



**STUDY ON PHYTOCHEMICAL AND PHARMACOLOGICAL  
ACTIVITY OF MISWAK TREE SALVADORA PERSICA  
(SALVADORACEAE)**

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**Abstract:**

*Salvadora persica* belongs to family Salvadoraceae also known as "Miswak" or "tooth brush tree" and is locally called as "Khari Jaal" in Rajasthan. It is an important source of various types of chemical compounds as well as pharmacological activities. The present paper is an attempt to provide a detailed botanical description, classification, phytochemical study of the plant.

**Key Words:** Medicinal, Ayurveda, Phytochemical, Antibacterial & Antiplasmodial

**Introduction:**

Man has long been using various plants to avert pain, cure diseases and to provide relief from health problems. Literature review revealed that ancient people and old cultures over ages knew the use of several medicinal plants to help in curing a disease state. In primitive medical history based on human efforts, trials, and errors, some natural toxic products were also recorded [1], [2]. The medicinal plants are extensively utilized throughout the world in traditional system of medicines "Ayurveda" [3]. On the planet earth, according to one report, more than 258,650 species of higher plants and round about similar number of lower plants exist but not more than 10% of higher plants species are in medicinal use [4]. India is rich source of medicinal plants and is called "Botanical Garden of the World" with enormous wealth of biodiversity. There are almost 45,000 plant species recorded in India so far [5] of which 7,500 species have been used for medicinal purposes [6]. Importance of the plants basically originates due to the presence of specific biological active classes of organic compounds [7]. The concentration of these classes, however, varies from specie to species and region to region of plants. *Salvadora persica* Linn belongs to family Salvadoraceae, also known as Miswak or tooth brush tree. "Miswak" (synonyms in different Arabic dialects and countries include "miswaak," "misswak," "miswaki," "meswak," "mswaki," "sewak," "siwak," and "siwaki") is an Arabic word meaning tooth-cleaning stick [8]. It is used for the cure and care of mouth and teeth. *Salvadora persica*, a medium-sized, upright evergreen small tree or shrub, is commonly called as "khari jaal" in Rajasthan. It is a characteristic desert tree of the Indian arid zone [9]. Together with other species (*S. oleoides*) these are the only plants that keep their green foliage even during the hot summers [10]. The leaves are smaller and more in number in *S. persica* compared to *S. oleoides*. In some natural habitats *Salvadora* can form up to 10 percent of the local vegetation [11].

**Taxonomy:**

Kingdom	=	Plantae
Division	=	Magnoliophyta
Class	=	Magnoliopsida
Order	=	Brassicales
Family	=	Salvadoraceae
Genus	=	Salvadora
Species	=	<i>Salvadora persica</i>

**Vernacular Name:**

Common name	=	Toothbrush tree
English	=	Mustard tree
Hindi name	=	Miswak, Jhal, Chhota pilu, Kharjal
Rajasthan	=	Khari jaal
Gujarat	=	Piludi, Motijal
Arab	=	Arak

**Chemical Constituents:**

*Salvadora persica* Linn plant contains more than 10 different natural chemical compounds considered essential for good oral and dental hygiene. They are fluorides, silica, tannic acid, resins, alkaloids (salvadorine), volatile oils (simgrins), sulfur, vitamin C, sodium bicarbonate, chlorides, calcium, benzyloisothiocyanate (BIT), salicylic acids, sterols, trimethylamine, saponins, and flavonoids [12]. El-Mostehy *et al.* [13] found the

following chemical substances: Trimethylamine, an alkaloid, chlorides, high amounts of fluoride, silica, sulfur, vitamin C, tannins, saponins, flavonoids, and sterols. The roots and bark of the *S. persica* tree are composed of 27% ash; a high ratio of alkaloids, such as salvadorine and trimethylamine; chlorides and fluorides; moderate concentrations of silica, sulfur, and vitamin C; and small quantities of tannins, saponins, flavonoids, and sterols [14], [15], [16]. High amounts of sodium chloride and potassium chloride were noted, along with other sulfur-containing organic substances (salvadourea and salvadorine).

#### **Pharmacological Activity:**

##### **Antibacterial Activity:**

Studies have indicated that *S. persica* contain substances that possess plaque inhibiting and antibacterial properties against several types of cariogenic bacteria which are frequently found in the oral cavity. The growth and acid production of these bacteria are thus inhibited [17].

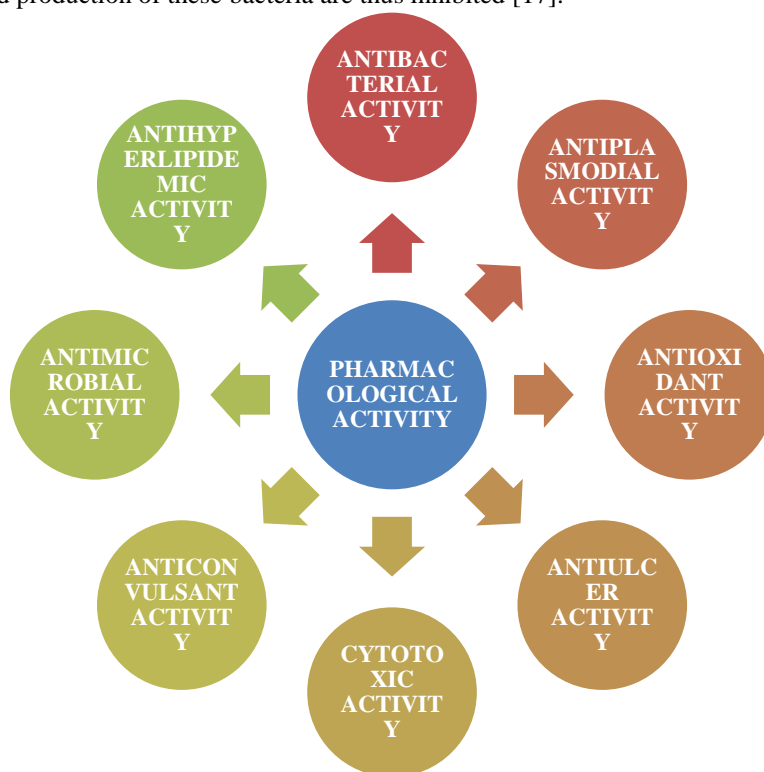


Figure: Pharmacological activity of *S. persica*

##### **Antiplasmodial Activity:**

Ethnobotanical investigations led to the selection of 19 plant species, used traditionally in Sudan against malaria and similar tropical diseases, for further studies of antiplasmodial activity of *S. persica*. The antiplasmodial activity of the different extracts of *Salvadora persica* against *P. falciparum* NF54 strain were found to be 0.6 microg/ml (stems) and 0.7 microg/ml (leaves) [18].

##### **Antioxidant Activity:**

The antioxidant activity of the bark, leaves, and the seed cake phenolic extracts of *Salvadora persica* using the  $\beta$ -carotene-linoleic acid assay were investigated by Mariod et al. [19]. They found 2 dominant tocopherols ( $\alpha$ -tocopherol, and  $\gamma$  tocopherol) in the seed oil of *Salvadora persica*. These compounds display antioxidant properties and are active as vitamin E, which makes them particularly important for human health [20].

##### **Antiulcer Activity:**

The antiulcer activity of decoction of *S. persica* has been reported against ASA-induced ulcer in rats. The ulcer index significantly decreased after the treatment with a lyophilized decoction of *S. persica* (500 mg/kg, os), once daily for 7 days, with respect to controls. Moreover, *S. persica* decoction possesses significant anti-inflammatory activity [21]. The other study was designed to confirm the antiulcer activity of *S. persica* decoction using optical microscopy. The elements of gastric mucosa tended to be reestablished normally in treated rats [22].

##### **Cytotoxic Activity:**

The cytotoxic activity of *S. persica* and CHX was evaluated by Rajabalian et al. in 2009. The results indicated that both persica and CHX mouthwashes were toxic to macrophage, epithelial, fibroblast, and osteoblast cells in a concentration-dependent manner [23].

**Anticonvulsant Activity:**

The effect of *S. persica* as an anticonvulsant was identified by using stem extracts. The stem extracts show the potentiating of sodium pentobarbital activity and on generalized tonic-clonic seizure produced by pentylenetetrazol (PTZ) on the rat is reported. The extracts of *S. persica* Linn. extended sleeping-time and decreased induction-time induced by sodium pentobarbital. In addition, it showed protection against PTZ-induced convulsion by increasing the latency period and diminishing the death rate [24].

**Antimicrobial Activity:**

The antimicrobial activity of miswak extract was compared with commercially available non-alcohol mouth rinses in vitro and evaluated that miswak extract shows low antibacterial activity against *Streptococcus pyogenes*, *Streptococcus mutans*, *Streptococcus faecalis*, *Staphylococcus aureus* and *Staphylococcus epidermidis* compared to mouth rinses containing chlorhexidine and cetylpyridinium chloride [25].

**Antihyperlipidemic Activity:**

The effects of prolonged administration of a lyophilized stem decoction of *S. persica* have also been investigated in diet-induced rat hypercholesterolemia. The results showed that the *S. persica* decoction significantly lowered cholesterol and LDL plasma levels in rats [26].

**Conclusion:**

Medicinal plants are rich source of secondary metabolites which has powerful physiological effects in humans and are used as medicines. This plant has great potential to develop the Ayurvedic, modern medicine and athletic supplements by pharmaceutical industries. This is the tree that is effective in treatment of various disease without producing any side effect. This review will serve the purpose of aiding in future Research work on this plant.

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