



EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

15 January 2013
EMA/HMPC/681469/2012
Committee on Herbal Medicinal Products (HMPC)

List of references supporting the assessment of *Adhatoda vasica* Nees, folium

Draft

The Agency acknowledges that copies of the underlying works used to produce this monograph were provided for research only with exclusion of any commercial purpose.

Abeywickrama K, Bean GA. Toxigenic *Aspergillus flavus* and aflatoxins in Sri Lankan medicinal plant material. *Mycopathologia*. 1991, 113(3):187-90

Abhyankar G, Reddy VD. Rapid micropropagation via axillary bud proliferation of *Adhatoda vasica* Nees from nodal segments. *Indian J Exp Biol*. 2007, 45(3):268-271

Al-Juaid SS, Abdel-Mogib M. A novel podophyllotoxin lignan from *Justicia heterocarpa*. *Chem Pharm Bull (Tokyo)*. 2004, 52(5):507-509

Amin AH, Mehta DR. A bronchodilator alkaloid (vasicinone) from *Adhatoda vasica* Nees. *Nature*. 1959, 184(Suppl 17):1317

Atal CK. Chemistry and Pharmacology of vasicine. Regional Research Laboratory Jammu-Tawi, India 1-156 1980

Avula B, Begum S, Ahmed S, Choudhary MI, Khan IA. Quantitative determination of vasicine and vasicinone in *Adhatoda vasica* by high performance capillary electrophoresis. *Pharmazie*. 2008, 63(1):20-22

Badami S, Aneesh R, Sankar S, Sathishkumar MN, Suresh B, Rajan S. Antifertility activity of *Derris brevipes* variety coriacea. *J Ethnopharmacol*. 2003, 84(1):99-104

Barry VC, Conalty ML, Rylance HJ, Smith FR. Antitubercular effect of an extract of *Adhatoda vasica*. *Nature*. 1955, 176(4472):119-120

Baumert A, Rosza Z, Schliemann W, Lewis JR, Gröger D. Biotransformation of a [14CH₃]-2-Methylaminobenzophenone by Plant Cell Cultures. *Planta Med*. 1987, 53(1):90-92

Bhaduri B, Ghose CR, Bose AN, Moza BK, Basu UP. Antifertility activity of some medicinal plants Indian. *J Exp Biol* 1968, 6:252-253



Bhattacharyya D, Pandit S, Jana U, Sen S, Sur TK. Hepatoprotective activity of *Adhatoda vasica* aqueous leaf extract on D-galactosamine-induced liver damage in rats. *Fitoterapia*. 2005, 76(2):223-225

Boluda CJ, López H, Pérez JA, Trujillo JM. First total synthesis of justicidone, a p-quinone-lignan derivative from *Justicia hyssopifolia*. *Chem Pharm Bull (Tokyo)*. 2005, 53(8):930-933

Bose KC. Being a collection of vegetable, mineral & animal drugs in common use in India. Pharmacopoeia Indica. Bishen Singh Mahendra Pal Singh 1984

British Pharmaceutical Codex. Council of the Pharmaceutical Society of Great Britain. The Pharmaceutical Press, London 1949

Burgos R, Forcelledo ML, Wagner H, Muller A, Hancke J, Wikman G et al. Lack of abortive effect of *Adhatoda vasica* spissum leaf extract by oral administration in rats. *Phytomedicine* 1997, 4:143-147

Claeson UP, Malmfors T, Wikman G, Bruhn JG. *Adhatoda vasica*: a critical review of ethnopharmacological and toxicological data. *J Ethnopharmacol*. 2000, 72(1-2):1-20

Das C, Poi R, Chowdhury A. HPTLC determination of vasicine and vasicinone in *Adhatoda vasica*. *Phytochem Anal*. 2005, 16(2):90-92

Dhuley JN. Antitussive effect of *Adhatoda vasica* extract on mechanical or chemical stimulation-induced coughing in animals. *J Ethnopharmacol*. 1999, 67(3):361-365

Dorsch W, Wagner H. New antiasthmatic drugs from traditional medicine? *Int Arch Allergy Appl Immunol*. 1991, 94(1-4):262-265

Duke JA. Handbook of medicinal herbs. CRC Press, Boca Raton 1985

Gacche RN, Dhole NA. Aldose reductase inhibitory, anti-cataract and antioxidant potential of selected medicinal plants from the Marathwada region, India. *Nat Prod Res*. 2011, 25(7):760-763

Gallagher JF, Goswami S, Chatterjee B, Jana S, Dutta K. N-H.N hydrogen bonding in 4,6-diphenyl-2-pyrimidinylamine isolated from the plant *Justicia secunda* (Acanthaceae). *Acta Crystallogr C*. 2004, 60:229-231

Gibbs BF. Differential modulation of IgE-dependent activation of human basophils by ambroxol and related secretolytic analogues. *Int J Immunopathol Pharmacol*. 2009, 22(4):919-927

Grange JM, Snell NJ. Activity of bromhexine and ambroxol, semi-synthetic derivatives of vasicine from the Indian shrub *Adhatoda vasica*, against *Mycobacterium tuberculosis* in vitro. *J Ethnopharmacol*. 1996, 50(1):49-53

Gupta KC, Chopra IC. Anti-tubercular action of *Adhatoda vasica* (N.O. acanthacea). *Indian J Med Res*. 1954, 42(3):355-358

Gupta OP, Anand KK, Ghatak BJ, Atal CK. Vasicine, alkaloid of *Adhatoda vasica*, a promising uterotonic abortifacient. *Indian J Exp Biol*. 1978, 16(10):1075-1077

Gupta OP, Sharma ML, Ghatak BJ, Atal CK. Pharmacological investigations of vasicine and vasicinone--the alkaloids of *Adhatoda vasica*. *Indian J Med Res*. 1977, 66(4):680-691

Gupta OP, Sharma ML, Ray Ghatak BJ, Atal CK. Potent uterine activity of alkaloid vasicine. *Indian Journal of Medical Research* 1977, 66:865-871

Gupta R, Thakur B, Singh P, Singh HB, Sharma VD, Katoch VM et al. Anti-tuberculosis activity of selected medicinal plants against multi-drug resistant *Mycobacterium tuberculosis* isolates. *Indian J Med Res*. 2010, 131:809-813

Hoppe HA, Drogen kunde, Band 1. Angiospermen. Walter de Gruyter Berlin New York 1975

- Hussain Z, Waheed A, Qureshi RA, Burdi DK, Verspohl EJ, Khan N et al. The effect of medicinal plants of Islamabad and Murree region of Pakistan on insulin secretion from INS-1 cells. *Phytother Res.* 2004, 18(1):73-77
- Hänsel R, Keller K, Rimpler H, Schneider G, editors. Hagers Handbuch der Pharmazeutischen Praxis. 5th ed. Vol 5. Springer-Verlag, Berlin 1993, 595-602
- Ignacimuthu S, Shanmugam N. Antimycobacterial activity of two natural alkaloids, vasicine acetate and 2-acetyl benzylamine, isolated from Indian shrub *Adhatoda vasica* Nees. leaves. *J Biosci.* 2010, 35(4):565-570
- Jacobsson I, Jönsson AK, Gerdén B, Hägg S. Spontaneously reported adverse reactions in association with complementary and alternative medicine substances in Sweden. *Pharmacoepidemiol Drug Saf.* 2009, 18(11):1039-1047
- Jahangir T, Khan TH, Prasad L, Sultana S. Reversal of cadmium chloride-induced oxidative stress and genotoxicity by *Adhatoda vasica* extract in Swiss albino mice. *Biol Trace Elem Res.* 2006, 111(1-3):217-228
- Jahangir T, Sultana S. Tumor Promotion and Oxidative Stress in Ferric Nitritotriacetate-Mediated Renal Carcinogenesis: Protection by *Adhatoda vasica*. *Toxicol Mech Methods.* 2007, 17(7):421-430
- Jain MP, Sharma VK. Phytochemical investigation of roots of *Adhatoda vasica*. *Planta Med.* 1982, 46(4):250
- Johri RK, Zutshi U. Mechanism of action of 6, 7, 8, 9, 10, 12-hexahydro-azepino-[2, 1-b] quinazolin-12-one-(RLX)--a novel bronchodilator. *Indian J Physiol Pharmacol.* 2000, 44(1):75-81
- Jayashankar S, Panagoda GJ, Amaratunga EA, Perera K, Rajapakse PS. A randomised double-blind placebo-controlled study on the effects of a herbal toothpaste on gingival bleeding, oral hygiene and microbial variables. *Ceylon Med J.* 2011, 56(1):5-9
- Kamaraj C, Abdul Rahman A, Bagavan A, Abduz Zahir A, Elango G, Kandan P et al. Larvicidal efficacy of medicinal plant extracts against *Anopheles stephensi* and *Culex quinquefasciatus* (Diptera: Culicidae). *Trop Biomed.* 2010, 27(2):211-219
- Kapoor LD. Handbook of Ayurvedic Medicinal Plants. CRC Press Boca Raton 1990
- Khan AU. Evaluating the last remnants of *Butea monosperma* (Lam.) Kuntze Forest for their in situ conservation: a case study. *Environ Monit Assess.* 2010, 170(1-4):171-184
- Khare CP. Indian Herbal remedies –rational western therapy, ayurvedic and other traditional usage, botany. Springer-Verlag, Berlin 2004
- Kumar A, Ram J, Samarth RM, Kumar M. Modulatory influence of *Adhatoda vasica* Nees leaf extract against gamma irradiation in Swiss albino mice. *Phytomedicine.* 2005, 12(4):285-293
- Kumar M, Samarth R, Kumar M, Selvan SR, Saharan B, Kumar A. Protective effect of *Adhatoda vasica* Nees against radiation-induced damage at cellular, biochemical and chromosomal levels in Swiss albino mice. *Evid Based Complement Alternat Med.* 2007, 4(3):343-350
- Kumar M, Sheikh MA, Bussmann RW. Ethnomedicinal and ecological status of plants in Garhwal Himalaya, India. *J Ethnobiol Ethnomed.* 2011, 19(7):32
- Lekana-Douki JB, Bongui JB, Oyegue Liabagui SL, Zang Edou SE, Zatra R, Bisvigou et al. In vitro antiplasmodial activity and cytotoxicity of nine plants traditionally used in Gabon. *J Ethnopharmacol.* 2011, 133(3):1103-1108

Letter from Shiv Basant, Joint Secretary Government of India, Ministry of Health and Family Welfare, Dept. of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy (AYUSH) enclosing eight draft monographs on Indian traditional medicinal plants. The letter was received by the HMPC on August 25, 2008

Madaus G. Lehrbuch der Biologischen Heilmittel, Band III. Georg Thieme Verlag, Leipzig 1938

Martindale: The Extra Pharmacopoeia. 28th ed. Reynolds JEF. The Pharmaceutical Press, London 1982

Nadkarni AK. Indian Materia Medica. vol I third ed. Popular Prakashan PVT, Mumbai 1954

Narimanian M, Badalyan M, Panosyan V, Gabrielyan E, Panossian A, Wikman G et al. Randomized trial of a fixed combination (KanJang) of herbal extracts containing

Adhatoda vasica, *Echinacea purpurea* and *Eleutherococcus senticosus* in patients with upper respiratory tract infections. *Phytomedicine*. 2005, 12(8):539-547

Nath D, Sethi N, Singh RK, Jain AK. Commonly used Indian abortifacient plants with special reference to their teratologic effects in rats. *J Ethnopharmacol*. 1992, 36(2):147-54

Nath D, Sethi N, Srivastava S, Jain AK, Srivastava R. Survey on indigenous medicinal plants used for abortion in some districts of Uttar Pradesh. *Filoterapia* 1997 68:223-225

Negera E, Gadisa E, Yamuah L, Engers H, Hussein J, Kuru T et al. Outbreak of cutaneous leishmaniasis in Silti woreda, Ethiopia: risk factor assessment and causative agent identification. *Trans R Soc Trop Med Hyg*. 2008, 102(9):883-890

Pahwa GS, Zutshi U, Atal CK. Chronic toxicity studies with vasicine from *Adhatoda vasica* Nees. in rats and monkeys. *Indian J Exp Biol*. 1987, 25(7):467-470

Paliwa JK, Dwivedi AK, Singh S, Gutpa RC. Pharmacokinetics and in-situ absorption studies of a new anti-allergic compound 73/602 in rats. *Int J Pharm*. 2000, 197:213-20

Pandita K, Bhatia MS, Thappa RK, Agarwal SG, Dhar KL, Atal CK. Seasonal variation of alkaloids of *Adhatoda vasica* and detection of glycosides and N-Oxides of vasicine and vasicinone. *Planta Med*. 1983, 48(2):81-82

Patel VK, Venkatakrishna-Bhatt H. In vitro study of antimicrobial activity of *adhatoda vasika* Linn. (leaf extract) on gingival inflammation--a preliminary report. *Indian J Med Sci*. 1984, 38(4):70-72

Prakash AO, Saxena V, Shukla S, Tewari RK, Mathur S, Gupta A, et al. Anti-implantation activity of some indigenous plants in rats. *Acta Eur Fertil*. 1985, 16(6):441-448

Prasad R, Verma SK, Dua R, Kant S, Kushwaha RA, Agarwal SP. A study of skin sensitivity to various allergens by skin prick test in patients of nasobronchial allergy. *Lung India*. 2009, 26(3):70-73

Premila MS. Ayurvedic Herbs –A clinical guide to the healing plants of traditional Indian medicine. Haworth Press, Binghampton 2006

Qureshi S, Rai MK, Agrawal SC. In vitro evaluation of inhibitory nature of extracts of 18-plant species of Chhindwara against 3-keratinophilic fungi. *Hindustan Antibiot Bull*. 1997, 39(1-4):56-60

Rajakumar N, Shivanna MB. Ethno-medicinal application of plants in the eastern region of Shimoga District, Karnataka, India. *J Ethnopharmacol*. 2009, 126(1):64-73

Ramesh L, Sharma PL. Potentiation of prostaglandins evoked contractions of isolated rat uterus by vasicine hydrochloride. *Indian Journal of Medical Research* 1981, 73: 641-648

Rote Liste. 1969 and 1980

Sharafkhaneh A, Velamuri S, Badmaev V, Lan C, Hanania N. The potential role of natural agents in treatment of airway inflammation. *Ther Adv Respir Dis*. 2007, 1(2):105-120

- Shrivastava N, Srivastava A, Banerjee A, Nivsarkar M. Anti-ulcer activity of *Adhatoda vasica* Nees. *J Herb Pharmacother*. 2006, 6(2):43-49
- Singh P, Srivastava B, Kumar A, Dubey NK. Fungal contamination of raw materials of some herbal drugs and recommendation of *Cinnamomum camphora* oil as herbal fungitoxicant. *Microb Ecol*. 2008, 56(3):555-560
- Soni S, Anandjiwala S, Patel G, Rajani M. Validation of Different Methods of Preparation of *Adhatoda vasica* Leaf Juice by Quantification of Total Alkaloids and Vasicine. *Indian J Pharm Sci*. 2008, 70(1):36-42
- Svinningen AE, Rashani KP, Jegathambigai V, Karunaratne MD, Mikunthan G. Efficacy of *Curcuma aeruginosa* rhizome and *Adhatoda vasica* plant extracts, on red spider mite, *Tetranychus urticae* in *Livistona rotundifolia*. *Commun Agric Appl Biol Sci*. 2010, 75(3):391-397
- Venkatesalu V, Gopalan N, Pillai CR, Singh V, Chandrasekaran M, Senthilkumar A et al. In vitro anti-plasmodial activity of some traditionally used medicinal plants against *Plasmodium falciparum*. *Parasitol Res*. 2012, 31
- Vyas T, Dash RP, Anandjiwala S, Nivsarkar M. Formulation and pharmacokinetic evaluation of hard gelatin capsule encapsulating lyophilized *Vasa Swaras* for improved stability and oral bioavailability of vasicine. *Fitoterapia*. 2011, 82(3):446-453
- Wagner H. Search for new plant constituents with potential antiphlogistic and antiallergic activity. *Planta Med*. 1989, 55(3):235-241
- Wakhloo RL, Wakhloo OP, Gupta OP, Atal CK. Vasicine hydrochloride a new drug for interruption of pregnancy. *Journal of Obstetrics and Gynecology of India* 1979, 29: 939-940
- WHO manual The use of traditional medicine in primary health care: a manual for health workers in South-East Asia. SEARO Regional Health Papers, No. 19. New Dehli 1990
- Wren RC, Morell Holmes E, Potter H, Wren RW. Potter's cyclopaedia of botanical drugs and preparations. 4th ed. Potter & Clarke, London 1932
- Yadav AK, Tangpu V. Anticestodal activity of *Adhatoda vasica* extract against *Hymenolepis diminuta* infections in rats. *J Ethnopharmacol*. 2008, 119(2):322-324