

Review Article On evaluation isolation characterization and phytochemical uses of Aghada plant

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ABSTRACT : *Achyranthes aspera*, commonly known as Aghada, is a widely distributed medicinal herb belonging to the family Amaranthaceae. Although often considered a weed, it possesses significant ethnomedicinal importance in traditional Indian medicine. *Achyranthes aspera* Linn. (Amaranthaceae) is an indigenous medicinal plant of Asia, South America and Africa and is commonly used by traditional healers for the treatment of fever, malarial fever, dysentery, asthma, hypertension and diabetes. Many herbal remedies individually or in combination have been recommended in various medical treatises for the cure of different diseases. *Achyranthes aspera* Linn. (Amaranthaceae) is an indigenous medicinal plant of Asia, South America and Africa and is commonly used by traditional healers for the treatment of fever, malarial fever, dysentery, asthma, hypertension and diabetes. The root extract is well reputed for its pronounced insect molting hormonal activity.

KEYWORDS: *Achyranthes aspera*, Aghada, Apamarga, Phytochemistry, Ethnomedicine, Seed morphology.

1. INTRODUCTION : *Achyranthes aspera*, commonly known as Aghada in Marathi and Apamarga in Sanskrit, is a well-known medicinal herb belonging to the family Amaranthaceae. *Achyranthes aspera* is an erect, annual or sometimes perennial herb that can reach a height of about 1 to 2 meters. The plant is characterized by a stiff, hairy stem and simple, opposite leaves that are ovate in shape and covered with fine hairs. The seeds and fruits of *Achyranthes aspera* are known to contain a variety of bioactive compounds, including saponins, alkaloids, flavonoids, tannins, and glycosides. In addition to its medicinal importance, *Achyranthes aspera* also plays a significant role in ethnomedicine and rural healthcare practices. In conclusion, *Achyranthes aspera* (Aghada) is a highly valuable medicinal plant with a wide range of therapeutic applications. Its fruits and seeds are rich in bioactive compounds that contribute to its pharmacological properties.

THE BIOLOGICAL SOURCE OF AGHADA SEED IS:

Aghada seed consists of the dried mature seeds obtained from the fruit of *Terminalia chebula* Retz., belonging

to the family : Combretaceae.

Biological name : Terminalia chebula Retz.

Family : Combretaceae

Part used : Dried mature seed (obtained from the fruit)



Figure : Aghada

Traditional Uses :

The plant is used in dropsy, piles, skin eruptions, colic, as diuretic, astringent and purgative, as an antidote to snake bite, in fractured bones, whooping cough, respiratory troubles, in asthma, laxative and in leucoderma. The inflorescence is used in cough and in hydrophobia. Fruit is used in hydrophobia. The seeds are employed as an emetic, purgative, and cathartic, in gonorrhoea, for insect bite and in hydrophobic ,cough including whooping cough, as an anti-asthmatic, The leaves are used in wounds, injuries, in intermittent fever, as an anti-asthmatic, for urination, dog bite and in typhoid. The root is used in whooping cough, tonsillitis, Hemorrhage, cough and hydrophobia, as an antiasthmatic, diuretic, diaphoretic, and antisiphilitic.

GEOGRAPHICAL SOURCE OF AGHADA SEED:

Widely distributed in sub-Himalayan tracts from Ravi River (Punjab) to West Bengal, and in Central and South India including Madhya Pradesh, Maharashtra, Chhattisgarh, Karnataka, Kerala, Tamil Nadu, and Andhra Pradesh. Found in Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, Thailand, Laos, Cambodia, Vietnam, and southern China.

Phytochemistry of Achyranthes aspera Whole plant

The plant is reported to yield a water-soluble base and a chloroform soluble base. The former was earlier designated as achyranthine. It was characterized as a betaine derivative of N-methylpyrrolidine-3-carboxylic acid. Later studies showed that the water-soluble base was betaine and not achyranthine. The ethanol extract of the plant contained alkaloids and saponin while flavonoid and tannin were found absent.

The chloroform extract of the stem led to the isolation of n pentatriacontan, 6-pentatriacontanone, hexatriacontane and triacontane.

The food value of the seeds in terms of its protein quality is also reported. The composition of the seeds has close similarity to Bengal gram with a protein content of 24.8 and calorific value of 3.92/g. The hydrolyse

contains the usual amino acids. The values obtained for ten essential amino acids and cystine shows that the seed protein can be compared favourably with Bengal gram in its leucine, isoleucine, phenylalanine and valine content, while its tryptophan and sulphur amino acid (methionine and cystine) content are higher than most of the pulses.

The chemical constituents of the root varied in different preliminary studies carried out. The root was found to contain oleanolic acid as the aglycone from the saponin fraction. Both root and shoot of the plant were found to contain saponin and alkaloids but no flavonoids.

Protein Extraction from Aghada Seeds:

Principle of Protein Extraction

Protein extraction involves breaking the cell wall and releasing intracellular proteins into a suitable solvent. The efficiency depends on factors such as pH, temperature, solvent type, and extraction time.

Conventional Extraction Methods

1. Aqueous Extraction

Seeds are powdered and soaked in distilled water

Homogenization is performed

Filtration and centrifugation are used

This is a simple and eco-friendly method but may give lower yield.

2. Buffer Extraction

Phosphate buffer (pH 6.8–7.4) or Tris-HCl buffer is used

Maintains protein stability

Improves extraction efficiency

Factors Affecting Extraction:

pH (neutral pH preferred)

Temperature (low temperature prevents denaturation)

Time of extraction

Solvent type

Protein Isolation Techniques

1 Ammonium Sulfate Precipitation

Common method for protein isolation

Based on solubility differences

2 Dialysis

Removes salts and impurities

Uses semi-permeable membrane

3 Chromatographic Techniques

Ion-exchange chromatography

Gel filtration chromatography

Affinity chromatography

These techniques provide high purity proteins.

Protein Characterization :

1 Molecular Weight Determination

SDS-PAGE is widely used

Proteins from *Achyranthes aspera* have been reported around 58 kDa in some studies □

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2 Spectroscopic Methods

UV-Visible spectroscopy

FTIR spectroscopy

3 Amino Acid Analysis

Determines protein composition

Helps identify bioactive peptides

4 Structural Characterization

X-ray crystallography

Mass spectrometry

Pharmacological Activity of *Achyranthes aspera*

Anti-microbial activity :

The aqueous solution of the base achyranthine as well as the entire plant of *A. aspera* showed antibacterial activity against *Staphylococcus aureus*, *Streptococcus hemolyticus* and *Bacillus typhus*. While the alcoholic and the aqueous extract of the leaves showed antibacterial activity against *S. aureus* and *E. coli*.

Anti inflammatory activity :

An alcohol extract of *Achyranthes aspera* Linn., showed the anti-inflammatory activity on carrageenin-induced hind paw oedema and cotton pellet granuloma models in albino male rats. It is also reported that the ethanolic extract of *A. aspera*, in the doses of 100-200mg/kg possess anti-inflammatory and anti-arthritis activity.

Immunomodulatory activity:

The extract of *Achyranthes aspera* Linn., was found to enhance the induction of ovalbumin (OVA)- specific humoral antibody response in mice, on intraperitoneal injection of extract along with OVA. Furthermore, the plant extract was found to increase the induction of OVA-specific antibody response in a dose-dependent manner. A significant elevation of IgM, IgG 1 and IgG 3 antibodies was observed; however, interestingly, the anti-OVA PCA titres were suppressed. Immunomodulatory activity of *Achyranthes aspera* seed was studied by incorporating it in the diets of *Labeo rohita*, rohu fingerlings. Super oxide anion production, serum bactericidal activity, lysozyme, ALP, serum protein, albumin: globulin ratio (A/G) were enhanced in *Achyranthes* treated groups compared to the control group.

Anti fertility activity:

The ethanol extract of the root was screened for antifertility activity in proven fertile female albino rats at 200 mg/kg body weight and given orally on days 1-7 of pregnancy. The ethanol extract exhibited 83.3% anti-

implantation activity when given orally at 200 mg/kg body weight. The rats, which continued their pregnancy, did not deliver any litters after their full term. Hence the combined antifertility (antiimplantation and abortifacient) activity of ethanol extract was 100%. The ethanol extract also exhibited estrogenic activity tested in immature ovariectomised female albino rats.

Analgesic and Antipyretic activities:

Achyranthes aspera leaves shows analgesic activity by using hot plate method and antipyretic by using brewers yeast induced method and compare with Aspirin as a standard in a dose of [25mg/kg] for analgesic and [125mg/kg] for antipyretic effect respectively.

Anti-carcinogenic activity

Achyranthes aspera leaves have been assessed for chemo preventive activity. The methanolic extract, alkaloid, non-alkaloid and saponin fractions exhibited significant inhibitory effects (concentration 100) on the Epstein-Barr virus early antigen activation induced by the tumor promoter 12-O-tetradecanoylphorbol-13-acetate in Raji cells. In this in vitro assay the non-alkaloid fraction containing mainly nonpolar compounds showed the most significant inhibitory activity (96.9%; 60% viability). In the in vivo two-stage mouse skin carcinogenesis test the total methanolic extract possessed a pronounced anticarcinogenic effect (76%) .

Anti-diabetic activity:

The 50% ethanolic extract of entire plant was screened for preliminary biological activities. It showed hypoglycemic activity in rat. It was devoid of anti bacterial, anti fungal, anti protozoal, anthelmintic, antiviral and anticancer activities and effects on isolated g. pig ileum, respiration, CVS and CNS in experimental animals. The MTD on the extract was found to be 1000 mg/kg orally in mice(68). It was found that oral administration of 2-4 g/kg of whole plant powder produced a significant dose-related hypoglycemic effect in normal as well as alloxan treated diabetic rabbits. The aqueous and methyl alcohol extracts of the plant also decreased blood glucose levels in normal and alloxan diabetic rabbits.

Conclusion :

Achyranthes aspera (Aghada) seeds are a promising source of bioactive proteins with important medicinal value. Proper extraction, isolation, and characterization methods are necessary to obtain good quality proteins and ensure their effectiveness.

Study shows that Aghada plant shows useful pharmacological activities in humans and animals such as anti-inflammatory (reduces pain and swelling), antimicrobial (fights infections), antioxidant (protects body cells), anti carcinogenic, antifertility activity

and antiulcer activity (helps heal ulcers). It also supports digestion and immunity.

Overall, Aghada has strong potential for pharmaceutical use, but more research and clinical studies are needed for its safe and effective application.

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