



## ANTIBACTERIAL ACTIVITY OF ACHYRANTHES ASPERA L.

R. Lavanya\*

Department of Pharmacy, Government Polytechnic for women, Nizamabad, Telangana, India.

\*Corresponding Author: R. Lavanya

Department of Pharmacy, Government Polytechnic for women, Nizamabad, Telangana, India.

Article Received on 15/03/2018

Article Revised on 05/04/2018

Article Accepted on 26/04/2018

### ABSTRACT

The Plants are known for their diverse pharmacological activities including antimicrobial activity. Plant products work as a substitute to synthetic products because of easy availability. In the present work an attempt has been made to find out the antibacterial activity of various solvent extracts of *Achyranthes aspera* Linn. (*Amaranthaceae*). The Diethyl ether, Ethyl acetate and Acetone solvent extracts of leaves of the plant were screened for anti bacterial activity. The anti bacterial activity was done by agar well diffusion method against *Bacillus Subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Enterobacter cloacae*. The present study revealed that Diethyl ether extracts showed significant Antibacterial activity against *Escherichia coli*, *Pseudomonas aeruginosa* and *Enterobacter cloacae*. Among the all bacteria screened *Enterobacter cloacae* was found to be more susceptible and *Bacillus subtilis* more resistant.

**KEYWORDS:** *Achyranthes aspera* L., anti bacterial activity, solvent extracts.

### INTRODUCTION

Infectious diseases are one of the leading causes of death in many countries.<sup>[1]</sup> Due to the development of antibiotic resistance in harmful bacteria, there is a continuous need for the search of new antibacterial compounds. The plants are the best source of remedies for curing various infectious diseases.<sup>[2-4]</sup> *Achyranthes aspera* L. (*Amaranthaceae*) is one of the plants used for medicinal purposes. The plant has been known to possess hypoglycemic activity,<sup>[5]</sup> analgesic and antipyretic activity,<sup>[6]</sup> anti-oxidant activity,<sup>[7]</sup> anti-tumor activity,<sup>[8]</sup> cardiac stimulant activity,<sup>[9]</sup> anti asthmatic,<sup>[10]</sup> diuretic,<sup>[11]</sup> anti microbial,<sup>[12]</sup> antihelminthic,<sup>[13]</sup> antiviral,<sup>[14]</sup> antiplasmodial,<sup>[15]</sup> hepatoprotective,<sup>[16]</sup> nephroprotective,<sup>[17]</sup> wound healing,<sup>[18]</sup> anxiolytic,<sup>[19]</sup> and antidepressant activity.<sup>[20]</sup>

#### *Achyranthes aspera* L.

##### Taxonomic classification<sup>[21]</sup>

Kingdom – Plantae  
Subkingdom - Tracheobionta  
Super Division - Spermatophyta  
Division - Mangoliophyta  
Class - Mangoliopsida  
Subclass - Caryophyllidae  
Order - Caryophyllales  
Family - Amaranthaceae  
Genus - Achyranthes  
Species - Aspera

### Botanical description

#### Synonyms

Latin - *Achyranthes aspera*  
Sanskrit - Aghata  
Hindi - Latjira, Chirchira  
Telugu - Uttaraeni  
Malayalam - Kadaladi  
Punjabi - Kutri Unani - Chirchitaa  
Ayurvedic - Apaamaarga, Chirchitaa, Shikhari, Shaikharika

#### Botanical description:<sup>[22-23]</sup>

*Achyranthes aspera* is a small tree that grows a height of 0.2-2.0 m. The base is woody, angular or ribbed, simple or branched, nodes are bulged, often tinged with pink color. Its Stem is yellowish-brown, branched, hairy, erect, cylindrical, solid, and hollow when dry. Leaf is Simple, sessile, slightly acuminate stipulate, wavy margin ovate, petiolate or elliptic, ovate and pubescent due to the presence of thick coat of long simple hairs. Flowers are arranged in long spikes form in inflorescences, 8-30 cm long, 3-7 mm wide, bisexual greenish-white, numerous, sessile, bracteate with two bracteoles, one spine lipped, actinomorphic, hypogynous, 5 perianth segments, membranous, 5 stamens, short filament, anther, two celled, 7 gynoecium bicarpellary, syncarpous, ovary superior, single ovule; style, single stigma, white or red flower. Flowers appear during summer. Fruit is an indehiscent dry utricle enclosed within bracteoles, persistent, and perianth. Seeds are

round at the base, sub-cylindric, truncate at the apex, endospermic, brown coloured.



**Figure 1: Achyranthes aspera L. Plant.**

## MATERIALS AND METHOD

### Plant material

*Achyranthes aspera* L. plants were collected from the region of Nizamabad, Telangana, India, in the month of October. The plant was authenticated by Dr. Vidya vardini, HOD, Department of Botany, Telangana University.

### Preparation of extracts

*Achyranthes aspera* L. leaves were washed in water, shade dried, broken into coarse powder, grinded to fine powder using mechanical grinder and stored in air tight containers at room temperature. The powdered plant material was then sequentially extracted with Dichloromethane and Hexane solvents separately. Each solvent extract was prepared by soaking 100 g of dried

fine leaf powder in 200 ml of the solvent (Dichloromethane and Hexane) for 4 days at room temperature with occasional shaking. The extracts were filtered using Whatman filter paper and then concentrated. The residual extracts were stored in refrigerator till further use.

### Anti bacterial Activity Test by Agar well Diffusion Method

In this study, one gram positive (*Bacillus subtilis*) and three gram negative bacteria (*Escherichia coli*, *Pseudomonas aeruginosa* and *Enterobacter cloacae*) were tested. The Anti antimicrobial assay was performed by agar well diffusion method.<sup>[24-25]</sup> The sterilized nutrient agar (HiMedia) was inoculated with 200 µl of the bacterial inoculum and poured into the sterilized Petri plates. Three wells of 6 mm diameter were made on sterilized nutrient agar with a sterile borer. The prepared concentration of 100 mg/ml of each solvent extracts were transferred into the wells. The plates were incubated overnight at 37 °C. Anti bacterial agent Gentamicin and amoxycillin (10 µg) were used as positive control and DMSO solvent as negative control. The diameter of clear zone of inhibition was measured.

## RESULTS AND DISCUSSION

The antibacterial activity of plant extracts is shown in Table 1. Among the all the bacteria screened *Enterobacter cloacae* was found to be more susceptible and *Escherichia coli* most resistant.

**Table 1: Antibacterial activity of leaves extracts of Cassia occidentalis L. zone of inhibition in mm diameter.**

Extract	<i>Bacillus subtilis</i>	<i>Escherichia coli</i>	<i>Pseudomonas aeruginosa</i>	<i>Enterobacter cloacae</i>
Dichloromethane	8	-	10	15
Hexane	7	-	7	13
+ve ctrl	40	38	38	31
-ve ctrl	-	-	-	-

DMSO 50µl/disc taken as negative control; Amoxycillin 10mcg/disc taken as positive control for *Enterobacter cloacae* and Gentamicin 10mcg/disc taken as positive control for the remaining three bacteria.

Each solvent extract concentration at 100 mg/ml

(-) Value indicates no activity.

## CONCLUSION

The present study reveals the antibacterial property of Dichloromethane and Hexane solvent extracts of *Achyranthes aspera* L. leaves. The data of this study may just enrich the existing comprehensive data of antimicrobial activity of *Achyranthes aspera* L. leaves.

## ACKNOWLEDGEMENTS

I gratefully acknowledge my sincere thanks to Head of Department of Botany, Telangana University for the identification of plant.

## REFERENCES

1. WHO (World Health Organization). The world health report. Shaping the future, 2003. Geneva, Switzerland, WHO, 2003; 11-12.
2. Renisheya Joy Jeba Malar T, Johnson M, Mary Uthith M, Arthy A. Antibacterial activity of ethanolic extracts of selected medicinal plants against human pathogens. Asian Pacific Journal of Tropical Biomedicine, 2011; Elsevier, S76-S78.
3. Doriane E, Djeussi, Jaurès AK, Noumedem, Jackson A, Seukep. Antibacterial activities of selected edible plants extracts against multidrug-resistant Gram-negative bacteria. The official journal of the International Society for Complementary Medicine Research (ISCMR), 2013; 13: 164.

4. Mativandlela SPN, Lall N, Meyer JJM. Antibacterial, antifungal and antitubercular activity of (the roots of) *Pelargonium reniforme* (CURT) and *Pelargonium sidoides* (DC) (Geraniaceae) root extracts. *S Afr J Bot*, 2006; 72: 232-237.
5. Akhter, M.S., Iqbal, J. Evaluation of hypoglycemic effect of *Achyranthes aspera* in normal and alloxan diabetic rabbits. *Journal of Ethnopharmacology*, 2000; 71: 527-532.
6. Sutar NG, Sutar UN, Sharma YP, Shaikh IK, Kshirsagar SS. Phytochemical investigation and pharmacological screening of leaves of *Achyranthes aspera* L. as analgesic and antipyretic. *Biosci Biotechnol Res Asia*, 2008; 5(2): 841-844.
7. Kumar A, Kumari NS, Bhargavan D. Evaluation of In vitro antioxidant potential of ethanolic extract from the leaves of *Achyranthes aspera*. *Asian J Pharm Clin Res.*, 2012; 5(3): 146-8.
8. Subbarayan PR, Sarkar M, Impellizzeri S, Raymo F, Lokeshwar BL, Kumar P, Agarwal RP, Ardalan B. Anti-proliferative and anti-cancer properties of *Achyranthes aspera*: Specific inhibitory activity against pancreatic cancer cells. *Journal of Ethnopharmacology*, 2010; 131: 78-82.
9. Gupta, S.S., Bhawat, A.W. & Ram, A.K. Cardiac stimulant activity of saponin of *Achyranthes aspera* (Linn). *J. Med. Res.*, 1972; 60: 462-471.
10. Goyal BR, Mahajan SG, Mali RG, Goyal RK, Mehta AA. Beneficial effect of *Achyranthes aspera* Linn. in toluene-di-isocyanate induced occupational asthma in rats. *Global J Pharmacol*, 2007; 1(1): 06-12.
11. Srivastav S, Singh P, Jha KK, Mishra G, Srivastava S, Karchuli MS, et al. Diuretic activity of whole plant extract of *Achyranthes aspera* Linn. *Eur J Exp Biol.*, 2011; 1(2): 97-102.
12. Parmar KA, Prajapati SN, Chauhan VV, Patel CR. Preliminary phytochemical, pharmacognostical and microbial screening of *Achyranthes aspera* (amaranthaceae). *J Nat Prod Plant Resour*, 2013; 3(1): 15-7.
13. Bharathi NM, Sravanthi V, Sujeeth S, Kalpana K, Santhoshi P, Pavani M, et al. In-vitro anthelmintic activity of methanolic and aqueous extracts of *Achyranthes aspera* Linn. (Amaranthaceae) Stems. *Int J Pharm Sci.*, 2013; 3(2): 181-4.
14. Mukherjee H, Ojha D, Bag P, Chandel HS, Bhattacharyya S, Chatterjee TK, et al. Anti-herpes virus activities of *Achyranthes aspera*: an Indian ethnomedicine, and its triterpene acid. *Microbiol Res.*, 2013; 68(4): 238-44.
15. Inbaneson SJ, Ravikumar S, Suganthi P. In vitro antiplasmodial effect of ethanolic extracts of coastal medicinal plants along Palk Strait against *Plasmodium falciparum*. *Asian Pac J Trop Biomed*, 2012; 2(5): 364-7.
16. Manjunatha BK, Abhilash N, Hegde V, Suchitra MN, Vidya SM. Hepatoprotective potency of *Achyranthes aspera*: an in-vivo study. *Int J Pharm Phytopharmacol Res.*, 2012; 1(6): 387-90.
17. Jayakumar T, Sridhar MP, Bharath Prasad TR, Ilayaraja M, Govindasamy S, Balasubramanian MP. Experimental studies of *Achyranthes aspera* (L) preventing nephrotoxicity induced by lead in albino rats. *J Health Sci.*, 2009; 55(5): 701-8.
18. Ghosh PK, Gupta VB, Rathore MS, Hussain I. Wound-healing potential of aqueous and ethanolic extracts of *Apamarga* leaves. *Int J Green Pharm*, 2011; 5(1): 12-5.
19. Bhosale UA, Yegnanarayan R, Pophale PD, Zambare MR, Somani RS. Study of central nervous system depressant and behavioral activity of an ethanol extract of *Achyranthes aspera* (Agadha) in different animal models. *Int J App Basic Med Res.*, 2011; 1: 104-8.
20. Barua CC, Talukdar A, Begum SA, Buragohain B, Roy JD, Borah RS, et al. Antidepressant-like effects of the methanolic extract of *Achyranthes aspera* Linn. in animal models of depression. *Pharmacologyonline*, 2009; 2: 587-94.
21. 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.
22. Krishnaveni A, Thaakur SR. Pharmacognostical and preliminary phytochemical studies of *Achyranthes aspera* Linn. *Anc Sci Life*, 2006; 26(1-2): 1-5.
23. 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.
24. Murray, PR; Baron, EJ; Pfaller, M A; Tenover, FC and Tenover, HR. *Manual of Clinical Microbiology*. 6th Ed. ASM Press, Washington DC, 1995; 15-18.
25. Olurinola, PF. *A laboratory manual of pharmaceutical microbiology*. Idu, Abuja, Nigeria, 1996; 69-105.