Pharmacological review of achyranthes asperalinn.

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Introduction

India produces a high volume of quality medicinal plants and is the world’s second-largest exporter. It is considered one of the world’s 12 major biodiversity hotspots, with 16 agro-climatic regions and rich diversity of approximately 45,000 plant species, of which 7000 are medicinally used [1]. Herbal knowledge has been passed down from generation to generation for thousands of years. Herbal remedies have a solid traditional or conceptual foundation and the potential to be effective pharmaceuticals for treating a variety of ailments due to their safety and efficacy. The World Health Organization has catalogued more over 20,000 species in an effort to catalogue all medical plants used worldwide [2]. Ayurveda, Siddha and Unani are three forms of Indian traditional medicine that heavily rely on plant-based remedies. Due to their efficacy, safety and affordability, herbal medications have grown in importance and appeal in recent years. In some circumstances, the interaction of medicinal plants with other plants in their habitat affects the therapeutic potential of those plants [3].

Achyranthes aspera (Aa) is a species of plant in the Amaranthaceae family. In kannada, it is referred to as Uttaranee. In India and the South Andaman Islands, it grows as a weed on road sides, field boundaries, and waste spots. It is an upright, annual or perennial herb that is between one and two metres tall. Phytochemical investigations revealed the presence of bioactive compounds like sterols, alkaloids, saponins, sapogenins and cardiac glycosides in leaves. It is used to cure snake bite by administering a mixture of root powder with hot water oral-
ly. Root is also used as tooth brush [4]. Also the plant is used to cure ringworm, head wounds and tonsillitis in east Africa. Although the entire plant is frequently utilised, various plant parts (root, stem, leaf, inflorescence and seed) are used individually to treat various ailments [5].

Morphology
The annual herb *Achyranthes aspera* has medical uses all around the world. Leaves are simple 1–3 feet from stem. Stamens are double in shapes, Stomata are anomotises, embryology is seen, indorse type of anther, many covering structures. Vascular and medullar bundles also founds and cambium.

- **Root** - Cylindrical Shape 1.0 cm in diameter. Secondary and tertiary roots are separated into two groups.
- **Leaves** - Elliptical, opposite, glossy, and simple ovate.
- **Flowers** - Green or crimson bracteolate bracteates in the form of spikes.
- **Petals** - Two petals in spikes green or white coloured.
- **Fruits** - Fruits stored in utricle and dry.
- **Seeds** - Smoothed and curved embryo, Alnuminous.
- **Androecium** - Five stamens with corolla lobes.
- **Gynoecium** - Ovary is superior and having two syncarpous.

![Fig 1 Achyranthes Aspera Linn.](image)

**Taxonomic Classification [5]**

- **Kingdom** - Plantae
- **Subkingdom** - Tracheobionta
- **Super Division** - Spermatophyta
- **Division** - Mangoliophyta
- **Class** - Mangoliophyta
- **Subclass** - Caryophyllidae
- **Order** - Caryophyllales
- **Family** - Amaranthaceae
- **Genus** - Achyranthes
- **Species** - aspera

**Common Names [5]**

- Kannada: Uttharanee
- Tamil: Shiru-kadaladi
- Latin: Achyranthes aspera
- English: Red chaff tree, rough chaff tree, and prickly chaff flower.
- Sanskrit: Aghata
- Hindi: Latjira, Chirchira
- Gujarati: Safad, Agedido
- Telugu: Uttaraene
- Malayalam: Kadalad
- Punjabi: Kutri
- Unani: Chirchitaa
- Ayurvedic: Apamarga, Chirchitaa, Shikhari, Shaikharika

**Phytochemistry**
Secondary metabolites found in *Achyranthes aspera* include alkaloids, terpenoids, proteins, tannins, saponins, phenolic compounds, phytosterol, cardiac glycosides, carbohydrates, amino acids, anthraquinones, steroids, reducing sugars, fatty acids, glycoproteins, volatile oil, proanthocyanidins, anthocyanidins, anthocyanins, carotenoids, coumarins, anthracenes and some other constituents are reported and they playing a major role in exhibiting greater bioactivity against various diseased conditions [6].

**Pharmacological Properties**

**Antioxidant activity**
NayanManandhar et al., (2021) reported the Study on Phytochemical Profile and Antioxidant activity of *Achyranthes aspera* whole plant. In the investigation, the hydroxyl radical scavenging activity of the plant extract was found to be 25.12% (100 µg/ml). The hydroxyl radical scavenging activity of different concentrations of ascorbic acid used as the standard antioxidant compound. The extraction of dried plant material was carried out by cold maceration with methanol followed by partitioning with ethyl acetate [7].

**Anti inflammatory activity**
extracts or compounds that inhibit enzymatic inflammatory activities may contain potential drivers or templates for the development of effective anti-inflammatory drugs for the management of lymphoedema. While approximate Achyranthes aspera (91.7%) activity was recorded [8].

Antidepressant activity
Md. Al-Mahdi Talukdare et al., (2021) reported the activity of the Evaluation of antidepressant effects of the methanolic extract of Achyranthes aspera leaves in Swiss albino mice by using methanolic extract of Achyranthes aspera (AA). MEAA exhibits an antidepressant effect in mice, according to the force swimming, tail suspension and open field tests. The pattern of effects seen in these studies implies that the noradrenergic or serotonergic neurotransmitter system may be involved in the antidepressant effects [9].

Anticancer activity
NafisehSadatOmodiani et al., (2020) reported the Anticancer potentials of leaf, stem and root extracts of Achyranthes aspera (AA). By using acetone extract. The LC-MS analysis of its stem, leaf, roots has revealed the presence of a anticancer compounds reported [10].

Anticonvulsant activity
Dinesh Y. Gawandeet al.,(2017) reported activity of the Anticonvulsant activity and acute neurotoxic profile of Achyranthes aspera Linn. Study was carried out using Swiss Albino mice. By using methanolic root extract of A. aspera possesses a significant anticonvulsant effect which might be mediated by GABAergic mechanism [11].

Antidiabetic activity
R.Vijayaraj et al.,(2017) Demonstrated the Evaluation of in vivo antidiabetic and antioxidant activity of Achyranthes aspera Linn. Seeds by streptozotocin induced diabetic rats. By using ethanol in Soxhlet apparatus. In STZ-induced hyperglycemic rats, ethanol extract of Achyranthes aspera demonstrated significant anti-hyperglycemic effects without significantly changing body weight; they can also improve the condition of diabetes mellitus as shown by parameters like body weight, blood glucose, plasma insulin, haemoglobin and lipid profile, as well as enzyme and nonenzymatic activity [12].

Anti-helminthic activity
Kamal Hasan et al.,(2015) reported the Preliminary Phytochemical Analysis and In vitro Anti-helminthic activity of Achyranthes aspera Leaf extract. By using 80% Ethanol. The ethanolic leaf extract of Achyranthes aspera showed significant anthelmintic activity. The result of anthelmintic activity of alcoholic leaf extract of A. aspera on earthworms (Phertimaposthuma). It was concluded from the study that the extract showed marked anthelmintic activity than the standard drug albendazole. Standard drug albendazole is showing moderate activity [13].

Diuretic Activity
Muhammad Asif et al.,(2014) Demonstrated the Diuretic Activity of Achyranthes aspera Linn Crude Aqueous Extract in Albino Rats by using hot water. Dose-dependent increase in the excretion of urinary K+ was observed after the IP administration of Aa.Cr. The saluretic index values also showed a dose-dependent increase in the excretion of Na+ and K+ in the urine samples of the treated groups. The study indicates that Aa.Cr. Has a strong potential as an ideal diuretic [14].

Hepatoprotective effects
Naveed Khan et al.,(2014) carried out the Antiobesity, hypolipidemic, antioxidant and hepatoprotective effects of Achyranthes aspera seed saponins in high cholesterol fed albino rats. By using extracted with 50 ml of hot water. The hepatic status of rats treated with HCD and also any alteration due to oral administration of saponins from Achyranthes aspera for 28 days and then tested their AST and ALT levels. Our findings suggested that the saponins from Achyranthes aspera have a modest ability to protect the liver from HCD [15].

Anti-herpes virus activity
HemantaMukherjeeet al.(2012) reported the activity of the Anti-herpes virus activities of Achyranthes aspera: An Indian ethnomedicine and its triterpene acid by using methanolic extract of Achyranthes aspera demonstrated that OA and ME of Achyranthes aspera prevent the earliest the regulation of some HSV replication stages and the infected host cell’s early immunological characteristics and consequently, could be a candidate for the creation of substitute a natural Anti-HSV substance [16].

Antiobesity Activity
Neerja Rani et al.,(2012) studied the Antiobesity Potential of Achyranthes aspera (AA). Seed by using petroleum ether and ethanol extract .Inhibiting pancreatic lipase activity and preventing or delaying lipid absorption activity were both found to be effective in treating obesity, which is brought on by an excessive consumption of calories [17].

Antibacterial activity
M.S.I Khan et al.,(2009) reported the study on Antibacterial activity of Achyranthes aspera (AA) L-as invitro study. by using Chloroform, ethanol,petroleum ether extract of Achyranthes aspera. The growth of B subtilis, S lutea and K.pneumoniae. The highest zone of inhibition of chloro-
form extract was found 9.10mm against B.megaterium. Among the three extractions, ethanol extract of A. aspera displayed the highest zone of inhibition was 12.17mm against S.aureus and 11.7mm against S.dysenteriae respectively [18].

Woundhealing activity
Edwin et al., (2009) investigated the Wound healing activity of Achyranthesaspera(Aa) of leaf, by using ethanol and aqueous extracts of leaves of Achyranthesaspera were prepared and its wound healing. The wound healing activity was studied using two wound models, excision wound model and incision wound model [19].

Antifungal activity
Elumalai et al.,(2009) carried out the antifungal activity of the aqueous ethanol, methanol leaves extract of Achyranthesaspera(Aa) by Ethanol leaves extract of Achyranthesaspera Linn, showed high antifungal activity against C.kefyr, Cryptococcus neoformans, Aspergillus niger and Aspergillus flavus. The methanol leaves extract showed high antifungal activity against Cryptococcus neoformans sand Aspergillus flavus[20].

Antiallergic Activity
S. B. Datiret et al.,(2009) reported the evaluation of Antiallergic activity of the various extracts of the aerial part of Achyranthesaspera var. porphyristachya extraction by using petroleum ether, chloroform, ethyl acetate and ethanol. Mice pre-treated with petroleum ether, chloroform, ethyl acetate, ethanol and aqueous extract of A. aspera have exhibited significant difference in total leukocytes before and after drug treatment. Petroleum ether extract of A. aspera has inhibited the milk induced leukocytosis (p < 0.05) with dose of 200 mg/kg, (i.p). Mice pretreated with petroleum ether, chloroform, ethyl acetate, ethanol and aqueous extract of A. aspera have exhibited significant difference in total leukocytes before and after drug treatment. Petroleum ether extract of A. aspera has inhibited the milk induced eosinophilia (p < 0.05) with dose of 200 mg/kg, (i.p.) [21].

Antimicrobial activity
P.V. Lakshmi Naidu et al.,(2006) investigated the Antimicrobial activity of Achyranthesaspera by using Chloroform extract and methanol extract of Achyranthesasperalinn. It reveals that the inhibition zones for Bacillus subtilis, Staphylococcus aureus, and Salmonella typhi were 6 mm in the stem, 8 mm in the inflorescence, and 6 mm in the entire plant, respectively. Methanol extract showed against Staphylococcus aureus, Salmonella typhi and Bacillus subtilis and zone diameters were 9 mm, 7 mm and 9 mm respectively [22].

Conclusion
In Conclusion According to the review, numerous phytochemical components have been extracted from the plant. Along with other significant medicinal properties, Achyranthesaspera shows the Anti inflammatory, Antibacterial activity, Antioxidant activity, Anticancer activity, Antiobesity Activity, Woundhealingactivity, Antifungal activity, Anticonvulsant activity, Antimicrobial activity, Antidepressant activity, Anti-herpes virus activity, Antidiabetic activity, Hepatoprotective effects, Anti-helmanthic activity, Diuretic Activity, Antiallergic Activity.

References
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