

**PHYTOCHEMICAL COMPOSITION AND PHARMACOLOGICAL
PROSPECTS OF *Perovskia botschantzevii***

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Perovskia botschantzevii Kovalevsk. & Koczka., belonging to the *Perovskia* Kar. genus, is one of the relatively understudied aromatic, nectar-producing, and essential oil-bearing plants occurring in the flora of Central Asia. *P. botschantzevii* is distributed in southern Tajikistan and in the Surkhandarya–Hissar region of Uzbekistan, where it grows on dry, rocky mountain slopes, gravelly foothills, and the lower elevations of the Jizzakh–Nurata mountain ranges. To identify and isolate the biologically active constituents present in this native plant material and to provide a scientific basis for the development of effective pharmaceutical agents and biologically active dietary supplements, a comprehensive phytochemical investigation of the plant was carried out.

Using chromatographic separation and purification techniques, the aerial parts and roots of *P. botschantzevii* were found to contain 11 phenolic acids and flavonoids, 11 abietane- and norabietane-type diterpenoids, 8 oleanane- and ursane-type triterpenoids, and 3 phytosterols. The chemical structures of these compounds were elucidated based on UV, ¹H and ¹³C NMR spectroscopic data, together with HSQC, HMBC, and COSY experiments. For several compounds, the molecular and three-dimensional structures were further confirmed by X-ray crystallographic analysis.

The abietane- and norabietane-type diterpenoids identified in *P. botschantzevii* Kovalevsk. & Kochka. possess highly oxygenated tricyclic C₂₀ skeletons and are biosynthesized from geranylgeranyl pyrophosphate. Compounds isolated from the plant include ferruginol, carnosol, rosmadial, methoxyrosmanol, tanshinone IIA, cryptotanshinone, przewalskin, sugiol, nimbiol, perangustine, and salviamone B. In addition, oleanane- and ursane-type triterpenoids were identified, which are biosynthesized via the mevalonate pathway through the enzymatic cyclization of 2,3-oxidosqualene. The occurrence of both diterpenoids and triterpenoids indicates that this species is rich in isoprenoid-derived secondary metabolites.

Phytochemical studies have demonstrated the presence of phenolic acids and flavonoids in the aerial parts and roots of *Perovskia botschantzevii*. Identified bioactive compounds include caffeic acid, rosmarinic acid, nepetoidin B, luteolin, kaempferol, cirsiol, taxifolin (dihydroquercetin), quercetin, hesperidin, and cirsimaritin.

The anti-inflammatory activity of a triterpenoid mixture was evaluated in male rats weighing 180–200 g using a formalin-induced acute inflammation model. Antiphlogistic activity was assessed based on the inhibition of paw edema measured by oncometry. The triterpenoid mixture was administered orally at a dose of 10 mg/kg, with diclofenac used as the reference drug. Three hours after induction of inflammation, the triterpenoid mixture reduced paw edema by 31.1%, whereas diclofenac produced a 26.8% reduction. These findings indicate that the triterpenoid mixture possesses significant anti-inflammatory activity. Moreover, it inhibited both the exudative and proliferative phases of inflammation and exhibited greater anti-inflammatory efficacy than diclofenac in both phases.