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PHARMACOLOGICAL STUDY ON *AILANTHUS EXCELSA*- ARDUSA (TREE OF HEAVEN) SIMAROUBACEAE: A MULTIPURPOSE TREE

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ABSTRACT

Ailanthus excelsa Roxb is commonly known as Ardusa, which is found in various parts of India. It is used as a folk medicine remedy for inflammation and rheumatoid antipyretic, antifertility, antifungal, anti-malarial and antibacterial, diabetes, antioxidant activity, anti-cancer activity. The present review is therefore, an effort to give a detailed survey of the literature on its botanical details, phytochemical reports, pharmacological activity of *Ailanthus excelsa*.

KEYWORDS: Medicine, Anti bacterial, Antifungal, Anti-malaria.

INTRODUCTION

Medicinal herbs possess curative properties due to the presence of various complex chemical substances of different composition, which are found as secondary plant metabolites in one or more parts of these plants. Traditional medicines are used not only for primary health care of the poor in developing countries, but also in countries where conventional medicine is predominant in the national health care system.[1] The herbal medicines serve the health needs of about 80% of the world's population, especially for millions of people in the vast rural areas of developing countries; more than 65% of the global population uses medicinal plants as a primary health care modality.[2] The knowledge of indigenous medicines is passing from generation to generation orally worldwide. It is, therefore, documentation of such knowledge as well as reported the scientific basis of their pharmacological potential is necessary since they are usually consider as free from adverse effects.

Ailanthus species is worldwide distributed from India, Sri Lanka, Japan, China, Australia and Sudan. *Ailanthus excelsa* Roxb belong to Family Simaroubaceae is commonly known as "Ardusa", "Tree of Heaven" which is found in various parts of India, it grows in Gujrat, Rajasthan, Bihar, Orrisa, M.P. and Maharastra, Karnataka and Tamilnadu. It is a fast-growing

and large tree, up to 25 m tall, also known as Indian Tree of Heaven, Tree of God. In traditional medicine the bark is being used as anti-spasmodic and expectorant.[3] *Ailanthus excelsa* tree is used as an ornamental tree, shelterbelts, afforestation and reforestation, for cultures of silk worms, and biomass production for fuel wood and as fodder for goats and cattle.[4] The wood is sainty, yellowish white and well suited for cabinet making.[5]

BOTANICAL DISTRIBUTION

Ailanthus excelsa Roxb is a large deciduous tree, 18-25 m tall; trunk straight, 60 to 80 cm in diameter; bark light gray-brown and rough on large trees, aromatic slightly bitter. Leaves alternate, pinnately compound, large, 30-60 cm or more in length; leaflets 8-14 or more pairs, long stalked, ovate or broadly lanced shaped from very unequal base, 6-10/90 cm long , 3-5 cm wide, often curved, long pointed, hairy gland; edges coarsely toothed and often lobed. Flower cluster lobed at leaf base, shorter than leaves, much branched; flowers many, mostly male and females on different trees, shorter stalked, greenish-yellow; calyx 5 lobed; 5 narrow petals spreading 6 mm across; stamens 10; on other flowers, 2-5 separate pistils, each with elliptical ovary, 1 ovule and slender type. Fruit a 1 seeded samara, lanced shaped, flat, pointed at ends, 5 cm long, 1cm wide, copper red, strongly veined, twisted at the base.[6]

Figure 1: Plant of *Ailenthus excelsa* (Ardusa)

PHYTOCHEMICALS

Plants from Simaroubaceae are known to contain compounds with highly oxygenated triterpenens and bitter taste called as quassinoids.[7] The leaves were reported to contain different flavonoids like kaempferol (5',4',5,7-Tetrahydroxy flavone), luteolin (3',4',5,7-

tetrahydroxy flavone), apigenin (4',5,7-trihydroxy flavone) while fruits contains quercetin.[8],[9] Bark contains wax like, reddish brown, water soluble bitter principle, known as ailantic acid.[10]

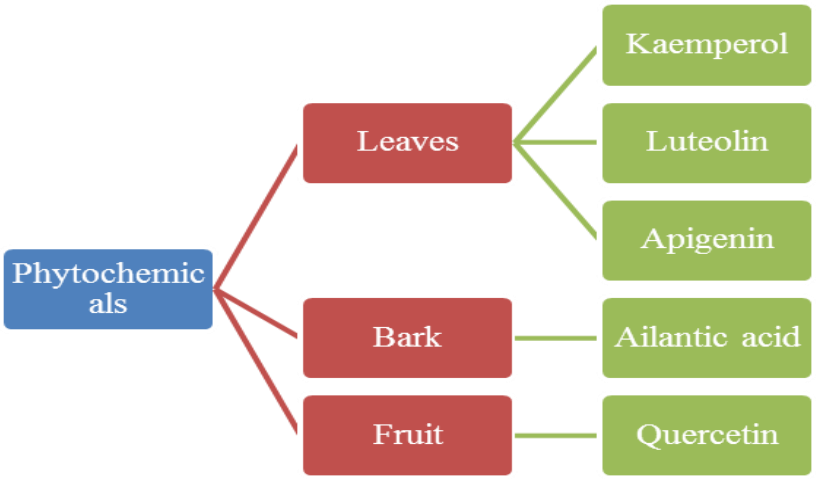

Figure 2: Some Phytochemicals in *Ailenthus excelsa* (Ardusa)

PHARMACOLOGICAL ACTIVITY

Hepatoprotective activity

Ethanol extract of leaves showed protective effects against CCL4 induced liver injury as evidenced by a significant reduction in the CCL4 induced elevated enzyme levels of serum glutamate oxaloacetate transaminase, serum glutamate pyruvate transaminase and serum alkaline phosphatase. The presence of phenolics might be the responsible factor for the above activity.[11],[12]

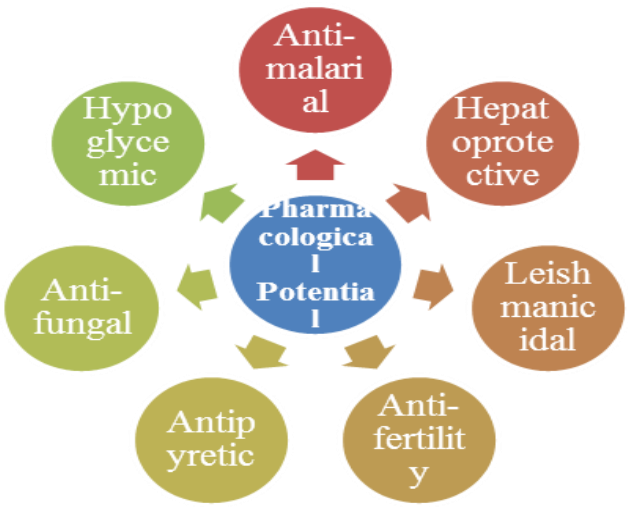

Figure 3: Some Pharmacological activity of *Ailenthus excelsa*

Leishmanicidal activity

A genus of parasitic flagellate protozoans causes leishmania. In man it invades the cells of the lymphatic system, spleen, and bone (kala-azar). Canthin-6- one alkaloid from Ailanthus was found to be active against these protozoans.[13]

Antimalarial activity

It has been considered as a great discovery that several quassinoids possess potent antimalarial activity especially against the chloroquine-resistant *Plasmodium falciparum*.[14],[15]

Anti fertility activity

The alcoholic extract of the leaf and stem bark at a dose of 250 mg/kg body weight exhibited a remarkable anti-implantation and early abortificient activity in female albino rats.[16]

Antipyretic activity

Ethanol extract of *Ailenthus excelsa excelsa*, showed moderate to significant degree of antipyretic activity against yeast suspension induced hyperthermia in an experimental rat model.[17]

Antifungal activity

Chloroform fraction of the methanol extract of stem bark of *A. excelsa* showed significant fungistatic and fungicidal activity against *Aspergillus fumigatus, Penicillium frequentence, Aspergillus niger, Penicillium notatum* and *Botrytis cinerea*.[18]

Hypoglycemic activity

A single administration of leaves or stem bark extracts of *Ailenthus excelsa* lowered the blood glucose of normal rats in a glucose tolerance test. Administration of each extract for 60 days produced a significant hypoglycemic effect on STZ-induced diabetic rats, with improved renal parameters which suggest of its potential use in the treatment of diabetes.[19]

CONCLUSION

Ailenthus excelsa which is also known as "Ardusa" locally, has various pharmacological actions which can contribute a lot to the world's health as herbal plant. Various part of the plant is used in treatment of various therapeutic effects. The extract and purified fractions of *A. excelsa* were strong plant growth inhibitors, therefore could be considered as potent, effective and environmentally safe agricultural pesticides.[20] *A. excelsa* is reported to have

many phytoconstituents and various pharmacological activity for which there is still further extensive research has to be done.

REFERENCES

1. Lanfranco G. Invited review article on traditional medicine. *Elect J Biotechnol,* 1999; 2: 1-3.
2. World Health Organization. General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine. WHO, Geneva, Switzerland.
3. Anis M, Sharma MP, Iqbal M. 2000. *Pharmacol Biol,* 2001; 38: 241.
4. Shrimali, M., Jain, D. C., Darokar, M. P., Sharma, R. P. Antibacterial activity of Ailanthus excelsa (Roxb.). Phytotherapy Research, 2001; 15: 165-166.
5. Bhandari, D.S. and Gupta, M.L. Studies on the digestibility and nutritive value of Aralu (*Ailanthus excelsa*. Roxb). *Indian Vet. J,* 1972; 49(5): 512-516.
6. Anonymous. The Wealth of India, Raw Materials. Publication and information Directorate, New Delhi, 1985; 116-118.
7. Khosa R.L, Shai M. and Bhatia N. 1999. Studies on *Ailanthus excelsa*. *Indian Drugs*, 1985; 22: 395.
8. Kapoor S.K, Ahmad P.I. and Zaman A. Chemical constituents of *Ailanthus excelsa*, *Phytochemistry,* 1971; 10: 3333.
9. Khan M.S, Kallm Y, J, Khan I.U. and Khan M.H. Chemical investigation of fruits and leaves of *Ailanthus excelsa* Roxb (Simaroubaceae) *Indian Drugs,* 1994; 31(3): 125-126.
10. Nadkarni K.M. *Indian Materia Medica,* Bombay Popular Prakashan, 1976; 56.
11. Lavhale, M.S., Hukkeri, V.I. and Jaiprakash, B. Comparative study of leaves and bark of Ailanthus excelsa. Roxb for hepatoprotective activity. Indian Drugs, 2003; 40(6): 355-357.
12. Lavhale, M.S. Hukkeri, V.I. and Jaiprakash, B. Hepatoprotective activity of leaves of Ailanthus excelsa. Roxb on experimental liver damage in rats. Indian J. Pharm. Edu.., 2003; 37(2): 105-106.
13. Thouvenel, C., Hocquemiller, R., Fournet, A. Leishmanicidal activity of two canthin-6-one alkaloids, two major constituents of *Zanthoxylum chiloperone* var. angustifolium. *J. Ethnopharmacol.*, 2002; 80(2-3): 199-202.
14. Ang HH, Chan KL. and Mak JW. In vitro antimalarial activity of quassinoids from *Eurycoma longifolia* against Malaysian chloroquine-resistant *Plasmodium falciparum* isolates. *Planta Med.*, 1995; 61: 177-178.

15. Cabral JA, McChesney JD. and Milhous WK. A new antimalarial quassinoid from *Simaba guianensis*. *J. 'at. Prod*, 1993; 56: 1954-1961.
16. Dhanashekaran S, Suresh B, Sethuraman M. and Rajan S. Antifertility activity of Ailanthus excelsa Roxb, in female albino rats. Indian J. Of Exper. Biology, 1993; 31: 384-385.
17. Suresh, B., Dhanasekaran, S., Elango, K. Anti-pyretic activity of some plants in female albino rats: A preliminary report. Ancient Sci. Life., 1995; 14: 253-7.
18. Joshi, B.C., Pandey, A., Chaurasia, Pal, L.M., Sharma, R.P. and Khare, A. Antifungal activity of stem bark of Ailanthus excelsa. Fitoterapia, 2003; 74: 689-691.
19. Genta S, Cabrera W, Said A, Farag A. and Rashed K. Hypoglycemic activity of leaves and stem bark extracts of *Ailanthus excelsa* in normal and diabetic rats. *Abstracts Biocell*, 2005; 29(1): 86.
20. Rong, T., Frieda, E., Romanchuk, J. Chris, Peterson and R.C. Joel. Plant growth regulatory effect and insecticidal activity of the extracts of the Tree of Heaven (*Ailanthus altissima* L.). *BMC Ecology*, 2002; 2: 1-6.