IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Review Article
May 2023 Vol.:27, Issue:2

A Review on Pharmacognostical Study and Antibacterial Activity of Leaves *Achyranthes aspera*

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ISSN 2349-7203
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Amit Chaudhary[1], Pooja Sharma*, Nutan Thakur[2], Neha[3]

[1] *Professor, Department of Pharmacy, Abhilashi University, Chailchowk, Mandi (HP), India.*

**Research Scholar, Department of Pharmacy, Abhilashi University, Mandi (HP), India.*

[2]*Assistant Professor, Department of Pharmacy, Abhilashi University, Mandi (HP), India.*

[3] *Research Scholar, Department of Pharmacy, Abhilashi University, Mandi (HP), India*

Submitted: 27 April 2023
Accepted: 02 May 2023
Published: 30 May 2023

Keywords: Antibacterial activity, *Achyranthes aspera*, Petroleum ether[3]

ABSTRACT

The Plants are known for their diverse pharmacological activities including antibacterial activity. In the present work an attempt has been made to find out the antibacterial activity of various solvent extracts of *Achyranthes aspera* Linn. (Amaranthaceae). Chloroform, Petroleum ether, ethanol, methanol, and water solvent extracts of leaves of the plant were screened for anti-bacterial activity. This study concludes that the plant extracts were active against some gram-negative bacteria.

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1. INTRODUCTION

Nowadays, herbal medications stand for safety in contrast to synthetic drugs, which are seen as being hazardous to both people and the environment. A global "herbal renaissance" is taking place as herbs make a comeback. Nowadays, herbal remedies offer safety in contrast to synthetics, which are deemed hazardous to both humans and the environment. (Mukherjee, 2013) [1].

Achyranthes aspera, also known as Latjeera (Hindi) and Rough Chaff tree (English), is one of the many plants that are being examined for their therapeutic efficacies. It is a 1-2 m tall, upright or procumbent, annual or perennial herb that is frequently seen as a weed of waysides on roadsides. Despite having a wide range of therapeutic uses, it is notably effective as a spermicidal, antipyretic, and cardiovascular agent. Chemicals such as 10-tricosanone, 10-octacosanone, and 4-tritriacontanone are present in the seeds. (Rastogi and Malhotra, 2004) [2]

The plant has historically been used to treat coughs and asthma. It helps with oedema, dropsy, piles, boils, skin eruptions, etc. It is pungent, anti-phlegmatic, antiperiodic, diuretic, purgative, and laxative. In order to treat pneumonia, crushed plant is cooked in water. A mild astringent is produced when the root is infused for intestinal issues. (Patil and Sharma, 2013) [3].

The blooming spikes or seeds are pulverised and put into a paste with water, which is applied externally to treat cutaneous illnesses and dangerous snake and reptile bites . The herb is helpful for treating rheumatism, scabies, and other skin conditions as well as liver issues. Additionally, it has calming qualities.[4]

Fig 1: *Achyranthes aspera*

2. *Achyranthes aspera* Linn

Taxonomic classification [5]

Kingdom - Plantae

Class – Mangoliophsida

Order - Caryophyllales

Family - Amaranthaceae

Genus – Achyranthes

Species – Aspera

3. Botanical description:

Synonyms Latin - *Achyranthes aspera*

Sanskrit - Aghata, Apaamaarga

Hindi - Latjira, Chirchira

Tamil - Shiru-kadaladi

Telugu - Uttaraeni

Malayalam - Kadaladi

Arabian - Atkumah

4. Distributional range:[6]

It is found all throughout the tropical world. It grows as a common plant along roadside edges in numerous locations, including India.

5. MATERIALS AND METHOD

Habitat: The plant can thrive in semi-shade (light woods) or in the absence of any shade. It needs moist soil to flourish, however it favours light sandy, medium loamy, and heavy clay

soils. Everywhere it grows as a wasteland plant. From July to September, flowers bloom, and October is when the seeds ripen.[7]

Botanical description [8-9]: A little tree, *Achyranthus aspera*, can reach a height of 0.2 to 2.0 metres. When dry, the stem is erect, cylindrical, solid, hairy, yellowish-brown, and hollow. Simple, subsessile, somewhat acuminate, wavy-margined, ovate, petiolate, or elliptic leaves with ovate shapes and glabrous surfaces. Greenish-white, numerous, sessile, bracteate with two bracteoles, one spine-lipped, actinomorphic, and hypogynous flowers are grouped in long spikes from inflorescences. The seeds are endospermic, spherical at the base, subcylindric, and truncate at the apex. They are also brown in hue.

Preparation of samples

Young stems of *Achyranthes aspera's* leaves and leaflets were removed from their branches. For use in future anatomical studies, some freshly cut leaves of these plants were preserved in formaldehyde-acetic acid and alcohol (FAA). The residual bulk was shade-dried for two weeks before being ground to 60 mesh sizes and packaged individually in airtight containers for chromatographic, physicochemical, and powder microscopy research.[10]

Extraction with different solvents

The Soxhlet extraction method integrates the advantages of the reflux extraction and percolation, which utilizes the principle of reflux and siphoning to continuously extract the herb with fresh solvent. The Soxhlet extraction is an automatic continuous extraction method with high extraction efficiency that requires less time and solvent consumption than maceration or percolation. Process: Approximately 10 gram of dried powder *Achyranthes aspera* leaves were weighed and placed into a round bottom flask with 300 ml of the extracting solvent. The sample were extracted using Soxhlet extraction method with different types of solvents including Petroleum ether, Chloroform, Ethyl acetate, Methanol and water (H2O). Process duration of the extraction used was six hours and temperature of extraction based on the boiling point of solvents. The extract from *Achyranthes aspera* was filtered through filter paper (Whatman No. 1) with Buchner filter under vacuum. The extract from H2O were kept in freezer at - 25°C prior to freeze dry process and organic solvent extract stored at room temperature before solvent recovery process. Then, H_2O extract was freeze-dried in order to remove the solvent. However, the extract from Petroleum ether, Chloroform, Ethyl acetate and Methanol were recovered using rotary evaporator under vacuum. The

evaporation process was conducted at 45°C to minimize any possible degradation of the phytochemicals in the samples.[11]

6. Preliminary phytochemical analysis

The extract was tested for the presence of bioactive compounds by using following standard methods.

Detection of Carbohydrates

Fehling's test: 0.2gm filtrate is boiled on water bath with 0.2ml each of Fehling solutions A and B. A red precipitate indicates the presence of sugar. 44 Fehling's solution A: Copper sulphate (34.66g) is dissolved in distilled water and made up to 5s.

Detection of Proteins and Amino acid

100 mg of extracts were dissolved in water (10 ml) and then it was filtered. The filtrate was used to test the presence of proteins and amino acids.

Ninhydrin test: to the test solution added 1 ml of 0.2 % ninhydrin solution, violet colour indicate the presence of amino acids in sample.

Millon's test: Added 5 drops of millon's reagent to 1 ml of test solution and heated on a water bath for 10 min, cooled and added 1% sodium nitrite solution. Appearance of red colour confirmed the test.[12]

7. Antibacterial Activity

Tested Microorganisms. A total 4 bacteria having 2-gram negative Escherichia col, Pseudomonas aeruginosa and 2-gram positive *Staphylococcus aureus and Bacillus subtilis* were used to check the effectiveness of ethyl acetate extract of the *Achyranthes aspera* medicinal plants. [13]

8. SUMMARY AND CONCLUSION

The examination of phytochemicals and the in vitro antibacterial activity of *Achyranthes aspera* leaves are the topics of the current study. Herbareous plant *Achyranthes aspera* is primarily collected from August to October and can be found at altitudes of 2.0 to 1000 m. *Achyranthus aspera* can reach heights of. The plant's square-shaped stems are about 30 cm

long, and its leaves are elliptic-ovate and 22 cm long and 2.5 in broad. The florescence has white or red flowers that are 7 mm wide. Summer is the growing season for flowers.

T.S of leaf of *Achyranthes aspera* showed that the leaf is dorsiventral and hypostomatic. The lamina shows a single layered epidermis on the upper side composed of cubical cells. The upper epidermis shows mostly uni, bi and multicellular hairs. Glandular hairs are rare. The epidermis is followed by a layer of hypodermis which is usually 3-5 layers of cells thick and is interrupted at places by the palisade layer. The cells of lower epidermis are cubical in shape mostly with unitricellular trichomes.

The basic cellular makeup of the leaf petiole, stem, and type of stomata present, which is the characteristic of certain species and proves to be the benchmark for identifying the plant species, were determined by macroscopic and microscopic investigation. The plant powder underwent histochemical investigation and physiochemical parameter determination.

Achyranthes aspera was extracted using a soxhlet apparatus or assembly using a variety of solvents, including water, ethanol, methanol, petroleum ether, and chloroform. With the help of consecutive solvent extractions from the plant *Achyranthus aspera* using chloroform, petroleum ether, methanol, and distilled water, phytohemical screening was carried out. Five distinct extracts were examined for phytochemical screening of various chemical substances, including alkaloids, amino acids, tannins, and saponins. Various tests are being conducted to determine whether the chemicals are present. These microorganisms, E. coli, P. Aeruginosa, S. Aureus, and Bacillus Subtills, are used in antibacterial activity. Different concentrations were used to verify the zone of inhibition value.

9. ACKNOWLEDGEMENT

We would like to thank all the faculty of School of Pharmacy, Abhilashi University for their constant support**.**

10. REFERENCES

1. Mukherjee PK. Quality control of herbal drugs. Business Horizon Pharmaceutical Publishers, 2013, 13.
2. Nadkarni KM. Indian Materia Medica, Bombay Popular Prakashan. 2009; 1:21.
3. Parekh J, Chanda SV. In vitro antimicrobial activity and phytochemical analysis of some Indian medicinal plants Turk Journal of Biology. 2007; 31:53-58.
4. Patil U, Sharma MC. Studies on antibacterial effect of Apamarga (*Achyranthes aspera*) on multi drug resistant clinical isolates International Research Journal of
Ayurveda Pharma. 2013; 4(2):45

5. Saurabh Srivastav, Pradeep Singh , Garima Mishra , K. K. Jha , R. L. Khosa, *Achyranthes aspera*-An important medicinal plant: A review, J. Nat. Prod. Plant Resour. 2011; 1 (1): 1-14
6. Pingale shirish sadashiv, Avvaru radha Krishna. Review of *Achyranthes aspera*. IJRST.2014;4(I):25-30
7. Fern K. *Achyranthes aspera*. Plants for a Future; 1996.
8. Krishnaveni A, Thaakur SR. Pharmacognostical and preliminaryphytochemical studies of *Achyranthes aspera* Linn. Anc Sci Life. 2006; 26(1-2):1-5.
9. Jadav HR, Galib R, Prajapati PK, Harisha CR. Pharmacognostical study on flowers and fruits of Apamarga (*Achyranthes aspera* Linn.). Int J Green Pharm. 2013; 7:136-9
10. Dnou A, Ahmed A, Dafam DG, Yakubu TP, Sanogo R, Diallo D, Alemika TE Pharmacognostic, physicochemical and phytochemical investigations on aerial parts of Argemone mexicana L Res J Pharmacogn. 2020; 7(3): 15-24.
11.Harborne JB, Phytochemical methods A guide to modern techniques of plant analysis London: Chapman and Hall. 1973; 40-96
12. Demeke Debalke, Mastewal Birhan, Amebaye Kinubeh , Muluken Yayeh, Assessments of Antibacterial Effects of Aqueous-Ethanolic Extracts of Sida rhombifolia's Aerial Part, Hindawi Scientific World Journal. 2018; 8429809: 8.