Effect of Perilla frutescens var. acuta Kudo and rosmarinic acid on allergic inflammatory reactions.

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Abstract

Allergy is characterized by an overreaction of the immune system. Perilla frutescens leaf extract has been reported to exhibit antiallergic inflammatory activity. To investigate precisely the effect and mechanism of 30% ethanol extract powder of P. frutescens var. acuta Kudo (EPPF) and rosmarinic acid (RA), a component of EPPF in allergic rhinitis and rhinoconjunctivitis, the antiallergic effects of EPPF and RA were analyzed using in vivo and in vitro models. Cytokine production was analyzed by means of an enzyme-linked immunosorbent assay. Cytokine expression was analyzed via reverse transcription-polymerase chain reaction and Western blotting. Transcription factor and caspase-1 activity were analyzed by a luciferase assay and caspase-1 assay, respectively. The number of nasal, ear and eye rubs after an ovalbumin (OVA) challenge in OVA-sensitized mice was significantly higher than that in OVA-unsensitized mice. Increased number of rubs was inhibited by administration of EPPF or RA. Increased levels of IgE in the serum, spleen and nasal mucosa of OVA-sensitized mice were reduced by EPPF or RA administration. The histamine level was also reduced by EPPF or RA administration in the serum of OVA-sensitized mice. Protein levels and mRNA expressions of interleukin (IL)-1β, IL-6 and tumor necrosis factor-α were inhibited by EPPF or RA administration in the nasal mucosa tissue or spleen of OVA-sensitized mice. In EPPF or RA-administered mice, the mast cell and eosinophil infiltration increase as caused by OVA-sensitization was decreased. In addition, EPPF or RA inhibited both cyclooxygenase-2 protein expression and caspase-1 activity in the same nasal mucosa tissue. In activated human mast cells, nuclear factor-kappa B (NF-xB)/Rel A and caspase-1 activation increased, whereas NF-xB/Rel A and caspase-1 activation was inhibited after a treatment of EPPF or RA. These results indicate that EPPF and RA ameliorate allergic inflammatory reactions such as allergic rhinitis and allergic rhinoconjunctivitis.

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