Anti-inflammatory effect of the ether extract and major fraction of Physalis peruviana calyces in acute TNBS-induced colitis

L.A. Franco\textsuperscript{1}, V. Motilva\textsuperscript{2}, Y.C. Ocampo\textsuperscript{1}, L.F. Ospina\textsuperscript{3}

\textsuperscript{1}University of Cartagena, Faculty of Pharmaceutical Sciences, Biological Evaluation of Promissory Substances Group. 130015, Colombia, \textsuperscript{2}University of Sevilla, Department of Pharmacology. School of Pharmacy. 41012, Spain, \textsuperscript{3}National University of Colombia, Department of Pharmacy. 11001, Colombia

Physalis peruviana L. (Cape gooseberry) is a member of the Solanaceae family widely used in traditional medicine for the treatment of malaria, asthma, hepatitis, dermatitis and rheumatoid arthritis. Extracts of this plant have showed relevant antioxidant and anti-inflammatory activities (Wu et al. 2006; Franco et al. 2007). The aim of the current study was to investigate the anti-inflammatory effect of the petroleum ether extract and the corresponding major fraction of \textit{P. peruviana} calyces on the acute experimental TNBS-induced colitis in rats. The inflammatory response was determined by quantifying the macroscopic and microscopic damage, myeloperoxidase activity (MPO) and tumor necrosis factor (TNF-\(\alpha\)) levels in colon mucosa. Rats treated with TNBS developed severe colitis characterized by black necrotic zones, edema, deep ulcerations, hemorrhage and a significant increase in the weight/length of the rat colon, an indicator of inflammation. At the histological level was observed colonic mucosa ulceration, the architecture of the crypts was distorted and the lamina propria was thickened in peripheral areas of distorted crypts, as well edema and infiltration of inflammatory cells. Enhancement in myeloperoxidase activity and TNF-\(\alpha\) levels compared to the control group, was also observed. Treatment with the ether extract of \textit{P. peruviana} calyces (125 mg/kg/day i.p.) did not show signs of toxicity \textit{in vivo} and demonstrated a significant protective effect of intestinal damage induced by TNBS, reducing edema, extent of colonic tissue damage, ulceration and hyperemia. Based on these promissory results, this extract was fractionated by chromatographic procedures. The major fraction obtained from the ether extract of \textit{P. peruviana} (10 mg/kg/day i.p.), constituted by the mixture of two new sucrose esters, attenuated the macroscopic damage to the colon, reduced significantly the weight/length of the rat colon, and prevented the disturbances in morphology associated to TNBS treatment with significant reduction of inflammatory cells in the crypts, submucosa and muscular layer. Colonic injury induced by TNBS administration was characterized by an increase of TNF-\(\alpha\) level in the inflamed colon (90.0 \(\pm\) 8.3 compared to 13.1 \(\pm\) 1.5 pg/mg tissue in the control group), and enhancement in MPO compared to the control (4.50 \(\pm\) 0.34 and 1.03 \(\pm\) 0.06 U/mg tissue, respectively) indicating an extensive neutrophil infiltration into inflammatory tissue. Intraperitoneal administration of TNBS-rats with the major fraction of \textit{P. peruviana} significantly reduced the levels of TNF-\(\alpha\) (66.4 \(\pm\) 6.2 pg/mg of tissue, \(p<0.05\) vs. TNBS group), but did not reduce the degree of leukocyte infiltration. In conclusion, the results of our study indicate that treatment of animals with the major fraction of \textit{P. peruviana} reduced the inflammation and the colonic damage induced by rectal instillation of TNBS. This affirmation was supported by macroscopic, microscopic, and biochemical data. This is the first report showing a putative pharmacological effect of the extract and an enriched fraction from \textit{P. peruviana} calyces in an experimental model of TNBS-induced ulcerative colitis.

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References:
