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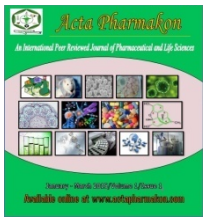

Review Article

APAMARGA (*A. ASPERA* LINN.) - A REVIEW ARTICLE

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ABSTRACT

There is great demand of Ayurveda Medicines in the developed as well as developing countries as they are considered to be efficacious and safe. Apamarga (*Achyranthes aspera*) is a perennial herb occurs naturally throughout India. Though almost all of its parts are used in Traditional Systems of medicines such as Seeds, Roots, and Shoots etc. which have potent medicinal properties. It has been used in treatment of different diseases such as Gynecological disorders, Gonorrhea, Dermatological disorders, Renaldisorders, Diabetes, Dysentery etc. The present article give an account of updated information on its Pharmacognostical, Phytochemical, Pharmacological and Therapeutic properties.

1. INTRODUCTION

Knowledge of herbs has been handed down from generation to generation for thousands of years.[1] Herbal medicines have a strong traditional or conceptual base and the potential to be useful as drugs in terms of safety and effectiveness leads for treating different diseases. World Health Organization has made an attempt to identify all medicinal plants used globally and listed more than 20,000 species. [2]

One of the many plants used is *Achyranthus aspera*. *A.* Linn. belongs to the family Amaranthaceae, is an annual, stiff erect or procumbent, annual or perennial herb, 1-2m in height, often with a woody base, commonly found as a weed of waysides, on roadsides [3,4,5] *A. aspera* Linn. is a well-known plant drug in

Ayurvedic, *Unani-Tibbi*, *Siddha*, Allopathic, Homeopathic, Naturopathic &Home Remedies [6]

2. DISTRIBUTION

It was found to be the most prevalent herb in Shivbari sacred grove of Himachal Pradesh, India [6] and an exotic medicinal plant of district Lalitpur, Uttar Pradesh, India. [7]

3. PHARMACOGNOSTICAL STUDY

3.1 Macroscopical examination:

Root - Cylindrical tap root, slightly ribbed, 0.1-1.0 cm in thickness, gradually tapering ,rough due to presence of some root scars, secondary and tertiary roots present, yellowish-brown; odour, not distinct.
Stem - 0.3 - 0.5 cm in cut pieces, yellowish-brown, erect, branched, cylindrical, hairy, solid, and hollow when dry.
Leaf - Simple, sub-sessile, ex-stipulate, opposite, decussate, wavy margin, obovate, slightly acuminate and pubescent due to the presence of thick coat of long simple hairs.
Flower - Arranged in inflorescence of long spikes, greenish-white, numerous, sessile, bracteates with two bracteoles, one spine lipped, bisexual, actinomorphic, hypogynous;perianth segments 5, free, membranous, contorted or quincuncial, stamens 5, opposite, the perianth lobes, connate forming a membranous tube-like structure, alternating with truncate and fimbriate staminodes, filament short; anther, two celled, dorsifixed;gynoecium bicarpellary, syncarpous; ovary superior, unilocular with single ovule; style, single; stigma, capitate.
Fruit - An indehiscent dry utricle enclosed within persistent, perianth and bracteoles,
Seed - Sub-cylindrical, truncate at the apex, round at the base, endospermic, brown.

3.2 Microscopic Examination:

Root - Mature root shows 3-8 layered, rectangular, tangentially elongated, thin-walled cork cells; secondary cortex consisting of 6-9 layers, oval to rectangular, thin-walled, parenchymatous cells having a few scattered single or groups of stone cells; followed by 4-6 discontinuous rings of anomalous secondary thickening composed of vascular tissues; small patches of sieve tubes distinct in phloem parenchyma, demarcating the xylem rings; xylem composed of usual elements; vessels simple pitted; medullary rays1-3 cells wide; small prismatic crystals of calcium oxalate present in cortical region and numerous in medullary rays.

Stem - Young stem shows 6-10 prominent ridges, which diminish downwards upto the base where it becomes almost cylindrical; epidermis single layered, covered by thick cuticle having uniseriate, 2-5 celled, covering trichomes and glandular with globular head, 3-4 celled stalk; cortex 6-10 layered, composed of parenchymatous cells, most of them containing rosette crystals of calcium oxalate; in the ridges cortex collenchymatous; vascular bundles lie facing each ridge capped by pericyclic fibres; transverse section of mature stem shows lignified, thin-walled cork cells; pericycle adis continuous ring of lignified fibres; vascular tissues show anomalous secondary growth having 4-6 incomplete rings of xylem and phloem; secondary phloem consisting of usual elements form incomplete rings; cambial strip present between secondary xylem and phloem; secondary xylem consisting of usual elements, fibres being absent; vessels annular, spiral, scalar form and pitted, fibers pitted, elongated, lignified; pith wide consisting of oval to polygonal, parenchymatous cells; two medullary bundles, either separate

throughout or found in some cases, present in pith; micro-sphenoidal silica crystals present in some epidermal, cortical and pith cells.

Leaf-

Petiole - Shows crescent-shaped outline, having single-layered epidermis with thick cuticle; ground tissues consisting of thin-walled, parenchymatous cells containing rosette crystals of calcium oxalate; 4-5 vascular bundle situated in mid region.

Midrib - Shows a single layered epidermis, on both surfaces; epidermis followed by 4-5layered collenchyma on upper side and 2-3 layered on lower side; ground tissue consisting of thin-walled, parenchymatous cells having a number of vascular bundles; each vascular bundle shows below the xylem vessels, thin layers of cambium, followed by phloem and a pericycle represented by 2-3 layers of thick-walled, non-lignified cells; rosette crystals of calcium oxalate found scattered in ground tissues.

Lamina - Shows single layered, tangentially elongated epidermis cells covered with thick cuticle having covering trichomes which are similar to those of stem found on both surfaces; mesophyll differentiated into palisade and spongy parenchyma; palisade 2-4 layered of thick parenchyma larger, slightly elongated in upper, while smaller and rectangular in lower surface; spongy parenchyma 3-5 layers thick, more or less isodiametric parenchymatous cells; idioblast containing large rosette crystals of calcium\ oxalate distributed in palisade and spongy parenchyma cells; stomata anisocytic and anomoacytic in both surface; stomatal index 4.5-9.0 on upper surface, 9.0-20.0 on lower surface; palisade ratio 7.0-11; vein islet number 7-13 per sq. mm.

Powder - Light yellow; shows fragments of elongated, rectangular, thin-wall edepidermal cells, aseptate fibres, vessels with annular, spiral, scalar form and pitted thickening, uniseriate hair with bulbous base, rosette and prismatic crystals of calcium oxalate. [9]

4. PHYTOCHEMICAL STUDY

The seeds also contain chemical constituents like 10-tricosanone, 10-octacosanone & 4 tritriacontanone [10] A.S. Chauhan *et al*.(2002) isolated a new cyclic chain aliphatic fatty acid (I) was also isolated from seeds of the plant [11]. T. G. Long chain compounds from the shoots like 27-cyclohexylheptacosan-7-ol and 16-hydroxy- 26-methylheptacosan-2-one.[12] Achyranthine a water soluble alkaloid which possess pharmacological actions like dilation of the blood vessels, lowering of the blood pressure, depression of the heart and increase the rate and amplitude of respiration.[13] Ecdyne, ecdysterone, inokosterone, oleanolic acid and glycoside from roots; Saponin, A & B from seeds along with hentriacontane; two new saponins C & D and oleanolic acid based saponins from fruit; alkaloids achyranthine and betaine from the whole plant are reported. [14]

5. PHARMACOLOGICAL ACTIONS

5.1 Spermicidal Activity: D. Paul *et al*. (2010) studied effects of various extracts from the roots of ***A. aspera*** and reported spermicidal activity inhuman and rat sperm.

5.2 Wound Healing Activity: S. Edwin *et al*. (2008) investigated the ethanolic and aqueous extracts of leaves of ***A. aspera*** for wound healing activity [16]

5.3 Anti-Diabetic Activity:

The ethanolic extract of A. aspera seed exhibited significant hypoglycemic activity in streptozotocin induced diabetic rats. [17] M. S. Akhtar & J. Iqbal studied the aqueous and methanolic extracts of the powdered whole plant, which shows hypoglyceamic activity. Blood glucose levels of normal and Alloxan induced diabetic rabbits were determined after oral administration of various doses.[18]

5.4 Analgesic and Antipyretic Activity:

Sutar N.G. *et al*. (2008) reported methanolic extract of leaves for analgesic and antipyretic activities by using hot plate and brewer's yeast induced methods using aspirin as a standard drug[19] M.T.J. Khan *et al*. (2010) reported that the ethanol and chloroform extracts of seeds of *A. aspera* shows mild to moderate antibiotic activity against *B. subtilis, E. coli* and *P. aeruginosa*.[20]

5.5 Anti-Viral and Anti-Carcinogenic:

In vitro assay the methonolic extract of *A. aspera* leaves (100 µg) revealed significant inhibitory effects on the Epstein-Barr virus early antigen induced by the tumour promoter 12-O-tetradecanoylphorbol-13-acetate in Raji cells. The fraction containing mainly non-polar compounds showed the most significant inhibitory activity (96.9 % and 60 % viability). In the in vivo two stage mouse skin carcinogenesis test the total methanolic extract possessed a pronounced anti-carcinogenic effect. The total extract and the fraction are believed to be valuable anti-tumour promoters in carcinogenesis.[21]

5.6 Anti-Oxidant Activity:

S. Edwin *et al.* reported free radical scavenging activity of the ethanolic and aqueous extracts. Both extracts were assessed using two methods, DPPH radical scavenging activity, and superoxide scavenging activity. The plant exhibited good antioxidant effect by preventing the formation of free radicals in the two models studied. T. Malarvili & N. Gomathi reported antioxidant activity on seeds of the plant. *A. aspera* is well documented for the presence of phytoactive constituents. Reduction in rate of lipid peroxidation and enhancement in free radical scavenging activity of the herbal seed powder is due to presence of phytoactive constituent.[22]

5.7 Hypolipidemic Activity:

A. K. Khanna *et al.* investigated the alcoholic extract of A. aspera, at 100 mg/kg dose lowered serum cholesterol (TC), phospholipid (PL) triglyceride (TG) and total lipids (TL) levels by 60, 51, 33 and 53% respectively in triton induced hyperlipidemic rats. The chronic administration of this drug at the same doses to normal rats for 30 days, lowered serum TC, PL, TG and TL by 56, 62, 68 and 67% respectively followed by significant reduction in the levels of hepatic lipids. The faecal excretion of cholic acid and deoxycholic acid increased by 24 and 40% respectively under the action of this drug. The possible mechanism of action of cholesterol lowering activity of *A. aspera* may be due to rapid excretion of bile acids causing low absorption of cholesterol.[23]

5.8 Anti-Parasitic Activity:

Ethyl acetate extracts of *A. aspera* have been proved to contain anti-parasitic activity by Zahir *et al.* It has been studied that dried leaf, flower and seed extract of *A. aspera* are active against the larvae of cattle tick Rhipicephalus (Boophilus) microplus (Acari:lxodidae), sheep internal parasite *Paramphistomum cervi*.[24]

5.8 Anti-Allergic:

Datir *et al.* reported that the petroleum ether extract (200 mg/kg, i.p.) of the plant shows significant antiallergic activity in both milk induced leukocytosis and milk induced eosinophilia in mice. Thus the antiallergic activity of A. aspera may be due to the presence of steroids. Thus these steroids present in the plant may be responsible for the antiallergic activity. [25]

5.10 Anti-Microbial Activity:

M. T. J. Khan *et al.* reported that the ethanol and chloroform extracts of seeds of *A. aspera* shows mild to moderate antibiotic activity against *B. subtilis*, *E. coli* and *P. aeruginosa*.[26] S. H. K. R. Prasad *et al.* studied the various extracts of the leaves and callus of the plant also shows antimicrobial activity.[27] P. Saravanan *et al.* reported the solvent leaf extracts were tested for antibacterial and antifungal activities against *E. coli*, *P. aeruginosa*, *P. vulgaris*, *S. aureus*, Klebsiella species[28]. T. N. Misra *et al.* reported 17-pentatriacontanol as a chief constituent isolated from essential oil of the shoots of plant, the oil shows antifungal activity against *Asperigillus carneus* [29]. S. Sharma *et al.* studied the alcoholic extract which shows the presence of the triterpenoid saponin with dose dependent inhibitory activity against *Staphylococcus aureus*, a bacteria causing skin disease in human beings. Minimum inhibitory concentration was found to be highest (0.15 mg) for purified fraction. The identification of the compound on spectral analysis gave a triterpenoidal saponin purified fraction. [30]

5.11 Hepatoprotective Activity:

The methanolic extract of the aerial parts of A. aspera shows hepatoprotective activity on rifampicin induced hepatotoxicity in albino rats. Methanolic extract showed dose dependent decrease in the levels of SGPT, SGOT, ALKP and total bilirubin.[31]

5.12 Anti-Inflammatory:

An alcohol extract of *A. aspera*, 375 and 500 mg/kg was tested in carrageenan-induced hind paw oedema and cotton pellet granoloma models in male albino rats. The alcoholic extract showed a maximum inhibition of rat paw oedema of 65.38% and 72.37% after 3 h. In a chronic test the extract exhibited 40.03% and 45.32% reduction of the granuloma weight in the sub-acute cotton pellet granuloma model. [32]

6. CONCLUSION

Above article summarize the complete information of an important Indian medicinal plant *A. aspera*. The plant shows many pharmacological activities like spermicidal, anti-allergic, cardiovascular, nephroprotective, antiparasitic, hypoglyceamic, analgesic and antipyretic. Many traditional uses are also reported like antiperiodic, purgative and laxative, in various types of gastric disorders and in body pain which are being studied. Thus, *A. aspera* is quite promising as a multipurpose medicinal agent so further clinical trials should be performed to prove its efficacy.

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