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ANTIBACTERIAL ACTIVITIES OF TUBER EXTRACTS OF *CHLOROPHYTUM BORIVILIANUM*

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ABSTRACT

Chlorophytum borivilianum is an important medicinal plant knows as 'Safed musli' and is used in herbal drug industries. In the present investigation the extracts obtained from tubers of *C. borivilianum* were used to evaluate *in-vitro* antibacterial activities against three bacterial strains i.e. *Bacillus licheniformis, Micrococcus* and *Paenibacillus*. Glacial acetic acid, petroleum ether, methanol and water were used as solvent to prepare tuber extract. The antibacterial activity of tuber extract for the micrococcus sensitivity was observed as 6, 15, 18 and 12mm zone of inhibition at 50 mg/ml conc. of water, methanol, glacial acetic acid and petroleum ether respectively. The most effective conc. for the antibacterial activity of tuber extract was 50 mg/ml conc. of glacial acetic acid.

KEYWORDS: *C. borivilianum*, *In vitro*, Antibacterial, Extract, Inhibition zone.

INTRODUCTION

The herb, *Chlorophytum borivilianum* Baker (Liliaceae) is medically important and endangered, indigenous crop of great pharmaceutical and commercial value. Most of medicinal plant species are rich in biomolecule contents which can cope with health hazard and antibacterial activity of many plant species, have been reported (Pandey & Mishra, 2010). *C.borivilianum* is an important class of Ayurvedic herb, known as Rasayan i.e., herb with immunostimulatory and adaptogenic properties (Thakur *et al.*,2010). Its aphrodisiac, antilarvicidal, anti microbial and anti inflammatory activities are highly pronounced (Thakur & Dixit 2006 and Deore & Khadabadi 2007, 2008 and 2009). The tubers are known as "Golden roots". It has multiple therapeutic applications. The tubers are the rich source of more than twentyfive alkaloids, phenolic compounds, vitamins, minerals, proteins, carbohydrate, steroids, saponin, polysaccharides, fructons (Tandon *et al.*,1992; Habeeb *et al*., 2007; Deore & Khadabadi, 2008 and Mayank & Dixit, 2008). Dry fasciculated storage tubers of safed musli have emerged as "An effective answer to present day health problems". In this study we determine the antibacterial activities of tuber extracts of *C. borivilianum.*

MATERIAL AND METHODS

Collection of tubers of *Chlorophytum borivilianum*

The germplasm of *C.borivilianum* (disc along with minimum of one finger) were collected from Patepur, Bihar. They were multiplied in polyhouse in the Research Garden, department of Botany Patna University, Patna. After maturity of plant fingers were dug out and stored in perforated bags filled with sand.

Preparation of extracts

The tubers of *C. borivilianum*was washed thoroughly under running tap water dried on bloting paper then chopped into small pieces and dried in oven at 50°C for 2 hours. It was then grinded into fine powder using mortal pestle and 50g of powder plant material (tubers) was mixed in 100ml of water,methanol, glacial acetic acid and petroleum ether and left for 24 hours on mechanical shells at room temperature. After 24 hours plant extract was filtered using whatman No.1 filter (Raaman 2006). The process repeated thrice for proper extraction. The extracts collected were pooled, evaporated to dryness by rotary evaporation. All extracts were stored at 4°C temperature for further use.

Tested Bacteria

The following microorganisms were isolated from infected culture tubes from tissue culture laboratory of department of botany Patna University, Patna. Isolated microorganisms were identified at Microbial Type Culture Collection & Gene Bank (MTCC), Institute of Microbial Technology, Chandigarh and was assigned Ref. no. 35844, like *Bacillus licheniformis, Micrococcus* and *paenibacillus.*

Preparation of discs

Disc diffusion method was used to check antibacterial activity. 0.05g of each extract dissolved in 100ml of distilled water to produce final concentration of 50mg/ml. Sterile blank discs 6mm in diameter were embedded into stock solution. All discs were fully dried before the application on bacterial lawn.

Determination of antibacterial activity (Culture and Sensitivity Test)

Antibacterial activities of tuber extracts were done by kirby-Baure method (Claus, 1995). Discs containing plant extracts were placed after inoculation of the selected bacterial strains. The inoculated plates were incubated at 33 $\pm$ 2°C temp. for 24hours. The inhibition zones around the discs were measured in mm scale.

RESULT

All tuber extracts of C. *borivilianum* tend to inhibit gram positive bacteria. The inhibitory activity was very low in aqueous extract i.e 5, 6 & 4 mm in comparison to methanol i.e. 12,15,10 mm, glacial acetic acid i.e. 15,18,15 mm and in the petroleum ether 10, 12, 8mm (table1). Results show that glacial acetic acid extracts possess great inhibitory effect (15,18,15mm) for gram positive bacteria like *Bacillus licheniformis Micrococcus* and *Paenibaccillus*.

In this study, we have reported that glacial acetic acid extract of *C. borivilianum* tubers have high antibacterial activities against gram positive bacteria.

Table 1: Showing zone of inhibition of tuber extracts of *C. borivilianum* in different solvent against *Bacillus licheniformis Micrococcus* and *Paenibaccillus*.

Tested Bacteria	Extract Conc. in mg/ml	Zone of inhibition in mm			
		Water	Methanol	Glacial Acetic Acid	Petroleum Ether
Bacillus licheniformis	50	5	12	15	10
Micrococcus	50	6	15	18	12
Paenibacllus	50	4	10	15	8

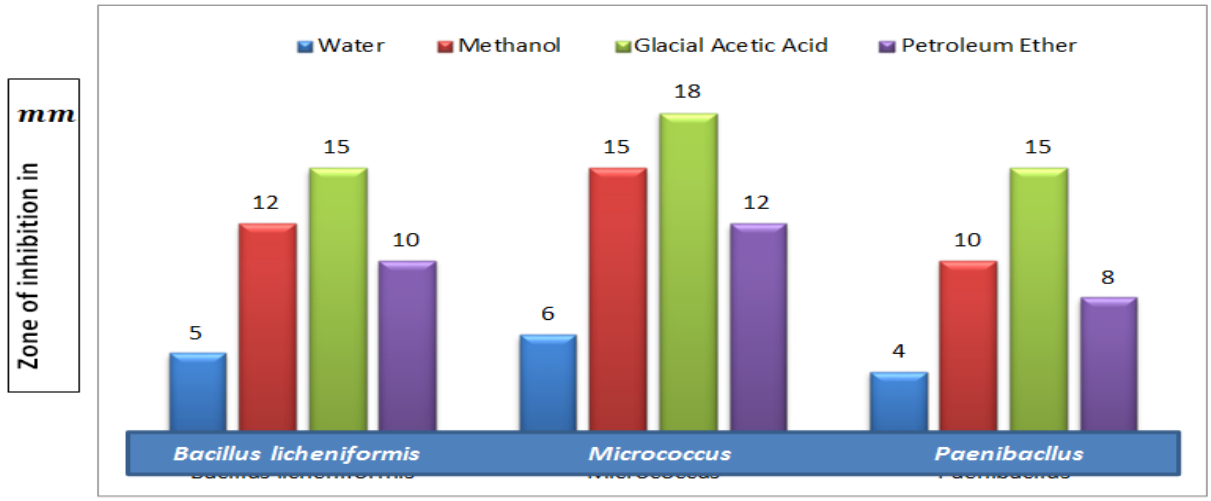

Fig. 1: zone of inhibition (in mm) of tuber extracts of *C. borivilianum*in in different solvent Water, Methanol, Glacial Acetic Acid and Petroleum Ether against *Bacillus licheniformis Micrococcus* and *Paenibaccillus.*

Fig. 2: Plant with tubers

Fig. 3: Healthy & mature tubers

Fig. 4: Tuber Extracts of *C. borivilianum* showing zone of inhibition against *micrococcus*. GAA = Glacial Acetic Acid, M=Methanol

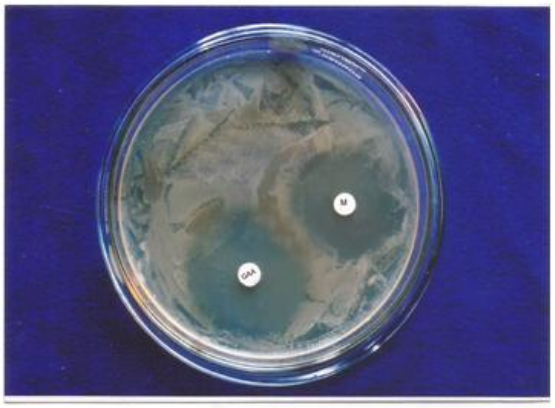

Fig. 5: Tuber Extracts of *C. borivilianum* showing zone of inhibition against *Bacillus licheniformis* GAA = Glacial Acetic Acid, M=Methanol

DISCUSSION

The present study strongly demonstrated that the *C. borivilianum* has potent antibacterial activity. The medicinal actions of plants are unique to a particular plant species or group, consistent with the concept that the combination of secondary products in a particular plant is taxonomically distinct (Parekh *et al.,* 2005). Plants extracts are potential sources of novel antimicrobial compounds especially against bacterial pathogens. Studies showed that plant extracts inhibit bacterial growth but effectiveness varies. The antimicrobial activity of many plant extracts has been previously reviewed and classified as strong, medium or weak (Zaika, 1998). Antibiotics provide the main basis for the therapy of microbial infections. However, the high genetic variability of microorganisms enables them to rapidly evade the action of antibiotics by developing antibiotic resistance (Leelaprakash & Dass, 2011). Also intensive use of antibiotics often resulted in the development of resistant strains (Sydney *et al.,* 1980), which create problems in treatment of infectious diseases, furthermore antibiotics are also sometimes attributed with side effects (Cunha 2001), whereas there are some advantages of using antimicrobial compounds of medicinal plants such as often fewer side effects, better patient tolerance. The obtained results from present woek showed that the glacial acetic acid has maximum antimicrobial activity. The polar extract of root and stem responded very good antimicrobial than nonpolar extract (Chakraborthy & Aeri 2009). It has been reported that the methanolic extract of *C. arundinaceum* showed maximum inhibitory activity than chloroform extract (Valya *et al.,* 2009). According to O'Donnel *et al.,* (2006) the methanolic extract of *C. inormnatum* has maximum antimicrobial potency. The different solvent i.e. hexane, chloroform, acetone and methanol were used to prepare extract in which methanolic extract was strong antimicrobial activity (Dabur *et al.,* 2007). These finding showed that phytoconstituents responsible for antibacterial activity are polar in nature and extract in polar solvents only. The chemical compounds, mannans and saponin are the main phytochemicals which are responsible for the different medical property present in *C. borivilianum* (Mayank & Dixit 2008). Therefore *C. borivilianum* have very potent antimicrobial agent.

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