

Methanol extract of *Muntingia calabura* leaves attenuates CCl₄-induced liver injury: possible synergistic action of flavonoids and volatile bioactive compounds on endogenous defence system

ABSTRACT

Context: *Muntingia calabura* L. (Muntingiaceae) exerts antioxidant and anti-inflammatory activities, thus, it might be a good hepatoprotective agent.

Objective: This study investigates the effect of methanol extract of *M. calabura* leaves (MMCL) on hepatic antioxidant and anti-inflammatory activities in CCl₄-induced hepatotoxic rat.

Materials and methods: Sprague Dawley rats (n = 6) were treated (p.o.) with 10% DMSO (Groups 1 and 2), 50 mg/kg N-acetylcysteine (Group 3) or, 50, 250, or 500 mg/kg MMCL (Groups 4–6) for 7 consecutive days followed by pretreatment (i.p.) with vehicle (Group 1) or 50% CCl₄ in olive oil (v/v) (Groups 2–6) on day 7th. Plasma liver enzymes and hepatic antioxidant enzymes and pro-inflammatory cytokines concentrations were measured while liver histopathology was examined.

Results: MMCL, at 500 mg/kg, significantly ($p < 0.05$) ameliorated CCl₄-induced hepatotoxicity by decreasing the plasma level of alanine transaminase (429.1 versus 168.7 U/L) and aspartate transaminase (513.8 versus 438.1 U/L) as well as the tissue level of nitric oxide (62.7 versus 24.1 nmol/g tissue). At 50, 250, or 500 mg/kg, MMCL significantly ($p < 0.05$) reduced the tumour necrosis factor α (87.8 versus 32.7 pg/mg tissue), interleukin-1 β (1474.4 versus 618.3 pg/mg tissue), and interleukin-6 (136.7 versus 30.8 pg/mg tissue) while increased the liver catalase (92.1 versus 114.4 U/g tissue) and superoxide dismutase (3.4 versus 5.5 U/g tissue). Additionally, qualitative phytochemicals analysis showed that MMCL contained gallic acid, ferulic acid, quercetin, and genistein.

Discussion and conclusions: MMCL ability to attenuate CCl₄-induced hepatotoxicity could be helpful in the development of hepatoprotective agents with fewer side effects.

Keyword: Muntingiaceae; Hepatoprotective activity; Antioxidant activity; Oxidative stress markers; Pro-inflammatory mediators; Phytoconstituents; UHPLC-ESI; GCMS