy of a polyherbal preparation, formulated by an expert panel of Ayurvedic physicians at Link Natural Product (Pvt) limited, was studied in carbon tetrachloride (CCl_4) induced dysfunction in male Institute of Cancer Research (ICR) mice by determining the following biochemical parameters: alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (AP), albumin (ALB) and total bilirubin (TB) in serum. The histopathological changes in the liver were also observed. The animals received the isopropyl alcohol:water (70:30 v/v) extract of the polyherbal formulation that consists of 14 herbs: *Andrographis paniculata (*bim kohomba)*, Eclipta alba* (keekiridiya)*, Phyllanthus amarus* (pitawakka)*, P. emblica* (nelli), *Piper longum (*thippili)*, Terminalia chebula* (aralu)*, T. bellerica (*bulu), *Tinospora codifolia* (rasakida)*, Curcuma longa (*kaha)*, Glycyrrhiza glabra* (welmee)*, Boerrhavia diffusa (*pita sudu sarana)*, Osbekia octandra* (heen bovitiya)*,Tephrosia purpurea* (kathuru pila) and *Vernonia cinerea (*monara kudumbiya) at two different doses (160 and 240 mg/kg body weight). Experimental animals (six groups with six animals in each) were treated with either the plant extract suspended in 0.25% carboxymethyl cellulose (CMC) or CMC alone once daily for 7 consecutive days followed by a single intraperitoneal administration (IP) of CCl_4 in olive oil (0.08 ml/kg body weight) or olive oil alone to induce the hepatic damage. Single IP administration of CCl_4 showed significant elevation in the serum biochemical parameters: AST, ALT, AP and TB levels (6398.9 ± 457.0 IU/L, 5868.3 ± 744.7 IU/L, 118.08 ± 36.75 IU/L and 0.53 ± 0.08 mg/dL respectively) and confluent necrosis in the liver (49% cellular damage) of the pathological control group. However the pretreatment with the polyherbal formulation reduced hepatocellular necrosis as well as the serum AST, ALT, AP and TB levels. The higher degree of protection was observed with the dose at 160 mg/kg body weight of the herbal preparation. This group showed reduced serum levels of AST, ALT, AP and TB (656.5 ± 161.9 IU/L, 1376.8 ± 298.2 IU/L ,93.56 ± 21.85 IU/L and 0.33 ± 0.02 mg/dL respectively) and focal necrosis in the liver (12% cellular damage). However, the pretreatment with the formulation or induction of the toxicity with CCl_4 caused no significant changes in serum ALB level compared to the controls ($p > 0.05$). Hence, the results suggest the possibility of the present polyherbal formulation to stabilize the structural integrity of hepatocytes and reduce the biliary dysfunction of the mice liver against CCl_4 induced acute toxicity.

Keywords: Biochemical parameters, CCl_4, hepatoprotective activity, histopathological changes, polyherbal formulation

ajitabey@gmail.com Tel: 0112758462