



RESEARCH ARTICLE

STUDY ON THE ANTIMICROBIAL PROPERTIES OF *ADHATODA VASICA* AND *LEUCAS ASPERA* FOR SOME COMMON HUMAN PATHOGENIC BACTERIAE

*Renuka, M. R.

Dept. of Zoology, N. S. S. Hindu College, Changanacherry India

ARTICLE INFO

Article History:

Received 11th December, 2018

Received in revised form

19th January, 2019

Accepted 14th February, 2019

Published online 30th March, 2019

Keywords:

E. Coli, Klebsiella,

Adhatoda vasica,

Leucas aspera.

ABSTRACT

The present study aimed at the analysis of sensitivity of *E. Coli* and *Klebsiella* to the plant extracts of *Adhatoda vasica* and *Leucas aspera*. The ethanolic extract of these two medicinal plants traditionally used in medicine, were studied for their antibacterial activity against the common human pathogens. Both the medicinal plant extracts showed inhibitory activity against the bacteriae. The study comes to the conclusion that medicinal plants which are traditionally used in Ayurveda or in other herbal medical practices have scientific basics and can be modified to produce specific medicines against each bacterium.

Copyright © 2019, Renuka. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Many antibiotics of microbial origin and other synthetic antibacterial drugs are employed for the treatment of bacterial diseases. These drugs are expensive and cause undesirable side effects. The other most serious problem is the development of drug resistance in bacteria to many of these drugs. It has been well known since ancient times that plants and species have antimicrobial activity (Zaika, 1988). It has to be noted that despite the remarkable progress in synthetic organic chemistry of the twentieth century, over 25% of prescribed medicines in industrialized countries are derived directly or indirectly from plants. Plant derived medicines are widely accepted because they are relatively safer than the synthetic alternatives, they are easily available and cheaper.

Adhatoda vasica: In ayurvedic medicine, Adhatoda is mainly used to relieve respiratory disorders and cough. The leaves of Adhatoda Vasica are rich sources of carotene and Vitamin-C. The extract from leaves has been used to relieve asthma, bronchitis, breathlessness and cough for centuries. It is also used to relieve other conditions like local bleeding due to piles, peptic ulcers and menorrhagia; and relief from bleeding gums. The flowers are used to relieve burning micturition, and as an effective expectorant to relieve congestion and dyspnoea.

Leucas aspera: It is used as antimicrobial, antioxidant, anticancer, phytotoxic, thrombolytic, hepatoprotective, anti-

inflammatory, analgesic, antinociceptive, antiulcer, antimalarial, antidiabetic agent. In folk medicine it is widely used to treat skin diseases. It is also used to treat snake bite and scorpion sting.

MATERIALS AND METHODS

Ethanolic extract of the plants were prepared using Soxhlet apparatus.

Preparation of inoculums: The test microorganisms were maintained at 4°C on nutrient agar slants. Active cultures for *E. coli* and *Klebsiella* was prepared by transferring a loopful of cells from the stock cultures to test tubes of 30 ml nutrient broth. The inoculated tubes were incubated without agitation for 24 h at 37°. The cultures were diluted with 20 ml fresh nutrient broth before using it for plate culture. Such prepared inoculums was used to spread onto Nutrient Agar plate (Himedia Laboratories Ltd., India) using sterile cotton swab to make a lawn of bacteria. Screening of antimicrobial properties was carried out by Agar disc diffusion method (Kirby Bauer *et al.*, 1966) 7 mm filter paper discs were impregnated with 1 ml of each of the different plant extracts. The discs were kept under refrigeration until ready to be used. Discs loaded with natural products as well as ampicillin were placed onto the surface of the agar. Discs were dispensed to the agar surface with a sterile forceps. After application, ensured that the disc has made complete contact with the agar surface by touching the top of the disc with forceps. Commercial antibiotic ampicillin and paper discs impregnated with 1ml of DMSO

*Corresponding author: Renuka, M. R.,

Dept. of Zoology, N. S. S. Hindu College, Changanacherry India

diluents used to dilute natural products were used as control. Tests were repeated for four times and the results were statistically analysed. Results are expressed as mean value \pm SD of diameters of zone of inhibition for four replications.

OBSERVATIONS AND RESULTS

After incubating for 24 hours at 37°C, both bacteriae produced uniform colonies on the surface of the Nutrient Agar plate. Following results were obtained from the antimicrobial property assay using disc diffusion method.

Ampicilin: Antibiotic Ampicillin produced IZDs of 25 mm for *E.coli* and 24 mm for *Klebsiella*. The treatment results are represented in Table 1. DMSO produced no zone of inhibition.

Adhatoda vasica: The analysis of the inhibitory activity of extracts from *Adhatoda vasica* in different treatments on *E.coli* was 10mm, 12mm, 11mm, 11mm and 13mm. The maximum inhibition zone produced is of 13mm diameter. For *Klebsiella* these were 14 mm, 13 mm, 15 mm, 13 mm and 15 mm. The treatment results are represented in Table 3.

Table 1. Inhibition Zone Diameter produced by Ampicilin against *E.coli* and *Klebsiella*

Sl.No	Test organism	Zone of inhibition
1	<i>E.coli</i>	25mm
2	<i>Klebsiella</i>	24 mm

Table 2. Inhibition Zone Diameters produced by *Adhatoda vasica* against *E.coli* and *Klebsiella*

Bacteria	Treatments					Mean (mm)	SD
	1	2	3	4	5		
<i>E.coli</i>	10 mm	12 mm	11 mm	11 mm	13 mm	11.4	1.14
<i>Klebsiella</i>	14mm	13mm	15mm	13mm	15mm	14	1

Table 3. Inhibition Zone Diameters produced by *Leucas aspera* against *E.coli* and *Klebsiella*

Bacteria	Treatments					Mean (mm)	SD
	1	2	3	4	5		
<i>E.coli</i>	8 mm	7 mm	10 mm	9 mm	11 mm	9	1.58
<i>Klebsiella</i>	14 mm	13 mm	12 mm	13 mm	2	13.2	0.836

Leucas aspera: The analysis of the inhibitory activity of extracts from *Leucas aspera* (Thumba) in different treatments on *E.coli* was 8 mm, 7 mm, 10 mm, 9 mm and 11 mm. The maximum inhibition zone produced is of 11mm diameter. For *Klebsiella* these were 14 mm, 13mm, 12mm, 13 mm and 14 mm. The treatment results are represented in Table 3.

DISCUSSION

The study revealed that both medicinal plant extracts had inhibitory activity on the human pathogens, *Escherichia coli* and *Klebsiella*. The inhibition zones were clearly visible on 24 hour incubation at 37°C. This shows the antibacterial potency of these plants. Antibiotic Ampicillin produced IZDs of 25 mm for *E.coli* and 24 mm for *Klebsiella*. DMSO produced no zone of inhibition. The analysis of the inhibitory activity of extracts from *Adhatoda vasica* in different treatments on *E.coli* was 10mm, 12mm, 11mm, 11mm and 13mm. The maximum inhibition zone produced is of 13mm diameter. For *Klebsiella* these were 14 mm, 13 mm, 15 mm, 13 mm and 15 mm. The analysis of the inhibitory activity of extracts from *Leucas aspera* in different treatments on *E.coli* was 8 mm, 7 mm, 10 mm, 9 mm and 11 mm. The maximum inhibition zone produced is of 11mm diameter. For *Klebsiella* these were 14 mm, 13mm, 12mm, 13mm and 14 mm. The indigenous medicinal system of India widely uses *Adhatoda vasica* as a remedy for respiratory diseases. The mean IZD obtained from the treatment of the leaf extracts of *Adhatoda vasica* on the tested bacteriae was 11.4 and 14 mm for *Escherichia coli* and *Klebsiella* respectively. This indicates the strong efficiency of the leaf contents to resist the growth of bacteria. Srinivasan, et. al., (2001) showed that about 22 Indian medicinal plants used on folkloric medicine were active against major gram negative bacteria. The results obtained from the present study was also supporting to this. Both of the medicinal plants tested, showed significant activity against the tested micro organisms. All these results supported the traditional use of these medicines. Due to persistent and unscientific usage, most of the antibiotics became less effective against pathogenic *E. coli* and *Klebsiella*. The results of the present study will be definitely useful to develop medicines from herbs to control the infection and growth of bacteriae. Because they are of herbal origin, they are expected to have fewer or no side effects.

REFERENCES

- Bauer, AW, Kirby, WM, Sherris, JC, Turck, M. 1966. Antibiotic susceptibility testing by a standardized single disk method. *Am J Clin Pathol.*, 45(4):493-496
- Sreenivasan, S., Rose, J.B. and Wong, K. 2001. *Journal of Ethnopharmacology*, 74 : iss 3 ; pp 217-220.
- Zika, L.S. 1988. Pices and herbs: their antimicrobial activity and its determination. *J. Food Safety*, 1988.
