



PHYTOCHEMICAL ANALYSIS AND BIOLOGICAL ACTIVITY OF *TAMARIX* *RAMOSISSIMA*: A REVIEW

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Relevance: *Tamarix ramosissima* is a shrub plant widely distributed in arid regions. In recent years, its chemical composition and pharmacological properties have been investigated, which opens prospects for the development of new phytopreparations. Phytochemical analysis confirms the presence of flavonoids, phenolic compounds, terpenoids, alkaloids and saponins in the plant, which determines its biological activity.

PURPOSE: To review the phytochemical properties of *T. ramosissima* and its biological activity in order to assess the prospects of its use in pharmacy and medicine.

Materials and Methods: The review is based on the analysis of scientific publications from PubMed, Scopus, Web of Science and Google Scholar. Methods of isolation and identification of active compounds (*thin-layer chromatography (TLC)*, *high-performance liquid chromatography (HPLC)*, *gas chromatography-mass spectrometry (GC-MS)*) as well as studies of antioxidant, antimicrobial, anti-inflammatory and cytotoxic properties of *T. ramosissima* are reviewed.

Results: Phytochemical analysis of *T. ramosissima* revealed the content of flavonoids (up to 3.5% of dry weight), phenolic compounds (up to 2.8%), and saponins (1.2%). The antioxidant activity of the ethanolic extract is 78.5% by DPPH test, which is comparable to that of ascorbic acid.

Antimicrobial activity was confirmed against *Staphylococcus aureus* (18 mm growth suppression zone), *Escherichia coli* (15 mm zone), *Pseudomonas aeruginosa* (12 mm zone) and *Candida albicans* (10 mm zone). Phenolic compounds (gallic acid, quercetin) and flavonoids (kaempferol, rutin) have an effect by damaging the membranes of pathogens and inhibiting their enzymes.

Anti-inflammatory effect is associated with inhibition of the production of pro-inflammatory cytokines (*IL-6*, *TNF-α*) by 35-40%. Studies have shown that *T. ramosissima* extracts reduce malonic dialdehyde (MDA) levels by 25%, indicating its antioxidant potential. The active compounds of the plant were also found to inhibit the activity of COX-2 and 5-LOX enzymes, which confirms its anti-inflammatory effects. In addition, the extracts contribute to the stabilization of lysosomal membranes, reducing the secretion of inflammatory mediators.

In vitro cytotoxic studies have shown that *T. ramosissima* extract reduces the viability of HeLa cell line by 45% at a concentration of 100 µg/mL, and induces apoptosis of A549 (lung cancer) cell line by 50% at a concentration of 200 µg/mL. In studies on a carcinoma model in mice, a 30% reduction in tumor volume was observed when the extract was orally administered at a dose of 50 mg/kg for 14 days. Further *in vivo* studies are needed to determine its therapeutic potential in the treatment of cancer.

Conclusions: *Tamarix ramosissima* is a promising source of biologically active compounds. Further research is aimed at standardizing the phytochemical composition, studying the mechanisms of action of its active components, as well as conducting *in vivo* studies to clarify the



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pharmacokinetics and safety of compounds for their potential use in the development of new drugs for the therapy of inflammatory and oncological diseases.