



Received on 17 June, 2011; received in revised form 09 August, 2011; accepted 14 October, 2011

PHARMACOGNOSTICAL INVESTIGATIONS ON *IPOMOEA AQUATICA* FORSK.

Mital N. Manvar

Department of Pharmacognosy, Atmiya Institute of Pharmacy, Yogidham Campus, Kalawad road, Rajkot, Gujarat, India

Keywords:

Ipomoea aquatica,
Convolvulaceae,
Pharmacognosy,
Microscopy

Correspondence to Author:

Mital N. Manvar

Assistant Professor, Department of
Pharmacognosy, Atmiya Institute of
Pharmacy, Yogidham Campus, Kalawad
road, Rajkot, Gujarat, India

ABSTRACT

Plants are a great source of medicines, which are useful in the treatment of various diseases. *Ipomoea aquatica* Forsk of family Convolvulaceae commonly known as Kalmisag or Nalanibhaji is being used as a green leafy vegetable and have great medicinal value in Indian medicine. It is used in Unani System of Medicine as carminative, lessens inflammation, useful in fever, jaundice, biliousness, bronchitis and liver complaints. In present investigation, the detailed pharmacognostic study of *Ipomoea aquatica* Forsk leaf is carried out to lay down the standards which could be useful in future experimental studies. The study includes macroscopy, microscopy, preliminary phytochemical screening and physicochemical evaluation.

INTRODUCTION: 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 substances¹.

Medicinal plants have been receiving great attention worldwide by the researchers because of their safe utility. The curative properties of medicinal plants are mainly due to the presence of various complex chemical substances of different composition which occur as secondary metabolites².

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. So it becomes extremely important to make an effort towards standardization of the plant material to be used as medicine. The present work was undertaken to study pharmacognostic characteristics and physicochemical evaluation of leaves of *Ipomoea aquatica* Forsk.

Ipomoea aquatica Forsk (Synonym. *Ipomoea reptans* Linn.) of family Convolvulaceae commonly known as kalmisag or nalanibhaji or water-spinach ; is a perennial herb found throughout India, Ceylon, Tropical Asia, Africa and Australia³.

Ipomoea aquatica use as carminative, lessens inflammation; useful in fever, Jaundice, biliousness, bronchitis, liver complaints in Yunani system of medicine; also use in nervous and general debility of female in Assam; stem and leaves use in febrile delirium in Cambodia⁴.

Leaves and flowers of *Ipomoea aquatica* shows antioxidant activity^{5, 6}. Leaves of *Ipomoea aquatica* possess oral hypoglycaemic activity in streptozotocin induced diabetic Wistar rats and Type II diabetic patients⁷. Methanol extract of leaves of *Ipomoea aquatica* shows hypolipidemic activity⁸.

MATERIALS AND METHODS:The leaves of the plant *Ipomoea aquatica* were collected from Rajkot district of Gujarat, India. The plant material was identified by

Botany Dept., Kotak Science College, Rajkot and a voucher specimen (Voucher No. ARGH-10) has been retained in Department of Pharmacognosy, A. R. College of Pharmacy, Vallabh Vidyanagar, Gujarat. Fresh leaves were used for macroscopical and microscopical studies. Coarse powder (# 60) of leaves was used to study microscopical characters of leaf, physicochemical parameters and phytochemical investigation. The detailed pharmacognosic studies of the plant leaf were carried out according to well known methods and procedures⁹⁻¹³. All the chemicals and solvents used in experiment were of analytical grade.

RESULTS:

Macroscopic Characters: *Ipomoea aquatica* is an herb. The leaves are simple, opposite, ovate to oblong shape; having acute apex, reticulate venation and glabrous surface. The base of leaves usually dilated, cordate to hastate. Leaves have entire margin and long petiole. Organoleptic evaluation of the leaf powder revealed that leaf powder is pale green in color, with a characteristics odour and taste.

Microscopic Characters: Transverse section of leaf shows typical dorsiventral structure. Epidermis is single layered with cuticle. Lamina is differentiated in two layers, spongy and palisade tissues. There are three layers of palisade cells found below upper epidermis. Midrib portion consist epidermis is as in lamina; collenchyma cells present below and upper layer of epidermis and vascular bundle consist of xylem and phloem. A unicellular trichomes, paracytic stomata and rosetts of calcium oxalate crystals found in the lamina and midrib portion of leaf (**Figure A, B and C**). Leaf constants such as stomatal number, stomatal index, vein-termination number and vein-islet number were measured. The results are shown in **table 1**.

TABLE 1: LEAF CONSTANTS

| Parameters | Value |
|---|-----------------|
| Average stomatal number in 25 different fields (45X) at upper epidermis | 300/square mm |
| Average stomatal number in 25 different fields (45X) at lower epidermis | 366/square mm |
| Stomatal index (45X) at upper epidermis | 14.52 |
| Stomatal index (45X) at lower epidermis | 17.46 |
| Vein-islet number (10X) | 41.33/square mm |
| Vein-termination number (10X) | 25.34/square mm |
| Palisade ratio | 7.42 |

X= magnification power

Powder Microscopy: The fine powder was mounted in glycerin as well as stained (phlorogucinol + HCL). Observation of microscope showed presence of unicellular trichomes, paracytic stomata, rosettes of calcium oxalate crystals, epidermal cells, xylem vessels and so on (**Figure D, E and F**).

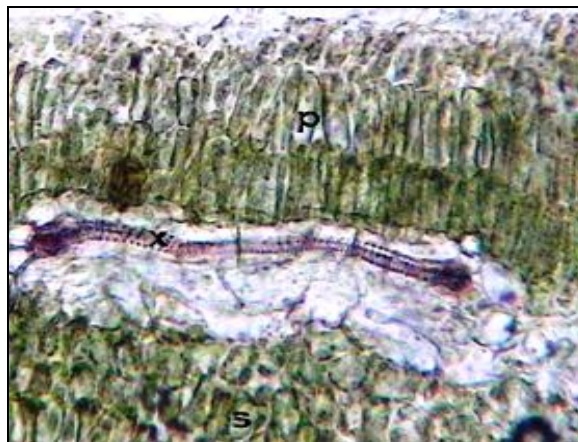


FIGURE A

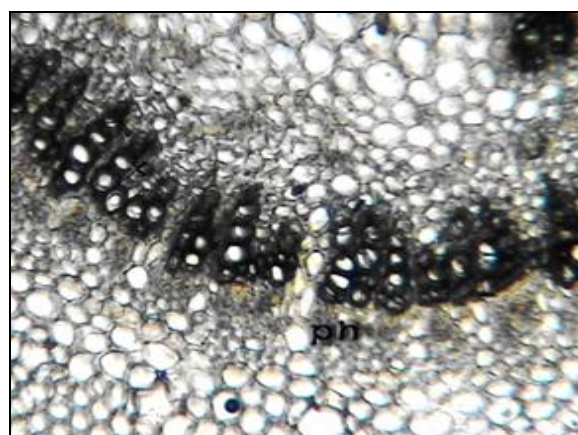


FIGURE B

FIGURE A: TRANSVERSE SECTION OF IPOMOEA AQUATICA LEAF THROUGH LAMINA (45X) p PALISADE CELLS AND s SPONGY CELLS. FIGURE B: TRANSVERSE SECTION OF IPOMOEA AQUATICA LEAF THROUGH MID-RIB (45X). ph PHLOEM AND x XYLEM



FIGURE C

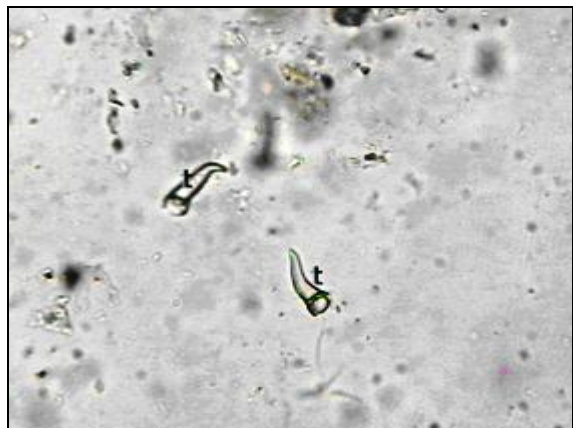


FIGURE D

FIGURE C: TRANSVERSE SECTION OF *IPOMOEA AQUATICA* LEAF THROUGH MID-RIB (45X). c COLLENCYMATOUS CELLS, e EPIDERMIS, pa PARENCHYMATOUS CELLS AND t UNICELLULAR TRICHOMES. FIGURE D: POWDER STUDY OF *IPOMOEA AQUATICA* LEAF (45X). t UNICELLULAR TRICHOMES

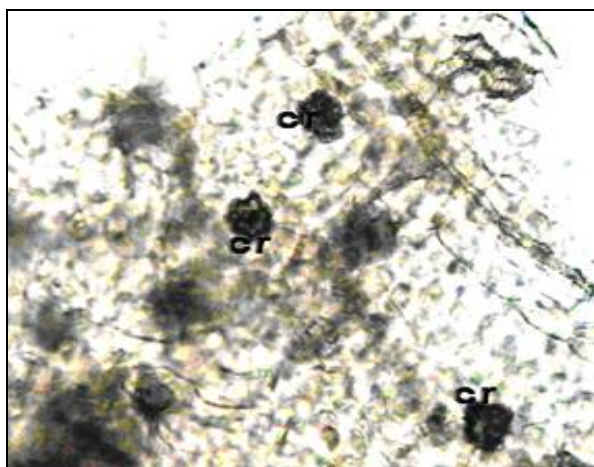


FIGURE E

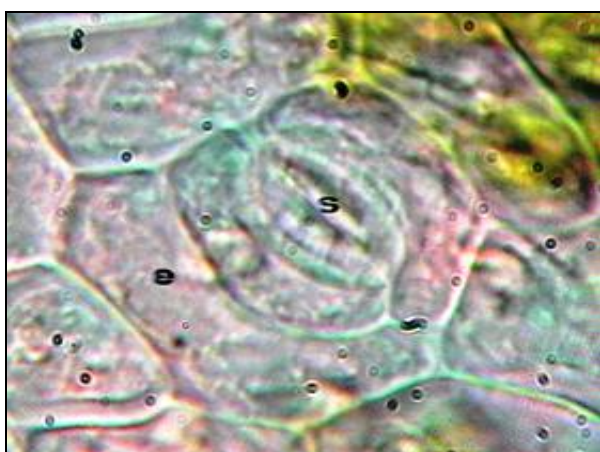


FIGURE F

FIGURE E: POWDER STUDY OF *IPOMOEA AQUATICA* LEAF (45X). cr ROSETTES CRYSTALS OF CALCIUM OXALATE. FIGURE F: POWDER STUDY OF *IPOMOEA AQUATICA* LEAF (100X). e EPIDERMAL CELLS AND S PARACYTIC STOMATA

Physiochemical Parameters: Ash values of a drug give an idea of the earthy matter or the inorganic composition and other impurities present along with the drug. Extractive values are primarily useful for the determination of exhausted or adulterated drugs. The results of these parameters are shown in **table 2**.

TABLE 2: PHYSIOCHEMICAL PARAMETERS OF LEAF

| Parameters | Value (% W/W) |
|----------------------------|---------------|
| Total ash | 4.41 |
| Acid-insoluble ash | 2.62 |
| Water-soluble ash | 0.53 |
| Alcohol soluble extractive | 21.92 |
| Water soluble extractive | 17.06 |
| Ether soluble extractive | 3.94 |
| Loss on drying | 3.20 |

Preliminary Phytochemical Screening: Preliminary phytochemical screening mainly revealed the presence of phytosterols, flavonoids, carbohydrates and proteins.

DISCUSSION: In the present investigation, the detailed pharmacognostic account of is given which includes macroscopic and microscopic characters, which will be helpful for the correct botanical identification of the drug. Leaves of *Ipomoea aquatica* possess abundantly unicellular trichomes on both epidermises, paracytic stomata found which are comparatively more on lower epidermis, rosettes of calcium oxalate found in lamina as well as in midrib region. Ash values, extractive values and leaf constants can be used as reliable aid for detecting adulteration. The information obtained from preliminary phytochemical screening will be useful in finding out the genuinity of the drug. Hence it was thought worth to investigate pharmacognostic profile of the leaf will assist in standardization for quality, purity and sample identification.

REFERENCES:

1. Shankar D and Ved DK: Indian Forester. 2003; 129, 275-288.
2. Karthikeyan A, Shanthi V, Nagasathaya A: Preliminary phytochemical and antibacterial screening of crude extract of the leaf of *Adhatoda vasica* L. Int. J. Green Pharm. 2009; 3: 78-80.
3. Nadkarni KM: Indian Materia Medica. Popular Prakashan, Mumbai, Vol. I, 1982: 684.
4. Kirtikar KR and Basu BD: Indian Medicinal Plants. International Book Distributors, Periodical Expert Book Agency, edition 2, Vol. III.1724-1725.
5. Prasad KN, Divakar S, Shivamurthy GR, Aradhya SM: Isolation of a free radical Scavenging antioxidant from water spinach

- (*Ipomoea aquatica* Forsk). Journal of Science, Food & Agriculture; In press 2005.
6. Mital B, Sangita S and Saluja AK: In-vitro Antioxidant activity of the flowers of *Ipomoea aquatica* Forsk. Pharmacognosy Magazine 2008; 4(16): 226-230.
 7. Malalavidhane S, Wickramasinghe SM, Jansz ER, Perera MS: Oral hypoglycaemic activity of *Ipomoea aquatica* in streptozotocin-induced, diabetic wistar rats and Type II diabetics. Phytotherapy Research 2003;17(9):1098-1100.
 8. Dhanasekaran S, Palayan M Hypolipidemic activity of *Ipomoea aquatica* Forsk. Leaf extracts on lipid profile in hyperlipidemic rats. International journal of Pharmaceutical and Biological Archive 2010; 1 (2): 175-179.
 9. Wallis TE: A textbook of pharmacognosy. J and A Churchill Ltd, London, Third edition 1976.
 10. Trease GE, Evans WC: Pharmacognosy. Baillene Tindall, London, 1982: 735-738.
 11. Pharmacopoeia of India: Controller of Publication, Ministry of Health and Family Welfare, Govt. of India, Delhi, 1996:A53-54.
 12. Kokate CK. Practical pharmacognosy. 1st ed. New Delhi: Vallabh prakashan; 1986.
 13. Khandelwal KR: Practical pharmacognosy. Nirali publication, Pune, eighteenth edition 2007.
