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ACHYRANTHES ASPERA A MIRACULOUS PLANT

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ABSTRACT

Achyranthes Aspera Linn is commonly seen in our surroundings but it has been used as a folk medicine over countries by Indian tribals it can be used to treat diseases, disorders, and also used as an insecticide. It can be even used as a antidote for scorpion bite. Its discussion is also seen in ayurvedic literatures like charaka samhita, sushruta samhita, vagbhata samhita under the name apamarga. Unbelievably, we found that there are more than 40 medicinal uses in this plant which are presented in this article.

KEYWORDS: Apamarga, folk medicine, Medicinal weed, Miraculous plant.

INTRODUCTION

India has an ancient heritage of herbal medicine. Indians believe that the plants around us provide remedies for many diseases and disorders. The Ayurveda is the oldest system of medicine. Most of the medicines described in Ayurveda are by herbal origin.

Achyranthes aspera linn is a commonly seen weed in our surroundings with great medicinal value.[1] Its medicinal uses were discussed in ayurvedic literatures like charaka samhita, sushruta samhita, vagbhata samhita under the name apamarga. Even it is having mythological importance in Hindu culture. It is the important constituent used in folk medicine for the cure of many ailments by Indian tribals over centuries.[2] It is being used as a folk medicine in Australia and Kenya. No part of the plant is useless. Each and every part of the plant possess definite medicinal use.

We can describe achyranthes aspera as a magical or miraculous plant due to its numerous medicinal uses. It is found to be useful in treating over 40 medical complications.

CHEMICAL CONSTITUENTS

Achyranthus aspera contains triterpenoid saponins which possess oleanolic acid as the aglycone, ecdysterone, an insect moulting hormone, and long chain alcohols are also found in achyranthus aspera. Other chemical constituents such as achyranthine, betaine, pentatriacontane, 6-pentatriacontanone, hexatriacontane, and tritriacontane are also present.[3][4]

TAXONOMICAL CLASSIFICATION[4][5]

Kingdom - plantae
Division- magnoliophyte
Class- magnoliopsida
Subclass- caryophyllidae
Order- caryophillaes
Family- amaranthaceae
Genus- achyranthus
Species- aspera

VERNACULAR NAMES[4][5]

Hindi - latjira, chirchira, chirchita
English- prickly chaff flower, rough chaff flower, red chaff tree
Telugu- uttaraene
Punjab- kurti
Malayalam- kadaladi
Unani- chirchitaa
French- collant
Bengali- apang,uputhlengra
Assam- apang
Tamil-shiru- kedaladi

PLANT MORPHOLOGY

Growth form : perennial herb up to 1.2m tall.

Foliage: green, papery leaves(1.5-7cm long, 0.4-4cm wide) are broadly oblate (egg shaped) or elliptic-oblong(oval- elongated). They are hairy on both sides.

Stems: stems are 4-sided and covered in short hairs.

Stem: 0.3-0.5 cm in cut pieces, yellowish brown, erect branch, cylindrical, hairy, solid, hollow when dry.

Flowers: They are arranged in a 10-30 cm long spike inflorescence which is initially erect, but later bends backwards after the flower bloom. arranged in inflorescence of long spikes, greenish - white, numerous, sessile, bracteate, 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.

Fruits: dry, indehiscent fruit known as a utricle is bladder-like and covered by loose, papery tissue. Each egg-shaped fruit(2.5-5mm long) contains 1 brown, egg shaped seed(2mm long).

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 present, yellowish brown; odor, not distinct.

Leaf: simple, subsessile, ex-stipulate, opposite, decussate, wavy margin, obovate, slightly acuminate and pubescent due to presence of thick coat long simple hairs.

Seed: sub cylindric, truncate at the apex, round at the base, endospermic, brown.[6]

DISTRIBUTION

Achyranthes aspera is found on roadsides, field boundaries and waste places as a weed throughout India up to an altitude of 2100 mts and in south Andaman islands. The plant is also wide spread in Baluchistan, sri-lanka, tropical Asia, Africa, Australia and America. It grows throughout the tropical and warmer regions of the world. It was reported as an invasive alien species in northern Bangladesh. It was found to be the most prevalent herb in Shivpuri sacred grove of Himachal Pradesh, India and an exotic medicinal plant of district Lalitpur, Uttar Pradesh, India.[7]

Table 1: Pharmacological actions.

Sl. No	Pharmacological activity as per region	Plant part used	Plant extract	Methods/ Parameters studied	Tested on
1)	**ON CNS**				
	Analgesic and CNS-depressant activity[8][9][4]	Leaves	Methanolic extract	Acetic acid-induced writhing test, thiopental sodium induced sleeping time determination	Swiss albino mice
	Anti- depressant activity[8][9][4][5][1]	Leaves	Methanolic extract	Forced swimming and tail suspension test	Mice and rats
	Anxiolytic[8][10]	leaves	Methanolic and ethanolic extract	Rota rod performance, neuropharmacological activity, hole board, light/dark exploration and open field test	Male swiss albino mice, Wistar albino mice
2)	**ON CVS**				
	Cardiovascular activity[8][5][4][1][11]	Seeds	Isolated saponins, isolated saponins achyranthine	Contractions of heart, activity of phosphorylase, BP, HR	Dogs, heart of frogs, pig, rabbit, rat heart
3)	**ON LUNGS**				
	Bronchoprotective activity[5][4][1][12]		Ethanolic extract		Wistar rats
	Anti-asthmatic activity[8][5][1][12]	Whole plant	Alcoholic extract	DLC,LPO,SOD,GSH,TP and histology	Wistar rats
4)	**ON KIDNEYS**				
	Nephroprotective activity[8][4][5][1][13]	Whole plant, stem	Methanolic extract and aq. extracts	Urea, uric acid, creatinine, ALP, ACP, LDH, NAG, urine microscopic and histology, cathepsin-D	Male albino rats, male wistar rats
	Diuretic[8][1][4][13]	Seeds, whole plant, root	Aq. Methanolic, ethanoic extracts, isolated saponin	K+, Na+, Cl-, bicarbonate, creatinine, urea and pH lip Schlitz method, TP, TB, ALP, AST, ALT, histology, calcium, phosphorous, urea, kidney weight	Male wistar albino rats, male albino rats
5)	**ON LIVER**				
	Hepatoprotective activity[8][4][5][1][14]	Aerial parts-seeds, leaves	Methanolic extract and ethanolic extracts	SGOT, SGPT, Ph, gastric volume, total and free acidity, ulcerative index, ALP, TP, TB, ALT, AST and histology, triglycerides, urea, albumin, SOD, LPO, GSH, GST	Rats, albino rats, male wistar albino rats, male swiss albino mice, albino rats, rabbits

6)	**ON PANCREAS**				
	Anti-diabetic activity[8][4][5][1][15][16]	Whole plant-leaves, aerial parts	Aqueous methanolic extract and ethanolic extract	Blood glucose level, TG, TC and histology, glucose, glycogen, plasma insulin, glycosylated hemoglobin, TP, GSH, LPO	Wistar strain of albino rats, rats
7)	**ON BONES**				
	Anti-arthritic[8][4][5][1][17]	-	Ethanolic extract	Carrageenan and freeund's complete adjuvant model	Mice and rats
8)	**ON HAIR**				
	Anti-dandruff[8][1]	Leaves	methanolic extract	-	-
9)	**ON IMMUNE SYSTEM**				
	Anti- inflammatory activity[8][4][5][1][18]	roots	Alcoholic extract	Carrageenan induced paw edema method, and cotton pellet granuloma test	Wistar rats
	Immune-stimulant activity[8][1][4][19]	seeds	-	Heam agglutination,TP, albumin, globulin, anti-proteases, RNA/DNA ratio	Catla catla (fish)
	Wound-healing activity[8][1][4][5][20]	leaves	Aqueous and ethanolic extracts methanolic extracts	Excision and incision wound model, area of wound measured, burn, immune compromised and diabetic wound model, excision, incision and dead space wound model, histology, wound contraction and linear incision wound model, total DNA content	Albino rats, swiss albino mice, Sprague dawley rats, albino mice of either sex, albino rats
10)	**ON MICRO-ORGANISMS**				
	Larvicidal[8][1]	Leaves, stems	Saponins isolated, extracted essential oil, methanolic extract, aq. extract	Larvicidal biopsy, Attractant/repellent,oviposition attractant/deterrent assay larvicidal, insecticidal, repellent activity	Aedesaegypeti, culex quinquefasciatus, mastuomyscoucha
	Anti-helminthic activity[8][1]	stems	Methanolic and aqueous extract	Anti-helminthic activity	Pheretimapostuma
	Anti-parasitic activity[8][4][5][1]	Dried leaf,flower, seed extract	Ethyl acetate extract		Larvae of cattle tick Rhipicephalus (boophilus)microplus, sheep internal parasite paramphistomum cervi
	Anti-feedant and insecticidal activity[8]	leaves	HEX, CH, EA	Insecticidal and anti feedant activity	Epilachna beetle, henosepilachna vigintioctopunctata
11)	**ON HORMONES**				
	Anti- ovulatory and anti-implantation activity[8][21]	roots	Ethanolic extract	Strous cycle phrases determination, anti-implantation activity	Virgin female rats
	Spermicidal activity[8][4][5][1]	Roots, whole plant	Ethanolic isolated active protein, benzene, Hexane	Sperm motility and count, AST,AST, ALT, Lipid, TC,HMG,glucose 6-phosphate dehydrogenate, testosterone, TP, Sperm immobilization and revival test, plasma membrane integrity, agglutination reaction, 5-nucleotidase, toxicity evaluation, SGOT, SGPT, histology, testosterone	Mice, humans and rats, male rats, male swiss albino rats, male wistar rats
	Parathyroid[8][1][25]	leaves	Aq. Extracts	LPO, SOD, CAT, TP, glucose, thyroid hormones	Male wistar rats
	Hypolipidemic[8][4][1]	Seeds	Aq extract, and alcoholic extract	TC, lipid profile, Triglycerides, phospholipids, total lipids	Male albino wistar rats, rats
	Hyperlipidemic[8]	Whole	Isolated saponin, aq.	Lipid profile, atherogenic index,TC,	Male wistar rats

		plant, leaf	extract	VLDL, LDL, PL, TG's, FFA, HDL, HMG, lipoprotein lipase, SOD, CAT, GSH, LPO	
12)	**OTHERS**				
	Anti-cancer activity[8][4][5][1][23][24]	Leaves, roots and whole plant	Methanolic extract, ethanolic extract and aqueous extracts	Epstein barr virus early antigen, ALT, AST, GGT, bilirubin, GST, GSH, LPO, SOD, CAT, histology, DNA fragmentation, apoptosis, anti-proliferation assay, assessment of morphological alterations, T- cell count, toxicity analysis, tail length	Raji cells, swiss albino mice, NRK-52E cell line, swiss albino rats(liver)
	Anti-oxidant activity[8][4][5][1][20]	Leaves, stem and roots	Ethanolic, aq., methanolic, benzene, petroleum ether extracts and chloroform	TAC, DPPH, FRAP, DPPH and superoxide scavenging activity, hydroxyl radical scavenging, DNA damage inhibition efficiency DPPH, beta karotine-linoleic acid	pBR 322 plasmid DNA
	anti-allergic[8][4][5][1]	leaves	Methanolic extract, petroleum ether	Milk induced leucocytes and milk induced eosinophilia	Mice
	Analgesics, anti-pyretic[8] [4]	Leaves, seeds,	Methanol, alcohol, ethanol	Hot plate and writhing test, tail flick and acetic acid induced writhing response method, formalin test	Mice, male albino rats, wistar albino mice
	Anti- cataract[8]	leaves	Aqueous extract	Lens opacity, total protein, lipid hydroperoxides, lipid peroxidation, inhibition of copper induced lipoprotein diene formation, calcium –ATPase activity	Fresh goat meals
	Anti-obesity[8][1][22]	Seed	As a obeloss drug powder	Triglycerides, cholesterol, BMI, alpha amylase and pancreatic lipase inhibitory activity, abdomen, hip, chest and thigh circumference	Humans

Table 2: Established Ethnobotanical Uses[8][2]

Plant part	Process	Disease
Whole plant	Juice of plant	Dysentery, boils, diarrhea, hemorrhoids, rheumatic and skin problems
	Plant ash mixed with the mustard oil and a pinch of salt	Tooth powder for teeth
	Fumes of plant mixed with smilex oval folia roots	Improve appetite and cure various gastric disorders
	Decoction of this plant	Diuretic in renal problem, general anasarca, beriberi, pneumonia
	Plant ash twice a day with honey	Cough
Root	Plant powder-2spoons taken once at night	Stomachic and digestive astringent and bowel complaints
	Decoction of root	Pneumonia, stomach problems
	Powder taken daily with water	Leprosy
	Paste taken daily with water	Anti-fertility
	Root ashes mixed with water	Cough, ascites, anasarca
	Powder taken twice daily	Bleeding in delivery
	A fresh piece	As Tooth brush
	Black pepper mixed with an equal	Diarrhea

	volume of root powder divided in three parts and gives in three times	
Stem	Fresh stem	As tooth brush
Leaves	Crushed leaves rubbed on back 7 leaves crushed and taken as a single dose twice a weak Juice taken every 3rd hour A paste of leaves Jiggery or black peppery and garlic mixed with fresh leave and made pills taken twice a day	Strain back cure Dog bite Diarrhea Rabies, nerve disorders, hysteria, insect and snake bite Anti-periodic
Seeds	Raw seeds taken with water	Expectorant, brain tonic, bleeding piles
Flowers	Flowers paste taken daily Paste as external use	Menorrhagia Snakes and reptile bites
Fruits	Unripe fruits taken thrice daily	Respiratory problems

DISCUSSION AND CONCLUSION

India has an ancient heritage of traditional herbal medicine. This plant is highly esteemed by traditional healers and used in treatment of different types of acute and chronic diseases due to the presence of large number of biologically active substances. Achyranthes aspera is one of the influential ayurvedic herbs and have been used to organize special medicine like kshara. In the current review we have made a humble effort to make an updated and detailed report on its numerous phytochemical constituents and pharmacological properties and also listed the use of part of plant and its effectiveness against the specific disorder of specific organ system. Thus, it is quite serves as a multipurpose medicinal agent. However, more studies are needed to improve the use of this herbal medicine more effectively in the treatment of above listed disorders and diseases all over the world.

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