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Cardiovascular effects of ginger aqueous extract and its phenolic constituents are mediated through multiple pathways

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Abstract

Ginger is a world known food plant which is equally reputed for its medicinal properties. We report here the hypotensive, endothelium-dependent and independent vasodilator and cardio-suppressant and stimulant effects of its aqueous extract (Zo·Cr). Zo·Cr, which tested positive for saponins, flavonoids, amines, alkaloids and terpenoids, induced a dose-dependent (3.0–10.0 mg/kg) fall in the arterial blood pressure (BP) of anaesthetized rats which was partially blocked by atropine (1 mg/kg). In isolated endothelium-intact rat aorta, Zo·Cr (0.01–5.0 mg/ml) relaxed the phenylephrine (1 μM)-induced contractions, effect partially blocked by atropine (1 μM). Zo·Cr inhibited the K^+ (80 mM)-induced contractions and also shifted the Ca^{++} dose-response curves to the right, similar to verapamil, indicating Ca^{++} antagonist activity. An atropine-resistant and L-NAME-sensitive vasodilator activity was also noted from ginger phenolic constituents 6-, 8- and 10-gingerol, while 6-shogaol showed a mild vasodilator effect. In guinea-pig atria, Zo·Cr (0.1–5.0 mg/ml) inhibited the force and rate of atrial contractions. Pretreatment with atropine blocked the inhibitory effect and a stimulatory effect was unmasked which was resistant to propranolol and verapamil but sensitive to ryanodine, blocker of Ca^{++} release from intracellular stores. Later at doses ≥1.0 mg/ml, the extract completely suppressed the atrial tissue, effect resistant to glibenclamide, pyrilamine, aminophylline and L-NAME. These data indicate that the aqueous ginger extract lowers BP through a dual inhibitory effect mediated via stimulation of muscarinic receptors and blockade of Ca^{++} channels and this study provides sound mechanistic basis for the use of ginger in hypertension and palpitations.

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Keywords

Ginger; Hypotensive; Cardioactive; Cholinergic; Calcium antagonist; Gingerol

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