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Physico-chemical investigation and characterization of *Fumaria parviflora* lam

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Abstract
Herbal plants and its application in treatment of various diseases is popularly known from ancient times in India. One of the important flowering plant *Furmaria parvifiora* has been recommended for the treatment of chronic, skin diseases, blood disorders, fever, cough, which is also commonly known as Pittapapada, Shatara, Parpat and found in Karnataka region.The objectives of our present work are to investigate the physicochemical properties and carry out the characterization of *Fumaria parvifiora.*The flowering plant material was extracted using alcoholic method using Soxhlet apparatus. Various parameters such as powered microscopy and physiochemical properties (ash, extract, LOD) and preliminary investigation were performed. The characterization study was carried out by using chromatographic method (TLC) using silica gel plates as stationary phase and ethyl acetate: n-hexane as a mobile phase in the ration of 3:9 v/v.The extract obtained was semisolid in nature with dark brown color. The results of powder microscopy showed xylem, phloem, fibers, trichome, cut fragments of pollen grains. The LOD was found to be 74.8± 0.14. Total ash value was found to be 24.62 ± 0.63. The Rf value of extract was found to be 0.56. The preparative TLC Rf values obtained were 0.40,0.54, and 0.69. Extract found to show the presence of alkaloids, flavonoids, saponins, steroids and tannins.The extract obtained found to show the presence of wide range of phytoconstituents and Flouroscence investigation has been done This review could be helpful to set some of diagnostic indications for preparation of monograph, standardization as well as for confirming identity of plant material.

Keywords: phytochemical investigation, *Furmaria parvifiora* lam TLC, powder microscopy, alkaloids

Introduction

Fumaria parviflora Lam is broadly used in traditional herbal drug and as well as folkloric system of medicine named as “earth smoke, beggary fumitory, fumus, vapor and fumitory or waxdolls” in English. It is locally known as ‘Shahtrah’ or ‘Pitpapra’ in India “Homaira” in Saudi Arabia Herbal plants and its application in treatment of various diseases is popularlyknown from ancient times in India. One of the important flowering plant *Furmaria parvifiora* has been recommended for the treatment of skin diseases, fever, blood disorders, chronic,cough, which is also commonly known as Pittapapada, Shatara, Parpat and also found in Karnataka region.The preliminary phytochemical analysis of Fumaria parviflora revealed the presence of glycosides, tannins triterpenoids, phenols, alkaloids, flavonoids,saponins, steroids, and anthraquinones [1]. The pharmacological studies showed that Fumaria parviflora possess hepatoprotective, antiinflammatory, antidiabetic, antipyretic, analgesic, prokinetic, laxative, dermatological, anticancer, antimicrobial, antiparasitic, reproductive, anticholinesterase and smooth muscle relaxant effects [2]. This Herbal plants and its application in treatment of various diseases is popularly known from ancient times in India. One of the important flowering plant *Furmaria parvifiora* represented in Figure 1. and several chemical constituents and the pharmacological effects of *Fumaria parviflora Lam* [3].

Fig 1: Representation of *Furmaria parvifiora*

Drug profile of *Fumaria parviflora Lam.*

Taxonomy

Kingdom: Plantae
Division: Tracheophyta
Class: Magnoliopsida
Order: Ranuculales
Family: Papaveraceae

Therapuetic Uses

anthelmintic, diuretic, anti-inflammatory, anticancer, diaphoretic, hypoglycemic, antimicrobial, antifungal, antipyretic [4].

Chemical constituents

Tannins, saponin, flavonoids, glycosides, steroids, Triterpenoids, phenols, alkaloids fumarophycine, adlumine, perfumidine dihydrosangrine, cryptopine, sinactine, stylopine, protopine [5].

Collection and Authentication of Plant

The plant of *Fumaria parviflora Lam.* was collected from Gavanal village of Hukkeri Tq (Dist. Belgaum, Karnataka). Authentication of plant is done from Shri B.M.K.Ayurveda Mahavidyalaya,Central Research Facility,(shahpur, Belgaum).

Fig 2: Fumaria Parviflora Lam

Materials and Methods

Plant Material

The flowering herbal material was extracted using alcoholic method using Soxhlet apparatus. Various parameters such as powdered microscopy.and physiochemical properties (ash, extract, LOD) and preliminary investigation were performed. The characterization study was carried out by using chromatographic method (TLC) using silica gel plates as stationary phase and ethyl acetate: n-hexane as a mobile phase in the ration of 3:9 v/v. [5-7]

Extract Preparation

Fp (*Fumaria Parviflora Lam)* plant was clean by distilled water and then kept for drying at ambient temperature. The sample prepared were powdered at 500gm of Fp powder dissolved in 400ml of ethanol and kept for extraction 72 hr using a Soxhlet extraction process. The ethanolic extract were dried under reduced pressure to get greenish brown residue (15 gm) [8-9].

Morphological studies

For morphological examination, several parts of *Fumaria Parviflora Lam* were examined under magnifying lens by Labomed Lx-300 trinocular halogen microscope in KLE College of Pharmacy, Belagavi [10]

Preliminary-phytochemical analysis

Preliminary-phytochemical screening of the *Fumaria Parviflora Lam* plant extract for the determination of the presence of secondary metabolites like Flavonoids, Alkaloids, Saponins, Triterpenoids, Steroids, Tannins, Glycosides and Phenolics by standard methods [11]. and results are presented in the Table 2.

Thin Layer Chromatography (TLC)

TLC is a part of liquid chromatography in which the sample is applied as a small streak or spot to the origin of a thin sorbent layer such as silica gel, alumina, cellulose powder, ion exchangers, polyamides or chemically

bonded silica gel supported on a plastic, glass or metal plate. This layer of adsorbent called stationary phase. The eluent or mobile phase is a solvent or a mixture of organic and aqueous solvents (sample) has been applied on plate by capillary action. The plates were developed in TLC chamber previously saturated with different solvent systems. The different spots developed in each solvent system were identified by means of UV light at λ max 254 nm and the Rf value (Rf value for each substance is the distance it has moved divided by the distance the solvent front has moved) are were calculated [12-14].

Physicochemical evaluation

Physicochemical parameters like percentage of loss on drying (LOD), acid insoluble ash, total ash and water soluble ash were examined as per the guidence of Indian Pharmacopoeia [15].

Fluorescence study

A fully powdered plant material was put down on a grease free clean microscopic slide and added 1 to 2 drops of freshly prepared reagent solutions were mixed well and waited for 1 to 2 minutes. Then the slide was seen in day light and inside the UV viewer chamber long at 365 nm and short at 254 nm ultraviolet radiations. The colors observed by application of different reagents in different radiations were reported [16].

Results and Discussion

Extract Characterization

The extract obtained using alcoholic method using Soxhlet apparatus was semisolid in nature with dark greenish brown color.

Morphological Studies

The results of powder microscopy showed xylem, phloem, fibers, trichome, cut fragments of pollen grains and microscopical images are mentined in Figure 2.

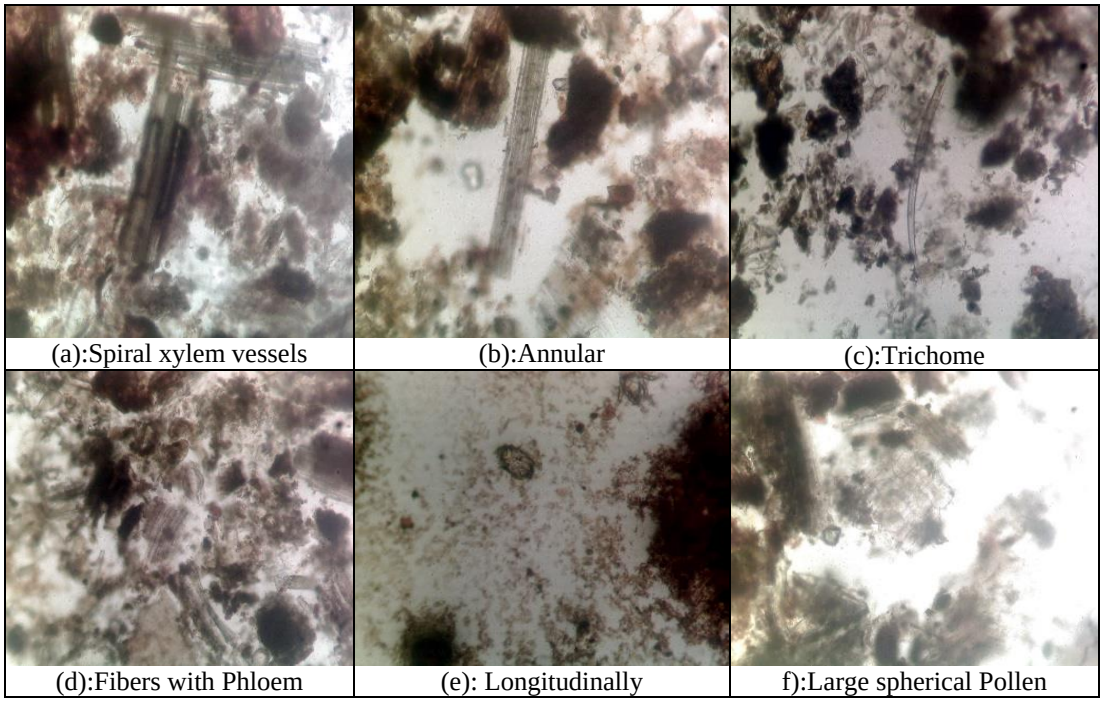


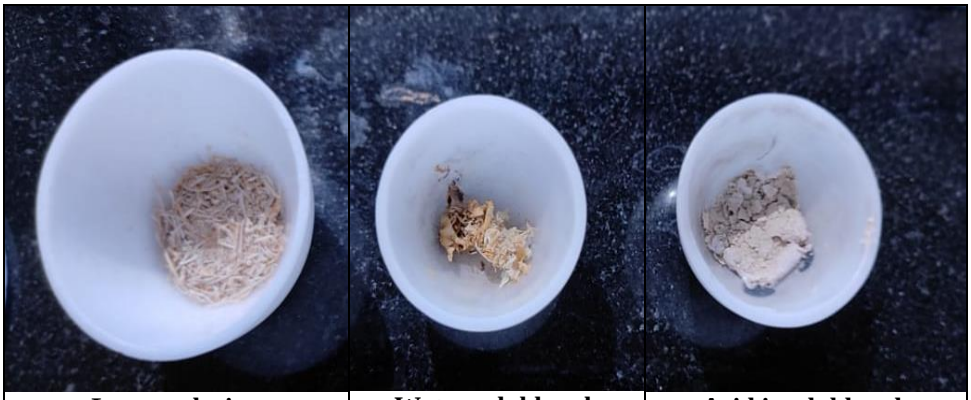
Fig 2: Morphological studies of *Fumaria Parviflora Lam*

Physico-Chemical Evaluations

Ash value is a standard to confirm the identity and clarity of crude plant drug material and total ash usually contains of silicate, phosphate, carbonate and silica. The LOD was found to be 74.8± 0.14. Total ash value was found to be 24.62 ± 0.63. The Rf value of extract was found to be 0.56 and results of ash values are represented in Table 1 and Figure 3.

Table 1: Physico-chemical parameters of *Fumaria Parviflora Lam*

Particular	% W/W ± SD
Loss on Drying	74.8 ± 0.14
Total Ash	24.62 ± 0.63
Water soluble Ash	2.53 ± 0.12
Acid insoluble Ash	8.4 ± 0.14
Extractive value	12.5 ± 0.25



Loss on drying	Water soluble ash	Acid insoluble ash

Fig 3: Physico-Chemical Evaluations of *Fumaria Parviflora Lam*

Phytocemical Screening

Phytochemical investigation ethanolic extract: by carrying out the different chemical test for the particular class of compounds it shows the presence of Steroids, Alkaloids, Flavonoids, Tannins, Triterpenoids, and Carbohydrates and the results are mentined in Table 2.

Table 2: Phytocemical screening of *Fumaria Parviflora Lam*

SR.NO	Chemical Test	EtOH Extract
1	**Test for carbohydrates**	
	a. Molish's test	+
2	**Test for Proteins**	
	a. Biuret test	+
	b. Million's test	+
3	**Test for Amino Acids**	
	a. Ninhydrin test	+
4	**Test for Steroids & Triterpenoids**	
	a. Salkowski reaction	+
	b. Liebermann-Burchar reaction	+
	c. Liebermann reaction	+
5	**Test for Glycosides**	
	I. Test for Cardiac Glycosides	
	a. Baljiet test	-
	b. Legals test	-
	c. Test for deoxy sugar Killer Killani test	-
	II. Test for anthraquinone glycosides	
	d. Borntragger's test	-
	e. Modified Borntragger's test	-
6	**Test for Alkaloids**	
	a. Dragendroff's test	+
	b. Mayer's test	+
	c. Hager's test	+
	d. Wagner's test	+
7	**Test For Flavanoids**	
	a. Shinoda test	+
8	**Test for Saponins**	
	a. Foam test	-
	b. Haemolysis test	-
9	**Test for Phenolic and Tannins**	
	a. erric chloride 5% solution	+
	b. Lead acetate solution	+

TLC of Extract

TLC describes the ethanolic extracts gives an better result that directs towards the presence of several phytochemicals. The TLC method is better choice for the identification of secondary metabolite present in plant material in solvent system by the ratio of 3:9 v/v (ethyl acetate: n-hexane). The different Rf values shows various nature of phytoconstituents in single extracts. Different Rf values of the compound also indicates an idea about

their polarity. This information will help in selection of correct solvent system for further separation of compounds from the plant extracts. The TLC Rf values obtained were 0.40,0.54, and 0.69 and the result of TLC is shown in Figure 4.

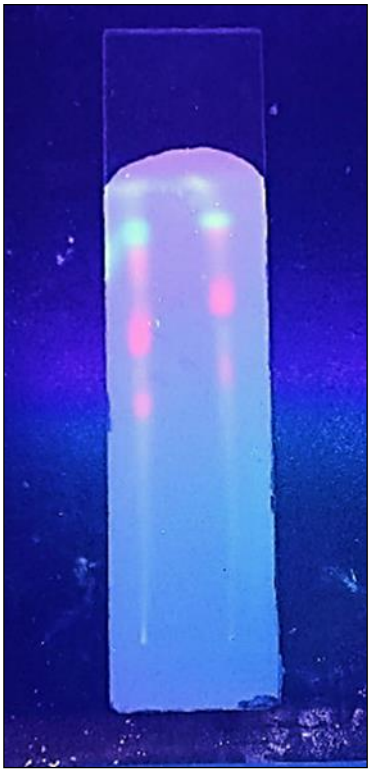


Fig 4: TLC of EtOH Extrat

Fluorescence Investigation

The fluorescence investigation feature of any powdered herbal drug is very individual and useful in detectable features for the determination of the drug content and the results are mentined in Table 3.

Table 3: Fluorescence analysis of powdered *Fumaria Parviflora*

S.R No.	FP Extract + Reagents	Observation		
		Whole Plant of *Fumaria Parviflora*		
		Visible/Day light	UV (Long)	UV (Short)
1	FP Extract + 1 M NaOH	Yellow at center Edges-blue	Blue	Black
2	FP Extract + CH_3COOH	Grey	Yellow at edges and blackish- grey at centre	Brown at edges and fluorescent yellow at center
3	FP Extract + 1 M HCl	Green	Grey	Yellowish-black
4	FP Extract + 5% I_2	Edges-yellow Centre-black	Edges-yellow Centre-black	Yellowish-black
5	FP Extract + 5% $FeCl_3$	Black	Black	Black
6	FP Extract + Methanol	Light-green	Grey	Fluorescent yellow
7	FP Extract + 1 M H_2SO_4	Centre-yellow Edges-green	Centre-yellow Outer-grey	Black with fluorescent yellow in centre
8	FP Extract + Conc. HNO_3	Orangish Yellow	Orange	Orange
9	FP Extract + $K_2Cr_2O_7$	Outer- yellow Inner-black Centre-orange	Yellow at Edges, orange at center.	Black with yellow
10	FP Extract + 1 N NaOH	Yellowish- brown	Outer-dark yellow Edges-black	Yellowish Black
11	FP Extract + 1 N NaOH (Ethanolic)	Yellowish- brown	Black	Blue

12	FP Extract + 1 N HCl	Green	Grayish-black	Yellow at center and brown at edges.
13	FP Extract + 1 N H_2SO_4	Yellowish-green	Yellowish-green	Yellowish-black
14	FP Extract + dil. HNO_3	Orange	Yellowish-brown	Yellowish-brown
15	FP Extract + 25% NH_3	Yellowish-black	Yellowish-black	Black
16	FP Extract + dil. NH_3	Dark Yellowish-green	Dark Yellowish-green	Black
17	FP Extract + 50% HNO_3	Orange	Yellowish-brown	Orangish-brown
18	FP Extract + HNO_3 + 25% NH_3	Yellowish-Orange	Yellow	Orange

Conclusion

The extract obtained found to show the presence of wide range of phytoconstituents like Alkaloids, steroids tannins, flavonoids, triterpenoids, and carbohydrates and Microscopy characterization show xylem,annular, trichome, Phloem fibres, spherical pollen, and Qulatitaive TLC shows three spots physico-chemical properties are as per standards and fluoroscence investigation has proved drug content.

List of Abbrevations

FP: *Fumaria Parviflora Lam*, TLC:Thin Layer Chromatography, Rf: Retension factor

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References

1. World Health Organization. WHO global report on traditional and complementary medicine 2020 World Health Organization, 2020.
2. Indian Council of Medical Research. The National Cancer Registry Programme Report, 2018.
3. Farhan MS, Kadheem EJ. Isolation and characterization of new flavonoids from Fumaria Parviflora Cultivated in Iraq J. Glob. Pharma Technol.
4. Jameel M, Ali A, Ali M. Phytochemical investigation of the aerial parts of Fumaria parviflora Lam. Int. J. Pharma Bio Sci,2014:2:1-8.
5. Jameel M, Islamuddin M, Ali A, Afrin F, Ali M. Isolation, characterization and antimicrobial evaluation of a novel compound N-octacosan 7 β ol, from Fumaria parviflora Lam. BMC Complement Altern. Med,2014:14(1):1-9.
6. Naz I, Khan MR. Nematicidal activity of nonacosane-10-ol and 23a-homostigmast-5-en-3β-ol isolated from the roots of Fumaria parviflora (Fumariaceae). J. Agric. Food Chem,2013:19:61(24):5689-95.
7. Sattari R, Khayati GR, Hoshyar R. Biosynthesis and characterization of silver nanoparticles capped by biomolecules by fumaria parviflora extract as green approach and evaluation of their cytotoxicity against human breast cancer MDA-MB-468 cell lines. Mater. Chem. Phys,2020:1:241:122438.
8. Hamedeyazdan S, Fathiazad F, Nazemiyeh H, Faezi SA. Phytochemical analysis and antioxidant activity of Fumaria parviflora. Res Pharm Sci,2012:2:7(5):762.
9. Paltinean R, Mocan A, Vlase L, Gheldiu AM, Crișan G, Ielciu I *et al*. Evaluation of polyphenolic content, antioxidant and diuretic activities of six Fumaria species. Mol,2017:22(4):639.
10. Hussein G, Miyashiro H, Nakamura N, Hattori M, Kakiuchi N, Shimotohno K. Phytother. Res,2000:14:510-516.
11. Kokate CK. Preliminary phytochemical screening. In 4th Edn. Practical Pharmacognosy. Nirali Prakashan, Pune, India, 2000, 107-11.
12. Mukherjee PK. Quality Control Herbal Drugs–An approach to evaluation of botanicals. Business Horizons Pharmaceutical Publishers. New Delhi, 2005, 131-196.
13. JB Harbone. Phytochemical Methods – a guide to modern techniques of plant analysis. 3rd ed. Springer, New Delhi, 2005, 1-32.
14. Sharma BK. Instrumental Method of Chemical Analysis, 21st edition, Goel Publication, Meerut, 2002.
15. Anonymous. Indian Pharmacopoeia. Controller of Publications, Edition 4th, New Delhi: Government of India, 1996, 2.
16. Khandelwal KR. Practical Pharmacognosy techniques and experiments; Nirali Prakashan: Pune, 2006, 157-160.