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PHARMACOGNOSTICAL AND PHYTOCHEMICAL EVALUATION OF *FAGONIA SCHWEINFURTHII HADIDI*

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ABSTRACT

Fagonia schweinfurthii hadidi (family zygophyllaceae) commonly known as dhamasa and dhamasia is used in Indian system of medicine since time immemorial in various disease like stomach problem fever, skin problem (itching, wounds) etc. The plant is found in desert and dry areas from India to Tropical Africa where plant is used in disease like high acidity, gonorrhea, tonic, anti-inflammation, kidney stone, etc. the current study therefore carried out to provide require its pharmacognostic details about the plant. In microscopic studies, the plant shows the presence of trichome, stone cells, fibers, calcium oxalate crystals, vessels etc. The total ash, acid insoluble ash, water soluble ash was observed to 10±0.3%, 2.5±0.5%, 5±0.2% respectively. Water soluble and alcohol soluble extractive values were found to be 80±1.5% and 24±1.2% respectively. A study of pH at 1% and 10% aqueous solution were found to be 6.09 & 5.07 respectively. LOD at 105^{0}C was found to be 2.4±0.5%. Preliminary phytochemical screening shows the presence of alkaloid, cardiac glycoside, flavonoids, carbohydrates, tannins, amino acid etc. in different extract. These findings will be useful for the identification of the species which may be useful to pharmaceutical industries for the quality control of commercial sample.

Key words: *Fagonia schweinfurthii*, pharmacognostical evaluation, dhamasa, kidney stone.

1. INTRODUCTION

Fagonia schweinfurthii hadidi is annual to biennial, up to 25 cm tall, glandular to glabrous found in India, Pakistan, Iran, Aden, Eritrea, Aethiopia, Sudan, Somalia and Kenya. Stem basally woody, branches prostrate to erect, terete, striate, with up to 1-3 (3.5) cm long

internodes. Lower leaves trifoliolate, petiole up to 10-12 (15) mm long terminal leaves unifoliolate, with up to 5 mm long petiole; leaflets linear-oblong, up to 3.5 cm long, acute, central the largest; stipular spines aculeate, shorter than leaves and internodes, patent, not reflexed[1]. Flowers pinkish-purple. 8-10 mm across, pedicel up to 6 mm long. Sepals ovate, 3-4 mm long, sparsely glandular hairy outside, deciduous or semi-persistent. Petals obovate, 4-6 mm long, 2-3 mm broad, obtuse. Stamens with 3-4 mm long filaments. Capsule 4 mm long pubescent, pedicel c. twice as long as fruit. Flowering season is almost throughout the year[3]. They are traditionally well known for the treatment of hemorrhoids, inflammation, sores, leprosy, open wounds and fever in the form of internal and external conventional formulation[4]. When the powder that is made up of the whole plant of *Fagonia schweinfurthii* is dusted on boils and skin eruptions, it causes healing and when the whole plant is boiled in water, its bath is useful for allergies and other skin diseases and decoction is given orally as blood purifier. The other species like *Fagonia bruguieri* aqueous extract is claimed for anti-allergy. The plant has been used to cure a number of ailments by the people living in desert region such as skin eruptions, in heal sores, skin diseases, anti-pyretic, in pain relief, ear infection, venereal diseases, etc. many other diseases[3].

A lot of scientist proves pharmacological activity of the same species like *Fagonia cretica*. **Matt Lam, *et al.* (2012)** demonstrate that an aqueous extract of *Fagonia cretica* contains potential anti-cancer agents acting either singly or in combination against breast cancer cell proliferation via DNA damage-induced FOXO3a and p53 expression[5]. **Saleh I., Alqasoumi *et al.* (2011)** conducted a study to investigate the anti-inflammatory and wound healing affect of 90% alcoholic extract of *Fagonia schweinfurthii* formulated gel on carrageenan induced rats paw edema and excision wound model[6]. **Al- Tahya, *et al.* (2007)** investigated the anti-allergic property of *Fagonia bruguieri*[7]. **Sharma S, *et al.* (2009)** evaluate the anti-microbial and analgesic activity of the ethanol and aqueous extract of *Fagonia indica* leaves extracts[8]. **Anjum MI, *et al.* (2007)** worked on *Fagonia cretica* and investigate the antimicrobial activity of its constituents. In the study eleven compounds have been isolated from methanolic extract of whole plant of *F. cretica*[9]. **Ahsan Hussain, *et al.* (2006)** observed the cytotoxic and antitumor activity of *Fagonia cretica*. In the study, this information was analyzed at laboratory level by performing cytotoxic, antitumor (potato disc) and DNA damage assay[10]. **Avinash K Rawal, *et al.* (2004)** reported the neuroprotective activity of three herbs Rubia cordifolia (RC), Fagonia cretica linn (FC) and Tinospora cordifolia[11]. **Soomro AL, *et al.* (2003)** investigated the effect of *Fagonia indica* on experimentally

produced tumours in rats. They were found that the survival of the rats administered Fagonia extract was significantly longer than the control group[12].

Figure 1: *Fagonia schweinfurthii* hadidi (whole plant)

2. MATERIALS AND METHODS

2.1 Collection and authentication of plant material: The drug has been collected from local area of Jodhpur, Rajasthan and authenticated by Joint Director of Botanical Survey of India, Jodhpur. A Voucher specimen has been preserved in the Department of Pharmacognosy, Jodhpur National University, Jodhpur for further references.

2.2 Microscopy: Anatomical surface preparation of fresh plant was used and microscopy was done of leaf, stem and root portion[20, 21].

2.3 Drying and size reduction of plant: The whole plant material of *Fagonia schweinfurthii Hadidi* was subjected to shade drying for about 2-3 weeks. The dried plant material was further crushed to powder and the powder was passed through the mesh 22 and stored in air tight container for further analysis.

2.4 Determination of fluorescence character: Fluorescence characters of powdered plant material with different chemical reagents were determined under ordinary and ultraviolet light[13, 14].

2.5 Determination of physicochemical parameters: The dried plant material was subjected for determination of physicochemical parameters such as total ash value, acid insoluble ash value, water soluble ash value, LOD, alcohol soluble extractive and water soluble extractive values, pH etc[15, 16].

pH 1% and 10% Solution: 1 gm of the accurately weighed powder of *Fagonia schweinfurthii Hadidi* (whole plant, stem, leaf and root) was dissolved in water and filtered. pH of filtrate was determined by using pH meter[18, 19].

2.6 Extraction of powdered plant material: The shade dried powdered plant material was subjected to soxhlet extraction using the solvents of different polarity such as chloroform, ethanol, water and hydro alcoholic. The extracts were collected and evaporated to dryness and the percent yields of all the extracts were determined. All the extracts were then stored in a refrigerator till further analysis[17].

2.7 Preliminary phytochemical analysis: Preliminary qualitative phytochemical analysis of all the extracts was carried out by employing standard conventional protocols.

3. RESULTS AND DISCUSSION

3.1 Fluorescence analysis of whole plant, leaves, root and stem of *Fagonia schweinfurthii* under UV light. (Table 1-4)

Table 1: Fluorescence analysis of whole plant powder of *Fagonia schweinfurthii*.

Treatment	Normal light	UV light	
		(254 nm)	(365 nm)
Powder (P)	Light green	Light brown	Black
P + 5% KOH	Light yellow	Light yellowish green	Dark brown
P + 5% NaOH	Light yellow	Light yellowish green	Dark brown
P + 5% FeCl3	Dark green	Light green	Black
P + Iodine solution	Dark brown	Dark greenish brown	Black
P + dil. H2SO4	Yellowish brown	Dark green	Brownish black
P + conc. H2SO4	Light yellowish brown	Dark green	Dark brown black
P + conc. HCl	Light yellowish green	Light green	Dark brown
P + dil. HCl	Light yellow	Light green	Dark brown
P + conc. HNO3	Dark brown	Light green	Brownish black
P + dil. HNO3	Light brown	Light yellow	Dark brown
P + Ammonia solution	Light yellowish green	Light green	Dark brown
P + Ethanol	Light yellowish green	Light green	Dark brown
P + Methanol	Light yellowish green	Light green	Dark brown

Table 2: Fluorescence analysis of leaves powder of *Fagonia schweinfurthii*.

Treatment	Normal light	UV light	
		(254 nm)	(365 nm)
Powder (P)	Yellowish green	Dark green	Black
P + 5% KOH	Light yellowish green	Light green	Dark brown
P + 5% NaOH	Light yellowish green	Light green	Dark brown
P + 5% FeCl3	Light yellowish green	Light green	Dark brown
P + Iodine solution	Yellowish brown	Light green	Dark brown
P + dil. H2SO4	Light brown	Dark green	Dark brown
P + conc. H2SO4	Dark brown	Light green	Brownish black
P + conc. HCl	Light brown	Dark green	Dark brown
P + dil. HCl	Light brown	Light brown	Dark green
P + conc. HNO3	Creamish brown	Creamish green	Brownish black
P + dil. HNO3	Light brown	Dark greenish brown	Dark brown
P + Ammonia solution	Light yellowish green	Light green	Light brown
P + Ethanol	Light brown	Light yellowish green	Light brown
P + Methanol	Light brown	Light yellowish green	Light brown

Table 3: Fluorescence analysis of roots powder of *Fagonia schweinfurthii* .

Treatment	Normal light	UV light	
		(254 nm)	(365 nm)
Powder (P)	Yellowish brown	Cream	Black
P + 5% KOH	Light yellow	Light green	Dark brown
P + 5% NaOH	Light yellow	Light green	Dark brown
P + 5% FeCl3	Light yellow	Light green	Black
P + Iodine solution	Blood red	Dark green	Dark reddish brown
P + dil. H2SO4	Light yellow	Dark green	Light brown
P + conc. H2SO4	Light voilet	Dark voilet	Black
P + conc. HCl	Light brownish green	Light green	Light brown
P + dil. HCl	Light yellow	Light green	Light brown
P + conc. HNO3	Reddish yellow	Light green	Dark brown
P + dil. HNO3	Light brown	Dark greenish brown	Dark brown
P + Ammonia solution	Light yellow	Light green	Light brown
P + Ethanol	Light yellow	Light green	Light brown
P + Methanol	Light yellow	Light green	Light brown

Table 4: Fluorescence analysis of stem powder of *Fagonia schweinfurthii*

Treatment	Normal light	UV light	
		(254 nm)	(365 nm)
Powder (P)	Light Yellowish green	Light green	Black
P + 5% KOH	Light Yellowish green	Light green	Light brown
P + 5% NaOH	Light Yellowish green	Light green	Light brown
P + 5% FeCl3	Brownish yellow	Light green	BrownishBlack
P + Iodine solution	Yellowish brown	Light green	Reddish brown
P + dil. H2SO4	Light yellow	Light green	Dark brownish brown
P + conc. H2SO4	Light voilet	Dark voilet	Black
P + conc. HCl	Light green	Yellowish green	Light brown
P + dil. HCl	Light yellow	Light green	Light brown
P + conc. HNO3	Reddish yellow	Light green	Dark brown
P + dil. HNO3	Light brown	Light green	Dark brown
P + Ammonia solution	Light yellowish green	Light green	Light brown
P + Ethanol	Light yellowish green	Light green	Light brown
P + Methanol	Light yellowish green	Light green	Light brown

3.2 Physicochemical parameters of whole plant, leaves, stem and root of *Fagonia schweinfurthii*.

Table 5. Physicochemical properties of *Fagonia schweinfurthii*

S No.	Parameters	Values obtained(%w/w)			
		Whole plant	Leaves	Stem	Roots
1	Total ash value	10	11.2	13.2	14.5
2	Acid insoluble ash	2.5	2.6	2.8	3.0
3	Water soluble ash	5	5.3	8.2	9.6
4	Alcohol soluble extractive	24	26	29	28
5	Water soluble extractive	80	89	75	83
6	pH(1% aq.sol.)	6.09	6.00	6.2	5.7
7	pH(10%aq.sol.)	5.07	5.03	5.1	4.9
8	LOD(at 105°C)	2.4	2.2	2.8	3.1

3.3 Extraction of powdered plant material with different solvents using soxhlet apparatus. (Table-6)

Table 6. Colour, nature and percent yields of extracts of *Fagonia schweinfurthii*(whole plant)

S.No.	Extract	% Yield	Colour	Nature
1.	Chloroform extract	5%	Dark greenish black	Semisolid
2.	Ethanolic extract	3.2%	Dark greenish	Semisolid
3.	Hydroalcoholic extract	4.1%	Dark brown	solid
4.	Aqueous extract	4.1%	Light brown	solid

3.4 Primary phytochemical screening of different extracts obtained from soxhlation of whole plant of *Fagonia schweinfurthii.*(Table-7)

Table 7: Preliminary phytochemical investigation of different extracts of *Fagonia schweinfurthii* plant.

Group of Phytoconstituents	Extracts			
	Chloroform	Alcoholic	Hydroalcoholic	Aqueous
Alkaloid	(+)	(-)	(-)	(-)
Cardiac glycoside	(+)	(-)	(-)	(-)
Flavoinds	(-)	(+)	(+)	(-)
Carbohydrate	(-)	(+)	(+)	(-)
Anthraquinones glycosides	(-)	(-)	(-)	(-)
Protein	(+)	(-)	(-)	(-)
Tannin	(-)	(-)	(-)	(+)
Amino acids	(-)	(+)	(+)	(+)
Saponins	(+)	(+)	(+)	(+)
Steroids	(-)	(+)	(+)	(+)
Gums and mucilage	(-)	(-)	(-)	(-)

(+): Presence of constituent; (-): absence of constituent.

Microscopy:

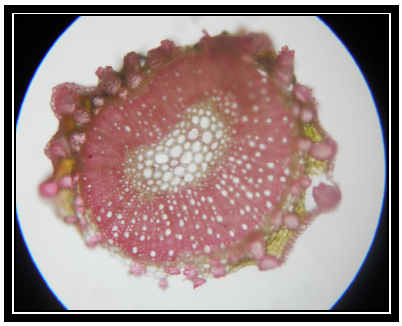

Fig. 2 T.S of root of *Fagonia schweinfurthii*

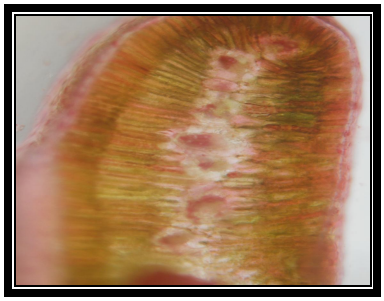

Fig. 3 T.S of stem of *Fagonia schweinfurthii*

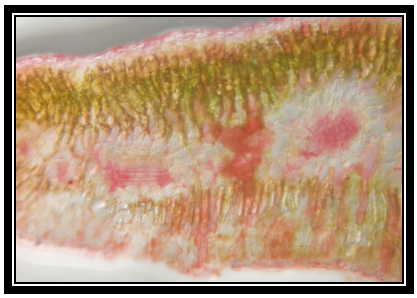

Fig. 4 T.S of leaf of *Fagonia Schweinfurthii*

4. CONCLUSION

The present work was undertaken with an aim of pharmacognostic investigation of *Fagonia schweinfurthii hadidi* providing useful information, which could be useful to detect the authenticity of this medicinally useful plant. Pharmacognostic evaluation can be useful to substantiate and authenticate the drug.

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