Original Research Article Website : www.ijbasr.org ISSN : 2349-1965
International Journal of Basic & Applied Science Research
[2014; 1 (1) pp 66-71]

STUDY OF ANTIBACTERIAL ACTIVITY OF *ACHYRANTHES ASPERA* EXTRACTS

Pandey B.[1], Bajpai P[1]., and Shrivastava A. K.[2]
[1]Department of Microbiology & Biotechnology,
Bhilai Mahila Mahavidyalaya, Hospital Sector, Bhilai, Distt. Durg, Chhattisgarh.
[2] Department of Botany and Microbiology, Govt. D.T. College, Utai,. Durg, Chhattisgarh.

ABSTRACT :

Achyranthes aspera (Amaranthaceae) is an important medicinal herb found as weed throughout India. It has been used in almost all the traditional system of medicine, Ayurveda, Unani, and Sidha since ancient time. The present study discuss about the antibacterial activity of *Achyranthes aspera* against *Escerichia coli*, *Staphylococcus aureus* and *Pseudomonas fluorescence* and minimum inhibitory concentration (MIC) was also determined. It was found that the extracts shown excellent inhibitory activity against *Bacillus subtilis.* MIC obtained from bacterial strains for methanol and aqueous extract, leaf extract of *Azadirachta indica* was mixed in different concentration and again the MIC of *A. aspera* was noted and found that with 50µl/ml. dilution of *A. indica* in 200µl/ml. of A.aspera inhibitory activity takes place which increases with increase in concentration. The present study is the first study on all parts of *Achyranthes aspera* which combines these different parameters in it including the mixing of plant extracts with *A. indica* leaf extract.

KEY WORDS : *Minimum Inhibitory Concentration, Inhibitory Activity, Antibacterial Activity, Bacterial Strains.*

INTRODUCTION:

Plants have been used in traditional medicine for several thousand years. The use of traditional medicine in most developing countries is a normative basis for the maintenance of good health. The secondary metabolites of the plants are the major sources of pharmaceutical, food additives and fragrances. Medicinal plants have been used as an exemplary source for centuries as an alternative remedy for treating human diseases because they contain numerous active constituents of immense therapeutic value. In the present era of drug development and discovery of newer drug molecules many plant products are evaluated on the basis of their traditional uses. One of the many plants which are being evaluated for their therapeutic efficacies is

Corresponding Author :
Bhawna Pandey
Email: - bhawanapandey15@gmail.com
Date of Acceptance : 15. 03. 2014
Date of Publication : 20. 04. 2014

Achyranthes aspera which is commonly known as Latjeera (Hindi) & Rough Chaff tree (English) (Charde, *et al.*, 2011). Although it has many medicinal properties, it is particularly used spermicidal (Anonymous, *et al.*, 2005), antipyretic (Zafar, *et al.*, 2009) and as a cardiovascular agent (Paul, *et al.*, 2010).

The plant shows many pharmacological activities (Vivek, *et al.*, 2012) like, anti-allergic (Tyler, *et al.*, 1994), hepatoprotective (Bafna and Mishra, 2004), cardiovascular (Han, *et al.*, 2003), nephroprotective, antidiabetic, antiparasitic (Banerji, *et al.*, 1970), hypoglycemic, analgesic and antipyretic (Gokhale, *et al.*, 2002). Many traditional uses are also reported like antiperiodic, purgative and laxative, in various types of gastric disorders and in body pain (Girach,*et al.*,1992) which is being studied till today. It also possess antioxidant activity (Tahiliani and Kar, 2000). *Achyranthes aspera* Linn. belongs to the family - Amaranthaceae and used by traditional healers for the treatment of fever, dysentery and diabetes. Roots are used as astringents to wounds, in abdominal tumor and stomach pain (Dhar, *et al.*,1968).

MATERIALS AND METHODS:

Antimicrobial Screening against Bacterial Strains

The methanolic and aqueous extract of leaf, stem, inflorescence and roots of *A. aspera* were prepared and their antibacterial activity were checked by Well Diffusion Method against *Escherichia coli*, *Pseudomonas fluorescence*, *Staphylococcus aureus and Bacillus subtilis*.MIC was also observed.

RESULTS AND DISCUSSION:

Antimicrobial Screening against Bacterial Strains: The zone of inhibition was observed in all plates for antimicrobial activity and the minimum inhibitory concentration was determined.

Antimicrobial Activity of *Achyranthes aspera* against Bacterial strains:

Leaf	Stem	Inflorescence	Roots
5%, 10%, 15%, 20%.	5%, 10%, 15%, 20%.	5%, 10%, 15%, 20%.	5%, 10%, 15%, 20%.

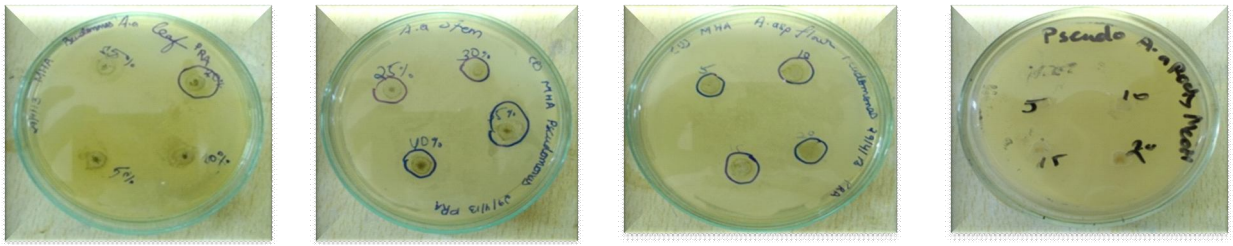


Fig 1: Antibacterial activity of *Achyranthes aspera* extracts against *P. fluorescence.*

For *P. fluorescence* the methanolic leaf, stem, inflorescence extract of *A.aspera* showed the antimicrobial activity whereas no zones were observed for roots extract, *i.e.*, negative for roots.

Methanolic Extract:

Leaf	Stem	Inflorescence	Roots
5%, 10%, 15% , 20%	5%, 10%,15% , 20%	5%, 10%, 15%, 20%,	5%, 10%, 15%, 20%

Fig 2: Antibacterial activity methanol extracts of *A. aspera* against *Bacillus subtilis*.

Methanolic extract of leaf, stem, inflorescence, roots of A.aspera showed inhibitory activity against *Bacillus subtilisas* zones of inhibition were observed in media plates.

Aqueous Extract :

Leaf	Stem	Inflorescence	Roots
5%, 10%, 15%, 20%	5%, 10%, 15%, 20%	5%, 10%, 15%, 20%	5%, 10%, 15%, 20%

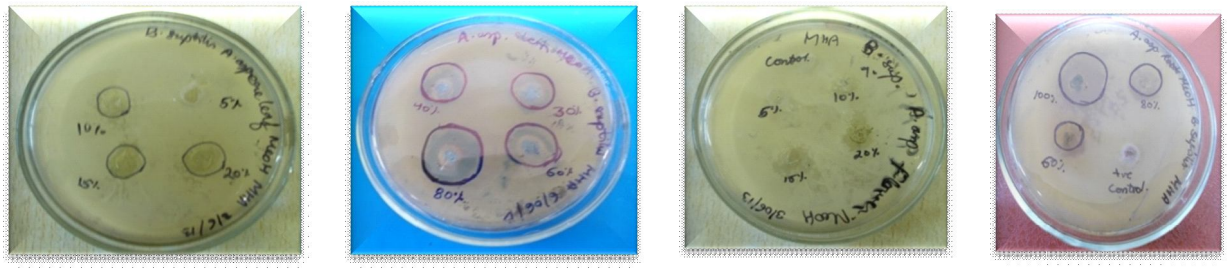


Fig 3: Antibacterial activity of aqueous extracts of *A. aspera* against *Bacillus subtilis*.

Zone of inhibition was observed in aqueous extracts of *A. aspera* against Bacillus subtilis showing its susceptibility towards the extracts. The diameter of these zones was measured and MIC was determined.

***Escherichia coli* :**

Leaf and Stem	Inflorescence	Roots
5%, 10%, 15%, 20%	5%, 10%, 15%, 20%	5%, 10%, 15%, 20%

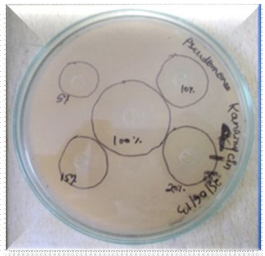
Fig 4: Antibacterial activity methanol extracts of *Achyranthes aspera* against *E. coli*.

The methanolic extract of *A. aspera* showed less susceptibility towards *E. coli* bacteria whereas the positive results were obtained only in leaf and stem extracts while inflorescence and roots extracts showed no zone of inhibition. It also showed negative result in case of aqueous extracts of *A. aspera*.

Kanamycin : Kanamycin is an antibiotic that acts against the plant pathogenic bacteria. The plates were set up against different bacteria to observe its antibacterial susceptibility.

B. subtilis
5%, 10%, 15%, 20%, 100%

Pseudomonas
5%, 10%, 15%, 20%, 100%



E. coli
5%, 10%, 15%, 20%

Fig 5: Antimicrobial activity of bacterial strains against Kanamycin antibiotic.

Zone of inhibition at different concentration of Kanamycin (stock 1µg/ml.) observed against *B.subtilis* and Pseudomonas whereas no zone of inhibition was observed against *E.coli*.

Table 1: Zone of inhibition (mm) against different Bacterial strains.

Microbe	Conc. in %	Zone of inhibition (in mm)								
		Methanolic Extract				Aqueous Extract				Standard Kanamycin
		Leaf	Stem	Inf.	Roots	Leaf	Stem	Inf.	Roots	
B.subtilis	5	-	-	-	-	-	-	-	-	13
	10	10	-	-	-	-	-	-	-	15
	15	10	-	10	-	10	-	-	-	18
	20	11	10	11	-	11	-	-	-	19
	30		13		-		-	-	-	
	35		13		-		-	-	-	
	40		14		-		-	-	-	
	60		15		10		-	-	-	
	80		18		12		-	-	-	
	100				18		-	-	-	27
E.coli	5	10	-	-		-	-	-	-	-
	10	12	-	-		-	10	-	-	10
	15	15	10	10		-	10	-	-	11
	20	15	10	12		-	12	11	-	14
P.florescence	5	-	-	-	-	-	-	-	-	15
	10	-	-	10	-	-	-	-	-	21
	15	-	-	10	-	-	-	-	-	21
	20	10	-	11	-	-	-	-	-	
	25	10	-							23
	30	11	-							
	35		10							
	100									31

Inf = inflorescences, Conc. = concentration

Antimicrobial activity against the bacterial strains showed maximum inhibition against *Bacillus subtilis, E. coli* and least against *S. aureus* for both methanolic and aqueous extract of *A. aspera.*

Table 2: Minimum Inhibitory Concentration (MIC) in µl/ml. of *Achyranthes aspera* extracts against Bacterial strains.

Solvent	Extract	*E.coli*	*P.florescence*	*B.subtilis*
Methanol	**Leaf**	150	200	100
	Stem	150	350	200
	Inf	150	200	100
	Roots			600
Aqueous	**Leaf**	-	-	150
	Stem	200	-	-
	Inf	150	-	-
	Roots	600	-	-

CONCLUSION:

The present work deals with the study of different parts of *Achyranthes aspera*. Its antimicrobial activity screening was done to support the traditional use of plants and suggests that the plant extracts possess compounds having antimicrobial properties. It may be used as antimicrobial agents in new drugs therapy of infectious diseases caused by pathogens.

The results suggested that minimum concentration of *A. aspera* extracts inhibit the growth of various pathogenic bacteria. This activity may be due to various chemical compounds present in extracts including flavonoids, triterpenoids, essential oils (esp. thymol) and natural phenolic compounds or free hydroxyl groups which are classified as active antimicrobial compounds. It was reported that *Achyranthes aspera* possesses high antibacterial activity like Kanamycin antibiotic.

The most active extracts can be subjected to isolation for therapeutic antimicrobials and carry out further pharmacological evaluation. As earlier studies have revealed that this plant is non-toxic even at the dose of 120 g/kg. Hence, it can be used in drug development for treatment of many crucial disorders. Thus, from the present work, it is concluded that the various extracts of *A. aspera* may be used for the preparation of various pharmacological formulations. Further, the active compounds can be isolated that could be used for the treatment of various infectious diseases.

REFERENCES:

1. Anonymous. The Wealth of India - Raw Materials, *Council of Scientific & Industrial Research, New Delhi,* 2005; 55 - 57.
2. Bafna A. R. and Mishra S. H., *Arsh Pharmaceuticals,* 2004; 45(4): 343 - 351.

3. Banerji A. and Chadha M. S., Insect moulting hormone from *Achyranthesa spera* Linn., *Phytochemistry,* 1970; 9: 16 - 71.

4. Chardeetal, Achyranthesa spera Linn. (Chirchira): A Magic Herb in Folk Medicine, *IJBAR,* 2011; 2(6): 228 - 240.

5. Dhar M. L., Dhar M. M., Dhawan B. N., Mehrotra B. N. and Ray C., Screening of Indian plants for biological activity: part I, I*nd. J. Exp.Biol.*, 1968; 6: 232 - 247.

6. Girach R. D., Khan A. S. A., Ethnomedicinal uses of Achyranthesaspera leaves in Orissa (India). *Int J Pharmacogn,* 1992; 30, 113-115.

7. Gokhale A. B., Damre A. S., Kulkami K. R. and Saraf M. N., "Preliminary evaluation of anti-inflammatory and anti-arthritic activity of S. lappa, *A. speciosa* and *A. aspera*, *Phytomed.*, 2002; 9(5): 433 - 437.

8. Han S. T. and Un C., Cardiac toxicity caused by *Achyranthesa spera*, *Vet Hum Topical.*, 2003; 45(4): 212 - 213.

9. Paul D., De D., Ali K. M., Chatterjee K., Nandi D. K. and Ghosh D., *Contraception,* 2010; 81(4): 355 - 361.

10. Tahiliani P. and Kar A., *Achyranthes aspera* elevates thyroid hormone level and decrease hepatic lipid peroxidation in male rats. *J Ethanopharmacol.,* 2000; 71: 527 - 532.

11. Tyler V., Phytomedicines in Western Europe: their potential impact on herbal medicine in the United States, *Herbalgram,* 1994; 30: 24 - 30.

12. Zafar R., Medicinal Plants of India, *CBS publishers & distributors,* 2009; 1 - 15.

***