Assessment of the mechanistic role of cinnarizine in modulating experimentally-induced bronchial asthma in rats

Abstract

Background: Bronchial asthma, a globally ascending chronic inflammatory airway disease, represents a true healthcare challenge. Calcium influx, inflammatory infiltration, cytokine production, immunoglobulin E activation and oxidative stress play co-ordinated roles in its pathogenesis.

Objective: We aimed to assess the protective effect, as well as the underlying mechanism, of the calcium channel blocker cinnarizine against experimentally-induced bronchial asthma in rats.

Material and methods: Bronchial asthma was induced by ovalbumin (OVA) sensitization and challenge. Rats were allocated into a normal control group, an asthma control group, a dexamethasone (standard) treatment group, and two cinnarizine treatment groups (lower and higher dose levels). The respiratory functions tidal volume (TV) and peak expiratory flow rate (PEFR), the inflammatory cytokines tumor nectosis factor-alpha (TNF-α) and interleukin-5 (IL-5) in lung tissue, the allergic immunoglobulin IgE in serum, the absolute eosinophil count (AEC) in bronchoalveolar lavage fluid (BALF), as well as the oxidative and nitrosative markers glutathione reduced (GSH) and superoxide dismutase (SOD) in lung tissue and nitric oxide end products (NOx) in BALF were assessed. A histopathological study was performed to confirm the results of numerical estimations.

Results: Cinnarizine administration in the higher dose level significantly restored TV, PEF, TNF-α, IL-5, IgE, AEC, GSH, SOD and NOx values back to normal levels. Both doses of cinnarizie significantly decreased perivascular and peribronchiolar inflammatory scores.

Conclusion: Cinnarizine may protect against experimental bronchial asthma. Suppressant effect on pro-inflammatory cytokines release, IgE antibody production, eosinophil infiltration as well as on oxidative and nitrosative stress may explain its anti-asthmatic potential.

Key words

Airway remodeling, Bronchial asthma, Calcium, Cinnarizine, Dexamethasone, Rat