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Pharmacological and Medicinal importance of *Achyranthes aspera*: A review

Hitesh Kumar Parmar^{1*} and Diksha Sharma²

1, Ujjain Institute of Pharmaceutical Sciences, Ujjain, (M.P.) - India

2, Department of Quality Assurance, MITR-Bhopal, (M.P.) - India

Abstract

Achyranthes aspera (Amaranthaceae) is an important medicinal herb found as a weed throughout India. Though almost all of its parts are used in traditional systems of medicines, seeds, roots and shoots are the most important parts which are used medicinally. The present review describes some of the important medicinal properties of *Achyranthes aspera*, which are instrumental in making it potent against infections.

Key-Words: Medicinal properties, Pharmacological activities, Antimicrobial medicinal plants, Microbial resistance, Antibiotics

Introduction

India has an ancient heritage of traditional herbal medicine. In Ayurveda a lot of medicinal plants are mentioned and some are having magical action and they are safer than allopathic treatment of disease. So we study on an herb to know more about it and its benefits. We collect various data and analysis the potential activity to work further study. During the analysis of data we found the multi-dimension activity of selected herbs. After all we have to focus on it, as an anti-viral herb to continue the further studies. We also found the awesome data about the herbs and we precede further analysis about the herbs. To know better and increase the level of action of herbs, to develop research to better understand the genetic mechanisms of resistance, and to continue studies to develop either synthetic or natural new drugs. Numerous studies have been done on herbals confirming their potential antimicrobial property against microorganisms. One of the strategies towards attaining this objective is the rational localization of bioactive phytoconstituents.

* Corresponding Author

E.mail: hkparmar7@rediffmail.com

Mob. +91787-9775676

More information about the plant to familiar to herbs^{1,2}:

Scientific Classification: Apamarga known as *Achyranthes aspera* belong to Amaranthaceae family, *Achyranthes* Genus, Caryophyllales Order, Core eudicots/ Eudicots Angiosperms Plantae Kingdom.

Synonyms Names: *Achyranthes aspera* has different names in various Indian languages,

Sanskrit: Aghata; Khara-manjari; Apamarga.

Hindi: Chirchira; Latjira, Onga. **Bengali:** Apang.

Gujrati: Safed Aghedo, "Anghadi", "Andhedi", "Agado". **Kannad:** Uttaraene,

Malayalam: Kadaladi; Katalati, **Malagasy:** Mahabaka,

Marathi: Aghada; Pandhara-aghada, **Punjabi:** Kutri,

Tamil: Nayuruvi; Shiru-kadaladi,

Telgu: Antisha; Apamargamu; Uttaraene, **Indonesia:** Jarong.

Morphology of *Achyranthes aspera*: Locally is one of the most important traditionally used antifertility plants in the indigenous health care delivery system of Ethiopia. It is a stiff erect perennial herb of 1 to 3 feet with simple elliptic leaves. The extracts of leaves, roots, and seeds of the plant have been used for control of fertility, in placental retention, and in postpartum bleeding. The preliminary study on leaves extract of the plant had shown some antifertility effect. Flowering time of this plant is in summer. The stems are square, leaves elliptic ovate or broadly rhombate. The inflorescences are 8 - 30 cm long, with many single, white or red flowers, 3 - 7 mm wide. The plant is widespread in the world as a weed, in Baluchistan, Ceylon, Tropical Asia, Africa, Australia and America.

In the northern part of India it is known as a medicinal plant in different systems of folk medicine. *Achyranthes aspera* L, a stiff erect herb, has been reported to possess medicinal properties.

Pharmacological action

Antifungal activity

The aim of the study was investigate antifungal activity of the various leaves extracts of *Achyranthes aspera* Linn. The aqueous, ethanol and methanol leaves extracts of *Achyranthes aspera* Linn. (Family: Amaranthaceae) were evaluated for antifungal activity against clinically important fungal spp viz. *Candida albicans* (MTCC 227), *C. tropicalis* (MTCC 750), *C. krusei* (ATCC 6258), *C. kefyr* (ATCC 4235), *C. guilliermondi* (ATCC 6260), *C. glabrata* (ATCC 2001), *Cryptococcus neoformans* (MTCC 1346), *Aspergillus niger* (MTCC 277), *Aspergillus fumigatus* (MTCC 343), *Aspergillus flavus* (MTCC 418), *Rhizopus oryzae* (MTCC 262). The in vitro antifungal activity was performed by agar well diffusion method. The ethanol extract of the leaves of *Achyranthes aspera* Linn revealed an elevated antifungal activity against *C. kefyr*, *Cryptococcus neoformans*, *Aspergillus niger* and *Aspergillus flavus*. The methanol extract of the leaves showed higher antifungal activity against *Cryptococcus neoformans* and *Aspergillus flavus*. Aqueous extract of the leaves did not show activity against tested fungal strains. The results obtained in the present study suggest that the ethanol and methanol extracts of the leaves of *Achyranthes aspera* Linn revealed a significant scope to develop a novel broad spectrum of antifungal herbal formulation³.

Anti-Bacterial and Anti-Oxidant Activity

In recent years, bacterial infections are increasing due to emergence of antibiotic resistance. Oxidative stress and gall bladder stones also pose a great health threat to millions. This study attempted the assessment of antibacterial, anti-oxidant and anti-gall bladder stones activity of an important medicinal plant *Achyranthes aspera* methanolic leaf extract. Anti-bacterial activity was performed by disc diffusion method. Significant susceptibility was observed against gram positive bacteria than gram negative strains. Anti-oxidant activity was studied in terms of 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging potential with ascorbic acid as standard. Highest DPPH scavenging activity for *A. aspera* and ascorbic acid was 59.21% and 92.41%, respectively. IC₅₀ value was 472.93 µg/ml for *A. aspera* and 1.4965 µg/ml for ascorbic acid. Effects of *A. aspera* leaf extract on gall bladder stones were also investigated. 2.0 mg/ml extract concentration showed the highest amount of cholesterol release (39.69 mg/dl) and the highest

amount of dry weight reduction (2.3 mg) from gall stones. Morphological changes like color change and fragility in gall stones were also observed at concentrations higher than 1.5 mg/ml⁴.

Antioxidant and antibacterial activity

Plants and plant-based medicaments are the basis of many of the modern pharmaceuticals we use today for our various ailments. The aim of the present study was to evaluate the antioxidant and antibacterial activities of the *Achyranthes aspera* plant extract in different organic solvents. The radical scavenging activity of the different extracts of root, stem, leaf and inflorescences was evaluated by DPPH assay and the antibacterial activity against *Staphylococcus aureus* a gram positive and *Escherichia coli* a gram negative bacteria was studied by Agar well cut diffusion method. All of the extracts exhibited different antioxidant and antibacterial activities and the activities varied from solvent to solvent and the activities are concentration and time dependant. The antioxidant and antibacterial activities were compared with the positive control Ascorbic acid and Gentamycin. A qualitative phytochemical analysis was carried out and found to possess bioactive compounds like alkaloids, glycosides, terpenoids, steroids, flavonoids, tannins⁵.

Antidiabetic potential

The present study, aims to evaluate the antidiabetic potential of aqueous extract of *Achyranthes aspera* Linn. against alloxan induced diabetic rats. Wistar strain of albino rats of either sex were divided into five groups comprising of six rats each. Group I served as normal control, group II served as disease control (alloxan induced), group III & IV animals, received aqueous extract of *A. aspera* Linn at a dosage of 250mg/kg body weight and 500mg/kg body weight for 45 days, group V served as standard drug control (glibenclamide 1mg/Kg body weight). After the experimental period the blood and tissue samples were collected and subjected to various biochemical and enzymic parameters. There were profound alteration in fasting blood glucose, serum insulin, glycosylated hemoglobin (HbA1C) and liver glycogen levels in alloxanized rats. Glucose-6-phosphatase, glucokinase, and glucose-6-phosphate dehydrogenase activity were also altered in diabetic rats. The alterations were observed to resume (P < 0.05) back to normal on treatment with plant drug. The effect of plant extract was found to be dose dependent. The present investigation reveals the antidiabetic potential of aqueous extract of whole plant of *A. aspera* Lin⁶.

Wound-healing activity

The floral richness of the North-East Indian region cannot be neglected in context to its medicinal

importance. *Achyranthes aspera* Linn. (Amaranthaceae; Prickly Chaff flower) is an indigenous plant species of this region. Although the local traditional healers have ethnomedical knowledge on the use of this plant, there is no scientific study on wound-healing activity of this plant⁷.

Anthelmintic activities

The Anthelmintic activities of methanolic and aqueous extracts of stems of *Achyranthes aspera* linn. were evaluated separately on Indian adult earthworms *Pheretima posthuma* (Annelida). For this work the stems were extracted separately with methanol and distilled water by following maceration method. Various concentrations (2.5, 5, 10, 20 mg/ml) of each extract were tested for anthelmintic activity which involved the determination of time of paralysis and time of death of the worms. The phytochemical screening of the crude extract showed the presence of saponins A and B, terpenoids, volatile oils. All extracts were able to show anthelmintic activity at all concentrations. The activities are well comparable with the standard drug, Albendazole as positive control. All the methanolic extracts showed better anthelmintic activity than the standard drug as well as the aqueous extract. Tween 20 (1%) with saline was used as negative control, did not showed any anthelmintic activity⁸.

Diuretic

Achyranthes aspera Linn (Amaranthaceae), commonly known as Apamarga in Ayurveda and is found as a weed that has been traditionally used for a number of ailments. The plant is indigenously used as diuretic, spermicidal, anti-allergic, cardiovascular, nephroprotective, antiparasitic, hypoglycaemic, analgesic and antipyretic. In the present study the methanolic extract of whole plant of *Achyranthes aspera* was investigated for its diuretic potential. The diuretic effect was found out by Lipschitz et al method using furosemide as standard drug. The methanolic extract treated rats showed high diuretic effect as compared to control but this effect was less than furosemide. Significant increase in renal clearance of sodium, potassium and chloride ions was observed in treated and standard groups⁹.

Anti-Cancerous Efficacy

Achyranthes aspera is a one of the important traditional medicinal plant. In the present investigation anticancer efficiency of *A. aspera* was evaluated in Swiss albino mice after treated with mineral oil. In Swiss albino mice the cancer state was induced by intraperitoneal injection of mineral oil at a dose of 1 ml/kg of body weight for 21 days. The tail length of the normal mice was 9.6 cm whereas the mice with

metastasize tumor in the head had a tail length of 5.8 cm, metastasize throat cancer mice had 5.9 cm of tail length and the mice with plasmacytoma alone had the tail length of 5.4 cm. The anticancerous activity of *A. aspera* leaves was tested against mineral oil induced cancer mice. Simultaneously a group of mice was first intraperitoneally injected with the sublethal doses (3 mg/ ml and 1.5 mg/ ml) of ether extract for 15 days. After 15 days the extract given mice were treated with 1 ml/kg of mineral oil periodically for 21 days. It was found that none of the mice got the symptoms of cancer. The present work clearly indicates that the ether extract at the concentration of 3 mg/ ml is very effective in reducing the cancer symptoms¹⁰.

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