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IN VITRO ANTIMICROBIAL EFFECT OF ADHATODA VASICA ON ESCHERICHIA COLI

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ABSTRACT

The present survey of this plant reveals that Adhatoda vasica Nees belonging to family Acanthaceae, commonly known as Adosa, is found many regions of India and throughout the world, with a multitude of uses in traditional Ayurveda. Vasica is most well-known for its effectiveness in treating respiratory conditions. Bacterial resistance against traditional antibiotics has posed a major problem nowadays and the phytoconstituents present in medicinal plants has the potential to combat bacterial infections. Leaves of Adhathoda vasica plant were screened for its medicinal property. Antibacterial activity was analyzed by preparing its extracts in different solvents like ethanol, methanol and Distilled water. Results obtained were compared with commercial antibiotic Streptomycin (used as control) on gram negative bacteria (E. coli). The results obtained showed effective results. The positive results of screening of Adhatoda vasica for antimicrobial activity form primiry plat form for further pharmocological studies.

KEYWORDS: *Adosa, Phytoconstituents, Antibiotic, Gram Negative Bacteria*

Article History

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INTRODUCTION

Adhatoda vasica leaves contain carotene, vitamin C, essential oils and the whole plant in general acts as sedative, expectorant, antispasmodic, antiseptic, expectorant and anthelmintic, and also has compounds including crystalline, oroxylin, alkaloids vasicine, adhatodic acid and pectin. The roots, leaves, flowers and fruits are mainly used in treating bronchitis, cold, whooping cough and asthma. The whole plant is useful in the removal of intestinal parasites. Adhatoda vasica according Ayurveda, flowers are used for treating tuberculosis. Adhatoda vasica poultice from the leaves is applied for healing wounds, rheumatic pains and edema, whereas a warm decoction of the leaves is useful in treating scabies and other skin diseases. In acute stages of bronchitis, Adhatoda vasica gives is respected for unfailing, especially where When the dried leaves are smoked, they relieve asthma. Diseases are the major causes of death in the developing countries and accounts to 50% of it. The extensive use of the antibiotics to control these diseases has led to the emergence of multidrug resistance (Westh et al., 2004). Bacterial resistance to antibiotics increases mortality likelihood of hospitalization and length of stay in the hospital (Winstanley, 1997). The use of plants as source of remedies for the treatment of many diseases dates back to history and people of many continents have this old tradition. The advent of science into the search for antibiotics largely depends on some of these plants as raw materials. Plant based antimicrobials represent a vast untapped source. The use of plant extract for medicinal treatment has become popular when people realized that the effective life span of antibiotic is limited and over prescription and misuse of traditional antibiotics are causing microbial

resistance (Alam et al., 2009). At present, nearly 30% or more of the modern pharmacological drugs are derived directly or indirectly from plants and their extracts dominate in homeopathic or ayurvedic medicines (Murugesan et al., 2011; Jabeen et al., 2007; Banso, 2009; Ahamunthunisa and Hopper, 2010).

Medicinal plants are finding their way into pharmaceuticals, cosmetics, neutraceuticals. Plants have given Western Pharmacopoeia about 7000 different pharmacologically important compounds and a number of top selling drugs of modern times eg. quinine, taxol, campothecine etc.(Tshibangu et al., 2002). The objective of this research is to evaluate the potentiality of *Adhatoda vasica* extract against *E-coli*.

MATERIALS AND METHODS

Plant Material and Extraction

The dried mature leaves of Adhatodha vasica were collected from local area in Jhunjhunu Rajasthan, India. Washed with distilled water and the leaves were separated and kept in a clean shaded place for 9-10 days, grounded to a powder and weight the whole powder. Cold Maceration method is used to prepare extracts. 250 ml of organic solvents ethanol, methanol and water is taken and 25 gm of leaf and flower powder is soaked in it. Extracts obtained are made solvent free and concentrated by rotary evaporator and kept at 4°C in airtight bottle until further use (akhter et al., 2014).

ANTIMICROBIAL ACTIVITY

Agar Well Diffusion Method

Antibacterial activities of all the extracts (ethanol, methanol, aqueous) of A. vasica were determined by agar well diffusion method. In this method DMSO (dimethylsulphoxide) was dissolved in the extract to obtain 125 µg/ml to 2000 µg/ml concentrations. Commercial antibiotic (streptomycin) and DMSO was taken as positive and negative control respectively. The test was done in triplicates and the final results obtained were presented as the mean zone of inhibition.

RESULT AND DISCUSSION

Antibacterial Activity

Various extracts of A. vasica leaves showed potent antimicrobial activity against the pathogens causing infections in humans. The 3 extract was found to be the most effective in suppressing the growth of selected pathogens as the values of ZOI were higher. 1 was the highest susceptible pathogen as the ZOI was 22mm (2000µg/ml) and least susceptible was 5 as ZOI was 8mm (125µg/ml). A1 at 2000µg/ml value showed maximum response 18mm zone in methanolic extract but ethanolic extract showed maximum response 22mm zone at 2000µg/ml. A5 at 125µg/ml least value showed 8mm zone in methanolic extract but ethenolic extract at 125µg/ml was nil response and leat inhibition was shown against *E-coli* at 250µg/ml.

Antibacterial Activity

Adhatoda vasica leaves extract were used to study for antibacterial properties of plant. *E-coli* showed least influence against the all two extracts (E1, E2) of *A. vasica*. E1 extract showed strong inhibitory activity against *E. coli.* Maximum ZOI for E2 extract was shown by *E-coli* at 2000µg/ml. In the study by Ramachandra et al., 2013, done on antibacterial activity of extracts of *A. vasica*, ethanolic extract was found to possess maximum antibacterial activity against *E-coli* while in our study maximum inhibitory activity was recorded by E2 extract for *E. coli* (Tables 1and Fig. 1).

Table 1: Zone of Inhibition (ZOI) Ethanolic Extract, Methanolic Extract, Water Extract and Streptomycin against Escherichia Coli

S. No.	Conc. of extract (µg/ml)	Conc. of streptomycin (µg/ml)	Average zone of inhibition (diameter in mm)			
			Streptomycin	Methanolic extract	Ethanolic extract	Water extract
1	2000	-	-	18	22	-
2	1000	-	-	14	19	-
3	500	500	47	11	16	-
4	250	250	45	10	11.5	-
5	125	125	44	8	-	-

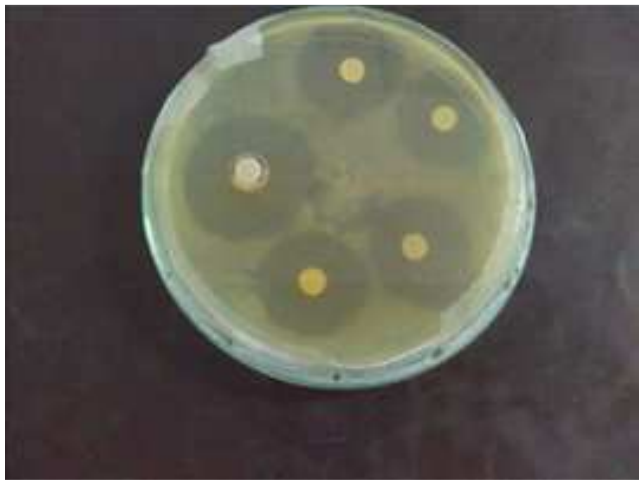

Figure 1: Zone of Inhibition (ZOI) of Different Concentration Ethanolic Extract on Escherichia Coli.

CONCLUSIONS

The obtained results support the use of these plants in traditional medicine. The potential for developing antimicrobials from higher plants appears rewarding as it leads to the development of new drugs which is needed today. Further research is necessary to find the active compounds within these plants with their full spectrum of efficacy. However, the present study of in vitro antibacterial activity of *Adhatoda vasica* form primary platform for further phytochemical and pharmacological studies.

The present study revealed that Adathoda vasica has a broad spectrum of antibacterial activity and potential source of antimicrobial agents. From the results obtained during the present study, we can conclude that the leaf extract of Adhatoda vasica has excellent antibacterial activity against the tested bacteria. (Sagar et al., 2013),(Josephin et al., 2012) Plant leaf extracts of Adathoda vasica was found to have significant antibacterial activity. From the results we can conclude that Adathoda vasica has potent antimicrobial activity. Thus, there is a possibility of developing Adathoda vasica as an important source of biopesticide and that could be useful for an important and antibacterial agent. (K. Ilango et al., 2009).

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