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Research Article

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PHARMACOGNOSTIC STUDIES OF THE Achyranthes aspera LEAVES

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ABSTRACT

World Health Organization appreciated the importance of medicinal plants for public health care in developing nations. *Achyranthes aspera* leaves having important role in the traditional Ayurvedic and Unani systems of holistic health and herbal medicine of the east. Especially the Leaves of *Achyranthes aspera* are reported to have good medicinal values in traditional system of medicine. The present study highlights the Pharmacognostical as well as phytochemical studies including parameters such as Macroscopic, Microscopic characters, Physical evaluation and preliminary phytochemical studies of the *Achyranthes aspera* leaves. These observations will help in the Pharmacognostical identification and standardization of the drug in the crude form and also to distinguish the drug from its adulteration.

Keywords: *Achyranthes aspera* leaves, Pharmacognosy, Microscopy.

INTRODUCTION

After decades of serious obsession with the modern medicinal system, people have started looking at the ancient healing systems like Ayurveda, Siddha and Unnani. This is because of the adverse effects associated with synthetic drugs. Herbal drugs play an important role in health care programs especially in developing countries. Ancient Indian literature incorporates a remarkably broad definition of medicinal plants and considers 'all' plant parts to be potential sources of medicinal substances.¹

However a key obstacle, which has hindered the acceptance of the alternative medicines in the developed countries, is the lack of documentation and stringent quality control. There is a need for documentation of research work carried out on traditional medicines.² With this backdrop, it becomes extremely important to make an effort towards standardization of the plant material to be used as medicine. The process of standardization can be achieved by stepwise pharmacognostic and phytochemical studies.³

These studies help in identification and authentication of the plant material. Correct Identification and quality assurance of the starting materials is an essential prerequisite to ensure reproducible quality of herbal medicine which will contribute to its safety and efficacy. Simple pharmacognostic techniques used standardization of plant material include its morphological, anatomical and biochemical characteristics.4

Achyranthes aspera Linn. belongs to the family-Amaranthaceae. It is an annual, stiff erect herb, and found commonly as a weed throughout India and used by

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Niranjan Sutar Department of Pharmacy, Sir Madanlal Group of Institutions, Etawah-206001, Uttar Pradesh, India. Contact no: +91-9760085338 Email: niranjansutar77@rediffmail.com traditional healers for the treatment of fever, dysentery and diabetes.^{5,6} Leaf decoction for cardiovascular toxicity has been reported⁷, and the ethanol crude extract showed high larvicidal activity on the tick larvae against *Boophilis microplus*.⁸ The root extract is well reputed for its pronounced insect molting hormonal activity⁹ and the ethanolic extract of the leaves and stem of the plant inhibited the growth of *Bacillus subtilis* and *Staphylococcus aureus* bacterial strains¹⁰ Roots are used as astringents to wounds, in abdominal tumor and stomach pain.¹¹ The benzene extract of the stem bark shows abortifacient activity in the rat.¹²

Leaf extracts were reported to posses thyroid stimulating, antiperoxidative and antifungal activity properties. ^{13,14} The aqueous and methyl alcohol extracts of the plant also decreased blood glucose levels in normal and alloxan diabetic rabbits. ¹⁵ It is reported to contain alkaloids, flavonoids, saponins, steroids and terpenoids. The water soluble alkaloid achyranthine isolated from *Achyranthes aspera* possess anti-inflammatory activity. ¹⁶

No systematic studies have been reported for its pharmacognostical and phytochemical study hence an effort has been made to establish the Pharmacognostical as well as phytochemical study of *Achyranthes aspera* leaves.

MATERIALS AND METHODS

Collection of plant material

The Fresh Plant of *Achyranthes aspera were* collected in the month of Janaury from the local market of Etawah, Uttar Pradesh, India and authenticated by Dr S P Paliwal, Head Department of Botany, Narain College, Shikohabad (UP). A voucher specimen was submitted at Institute's herbarium department for future reference no. *SMGI 242/16*. The fresh leaves were collected and fixed immediately using FAA (formalin: Acetic acid: ethyl alcohol) as fixative agent for anatomical studies.

Macroscopic of leaf

The macroscopic characters such as Size, shape, margin, apex, Surface, colour, odour, taste, nature, texture were studied for Morphological investigation.

Microscopic

For microscopical studies, free hand section of leaf were cut, cleared and stained with safranine according to the prescribed method. 17,18

Physical evaluation

The ash values, extractive values and loss on drying were performed according to the officinal methods prescribed in Indian pharmacopeia¹⁹ and the WHO²⁰ guidelines on quality control methods for medicinal plants materials. Fluorescence analysis was carried out according to the method of Chase and Pratt²¹ and Kokoski²²

Phytochemical screening

The preliminary phytochemical tests for dried leaves powder were also carried out according to the standard procedures described by Kokate²³ and Horborne.²⁴

Powder Drug with Chemical Reagents

The powder drug with different chemical reagents show different colour when seen on naked eye. (Table ${\bf 1}$)

TABLE 1. POWDER ANALYSIS WITH CHEMICAL AGENTS

Reagents	Colour observed
Powder as such	Green
Powder + Concentrated HCL	Dark Green
Powder + Concentrated HNO ₃	Yellowish green
Powder + Concentrated H ₂ SO ₄	Pale yellow
Powder + Glacial acetic acid	Dark green
Powder + 5% NaOH solution	Brawnish Green
Powder + 5% KOH solution	Yellowish Green
Powder + 5% Ferric chloride solution	Greenish Brown
Powder + Picric acid	Greenish Yellow
Powder + Ammonia	Dark green

Fluorescence Analysis

Many drugs fluorescence when their powder is exposed to ultraviolet radiation. It is important to observe all materials on reaction with different chemical reagents under UV light. The fluorescence characteristics of powdered drug were studied under U.V. light after treating with different chemical reagents is reported. (Table 2)

TABLE 2. FLUORESCENCE ANALYSIS OF POWDERED DRUG

Reagents	Fluorescence Observed
Powder as such	Green
Powder + 1N NaOH in methanol	Green
Powder + 1N NaOH in water	Light Green
Powder + 50% Hydrochloric acid	Dark green
Powder + 50% Sulphuric acid	Light green
Powder + 50% Nitric acid	Green
Powder + Petroleum ether	Light green
Powder + Chloroform	Dark Green
Powder + Picric acid	Green
Powder + 5% Ferric chloride solution	Dark Green
Powder + 5% Iodine solution	Light green
Powder + Methanol	Dark green
Powder + (HNO ₃ + NH ₃)	Green

RESULTS AND DISCUSSION

Macroscopic and Microscopy

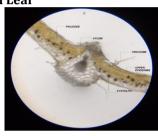
Macroscopically, the fresh leaf of *Achyrenthes Aspera* is 3.3 to 4.5 mm. in size, Shape: lanceolate, Margin: Entire, Apex: Accuminate, Surface: Rugose, Colour: Green Taste:Chracteristic, Sharp and Odour: Characterstic reffer in figure **1**.

Figure 1. Plant of Achyrenthes aspera



Transverse section of leaf Consist of xylem, Palisade Ratio, Trichrome, epidermis in surface view, lamina in surface view and lamina in transverse view show following characteristic. Leaf is having single layer of epidermis on both the surface. Upper epidermis is covered by thin cuticle. Both the epidermis show anomocytic stomata. Simple covering trichomes are very rare on both epidermises. Transverse view of lamina shows single layer of closely pack palisade cells below upper epidermis. Midrib show 5-7 layered thick wall closely pack collenchyma on both surface. Spongy mesophyl and vascular bundle.reffer in figure 2.

Figure 2. T S of Leaf



Physical evaluation

The Loss on Drying (LOD), Ash Values likes (Total Ash, Acid insoluble ash, Water soluble ash) Water soluble extractive, Methanol soluble extractive, Benzene soluble extractive and Swelling Index of leaf powder are given in table 3.

Table 3. Physico-chemical parameters of *Acyranthes aspera* leaves

S No	Parameter	Values (% w/w)
1.	Loss on Drying	5.6%
2.	Ash Values	
	A. Total Ash	23%
	B. Acid insoluble ash	75.95%
	C. Water soluble ash	19.53%
3.	Extractive Values	
	A. Water soluble extractive	0.96%
	B. Methanol soluble extractive	0.44%
	C. Benzene soluble Extractive	2%
4.	Swelling Index	0.29

Phytochemical screening

The extracts and powder drug were subjected to phytochemical screening for the presences of type of phytoconstituets. The extracts and powder were found to contain carbohydrates, alkaloids, glycosides, flavonoids, tannins and saponins.

CONCLUSION

Establishing standards is an integral part of establishing the correct identity and quality of a crude drug. Before any drug can be included in the pharmacopoeia, these standards must be established. The majority of the information on the identity, purity and quality of the plant material can be obtained from its macroscopy, microscopy and physio- chemical parameters. As there is no record on pharmacognostical work on leaves of *Achyrenthes Aspera*, The present work is undertaken to produce some pharmacognostical standards.

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