

**PHARMACOLOGICAL AND PHARMACOGNOSTICAL STUDY OF *FAGONIA INDICA*:
A REVIEW**

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ABSTRACT

Fagonia indica belong to zygophyllaceae family commonly known as dhamasa. It is a small spiny under-shrub, mostly found in the deserts of Asia and Africa. Many chemical constituents such as alkaloids, terpenoids, glycosides, flavonol, ursolic, saponins and oleanolic acids have been reported. Because of the presence of these active chemical constituents it possesses anti-inflammatory, anti-asthmatic, anti-diabetic, antibacterial, antifungal, astringent and analgesic.

KEYWORDS: *Fagonia indica*, Dhamasa, Pharmacology, Pharmacognosy.

INTRODUCTION

Herbal medicines have been the main source of primary health care in many nation. The plants as medicine are used in different system of medicine such as Ayurveda, Allopathy, Unani, Homeopathy and even in other system.^[1] The genus *fagonia* belong to the family Zygophyllaceae in the major group Angiosperms. *Fagonia indica* is a small spiny under-shrub, mostly found in the desert of Asia and Africa.^[2] It is reputed to

be a medicinal plant in scientific and folkloric literature and its medicinal values are well documented. The medicinal properties of the plant were attributed due to its variety of active phytochemical constituents.^[1] *Fagonia indica* have been found to contain saponins, alkaloids, terpenoids, sterols, Flavonoids, proteins, amino acids, coumarins and trace elements.^[1]



Fig. 1: Whole plant of *Fagonia indica*.

CLASSIFICATION

Phylum: Tracheophyta
Subphylum: Euphyllophytina
Infraphylum: Radiatopses
Class: Magnoliopsida
Subclass: Rosidae
Superorder: Geraniae
Order: Zygophyllales
Suborder: Zygophyllineae
Family: Zygophyllaceae
Kingdom = Plantae
Subkingdom = Viridaplantae

Vernacular Names

Table 1: Data showing synonyms of *Fagonia indica* in different languages.

English	Khorasan thorn
Hindi	Damhar, Dhamasa
Punjabi	Damanh, Damiya, Dhama
Sanskrit	Dhanvayavasa
Telgu	Chittigara
Marathi	Dhamasa
Urdu	Dhamas
Gujrati	Dhamaso
Rajasthan	Dhamasa
Kannada	Nela ingali

Habitat^[1,2]

Fagonia indica is a small spiny under – shrub, mostly distributed in the deserts of Asia and Africa. It is reported to be a medicinal plant in scientific and folkloric literature and its medicinal values are well documented. The medicinal properties of the plant were attributed due to its variety of active phytochemical constituents.

Geographical Source^[1,2,3,6]

Fagonia indica is a plant distributed in the deserts and dry areas of India, Tropical Africa, Chile, Pakistan, Mid East, Saudi Arabia, Cyprus, Tunisia, Morocco, Egypt, Algeria, and South West USA.

This species grows on dry and desert areas of Rajasthan, Haryana, Punjab, Maharashtra, Madhya Pradesh and Gujarat. *Fagonia indica* is distributed in Jodhpur, Bhilwara, Barmer districts of Rajasthan.

Botanical Description^[1,3]

Fagonia indica is perfused branched, pale-green, glandular, annual or perennial shrublets upto 60cm high; internodes 2.5-5.0 cm long.

(a) Root

Fagonia indica has been found to have a long taproot and to its growth slowing where temperatures dipped below 65F.

(b) Stem

Stem with woody base, finely striate but terete; branches procumbent or erect, cylindrical, striped, internodes 2.5-5cm long.

(c) Leaves

The leaves are trifoliolate, imparipinnate compound, opposite and cauline. Central part of leaf is about narrowly elliptic, glandular and glabrous, and is greater than the lateral part which is linearly narrowly elliptic; leaflets 8-16X3-4mm, narrowly ovate-lanceolate, mucronate, distinctly articulate at the base; stipular spines suberect, equal to or shorter than leaves.

(e) Flowers

The flowers of *Fagonia indica* are pedicillate, solitary, polypetalous and polysepalous. The color of petals are pinkish purple and there are two collateral ovules in each carpel.

(f) Fruits

The fruits of *Fagonia indica* are like a capsule; 3-5mm long, 2-5mm wide, short pubescent with persistent style.

(g) Seed

Seeds are flat rounded and brown in color.

Phytochemistry

Various phytoconstituents have been identified and isolated from different parts of *Fagonia indica* which includes saponins, alkaloids, glycosides, tannins, flavanoids, sterols and triterpenoids. Three saponins

named nahagenin, hederagenin and urosolic acid have been isolated from aerial part of *Fagonia indica*.

Several saponins or triterpenoid glycosides have been isolated from *Fagonia indica*. They characterized as 23,28-di-o-β-D-glucopyranosyltaraxer-20-en-28-oic acid, 3β,28-di-o-β-D-glucopyr acid, 21,22α-epoxy-23-o-β-D-glucopyranosyl-nahagenin, 3-o-[[β-d-glucopyranosyl-(1-2)]-[α-1-arabinopyranosyl-(1-3)-α-1-arabinopyranosyl]-urassic acid-28-o-[[β-d-glucopyranosyl]ester (indicasaponin A) and 3-o-[[β-d-glucopyranosyl-(1-2)]-[α-1-arabinopyranosyl-(1-3)-α-1-arabinopyranosyl]-oleanolic acid-28-o-[[β-d-glucopyranosyl]ester (indicasaponin B).

Four flavonoidal compounds identified as quercetin, isorhamnetin-α-3-o rhamnoside, quercetin 3-o-β-D-glucopyranosyl-(1''-6''')-β-D-glucopyranoside and quercetin 3-o-β-D-galactopyranosyl-(6''-1''')-α-L-2'' acetyl rhamnose-(3''-1''') β-D-glucopyranoside were isolated from the alcoholic extract of *Fagonia indica*¹.

Constituent Percent (wet basis)^[9]

Moisture 11.13 ± 0.03

Total ash 15.68 ± 0.08

Crude fibre 18.69 ± 0.10

Total proteins 6.48 ± 0.15

Total carbohydrate 64.25 ± 0.30

Fat 2.46 ± 0.01

n = 3; Means (Standard derivation) of triplicate analysis.

Traditional Uses

Fagonia indica is widely used for the treatment of various diseases including gynaecological problems, gastric troubles, skin allergies, digestive disorders, piles, liver troubles, bronchitis, asthma, urinary discharges, scabies, typhoid and fever. It also used for the treatment of cancer.^[3]

Whole plant without roots is crushed and extract is taken for pimples and acne problem of face¹. Dried plant is crushed, mixed with black salt and powder is taken for gas trouble. The plant is bitter and used for the treatment of fever, thirst, vomiting, dysentery, toothache.^[1]

Pharmacological Uses**Anti-inflammatory and analgesic activity**

The in vitro anti-inflammatory activity observed in their study support the utilization of the plants in traditional medicine as crude anti-inflammatory agent. Ethanolic extract of aerial parts exhibited anti-inflammatory and analgesic activity. Analgesic activity of ethanolic and aqueous extract of *Fagonia indica* was studied by tail flick method in rats. Acute and sub-acute anti-inflammatory activities of the 10% ethanolic extract of *Fagonia indica* were also assessed in rats.^[4]

Powdered sample of shoot of *Fagonia indica* was estimated for antioxidant activity using Electron Spin Resonance instrument. The extract *Fagonia indica*

effectively reduced free radical levels by mechanisms involving increased expression of Cu-Zn SOD, decreased expression of iNOS and simultaneous scavenging of the free radicals such as O²⁻, OH, NO and ONOO.^[1]

Anti-bacterial activity

The ethanolic extract of *Fagonia indica* showed antimicrobial activity against some bacterial and fungal strains.^[1] Antimicrobial study of ethanol extract of *Fagonia indica* leaves extracts was recorded against Gram-negative and Gram-positive bacterial strains by observing zone of inhibition.^[4-5]

Hepatoprotective-activity

The Methanolic extract of *Fagonia indica* on CCl₄ induced hepatotoxicity in albino rats was examined. MEFI in different doses have significant Hepatoprotective activity against CCl₄ induced hepatotoxicity and this might be linked with presence of Flavonoids and tannins in this plant.^[4]

Anti-diabetic activity

Phenolic and Flavonoids contents and scavenging capability by DPPH assay of whole plant of *Fagonia indica*. The Antidiabetic activity of various fractions at different concentrations was determined by inhibition of alpha amylase enzyme assay.^[3-6]

Anti-pyretic activity

Antipyretic potential of hydro-alcoholic extract of *Fagonia indica* revealed significant antipyretic effect and reducing E.coli induced pyrexia in rabbits. After the drug administration, the decrease in body temperature of rabbits with the dose of 25mg/kg⁻¹ during the next four hours ranged from 2.2-3.0 °F as compared to the negative control.^[7]

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