International Journal of Zoology and Applied Biosciences **ISSN: 2455-9571**
Volume 1, Issue 3, pp: 144-147, 2016 **http://www.ijzab.com**
https://doi.org/10.5281/zenodo.1310551

Research Article

EVALUATION OF ANTIBACTERIAL ACTIVITY OF DIFFERENT SOLVENT EXTRACTS OF *BEGONIA CORDIFOLIA*

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Article History: Received 4th May, 2016; Revised 10th June, 2016; Accepted 24th June; Published 30th June, 2016

ABSTRACT

The resurgence of several infections appeared to have been controlled and the increase in bacterial resistance have created the necessity for the development of new antibacterials. In this study the antibacterial efficiency of *B. cordifolia* leaf extracts were examined using Hexane, Ethyl Acetate, Acetone and Aqueous solution as solvents and tested against pathogens like *Vibrio harvayie* and *Pseudomonas aeroginosa* using disc diffusion method. The minimum zone of inhibition was observed in acetone and aqueous solution of *B.cordifolia*, showing less antimicrobial activity against both experimental strains. The other two extracts, hexane and ethyl acetate showed maximum zone of inhibition against the experimental strains. The antimicrobial activity of *B. cordifolia* extracts proved that it may be a new and effective herbal medicine to treat the infectious diseases, caused by *Pseudomonas aeroginosa* and *Vibrio harvayie*.

Keywords: Antimicrobial activity, Disc diffusion method, *Begonia cordifolia*, *Pseudomonas aeroginosa*, *Vibrio harvayie*.

INTRODUCTION

Plants, as the source of medicine, have been playing an important role in the health services around the globe (Thomson, 2010). About three quarters of the world's population relies on plant and their extracts for health care (Kunwar and Bussmann, 2008). A large number of our population, particularly in rural areas depends largely on herbal remedies for the treatment of different types of diseases. It indicates the importance of the individual plants in the health care system (Amit Subedi *et al*., 2011).

World Health Organization reports that, at least 75 to 95% of the world population's chiefly relay on traditional medicines and major part of traditional therapies involves the use of plant extracts or their active constituents (Moly, 2011). The demand for more and more drugs from plant sources are continuously increasing, which necessitates the screening of medicinal plants with promising biological activity (Sumathi and Parvathi, 2010). Medicinal plants are the gift of nature to cure number of diseases among human beings. Large number of plants in different location around the world have been extracted and semi-purified to investigate their antimicrobial activity individually (Vadlapudi and Chandrasekar, 2010).

But the expanding bacterial resistance to antibiotics has become a growing concern worldwide (Gardam, 2000). Increasing bacterial resistance is prompting a resurgence in research of the antimicrobial role of herbs against resistant strains (Hemiaiswarya *et al*., 2008). Among the herbs, Begonia comprises almost 1400 species arranged into 78 sections (Baranov and Barkley, 1974; Smith *et al*., 1986; Doorenbos *et al*., 1998; Forrest and Hollingsworth, 2003; Wilde and Plana, 2003). Among the Begonia species, *Begonia cordifolia* (Wight) Thwaites is a perennial herb having subterranean rhizomes, growing horizontally and also commonly available in the hill stations of Tamilnadu.

Hence in this study it was planned to determine the antibacterial activity of *Begonia cordifolia* plant extract against *P. aeruginosa* and *V. harvayie*.

MATERIALS AND METHODS

Plant collection

Begonia cordifolia leaves were collected from Papanasum, Tirunelveli District, Tamil Nadu.

Solvent extraction

The leaves of *Begonia cordifolia* was air- dried and powdered. About 250g of this powder was extracted with Hexane, Ethyl Acetate, Acetone, Methanol and Aqueous in

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a Soxhlet apparatus. The extraction process was continued for 8h. The solvents were evaporated under reduced pressure. After determining the yields, the sediments extracts were stored at 4°C until further use.

Drug preparation

About 100 mg of each sediment extract Hexane, Ethyl Acetate, Acetone, Methanol and Aqueous was redissolved in 1 ml of 1% Dimethyl sulfoxide (Fischer chemicals, Fair Lawn N.J).

Test bacterial strains

All the experimental bacterial strains were propagated by IMTECH culture. *Vibrio harvayie* and *Pseudomonas aeruginosa* were selected as test bacterial strains and maintained in stock culture. These bacteria were subcultured in nutrient broth media (Purchased from HiMedia Laboratories Limited, Mumbai, India) which was prepared by the following composition.

Preparation of nutrient broth liquid media

Eight grams of Nutrient agar was dissolved in 1000 ml of distilled water and boiled. The P^H was maintained to 6.9 ± 0.7. The media was sterilized by autoclaving at 15 Lbs pressure and 121°C for 15 minutes.

Inoculum preparation

Inocula were prepared by picking colonies from 12h old cultures. Colonies were suspended in 5ml saline solution (0.145m). The density was adjusted by the spectrophotometer to 0.5 McFarland standard at a wavelength of 530nm to yield a stock suspension of 1×10^6 cells per ml (Barry *et al.,* 1983).

Preparation of nutrient agar medium

37 grams of Nutrient agar was dissolved in 1000 ml of distilled water and boiled. The P^H maintained to 7.3 ± 0.1. The media was sterilized by autoclaving at 15 Lbs pressure and 121°C for 15 minutes.

Disk diffusion test

Experimental plates were assigned into four groups. Each group consists of six plates of *V. harvayie,* six plates of *E.coli* and six plates of *P. aeroginosa.* About 1.5 ml bacterial inoculums ($1*10^6$cells/ml) was uniformly seeded on nutrient agar plates. The nutrient agar medium was poured in glass petri dishes, left aside for 15 minutes and excess of suspension was then drained and discarded properly. Subsequently, filter paper discs (6mm in diameter) saturated with sediment extract was placed on surface of each inoculated plate. Culture plates, were incubated at 37 ± 1°C for 24 h. After 24 hr, bioactivity was determined by the measurement of zones of inhibition in diameter (mm). All the samples were tested in triplicates. Control had a solvent without test extract. All data were expressed as mean ± standard deviation and statistically analysed using Microsoft Office XP - Excel program.

RESULTS AND DISCUSSION

The results of the antibacterial activity of *Begonia cordifolia* are presented in Table-1. Hexane, ethyl acetate, acetone, methanol and aqueous extracts of *Begonia cordifolia* were confirmed the antibacterial activity against the *Vibrio harvayie* and *Pseudomonas aeruginosa.* The maximum zone of inhibition was observed in methanolic extract of *Begonia cordifolia* against *Vibrio harvayie.* The study also revealed that hexane, ethyl acetate extract shows moderated and acetone and aqueous extract shows minimum antimicrobial activity.

Table-1: Study of antibacterial activity of *Begonia cordifolia* leaf extract against selected bacteria using different solvents

Solvents	Zone of Inhibition (mm)	
	Vibrio harvayie	*Pseudomonas aeruginosa*
Hexane	12	12
Ethyl Acetate	14	11
Acetone	8	12
Methanol	16	11
Aqueous	8	12
Gentamycin (Antibiotics)	-	10

Various studies on the efficacy of plant extracts used for antimicrobial activity has also been realized by many scientist in many plant species like *Adhatoda zeylanica* Medic (Ilango *et al*., 2009), *Trianthema decandra L*. (Geethlakshmi *et al.,* 2010), *Argemire mexicana L*. (Rahman *et al*., 2001), T*inospora cordifolia* and *Cassia fistula* (Upadhyay *et al*., 2011), *R. communis, P. niruri, A. lebbeck, C. asiatica* and *T. cordifolia* (Sankar *et al*., 2011*)*. Recently, a number of plants have been reported for antibacterial properties across the world (Olowosulu and Ibrahim, 2006; Murugan and Mohan, 2012; Murugan and Mohan, 2013).

Organic solvents such as ethanol, acetone and methanol are often used to extract compounds (Eloff,

1998). The methanolic extract of *B. cordifolia* showed significant antimicrobial activity against the *Vibrio harvayie*. The effectiveness of the *B. cordifolia* extract largely depends on the type of solvent used. The organic extracts provided more powerful antimicrobial activity as compared to aqueous extracts.

However, Murugesan *et al.* (2011) mentioned that petroleum ether extract of plant *Menecylon umbellatum Burm.*f. Showed significant antimicrobial activity. Furthermore, water extract from leaves of *P. ocerifolium* had been reported to have prominent antibicrobial activity against several gram positive and gram negative human pathogenic bacteria (Thatoi *et al.*, 2008). In the present investigation, different extracts of *B. cordifolia* was evaluated for exploration of their antimicrobial activity against *V. harvayie and P. aeruginosa*. The presence of antibacterial activity in a particular part of a particular species may be due to the presence of one or more bioactive compounds such as alkaloids, glycosides, flavonoids, steroids, saponins etc. (Baladrin and Kloeke, 1988).

CONCLUSION

B. cordifolia contain potential antimicrobial components, may be of great use for the development of new drugs in pharmaceutical industries against various diseases.

ACKNOWLEDGEMENT

The authors would like to thank Head of the Department of Zoology, Vivekananda College, for the laboratory facilities provided.

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