



Received on 18 November, 2013; received in revised form, 13 January, 2014; accepted, 26 January, 2014; published 01 February, 2014

COMPARATIVE PHARMACOGNOSTIC STUDY OF LEAVES OF *ADHATAODA VASICA* AND *AILANTHUS EXCELSA*

U. R. Shah ^{*1}, R. G. Shah ², N. S. Acharya ³, S. R. Acharya ⁴

Pioneer Pharmacy Degree College, Vadodara-390019, Gujarat India

Sun Pharmaceutical advanced research centre, Vadodara-390020, Gujarat, India

Institute of Pharmacy, Nirma University, Ahmedabad-382481, Gujarat, India

Institute of Pharmacy, Nirma University, Ahmedabad-382481, Gujarat, India

Keywords:

Adhataoda vasica, *Ailanthus excelsa*,
Pharmacognostic study

Correspondence to Author:

U. R. Shah

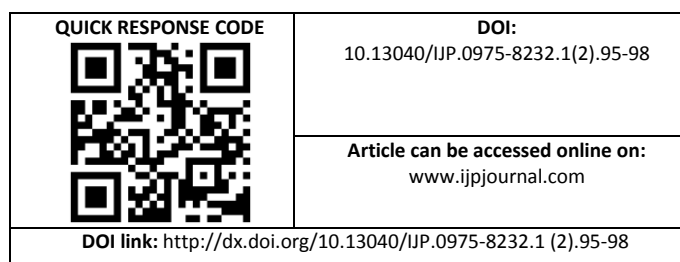
Assistant professor, Pioneer Pharmacy
Degree College, Vadodara-390019,
Gujarat, India

E mail: shahunnati_3@yahoo.com

Abstract: *Adhataoda vasica* and *Ailanthus excelsa* are distributed throughout tropical and sub tropical parts of India. Their leaves are used as expectorant and bronchodilator. The present investigation deals with the comparative pharmacognostical study of the leaves of the two species and establishment of its quality parameters. Detailed morphological and qualitative as well as quantitative microscopic study was carried out. This was followed by phytochemical screening of the species. Leaf surface microscopy of *Adhataoda vasica* shows polygonal thin walled epidermal cells and diacytic stomata whereas *Ailanthus excelsa* shows penta and hexagonal epidermal cells and anomocytic stomata. The chief powder characteristics of *Adhataoda vasica* leaf powder are 2-4 celled blunt covering trichomes, sessile glandular trichomes, acicular and prismatic calcium oxalate crystals whereas *Ailanthus excelsa* leaf powder shows multicellular bent thick walled covering trichomes, multicellular head and stalk glandular trichomes, cluster and rosette calcium oxalate crystals. The present work can serve as a useful tool in the identification, authentication and standardization of the plant material and distinguishing the two species from each other. The present study can be very useful in distinguishing *Adhataoda vasica* and *Ailanthus excelsa*, standardizing their formulations as well as serving as a guide for isolating novel phytoconstituents from them.

INTRODUCTION: *Adhatoda vasica* Nees (Family - Acanthaceae), commonly known as Vasaka or Ardu

is found commonly in India^{1,2}. These species are rich source of polyphenolic compounds, flavonoids which are responsible for strong anti-oxidant properties that help in prevention and therapy of various oxidative stress related diseases. It has been used for a multitude of disorders including; bronchitis, leprosy, blood disorders, heart troubles, thirst, asthma, fever, vomiting, loss of memory, leucoderma, jaundice, tumors, mouth troubles, sore-eye, fever, and gonorrhea^{3, 4, 5}. *Ailanthus excelsa* Roxb, (Family:



Simaroubaceae) is a large, deciduous tree indigenous to central and Southern India and Sri Lanka^{6, 7, 8}. Traditionally or in Indian system of medicine, *A. Excelsa* Roxb. is used in treatment of asthma, cough, colic pain, cancer, diabetes and also used as antispasmodic and bronchodilator. It is known as tree of heaven or tree of Gods, Maharuk in Hindi, Arduso in Gujarati, Mattipongilyam in Malayalam, Perumaruthu in Tamil also used as substitute of *A. vasica*^{9,10}. In present investigation, pharmacognostic study of *Adhatoda vasica* (leaves) and *Ailanthus excelsa* Roxb (leaves) was carried out to lay down the standards which could be useful in future experimental studies. The present study deals with comparative pharmacognostic study of the leaves of the two species. Morphological and anatomical studies of plant parts will enable to identify the crude drug. The information obtained from preliminary phytochemical screening will be useful in finding out the genuity of the drug. These parameters used as reliable aid for detecting adulteration¹¹. These simple but reliable standards will be useful to a person in using the drug as a home remedy. Also the manufacturers can utilize them for identification and selection of the raw material for drug production.

MATERIALS AND METHODS:

Leaves of *Adhatoda vasica* and *Ailanthus excelsa* were collected from campus of Pioneer Pharmacy Degree College, Vadodara in June 2013. Herbarium and voucher samples of *Adhatoda vasica* (PPDC/COG/1/2013) and *Ailanthus excelsa* (PPDC/COG/2/2013) were deposited in the college laboratory. The fresh leaves were compared morphologically and used for transverse section, surface preparation and quantitative microscopy¹². The dried leaves were powdered, stored in airtight containers and used for powder study and phytochemical screening. For microscopical studies, phloroglucinol and HCl were used for staining (Table 2). Photomicrography of the transverse sections and the powdered drug was performed using camera. Quantitative microscopic study was performed using camera lucida and stage micrometer scale (Table 3). Phytochemical screening of both the species was performed using the appropriate extracts (aqueous and alcoholic) and appropriate chemical tests (Table 4).

TABLE 2: MICROSCOPICAL COMPARISON BETWEEN ADHATODA VASICA AND AILANTHUS EXCELSA LEAVES

Parameters	<i>Adhatoda Vasica</i> leaf	<i>Ailanthus Excelsa</i> leaf
Nature of lamina	Dorsiventral	Dorsiventral
Transverse Section	Cystolith was observed in cortical parenchyma	Cystolith was absent in cortical parenchyma
Palisade	double layers	Single layer
Trichomes		
Covering trichomes	2-4 celled blunt Sessile	Multicellular bent thick walled
Glandular trichomes		Multicellular head and stalk
Epidermal cell	Polygonal thin walled	Pentagonal and hexagonal
Stomata	Diacytic	Anomocytic

TABLE 3: QUANTITATIVE MICROSCOPICAL COMPARISON BETWEEN ADHATODA VASICA AND AILANTHUS EXCELSA LEAVES

Parameters	Measured value	
	<i>Adhatoda Vasica</i>	<i>Ailanthus excelsa</i>
Stomatal number	6.4-7.4-8.4	3-4-5
Stomatal index	11.5-12.5-13.5	9-10-11
Vein islet number	23-25	35-37
Vein termination number	35-37	43-45
Palisade ratio	5.5-6.5-8.5	6-8-10

Various chemical tests performed for screening of various phytoconstituents of *Adhatoda Vasica* and *Ailanthus Excelsa* leaf powder and shown in Table 4.

TABLE 4: PHYTOCHEMICAL SCREENING OF ADHATODA VASICA AND AILANTHUS EXCELSA LEAF POWDER

Phytoconstituens	<i>Adhatoda Vasica</i>		<i>Ailanthus Excelsa</i>	
	Methanol Extract	Aqueous Extract	Methanol Extract	Aqueous Extract
Alkaloids	+ve	+ve	+ve	+ve
Saponin	+ve	+ve	+ve	+ve
Carbohydrates	+ve	+ve	+ve	+ve
Phytosterols	+ve	-ve	+ve	-ve

Phenolic glycoside/Tannin	+ve	+ve	+ve	+ve
Proteins	-ve	-ve	+ve	+ve
Gum and Mucilage	-ve	-ve	-ve	-ve
Flavonoids	+ve	+ve	+ve	+ve
Volatile Oil	-ve	-ve	-ve	-ve
Fixed Oil	-ve	-ve	-ve	-ve

RESULTS: The fresh leaves were compared morphologically and shown in Table 1.

TABLE 1: MORPHOLOGICAL COMPARISON BETWEEN *ADHATODA VASICA* AND *AILANTHUS EXCELSA* LEAVES

Parameters	Adhatoda Vasica	Ailanthus Excelsa
		
Colour	Light green	Grayish green
Size	10-13cm long	20-30cm long
Apex	Acuminate	Acute, slightly curved
Shape	Ovate-lanceolate	lanceolate
odour	Characteristic	Disagreeable
Taste	Bitter	Characteristic bitter
Margin	Slightly crenate to entire	Irregularly toothed
Base	Symmetric	Assymetric
Texture	Leathery	Velvety
Venation	Pinnate	Pinnate

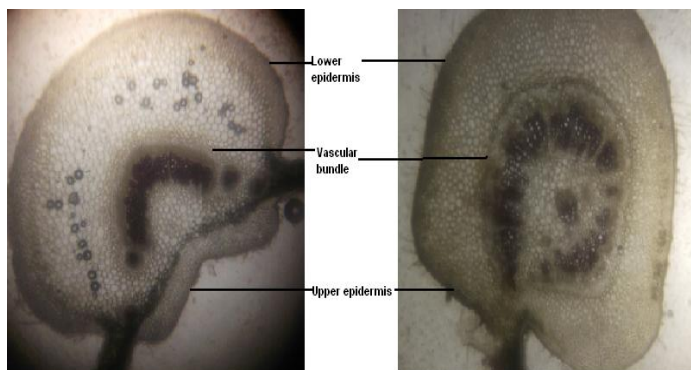


FIGURE 1: TRANVERSE SECTION OF *ADHATODA VASICA* AND *AILANTHUS EXCELSA* LEAVES

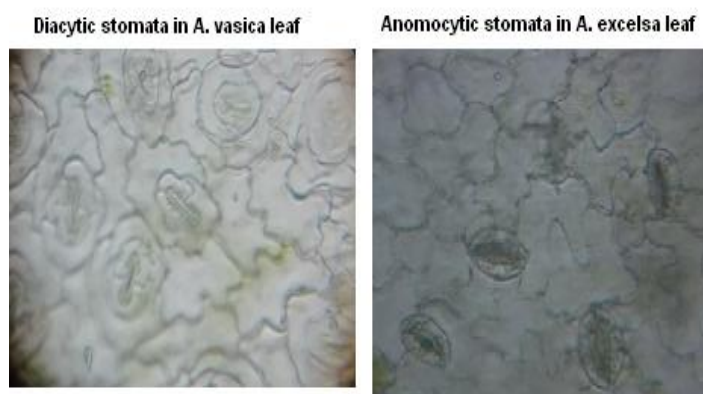


FIGURE 2: SURFACE PREPARATION OF *ADHATODA VASICA* AND *AILANTHUS EXCELSA* LEAVES

DISCUSSION: A detailed comparative pharmacognostic study of leaves of *Adhatoda vasica* and *Ailanthus excelsa* has been performed. Leaf surface microscopy of *Adhatoda vasica* shows polygonal thin walled epidermal cells and diacytic stomata whereas *Ailanthus excelsa* shows penta and hexagonal epidermal cells and anomocytic stomata. The chief powder characteristics of *Adhatoda vasica* leaf powder are 2-4 celled blunt covering trichomes, sessile glandular trichomes, acicular and prismatic calcium oxalate crystals whereas *Ailanthus excelsa* leaf powder shows multicellular bent thick walled covering trichomes, multicellular head and stalk glandular trichomes, cluster and rosette calcium oxalate crystals. Various quantitative microscopic parameters were also established. Alkaloids, flavonoids, Phenolics, saponins and sterols were detected in both the species, but proteins were detected only in *Ailanthus excelsa*.

CONCLUSION: The pharmacognostic standards for the leaves of *Adhatoda vasica* and *Ailanthus excelsa* are laid down for the first time in this study. Morphological and anatomical studies of plant parts will enable to identify the crude drug. The information obtained from preliminary phytochemical screening will be useful in finding out the genuity of the drug. These simple but reliable standards will be useful to a person in using the drug as a home remedy. Also the manufacturers can utilize them for identification and selection of the raw material for drug production. So further study should be carried out in future to isolate the specific chemical constituents as well as

detailed pharmacological activity will be carried out in proper scientific way.

REFERENCES:

1. Anonymous,. The Ayurvedic Formulary of India Vol. I and II. Controller of Publications, Ministry of Health & Family Welfare, Government of India. 2003.
2. WHO, WHO Monographs on Selected Medicinal Plants. Vol. 1, World Health Organization, Geneva 1999.
3. Anonymous, The Wealth of India, Raw Materials. Publication and information Directorate, New Delhi 1985.
4. Anonymous, The Useful Plants of India. Publications and Information Directorate, CSIR, New Delhi, India 1985.
5. Kumar A, Garg VK, Kumar R, Singh L and Chauhan S: Pharmacognostic Study and Establishment of Quality Parameters of Leaves of *Adhatoda vasica*. Linn. *Journal of Medicinal Plants Studies* 2013; 1:35-40.
6. Kumar SK, Bhowmik D. Kharel R. Tiwari P: Indian traditional herbs *Adhatoda vasica* and its Medicinal application. *J. Chem. Pharm. Res* 2010; 2:240-245.
7. Kumar D, Bhat ZA, Singh P, Shah MS and Bhujbal SS: *Ailanthus excelsa* Roxb. is Really a Plant of Heaven *International Journal of Pharmacology* 2010; 6:535-550.
8. Kirtikar KR and Basu BD: Indian Medicinal Plants. Vol. 1, International Book Distributors, Dehradun, India. Fourth edition, 1995.
9. Nadkarni AK: Indian Materia Medica. Popular Prakashan, Mumbai, India. First Edition 1976.
10. Evans WC: Trease and Evans-Pharmacognosy, Elsevier Science limited. Fifteen editions, 2002.
11. Wallis TE: Practical Pharmacognosy. J & A Churchill Ltd., London, Fifth Edition, 1984.
12. Khandelwal KR, Kokate CK, Gokhale SB: Practical pharmacognosy techniques and experiments. Nirali Prakashan, Pune. Third edition, 1996.

How to cite this article:

U. R. Shah *, R. G. Shah, N. S. Acharya, S. R. Acharya: Comparative Pharmacognostic Study of Leaves of *Adhataoda Vasica* And *Ailanthus Excelsa* . *Int J Pharmacognosy* 2014; 5(1):95-98 .doi: 10.13040/IJP. 0975-8232.1(1).95-98

All © 2014 are reserved by International Journal of Pharmacognosy. This Journal licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported License

This article can be downloaded to **ANDROID OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)