



INDO AMERICAN JOURNAL OF PHARMACEUTICAL RESEARCH



ANTIBACTERIAL ACTIVITY OF ACHYRANTHES ASPERA LINN.

Rentapathri Lavanya

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

ARTICLE INFO

Article history

Received 22/02/2017

Available online

28/02/2017

Keywords

Achyranthes Aspera Linn,
Anti Bacterial Activity,
Solvent Extracts.

ABSTRACT

The Plants are known for their diverse pharmacological activities including antimicrobial 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)*. The Diethyl ether, Ethyl acetate and Acetone solvent extracts of leaves of the plant were screened for anti bacterial activity. The screening 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. This study concludes that the plant extracts were active against some gram negative bacteria.

Corresponding author

R. Lavanya

Lecturer in Pharmacy,
Government Polytechnic for Women,
Nizamabad, Telangana, India.
lavaanyaresearch@yahoo.com

Please cite this article in press as **R. Lavanya et al.** Antibacterial Activity of *Achyranthes Aspera Linn.* Indo American Journal of Pharmaceutical Research.2017:7(02).

Copy right © 2017 This is an Open Access article distributed under the terms of the Indo American journal of Pharmaceutical Research, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Infectious diseases are one of the leading causes of death in many countries [1]. 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 [2-4]. *Achyranthes aspera* Linn. (Amaranthaceae) is one of the plants used for medicinal purposes. The plant has been known to possess hypoglycemic activity[5], analgesic and antipyretic activity [6], anti-oxidant activity [7], anti-tumor activity [8], cardiac stimulant activity [9], anti asthmatic [10], diuretic [11], anti microbial [12], antihelminthic [13], antiviral [14], antiplasmodial[15], hepatoprotective [16], nephroprotective[17], wound healing[18], anxiolytic [19], and antidepressant activity[20]. The main purpose of this study is to know the antibacterial activity of various solvent extracts of *Achyranthes aspera* Linn. leaves.

Achyranthes aspera Linn.

Taxonomic classification[21]

Kingdom - Plantae

Class - Mangoliophsida

Order - Caryophyllales

Family - Amaranthaceae

Genus - Achyranthes

Species - Aspera

Botanical description:

Synonyms

Latin - Achyranthes aspera

Sanskrit - Aghata, Apaamaarga

Hindi - Latjira, Chirchira

Tamil - Shiru-kadaladi

Telugu - Uttaraeni

Malayalam - Kadaladi

Arabian - Atkumah

Distributional range:[22]

It is distributed throughout the tropical world. It can be found in many places including India growing as a common weed along the roadsides.

MATERIALS AND METHOD

Habitat:

The plant can grow in absence of shade or in semi-shade (light woodland). It requires moist soil but prefers light sandy, medium loamy, heavy clay soils for its growth [23]. It grows as wasteland herb everywhere. Flowers appear from July to September and seeds ripe in the month of October.

Botanical description [24-25]:

Achyranthus aspera is a small tree that grows a height of 0.2-2.0 m. 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. Flowers are arranged in long spikes form in inflorescences, greenish-white, numerous, sessile, bracteate with two bracteoles, one spine lipped, actinomorphic and hypogynous. Seeds are round at the base, sub-cylindric, truncate at the apex, endospermic and brown coloured.



Figure 1: *Achyranthes aspera* Linn. Plant.

Plant material:

Achyranthes aspera Linn. 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 Linn. 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 Diethyl ether, Ethyl acetate and Acetone solvents according to their increasing order of polarity. Each solvent extract was prepared by soaking 100 g of dried fine leaf powder in 200 ml of the solvent (Diethyl ether, Ethyl acetate and Acetone) successively 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 [26-27]. The sterilized nutrient agar (HiMedia) was inoculated with 200 μ l 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 μ g) 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 all the tested plant extracts Diethyl ether extract was found to be most effective. All the solvent extracts were inactive against gram positive bacteria (*Bacillus Subtilis*). Among the all the bacteria screened *Enterobacter cloacae* was found to be more susceptible and *Bacillus Subtilis* more resistant.

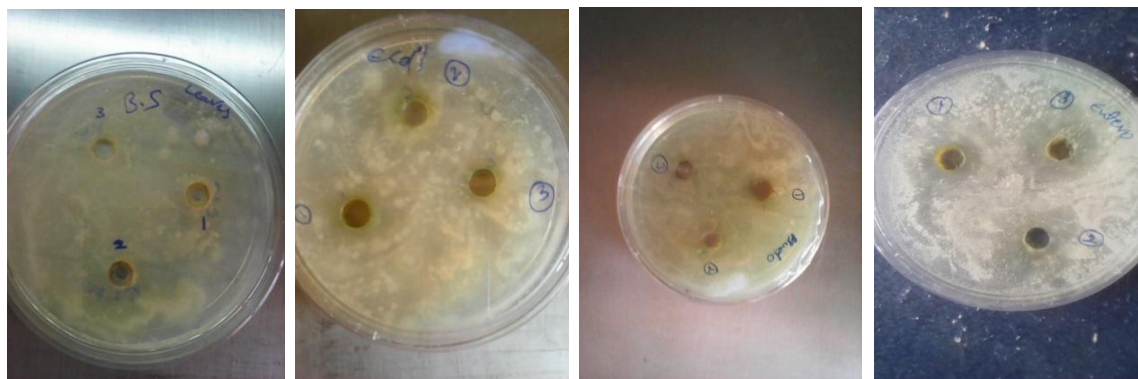
Table.1 Antibacterial activity of leaves extracts of *Cassia occidentalis* Linn. zone of inhibition in mm diameter.

Extract	<i>Bacillus subtilis</i>	<i>Escherichia coli</i>	<i>Pseudomonas aeruginosa</i>	<i>Enterobacter cloacae</i>
Diethyl ether	-	11	9	20
Ethyl acetate	-	-	-	18
Acetone	-	-	-	20
+ve ctrl	40	38	38	31
-ve ctrl	-	-	-	-

DMSO 50 μ l/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.



a) *Bacillus subtilis* b) *Escherichia coli* c) *Pseudomonas aeruginosa* d) *Enterobacter cloacae*

1. Diethyl ether extract. 2. Ethyl acetate extract. 3. Acetone extract.

Figure.2: Antibacterial activity of leaves extracts of *Achyranthes aspera* Linn.

CONCLUSION

The present study reveals the antibacterial property of Diethyl ether, Ethyl acetate and Acetone solvent extracts of *Achyranthes aspera* Linn. leaves. The data of this study may just enrich the existing comprehensive data of antimicrobial activity of *Achyranthes aspera* Linn. leaves. This study paves the pathway for future research to identify the active chemical constituents responsible for the antibacterial activity.

ACKNOWLEDGEMENTS

I gratefully acknowledge my sincere thanks to Principal, Head of Department of Pharmacy and Colleagues of Govt. Polytechnic for women for their motivation and also thankful to Head of Department of Botany, Telangana University for the kindly support.

Declaration

There is no conflict of interest.

REFERENCES

1. WHO (World Health Organization). The world health report. Shaping the future, 2003. Geneva, Switzerland, WHO; 2003. pp. 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. Pingale shirish sadashiv, Avvaru radha Krishna. Review of *achyranthes aspera*. *IJRST.*2014;4(I):25-30.
23. Fern K. *Achyranthes aspera*. *Plants for a Future*; 1996.
24. Krishnaveni A, Thaakur SR. Pharmacognostical and preliminary phytochemical studies of *Achyranthes aspera* Linn. *Anc Sci Life.* 2006; 26(1-2):1-5.
25. 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.
26. Murray, PR; Baron, EJ; Pfaller, M A; Tenover, FC and Tenover, HR. *Manual of Clinical Microbiology.* 6th Ed. ASM Press, Washington DC; 1995. Pp.15-18.
27. Olurinola, PF. *A laboratory manual of pharmaceutical microbiology.* Idu, Abuja, Nigeria; 1996. pp. 69-105.



54878478451170219



Submit your next manuscript to **IAJPR** and take advantage of:

Convenient online manuscript submission

Access Online first

Double blind peer review policy

International recognition

No space constraints or color figure charges

Immediate publication on acceptance

Inclusion in **Scopus** and other full-text repositories

Redistributing your research freely

Submit your manuscript at: editorinchief@iajpr.com

