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World Journal of Science and Research

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Review Article

Chemistry

ACHYRANTHUS ASPERA - MEDICINAL PLANT: A REVIEW AND BIOLOGICAL ACTIVITY

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ABSTRACT

Achyranthus aspera (Amaranthaceae) a well known plant in out moded medical sciences, Much research has been done on the leaves, flowers, seeds and rhizomes of the plant, Our present aim is to review all the work performed on the plant to get a clear idea to evaluate its various medicinal principles relating to phytochemical like alkaloids, quinines, aminoacid, monoterpenes, triterpene, glycosides, phenols, tannins, saponins, and flavonoids. Pharmacological like anti-diabetic, diuretic, anti- spamodic, antimicrobial, anti-fungal and anti-oxidants even cancer also. microbiological and allied approaches

Citation: Anburaj G and R. Valivittan M. Marimuthu, Dr. R. Manikandan (2016) *Achyranthus aspera* - Medicinal Plant: A Review and Biological Activity. World Journal of Science and Research. 1 (3): 01-05

Article Info:

Received on 1st July 2016
Accepted on 07th August 2016
Online August 2016

Keywords:

Achyranthus aspera
(Amaranthaceae) Medicinal
Uses & Phytochemical

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INTRODUCTION

Wound might defined as a departure or revealing of anatomic persistence of living tissue. Wound healing process which is essentially a connective tissue reaction, early stage of this process require an acute inflammatory phase pursued by the synthesis of collagen and other extracellular macromolecules which are later on reconstructed to form scar. Wound healing necessitates a highly active incorporate series of cellular, physiological and biochemical process in living organism. Several components hold up or decrease wound healing that is bacterial infection, necrotic tissue, and interference

with blood supply, lymphatic blockage and diabetes mellitus. The above reasons could be changed by any other factor; an increased healing range could be achieved . Nano ayurvedic herbal formulation investigated for their pharmacological actions and clinical uses in wound healing..(1) *Achyranthes aspera* In addition, chemical mobilization of fat stores under various conditions such as lactation, exercise, fever, infection and even fasting can result in increased radical activity and damage .

However a key obstacle, which has hindered the acceptance of the alternative medicines in the developed countries, is the lack of documentation and stringent quality control. There is a need for

documentation of research work carried out on traditional medicines.² With this backdrop, it becomes extremely important to make an effort towards standardization of the plant material to be used as medicine. The process of standardization can be achieved by stepwise pharmacognostic.

History and Origin

Two varieties of *A. aspera*, red and white are mentioned in Ayurvedic and Chinese medicines. *Achyranthes aspera* as a rough flowered stalk is described as in Sanskrit synonyms. It is described in 'Nighantas' as pungent, purgative, digestive, and a remedy for inflammation of the internal organs, itch, piles, abdominal enlargements and enlarged cervical glands. The diuretic property of the plant was well known to the natives of India and European physicians. Various plant parts form ingredients in many native prescriptions were used in combination with more active remedies.⁽³⁾

VERNACULAR NAMES

Latin ;	<i>Achyranthes aspera</i>
Sanskrit ;	Aghata
Hindi ;	Latjira, Chirchira
Gujarati ;	Safad Aghedo
Tamil ;	Shiru-kadaladi
Telugu ;	Uttaraene
Malayalam;	Kadaladi
Punjabi ;	Kutri
Unani ;	Chirchitaa
Ayurvedic;	Apaamaarga, Chirchitaa,
Persian ;	Khare-vazhun
Arabian ;	Atkumah
French ;	Achyranth a feuilles
Spanish;	Mosotillo, rabo de gato,

TAXONOMICAL CLASSIFICATION

Kingdom ;	Plantae
Subkingdom ;	Tracheobinota
Super Division ;	Spermatophyta
Division ;	Mangoliophyta
Class ;	Mangoliophsida
Subclass ;	Caryophyllidae
Order ;	Caryophyllales
Family ;	Amaranthaceae

Genus ;	<i>Achyranthes</i>
Species ;	<i>Aspera</i>

Figure 1. *Achyranthus aspera* tender part with inflorescence



MEDICINAL USES

Decoction prepared from the whole plant is given for inflammatory conditions of the body. Root decoction is helpful to cure abdominal disorders. The dried leaf powder (2-5gms) is taken with honey for diarrhoea. The dried root and *Justicia adhatoda* leaf powder are recommended for cough. Leaf juice is useful remedy for skin diseases like pruritis and scabies. Leaf paste is applied externally for toxic bites. Whole plant ash is a good remedy for bleeding piles and abdominal problems. Root is used as tooth brush to clean the mouth and to cure halitosis. Infusion of the twig is also used as a wash for toothache. Root extract is used as an eye drop at bed time for night blindness.⁽⁴⁾

PHYTOCHEMICAL STUDIES:

Chemical constituents: Betaine, achyranthine, hentriacontane, ecdysterone, achyranthes saponins A, B, C, D are the major chemical constituents found in *A. aspera*. The seeds of *Apamarg* contains α -Lrhamnopyranosyl-(1→4)-(β-Dglucopyranosuluronic acid)-(1→3)-Oleanolic acid, α -Lrhamnopyranosyl-(1→4)-(β-Dglucopyranosyluronic acid)-(1→3)- Oleanolic acid,-28-O-β-D-glucopyranoside and α -Lrhamnopyranosyl-(1→4)-(β-D glucopyranosyluronic acid) - (1→3)-oleanolic acid-28-O-β-Dglucopyranosyl-(1→4)-β-Dglucopyranoside [5]. Ethanolic extracts of the roots of *Achyranthes aspera* Linn. Isolated a new aliphatic acid and it has been identified as n-hexacos-14-enoic acid [6]. This compounds reported for the first time from any natural and synthetic source, certain other compound were also isolated and identified as strigmasta-5, 2-

dien-3- β -ol, trans-13-docasenoic acid, n-hexacosanyl n decanate, nhexacos-17-enoic acid. Rameswar isolated chemical compounds of the volatile oil from *Achyranthes aspera* leaves [7].

Biological Activity of *Achyranthes*

Aspera: The methanolic extracts of leaves of *Achyranthes aspera* has shown different activities against 22 microorganism (bacterial and fungal) [8]. *A. aspera* shows antiviral activity against Papaya viruses. In addition to these *A. aspera* shows various biological activities [9].

Antiviral and Anticarcinogenic: the in vitro assay the methanolic extract of *A. aspera* leaves (100 μ g) 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 anticarcinogenic effect. The total extract and the fraction are believed to be valuable antitumour promoters in carcinogenesis. [10].

Spermicidal Activity: Extracts from roots of *Achyranthes aspera* have been reported to possess spermicidal activity in human and rat sperm, as studied by [11]. Study was made on hydroethanolic, n-hexane and chloroform extracts, which were found to be most effective for sperm immobilization, sperm viability, acrosome status, 5'-nucleotidase activity and nuclear chromatin decondensation. Vasudeva N 2006 was reported the ethanolic extract of the root of *Achyranthes aspera* shows post coital antifertility activity in female albino rats. According to their study, the extract exhibited 83.3% anti-implantation activity when given orally at 200 mg/kg body weight [12].

PHARMACOLOGICAL ACTIVITIES:

Hepatoprotective Activity: the methanolic extract of the aerial parts of *Achyranthes 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. [13]

Nephroprotective Activity: Methanolic extract of the whole plant of *Achyranthes aspera* was shown to produce nephroprotective activity against lead acetate induced nephrotoxicity in male albino rats, as reported by Jayakumar [14].

Antidiabetic Activity: The ethanolic extract of *A. aspera* seed exhibited significant hypoglycemic activity in streptozotocin induced diabetic rats [15]. M. S. Akhtar & J. Iqbal studied the

aqueous and methanolic extracts of the powdered whole plant, which shows hypoglycemic activity. Blood glucose levels of normal and Alloxan induced diabetic rabbits were determined after oral administration of various doses [16].

Antiinflammatory: An alcohol extract of *A. aspera*, 375 and 500 mg/kg was tested in carrageenan-induced hind paw oedema and cotton pellet granuloma 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 [17].

Immuno modulatory: The indigenous Indian fish *Labeo rohita* was fed with a diet containing 0.01 %, 0.1% and 0.5% of *A. aspera* seeds. The fish immunized with heat-killed *Aeromonas hydrophila* were experimentally infected with living *Aeromonas hydrophila* then. In the *A. aspera* treated groups the mortality was less against controls up to the day after infection. Super oxide anion production, serum bactericidal activity, lysozyme, serum protein and albumin/globulin ratios became enhanced in *Achyranthes*-treated groups. The authors came to the conclusion that *A. aspera* stimulates immunity and increases resistance against the infection in this fish [18].

Antimicrobial Activity: M. T. J. Khan et al. reported that the ethanol and chloroform extracts of seeds of *Achyranthes aspera* shows mild to moderate antibiotic activity against *B. subtilis*, *E. coli* and *P. aeruginosa* [19]. S. H. K. R. Prasad et al. studied the various extracts of the leaves and callus of the plant also shows antimicrobial activity [20]. 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 [21]. 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 *Aspergillus carneus* [22]. 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 [23].

Antiparasitic 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:Ixodidae), sheep internal parasite Paramphistomum cervi [24].

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].

Wound Healing Activity: S. Edwin *et al.* investigated the ethanolic and aqueous extracts of leaves of *Achyranthes aspera* for wound healing activity. The wound healing activity was studied using two wound models, excision wound model and incision wound model [26].

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 [26]. 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. *Achyranthes asperais* 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 [27].

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 [28].

CONCLUSION

From this study, it's clear that *Achyranthes aspera* is an important source of many therapeutically and pharmacologically active constituents. Our present aim is to review all the work performed on the plant to get a clear idea to evaluate its various medicinal principles relating to phytochemical. A Pharmacological like *anti-diabetic*,

diuretic, anti-spasmodic, antimicrobial, anti-fungal and anti-oxidants even cancer also. microbiological and allied approaches Its study paves the way for further attention and research to identify the active compounds responsible for the plant biological activity, to characterize the active compounds and to elucidate the exact mechanism of action by which they exert their antibacterial effects

Acknowledgements

The authors would like to thank Dr. R. Manikandan, P. Thangaraj Poonai, & Mr. R. Pierson for his contribution towards collection of plant material and would like to sincerely thanks to Mr. M. Marimuthu, Department of chemistry, A.V.V.M Sri Pushpam College (Autonomous), Poondi, Thanjavur, for identification of the plant and my special thanks to Miss. Meena devi BSc.,

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Source of support: Nil;

Conflict of interest: None declared