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Effect of ninhydrin on the biochemical and histopathological changes induced by ethanol in gastric mucosa of rats

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Abstract

Studies on the effect of ninhydrin in the normal gastric mucosa and against the ethanol induced gastric injury were undertaken in rats in view of the presence of a carbonyl function as well as hydroxyl groups in its chemical structure. In spite of its potentials to generate hydroxyl radicals, it is deemed to possess antioxidant property by virtue of its electrophillic nature. Recent studies have shown gastroprotection to mediate through a reaction between the electrophillic compounds and sulfhydryl groups of the mucosa. Hence it was found worthwhile to evaluate the interaction between the oxidant and antioxidant functions in the structure of the same compound. The effects of ninhydrin pretreatment on gastric mucosal injuries caused by 80% ethanol, 25% NaCl and 0.2M NaOH were investigated in rats. The gastric tissue in ethanol-treated rats was analyzed for different histopathological lesions. In addition, the effects on ethanol-induced changes in the gastric levels of proteins, nucleic acids, non-protein sulfhydryl (NP-SH) and malondialdehyde (MDA) were also evaluated. Ninhydrin, as such, failed to induce any significant changes in normal gastric mucosa, while its pretreatment at oral doses of 5, 10 and 20 mg/kg was found to provide a dose-dependent protection against the ulcers induced by ethanol, NaOH and NaCl. The results of histopathological evaluation revealed a protective effect of ninhydrin on congestion, hemorrhage, edema, erosions and necrosis caused by ethanol. Furthermore, the pretreatment afforded a dose-dependent inhibition of the ethanol-induced depletion of proteins, nucleic acids, NP-SH and increase of MDA in the gastric tissue. The results obtained clearly demonstrate the anti-ulcerogenic activity of ninhydrin. The exact mechanism of action is not known. However, the carbonyl function in ninhydrin appears to achieve antioxidant balance and protect the gastric mucosa from the ethanol-induced gastric injury. Further studies are warranted to investigate the toxicity and detailed mechanism of action of this potent compound before any clinical trials, especially at the effective lower doses.

Keywords: Ninhydrin; Gastroprotection; Histopathological and biochemical effects

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