



## STUDYING THE ANTI-INFLAMMATORY PROPERTIES OF *SALVIA OFFICINALIS*

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**Relevance:** Inflammation is one of the body's defense mechanisms that develops as a response to infection, injury, or other adverse effects. At the same time, chronic inflammatory processes are considered an important pathogenetic factor in the development of atherosclerosis, diabetes mellitus, arthritis, and even oncological diseases. In recent decades, scientific research has shown great interest in natural bioactive substances, particularly extracts from medicinal plants, as potential sources of anti-inflammatory agents. *Salvia officinalis* L. (sage) belongs to the Labiatae family and has been used for centuries in European and Asian folk medicine to heal wounds, treat respiratory infections, reduce pain, and as an anti-inflammatory agent. Current molecular and pharmacological studies demonstrate that rosmarinic acid, carnosic acid, carnosol, and ursolic acid found in sage leaves confirm their therapeutic significance through anti-inflammatory and antioxidant properties. These compounds have been found to reduce the expression of inflammation mediators—NF- $\kappa$ B, COX-2, iNOS, and various pro-inflammatory cytokines (IL-1 $\beta$ , IL-6, TNF- $\alpha$ ). Although chemically synthesized anti-inflammatory drugs (e.g., steroids, NSAIDs) are effective in pharmaceutical and clinical pharmacology, their long-term use may lead to numerous adverse effects (gastrointestinal damage, hepato- and nephrotoxicity, immune system disorders). Therefore, developing anti-inflammatory agents from natural sources, including medicinal plants like sage, is an important scientific task.

**Purpose of the study:** To investigate the mechanisms of action of *Salvia officinalis* on inflammatory processes and evaluate its medicinal potential.

**Methods:** Scientific articles and literature were used to highlight the research.

**Results:** The leaves of *Salvia officinalis* are rich in phenolic acids (rosmarinic acid, caffeic acid), diterpenoids (carnosic acid, carnosol), triterpenoids (ursolic acid, oleanolic acid), and monoterpenoid components of essential oil ( $\alpha$ - and  $\beta$ -thujone, 1,8-cineole, camphor). These bioactive substances are the main sources of anti-inflammatory and antioxidant effects. Animal studies have shown that sage extracts produce significant anti-inflammatory and analgesic effects in various inflammation models (such as carrageenan-induced edema, formalin tests). Carnosol and ursolic acid have been proven to reduce abdominal and joint inflammations. Topical application: Ointments and gels based on sage have reduced swelling, redness, and cell infiltration in skin inflammations, eczema, and dermatitis models. In clinical practice, sage tea or mouth rinses have been effectively used in stomatitis and gingivitis. Clinical observations: Large-scale clinical trials in humans on inflammatory diseases are still lacking.

**Conclusion:** *Salvia officinalis* (sage) has significant anti-inflammatory biological activity, and the molecular mechanisms of its main active components—rosmarinic acid, carnosic acid, carnosol, and ursolic acid—have been scientifically proven. These compounds act by suppressing pro-inflammatory pathways such as NF- $\kappa$ B, COX-2, and iNOS and enhancing antioxidant defenses. Invitro and invivo studies have shown that sage extracts reduce cytokine production, tissue swelling,



and cell infiltration during inflammation. Clinical observations have also recorded beneficial results in dental inflammations and some symptomatic conditions.