

**INTERNATIONAL JOURNAL OF ADVANCES IN
PHARMACY, BIOLOGY AND CHEMISTRY**

Research Article

**PHARMACOGNOSTICAL AND PHYTO CHEMICAL
STUDIES ON ANDROGRAPHIS
ECHIOIDES (L)NEES.**S.Anandanayaki¹, C.Uma.*²

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ABSTRACT

Andrographis echiodies(L.) Nees is one of the common herbs available in Tamil Nadu. A dried or fresh leaves of false water willow is used to treat fever. The present paper deals with the pharmacogonostical study, including the macroscopic, microscopic, fluorescence and phytochemical characteristics of AndrographisEchioides (L)Nees. These studies provided referential information for identification of this crude drug.

Key words: Andrographis echioides (L) Nees, Microscopic, Pharmagonostic characterization, phytochemical analysis.

INTRODUCTION

Nature has provided a complete store-house of remedies to cure all ailments of mankind. The knowledge of drugs has accumulated over thousands of year as a result of man's inquisitive nature. So that today we possess many effective means of health care. In the past almost all the medicines used were from the plants being, man's only chemist for ages. Today a vast store of knowledge concerning therapeutic properties of different plants has accumulated.

Powdered drugs of many plants are now available as plant products. In such cases, the study of cellular characters of the drugs and the phytochemical test of their constituents are inevitable^{1,2}. Moreover, the adulteration of drugs is often found to be deliberate act, these days. Apart from the prevalence of such adulterations, it is also an accepted fact many of the well known formulations of indigenous system of medicine are viewed with great suspicion just because, properly identified crude do not seems to be used in their preparation^{3,4}.

Hence the need for evolving criteria for standard samples of crude drugs has become very important in pharmacogenosy. Proper scientific standards are also

to be developed to check the uniformity of the products in a commercial management, as well as to have sort of control over the manufacture of spurious drugs, themselves⁵.

Everywhere in the world research has been carried out to explore the hidden drugs and to utilize the healing property of herbs. The scientific validation of the herbs made the man to change his view towards the miraculous effect of plant products. Production of drugs without scientific quality control would be harmful to traditional systems of medicinal and to man's welfare.

The present experimental plant Andrographis echiodes(L.)Nees belongs to the family of acanthaceae. It is widely distributed in the tropical India, Srilanka. Andrographis echiodes(L.) Nees is traditionally used as anti inflammatory, febrifuge, cooling, alternative for cuts and wounds. The extract of the whole plant is used to cure fever⁶. The pills prepared from the expressed leaves with other ingredients are given for fever. This plant is used to relieve griping, irregular stools and loss of appetite in case infants and in debility and certain farms of dyspepsia. However, information on the chemical

composition and bioactivity of this species is very rare. *Andrographischioides* is often substituted for kalmegh in tribal medicine⁷. Dried plants of *Andrographischioides* is used by the tribal's to keep up the moisture content of economically important crops during the hot summer⁸.

Medicinal properties of this plant are more or less similar to those of *Andrographispaniculata*. However *Andrographischioides*(L.)Nees are devoid of andrographolide, which is the major bio-active constituent of kalmegh⁹. The juice expresses from the fresh leaves are used as febrifuge¹⁰. *Andrographischioides* is identified as one of the most important medicinal plants in kanjamalai hills of Salem, which can be used for many ailments like cuts, wounds, and fever¹¹. Androechin a new chalcone glucoside from *Andrographischioides* was suspected to possess all the medicinal properties as that of *Andrographispaniculata*.

A herbal preparation containing garlic *Terminaliabellicaria*, *TerminaliaChebulla*, *GymnemaSylvestris* along with the *Andrographis* Species was studied for hypodipidimic, antioxidant and Hypo glyceemic activities¹².

MATERIAL AND METHODS

The fresh plant were collected from the waste and fallow lands of padutharkollai village, five kilometers away from karaial and also from the garden of Maideenpalli, Karaikal. Collected plants were carefully examined and identified with the help of local floras. Identities of specimens were further confirmed with reference to flora of presidency of Madras¹³. Flora of Tamil Nadu Carnatic Mathew¹⁴. The fresh leaves were separated and used for the study of macroscopic and microscopic characters. Whereas the herbs were collected, dried in a shade and used for further studies. The plant is collected at different stages of Maturation and fixed in fixation for anatomical histochemical studies and determination of phytochemicals using standard procedure.

RESULTS AND DISCUSSION

Morphology

The plant *Andrographischioides*(L.)Nees is a dense herb with branchlets to 50 cm. Leaves are oblong to oblanceolate and are sub-sessile with glandular hairs on both abaxial and adaxial surface. The stem is slightly quadrangular with hairs on its surface. The plant shows Raceme type of inflorescence not exceeding the leaves and is scarcely branched.

The calyx of the flower is with sub equal lobes, lanceolate with glandular hairs. Corolla is white with brown tinge. It is tubular, showing the 2+3 lipped

condition, which are unequal. Stamens-2, exerted and straight, style slender, with capitate stigma.

The capsules are ovoid, sparsely hairy, pointed above and narrowed below. The average number of the capsule per plant is 38, which is given in table-1. Seed are yellow in colour and ovoid. Average 100 seeds weight is given in the Table-1. Four seeds per capsule, 1.5mm across and glabrous.

By The free hand sections, the anatomical characters of root stem and leaf were observed.

ROOT: The outermost covering of the root is the epidermis which is composed of single layer of barrel shaped epidermal cells. It lacks stomata and cuticle. The epidermis is followed by the compactly arranged parenchymatous cortex. Secondary growth is present. The phloem is towards the epidermis and the xylem is at the centre (Fig-1).

STEM: T.S of the stem shows the well-defined epidermis with epidermal hairs. It is followed by the hypodermis and the chlorenchymatous cortex. The xylem elements are spherical in shape. The xylem is endarch. The phoem is encircling the xylem. Prominent pith is present in the centre. The pith cells are polygonal and are compactly arranged (Fig-2).

LEAF: the transverse section of leaf shows the upper and lower epidermis with glandular hairs. The mesophyll, in between the epidermis is made of palisade cells and spongy cells. The palisade parenchyma cells compactly arranged without any intercellular spaces. The spongy cells are loosely arranged with intercellular space and air cavities for gaseous exchange. In the midrib region the stele is surrounded a layer of compactly arranged parenchymatous cells. The stele is limited by the boarded parenchyma cells. The xylem is facing the upper epidermis where the phloem is towards the lower epidermis (Fig-3).

Quantitative microscopical analysis:

The vital quantitative microscopical analysis of leaves of *andrographischioides*(L.)Nees was carried out. Leaf constants like stomatal index, Stomatal frequency, vein islet number, vein termination number and palisade ratio were measured (Table-2).

Histochemical Studies:

Histochemical colour reactions were carried out on the leaf, stem transverse sections by the reported methods^{15,16}. T.S of leaf and stem stained with reagent showed that the presence of carbohydrate, alkaloids, tannins and phenols.

Physiochemical Analysis:

Behavior of crude leaf powder with different chemical reagents was studied to detect the presence

of phytoconstituents with colour changes under daylight by reported method¹⁷ and the results were shown in table (3).

Ash values:

Total ash, sulphated ash, water soluble ash and acid insoluble ash of the whole plant powder of *Andrographis echinoides* (L.) Nees were done as per the Indian Pharmacopoeia and the results are in Table.4. Extracts were prepared with alcohol and ethanol solvents by reported method¹⁸.

Fluorescence analysis of extracts:

In fluorescent analysis the appearance of powder in both visible light and UV light were quantitatively measured and determined by the method¹⁸. The observation are given in Table.5

Qualitative phytochemical Analysis:

The freshly prepared plant extracts of *Andrographis echinoides* (L.) Nees in water were tested for the presence of phytochemical constituents using reported methods¹⁹ and the results are given in Table.6

CONCLUSION

In conclusion, the present study on Pharmacognostical characters of *Andrographis echinoides* (L.) Nees plant will be providing useful information in ash value, Acid insoluble and soluble ash, solubility percentage, extractive value, Fluorescence characteristics and quantitative estimations. The phytochemical standards were evolved. The plants were identified based on their morphological characters. All the parts of the plant lie root, stem, leaves, flowers and fruits were analyzed and their morphological, microscopical, histochemical, and physiochemical, phytochemical characteristics were studied.

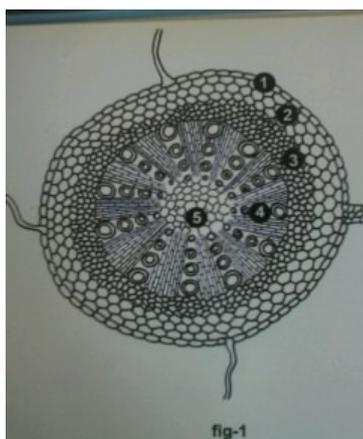


Fig 1
Transverse section of root



Fig 2
Transverse section of stem

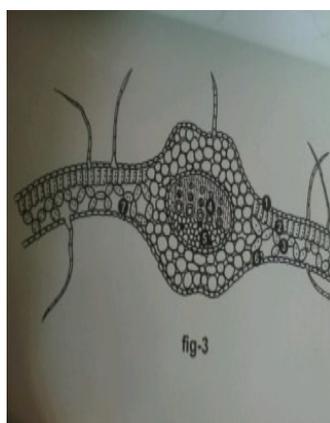


Fig 3
Transverse section of leaf

Table 1
Morphological parameters

| | |
|--------------------------------------|------------------------|
| SHAPE OF LEAF | OBLONG TO OBLANCEOLATE |
| Average dimension of Leaf (cm) | L-3.81 :B-0.9 |
| Average Leaf Area (cm ²) | 34.29 |
| Shape and colour capsule | Ovoid Brown |
| Average No.of the capsules/plant | 38 |
| Average No. of the seeds/ capsule | 4 |
| Average 100 seeds wt. | 0.368g |

Table 2
Quantitative Microscopical values of leaves of Andrographischioides (L) Nees.

| S.No. | Parameters studied | Leaf |
|-------|-------------------------|-------------------|
| 1. | Stomatal Frequency | |
| | Upper Surface | 95-110-125 |
| | Lower Surface | 120-116-142 |
| 2. | Stomatal Index | |
| | Upper Surface | 10.09-13.0-15.11 |
| | Lower Surface | 11.06-14.41-17.22 |
| 3. | Vein islet number | 4-5.5-9 |
| 4. | Vein termination number | 8-12-16 |
| 5. | Palisade ratio | 18.2-19.8-21.8 |

Table 3
Leaf powder Behaviour of Andrographischioides(L)Nees

| S.No | Reaction with powder | Colour |
|------|---|-------------|
| 1. | Powder as such | Light green |
| 2. | P+ Conc. H ₂ SO ₄ | Brown |
| 3. | P+ Conc. HCl | Brown |
| 4. | P+ Conc. HNO ₃ | Red |
| 5. | P+ Acetic acid | Dark green |
| 6. | P+ 10% NaOH | Deep green |
| 7. | P+1N HCl | Light green |
| 8. | P+I ₂ solution | Blue |
| 9. | P+FeCl ₃ | Brown |

Table 4
Physiochemical values (percentage) of Andrographisechioides (L).Nees.

| S.No. | Parameters studied | Percentage values |
|-------|--------------------------|-------------------|
| 1. | Total ash value | 34% |
| 2. | Acid insoluble ash value | 17% |
| 3. | Acid soluble ash value | 83% |
| 4. | Solubility % in alcohol | 40% |
| 5. | Loss on drying | 46% |
| 6. | Solubility % in water | 28% |

Table 5
Fluorescence analysis of powder of Andrographisechioides (L).Nees

| S.No | Powder with chemical substances | UV light | Visible Light |
|------|---------------------------------|-----------|---------------|
| 1. | Powder as such | Ash green | Light green |
| 2. | P+ 50% HNO ₃ | Ash green | Red |
| 3. | P+ 1N HCl | Ash green | Ash green |
| 4. | P+ 1N NaOH in water | Ash green | Ash green |
| 5. | P+ 1N NaOH in Alcohol | Ash green | Brown |

Table 6
Qualitative phytochemical screening of extract of Andrographisechioides(L).Nees

| S.No | Name of the compounds | Name of the test | Aqueous Extract |
|------|-----------------------|--|------------------|
| 1. | Carbohydrates | i. Fehling's ii. Benedict's | ++ + |
| 2. | Alkaloids | i. Mayer's ii. Hager's iii. Wagner's iv. DragenDroff's | - + + - |
| 3. | Steroids | Chloroform+ acetic acid +H ₂ SO ₄ | - |
| 4. | Tannins & Phenols | i. 10% Lead acetate ii. 5% Ferric chloride iii. 1% gelatin | + + + |
| 5. | Saponins | Foam test | ++ |
| 6. | Fixed oils & Fats | Spot test | - |
| 7. | Gums & Mucilage | Alcoholic precipitation | + |
| 8. | Proteins | Biuret test | ++ |
| 9. | Flavonoids | NaOH/HCl | +++ |
| 10. | Volatile oils | Hydro distillation method | - |

(+++)- Rich amount,(++)- Moderate amount,(+)- Minimum amount,(-)- Absent

REFERENCES

1. Iyengar M.A. Anatomy of crude drugs, Ied. Manipal power press: Manipal India.1974 & 1975
2. Iyenga and NA Yalc S.G.K. Anatomy of crude drugs, Ied. Manipal power press: Manipal India.1975.
3. Dash B and Bedi R. Indigenous drugs for import substitution, Indian std. Inst. Bull.1967; 19:393-396.
4. Yoga Narasimhan SN, Venkataram BS and Togunashi VS. Standard specimen- its needs and advantages for Ayurvedic Drugs, Jour, Res. Indian Med.1974; 9: 111-114.
5. Israili AH and Issar RW. Adulterated drug and their standardization, Jour, Res. Ind. Med.1975;10: 55-60.
6. Nadkarni KM. Nadkarni's Indian Materia Medical Popular Book Depot: Bombay 1976; 101-102.
7. Dr. C.K. Kokate. Practical Pharmacognosy, Vallabh Prakshan, New Delhi. 1986; 15-30.
8. Pharmacopoeia of India Ministry of Health, Govt. of India Publication New Delhi, India. 1966.
9. C. K. Kokate Practical Pharmacognosy, Vallabh Prakshan, New Delhi 1994; pp 107-113.
10. Terminalia arjuna. Alternative Medicine. Review. 1999.
11. Algesaboopathi C. Medico botanical survey of plants in kanjamalai hills of salem, Tamil Nadu, Ancient science of life. 1994; 14,1/2: 112-116.
12. Chandar R, Khanna AK, Mathur SK, and kar A. Antiglycosmic and antioxidant activities of SBC a herbal preparation. Ethanotany. 2002; 14 (1&2): 123-128.
13. Gamble JS. Flora of presidency of Madras, 1-3, BSI, Calcutta, India. 1967.
14. Mathew KM. The flora of the Tamil Nadu carnatic, vol-3 Part-1, The Rapinat Herbarium: Thiruchirapalli, India. 1983.
15. Kokate. C.K. Practical Pharmacognosy, Vallabh Prakshan, New Delhi. 1994.
16. Trease G.E., and Evans. W.C. Pharmacognosy 12th Ed. Bailliere. Tindal. London. 1983. 622.
17. Chase CR and Pratt RJ. Fluorescence of powdered vegetable drugs with particular references to development of a system of identification, J.A. Pharma. Assoc. 1949; 38:324-331.
18. Kokashi CJ, Kokashi RJ. Sharma M. Fluorescence of powdered vegetable drugs in ultra-violet radiation. J. Am. Pharm. Asso, 1958; 47:715-17.
19. Fransworth NR, Akerele O, Bingel AS, Soejarto DD and Zhengang G. Bull of the World Hhealth Organi. 1985; 63:965-981.