

PHARMACOGNOSTICAL STUDY OF TWO VARIETIES OF PARPATAKA (OLDENLANDIA CORYMBOSA & FUMARIA INDICA)

Pallavi Varshney¹, Swastik Suresh²

¹Associate Prof. Dept. Of Dravyaguna, HAMC Campus, Uttarakhand Ayurveda University, Dehradun, Uttarakhand, India

²Medical Officer In charge, Ayurvedic & Unani Services, Govt. of Uttarakhand, India

ABSTRACT

Parpataka is a plant often used in different medical conditions mostly pyrexia. Researches have also proved its antipyretic potential. It has a variety of botanical sources all classically called *Parpataka* because they have the same pharmacological actions. Although the actions of these source plants are widely known yet pharmacognostical study of their root, stem, leaves, flowers and fruits are not available till date. *Panchanga* of *Parpataka* is often used in folklore medicine. The present study was designed to evaluate the pharmacognostical study of two varieties of *parpataka* so as to identify their similar and differentiating features. Macroscopic, microscopic and histochemical study of fresh samples of root, stem, leaf, flower and fruit of *Parpataka* was carried out to establish the correct pharmacognosy of the two samples.

Keywords: *Pyrexia, anti-pyretic, panchanga*

INTRODUCTION

Fever or pyrexia is a common condition faced by people worldwide. Derived from the Greek word “pyretos” meaning fire / febrile response, it is a frequent medical sign that describes an increase in internal body temperature to levels above normal. It is most accurately described as a temporary elevation^{1,4,8,25} in body’s thermoregulatory set point¹⁴ usually by about 1-2°C. In ayurveda fever is commonly known as *jwara*^{2,10}. Although many drugs for treating pyrexia are available in modern medical science^{5,7,15,16,19}, still Medical fraternity has always been trying to search newer, easily available and cost effective drugs for treatment of various diseases. *Parpataka* in this context has been found to be very useful in treating various ailments^{9,11,25,26} mainly *jwara*¹³. In this

context the very first step consists of identifying the drugs correctly which shall be used for treatment purpose. A study was conducted to experimentally evaluate the comparative efficacy of two varieties of *parpataka* as an anti-pyretic or *jwaraghna* drug. The pharmacognostical study was carried out initially to establish the correct identity of the trial drugs.

Aims & Objectives:

To standardize two varieties of *Parpataka* *Fumaria indica* and *Oldenlandia corymbosa* by conducting pharmacognostic study including macroscopic, microscopic and phytochemical studies of the plant parts.

Materials & Methods:

3.1 Collection & Identification

The botanical identity of the trial drugs was confirmed by the botanist in the department of pharmacognosy of Ayurvedic College. The drugs were collected in person to make sure of their identity.

Pharmacognostical Study: This has been carried under the following steps-

1. Macroscopic study
2. Microscopic study

Oldenlandia corymbosa Linn:

Macroscopic study^{3,4,6,12}: It includes the identity, characters, colour, odour and taste of the whole plant.

Characters of root: Long cylindrical with slender fibrous secondary roots arising from it. Colour- Creamish white, Odour- None. Taste-Bitter, Fracture-Brittle

Microscopic study: T.S is almost circular in outline with major central portion covered with vascular strands. A layer of epiblema followed by 6-7 layers of dead cork cells in mature root form the outer covering. Cork cells are brown in colour not differentiated from phellogen. Below the cork, a zone of cortex composed of 8-10 layers of parenchymatous cells is found. Starch grains and colouring matter are scattered in the cortex. Cortex is followed by a layer of endodermis separating the phloem from the cortex. The biggest portion is covered by xylem elements present as a central core.

Characters of the stem: Erect, terete, numerous, slender, ascending, spreading glabrous often rooting at lower nodes. Colour-Brown, Odour-None, Taste-Bitter, Fracture-Brittle

Microscopic study: T.S is quadrangular in shape with swollen laterals. The four angles appear blunt horn shaped. The detailed structure shows one layer of epidermis as

outermost covering enveloped with cuticle. The cells of epidermis are hexagonal to polyhedral and radially elongated. Unicellular dome shaped trichomes are present as extension of epidermis. Hypodermal cells are filled with chlorophyll. 5-8 layers of oval oblong shaped parenchymatous cells of various sizes constitute the cortex and are present under the hypodermal region. The central stele is differentiated by phloem cells composed of sieve tubes, companion cells and parenchyma fibres. The xylem is exarch type, composed of tracheids and xylem parenchyma. A large pith is present in the centre.

Characters of leaf:

Subsessile, linear or linear lanceolate, acute, with recurved scabrous margins, stipules short, membranous with few short bristles. Colour-Green, Odour-Characteristic, Taste-Bitter

Microscopic study: The section is dorsiventral in nature where $\frac{3}{4}$ th of the lamina is covered by two layers of palisade cells. Detailed section shows one layer each of upper and lower epidermis. Epidermal cells on both the sides are rectangular in shape and covered with cuticle. Unicellular trichomes are found on upper epidermis. Just below the upper epidermis two layers of palisade parenchyma are found extending upto midrib. Above the lower epidermis 3 to 5 layers of spongy parenchyma cells interfered with vascular bundles are present. Chlorophyll pigments are distributed throughout the mesophyll cells. In the midrib region collateral type of vascular bundles are seen.

Characters of Flower – Bisexual, usually actinomorphic, white, solitary, or in axillary pairs, on filiform pedicels, usually 2-3 on

the top of a slender axillary, solitary peduncle.

Characters of fruit: Capsules, globose, top rather flat, glabrous.

Microscopic study:

The detailed study shows the epicarp composed of a layer of epidermis followed by three to 4 layers of hypodermis. The number of layers increases below the ridge. Underneath the epicarp 4-8 layers of mesocarp composed of parenchyma cells tangentially elongated in nature are found. 2-4 layers of endocarp cells separate the seed from rest of the fruit.

Characters of Seeds- Minute, many, pale brown, smooth or angular, albumen fleshy

Fumaria indica Pugsley

Macroscopic study^{17,18,20,21}:

Characters of root: Long cylindrical with many side branches arising from it. Colour-Cream, Odour-None, Taste-Bitter and slightly acrid, Fracture-Brittle

Microscopic study: The outline of the section is circular in shape. The outermost layer is of the epidermis followed by layer of cortex. Medullary rays are observed radiating outwards opposite two xylem poles. The secondary wood elements are arranged in radiating rows embedded in the parenchyma. Phloem is laid outside the xylem, and is composed of the sieve tubes, companion cells and phloem parenchyma followed towards the periphery by a few layers of cork cells.

Characters of stem: Suberect or diffuse, scarcely scandent, glabrous Colour-Light green, Odour-Characteristic, Taste-Bitter and acrid, Fracture-Brittle

Microscopic study:

The outline of the section is angular in shape with fairly prominent angles under which the collenchyma lies. The T.S shows a layer of epidermal cells enveloping the section. Cells are oval to polygonal in shape with fringed wall externally. Epidermis is single layer of oblong rectangular cells. Cortex narrow composed of 3-4 layers of chlorenchymatous cells. Vascular bundles are collateral, endarch and open. The xylem is composed of vessels, tracheids, fibres and xylem parenchyma.

Characters of leaf: Multifid, more or less glaucous, leaflets 2-4 pinnatisect, segments long, linear or linear oblong, flat, acute. Colour-Green, Odour-Characteristic, Taste-Bitter

Microscopic study: T.S of the leaf shows distinct bifacial structure. There is a layer of epidermis covering both the upper and lower layers. The epidermal cells are oblong to rectangular in shape. Stomata are anomocytic. Mesophyll cells in the lamina are composed of 1-2 layers of palisade cells followed by few layers of spongy cells. There more number of stomata on the upper surface.

Characters of flower: – 5-6 mm. long, rose coloured, superior petal obtuse, rarely purplish, more or less upward reflexed, lower petal with spreading margins, obtuse spatulate, inner petals black purple at the apex, curved.

Characters of Fruit: About 2.5mm Broad, sub-rotund, quadrate, subtruncate abruptly narrowed below, slightly compressed but much keeled, especially towards the apex, rugose when dry.

Microscopic study: T.S. is almost oval in shape. The detailed section shows the epi-

dermis covering the epicarp. The wide zone of mesocarp is composed of parenchymatous cells interfered with vascular bundles, mostly composed of annular vessels. Endocarp separates the rest of the fruit from the seed.

Characters of Seed: 1 seeded

5. Phytochemical Study: Consists of Phytochemical investigation^{22,23} of crude extracts.- Alkaloids, Carbohydrates, Flavanoids, Glycosides, Proteins, Saponin, Steroids

QUALITATIVE TESTS:

1) Test for alkaloids –

a) Mayer's test: Mayer's reagent was added to the acidic test solution. Cream coloured precipitate was formed. **b) Wagner's test:** Wagner's reagent was added to the acidic test solution. Brown coloured precipitate was formed.

2) Test for Carbohydrates:

a) Molisch's test: Small quantity of extract was taken in a test tube, and a few drops of Molisch's reagent and 2 ml of conc. H₂SO₄ were added slowly along the sides of the test tube. A purple ring was formed at the junction of the 2 liquids. **b) Benedict's test:** To the test solution Benedict's reagent was added and boiled on water bath. Reddish brown precipitate was formed.

3) Test for Flavanoids:

a) Ferric chloride test: Few drops of Ferric chloride solution were added to the test solution. Intense green colour appeared. **b) Alkaline reagent test:** NaOH solution was added to the test solution. Mixture shows increase in the intensity of yellow colour, which becomes colourless on addition of few drops of dilute acids.

4) Test for Glycosides:

a) Keller-killiani test: To the test solution, few drops of Ferric chloride solution was added and mixed well. Then conc. H₂SO₄ was added slowly. Two layers are formed. The upper layer was bluish and the lower layer was reddish brown in colour.

b) Bromine water test: Test solution was dissolved in Bromine water gives yellow precipitate.

5) Test for Proteins:

a) Xanthoproteic test: Test solution was treated with conc.HNO₃. On boiling, gave yellow precipitate.

b) Ninhydrin test: Test solution when treated with Ninhydrin reagent gives blue coloured precipitate.

6) Test for Saponins:

a) Foam test: Small quantity of extract was treated with 5 ml of water and shaken well. It shows formation of froth, stable for about 15 minutes.

7) Test for steroids:

a) Salkowaski test: To the test solution, few drops of conc. H₂SO₄ were added, shaken well for some time, allowed to stand. The Lower layer colour turns red, indicating the presence of steroid.

b) Liberman Buchart test: A few drops of Acetic anhydride was added to test solution, then conc. H₂SO₄ was added along the sides of the test tube. A brown ring was formed at the junction of the 2 liquids and the upper test tube.

DISCUSSION

The macroscopic study of the plants establish *Oldenlandia corymbosa* as a small herb with Long cylindrical slender fibrous secondary roots, Erect, terete stem, Subsessile, linear or linear lanceolate leaves, Bisexual, usually actinomorphic, white flowers, Cap-

sules, - Minute, many, pale brown, smooth seeds. *Fumaria indica* is also a herb with cream coloured long cylindrical root, sub-erect or diffuse green coloured stem, multifid leaves, rose coloured (pink) flowers and quadrate, subtruncate fruit with 1 seed. Phytochemical analysis showed presence of alkaloids, carbohydrates, flavanoids, glycosides, proteins, saponins and steroids.

CONCLUSION

Microscopy of different plant parts of both plants revealed different distinct features characteristic of the particular plant. The chemical analysis demonstrated the presence of varied chemical compounds in the two plant parts.

REFERENCES

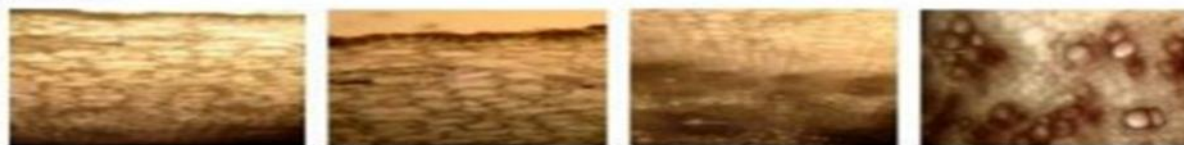
1. Anderson Wad, Kissane John M "Pathology" Vol – 1, Bombay, Taiwan, Library of Congress Cataloging in publication data, 7th Edition 1977.
2. Athvale Y.M & Athvale K.V "Fever Ayurvedic Concept" Delhi, Choukamba Sanskrit Prasthan, 1st Ed. 2001.
3. Ayurvedic Pharmacopoea Of India, Part 1, Vol 4, New Delhi, Dept. Of ISM&H, 1st Edition, 2004, page no 84.
4. Bedi Ramesh – Bedi Vanaspati Kosha – Vol.4 ,KitabgharPrakashan, New Delhi , 1st. Ed. 2005, page. No.90
5. Bhandarkar S.D, Satoshkar R.S "Pharmacology and Pharmacotherapeutics" Vol – 1, Popular Prakashan, Bombay 12th Edition 1991.
6. Billore.K.V. ,Yelne M.B., Dennis T.J.- Data Base on Medicinal Plants in Ayurveda (Vol. 7) Published by CCRAS New Delhi , 2005, page no. 340 Bowman W.C, Rang M.J, "Text book of

- Pharmacology", Italy, Blackwell scientific publications 2nd Edition.
7. Cappel D.F, Anderson , "Muir's text book of Pathology" London, Edward Arnold publishers ltd ,10th Edition 1976.
8. Chandraraj Bhandari – Vanaushadhi Chandrodaya , Vol.2, Chaukhambha Sanskrit Sansthan , Varanasi, Revised Edition 2006, page no. 110
9. Chakrapanidatta-Chakradatta by Sri Indradeva Tripathi, Chaukhambha Sanskrit Samsthana, Varanasi, 1st.Edition 1992
10. Chatterjee Asima And Prakash Satyendra Chandra "Treatise on medicinal plants ", New Delhi, Vol.1, Reprint 1997, page no.178
11. George Watt- "Dictionary of Economic Products of India", Gordhan and Company, New Delhi, Vol.3
12. Gogte V.M – "Ayurvedic Pharmacology and Therapeutic Uses of Medicinal Plants", Bombay, 1st. Edition 2000, page no.650
13. Gyton C- "Text Book of Medical Physiology", W.B.Saunders Company, 8th.Edition 1986
14. Harrison "Principles of Internal Medicine" vol – 1, Spanish, Library of Congress, 11th Edition 1987.
15. K.D Tripadi- "Essentials of medical pharmacology", Jaypee brothers medical publications, New Delhi , 5th Edition 2003
16. Kirtikar K.R And Basu B.D, "Indian medicinal plants" Vol 2, Edited by Blatter. E, Dehradun, International Book Distributers Booksetters and Publishers, 3rd Edition 1988, page no. 138, 1263
17. Nadkarni K.M- "Indian Materia Medica", Vol. 1 Published by Popular Prakash-

- anpvt.ltd 3rd Edition,1982, Reprinted 2000, page no.869
18. Rang HP, Dale M.M, “Pharmacology”, Germany library of congress publications.
 19. Sivarajan and Indira Balachandran. – Ayurvedic Drugs And Their Plant Sources, New-Delhi And Calcutta, Oxford and I BH publishing co. Pvt. Ltd., print 1996, page no 354
 20. Trease and Evans “Pharmacognosy” London ,Wb Saunders Company ltd, 14th Edition 2001,page no.478
 21. Turner Roberta, “Screening Methods In Pharmacology” Vol – 2 Academic Press Ltd, 1965.
 22. Vogel Gerald H “Drug Discovery And Evaluation- Pharmacological Assay”, Germany library of congress 2nd Edition 2002.
 23. William Boyd CC, “ A Text book of Pathology”, Lea &Febriger publications, Philadelphia, 8th Edition 1977
 24. Wwww.pubmed.com,
 25. Wwww.sciencedirect.com

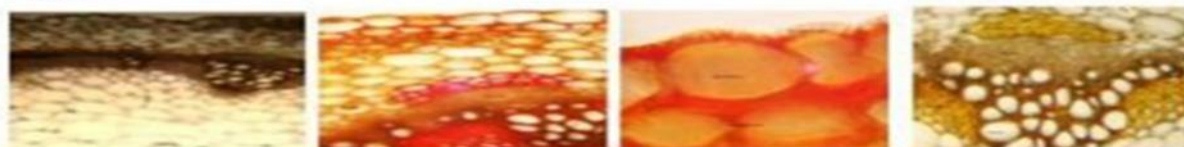
MICROSCOPY OF *Fumaria Indica* Pugsley

ROOT

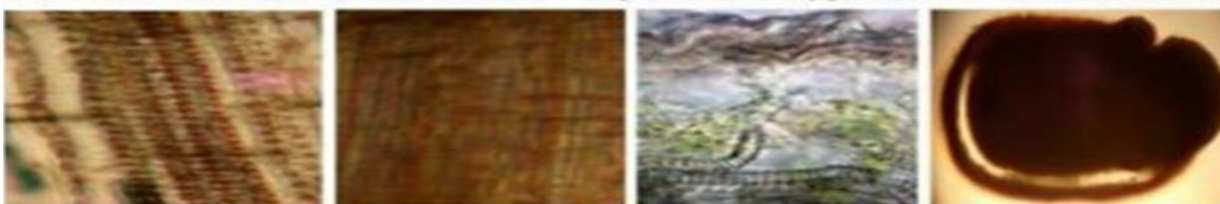


Outline of T.S Root Epiblema and cortex T.S Cortex and V.B. Vascular bundle (V.B.)

STEM

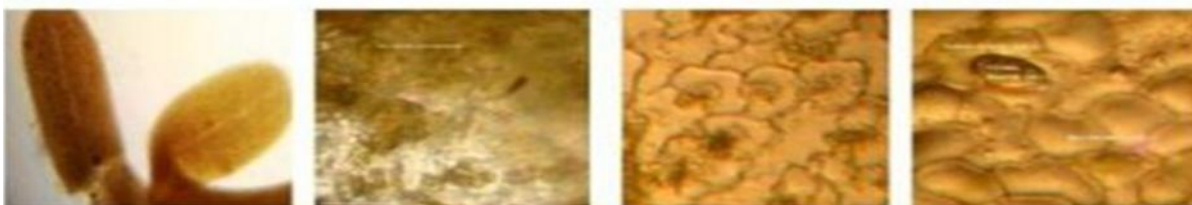


Outline of T.S of Stem T.S of stem Epidermis & hypodermis Vascular Bundle



Spiral Vessels Sclerenchymatous Fibres T.S. of Fruit Seed

LEAF



Cotyledons T.S. Upper Surface Lower Surface

Photographs of *Fumaria indica* Pugsley



Whole plant Stem Leaf Flower

Photographs of *Oldenlandia corymbosa* Linn



Whole plant Leaves Flower Fruit

MICROSCOPY OF *Oldenlandia corymbosa* Linn. ROOT



Outline of T.S root Cork and cortex of root Vascular Bundle Phloem element

STEM



Outline of T.S Epidermis and cortex Xylem elements Phloem elements

LEAF



Outline of T.S of Leaf Lamina portion Spiral vessels Epidermal cells without Stomata (Upper surface)



Stomata (lower surface) Cell wall attached to seed T.S Fruit T.S Seed

CORRESPONDING AUTHOR

Dr. Pallavi Varshney

Email:bel.pallavi@gmail.com

Source of support: Nil
Conflict of interest: None Declared