

ORIGINAL RESEARCH ARTICLE

Comparative Antibacterial study of *Barleria prionitis* Linn. Leaf Extracts

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**ABSTRACT**

The purpose of this investigation was to find out the comparative antibacterial activity of ethanolic extracts, chloroform extract, petroleum ether extracts and column fraction of *Barleria prionitis* Linn. on various bacterial species. The different extracts of the plant were first prepared on basis of various concentration levels and then extensively applied on selected bacterial culture media for determination of minimum inhibitory concentration (mg/mL) and these extracts exhibited significant antibacterial activity. This comparative study taking with selected extracts has been demonstrated for the first time.

**Key words:** *Barleria prionitis*; antibacterial activity; Comparative study; Minimum Inhibitory Concentration (MIC).

**INTRODUCTION**

In recent time, traditional medicines have been brought a huge potential in herbal medicine with enormous therapeutic potential to heal many infectious diseases without associated with the side effects unlike synthetic drugs. Bacterial infections are one of the prominent causes of health problems, physical disabilities and mortalities around the world. Symptoms and complications associated with bacterial infections such as fever, chills, headache, nausea, vomiting and organ failures affect patient's life severely. Medicinal plants are a rich source of antimicrobial agents and provide a safer and cost effective way of treating the bacterial infections. *Barleria prionitis* Linn. (Acanthaceae) is widely distributed throughout India, Sri Lanka, Africa and tropical Asia. The crude extract of this plant is commonly used in folk medicine to treat whooping cough. The plant extract has also shown its potential applications as diaphoretic and expectorant. The plant has also shown anti-respiratory syncytial virus, anti-arthritis, anti-inflammatory and anti-fertility activities. In Ayurveda the leaves and the tender branches are used for treatment of toothache, strengthening of gums, whooping cough and premature ejaculation. Whole-plant extracts of porcupine flower contain iridoid glycosides, barlerin, and verbascoside, which have

shown potent activity against respiratory syncytial virus *in vitro* and may account for the plant's use in treating fever and several respiratory diseases in herbal medicine<sup>1</sup>. Plants and plant products have been used extensively throughout history to treat medical problems. Extracts of many plants are highly efficient against parasitic as well as microbial infection. It is estimated that around 70,000 plant species, from lichens to tall trees, have been used at one time to other for medicinal purposes<sup>2-7</sup>. In this study, the various solvent extracts of *Barleria prionitis* plant were prepared and successfully determined their minimum inhibitory concentration on different bacterial species.

**MATERIALS AND METHODS**

The plant has been collected from the forest of Ichharia village, Bankura, West Bengal, India and has been authenticated by B.S.I., Shibpur, Howrah, West Bengal, India.

**Preparation of Extract**

The leaves were carefully washed under running tap water followed by sterile distilled water. These were air dried at room temperature (45<sup>o</sup>C) for five days and pulverized to a fine powder using a sterilized mixer grinder and stored in air-tight bottles. Then the leaf powder extracted with petroleum ether (40<sup>o</sup>-60<sup>o</sup>), chloroform and

maceration was done with 70% ethanol. The column fraction (70% ethanol extract) was prepared by column chromatography. After filtration of total extracts, the extracts were evaporated to dryness in vacuum. The various media viz. solid media, liquid media and peptone water were prepared to conduct the study [8].

### Determination of Minimum Inhibitory Concentration

Gram positive and gram negative bacteria were grown in peptone water for 18 h; this gave an optimum growth of the test bacteria. The petroleum ether (40<sup>o</sup>-60<sup>o</sup>C) extract, chloroform extract, 70% ethanol extract and column fraction separately dissolved in dimethyl sulfoxide (DMSO) sterilized by filtration by using sintered glass filter (G-5) and stored at 4<sup>o</sup>C [9].

Petroleum ether extract was added to molten nutrient agar in the following concentration (mg/mL): 3.33; 6.66; 16.66; 33.33. Chloroform extract and column fraction was then added to molten nutrient agar in the following concentration (mg/mL): 5; 10; 25; 50. Ethanol (70%) extract added to 9 ml molten nutrient agar in the following concentration (mg/mL): 10; 20; 50; 100 and poured into sterile petridish. The pH of the media was maintained at 7.2-7.4. The inoculums consisted of an over night grown broth culture of a bacterium diluted in such a manner

that a 2mm (internal diameter) loop full of that culture contain 10<sup>5</sup> colony forming unit (CFU). These were then spot inoculated at the sterilized laminar air flow on nutrient agar plates containing increasing amount of a compound, inoculated at 37<sup>o</sup>C up to 72h for determination of the minimum inhibitory concentration (MIC) [9].

### RESULTS

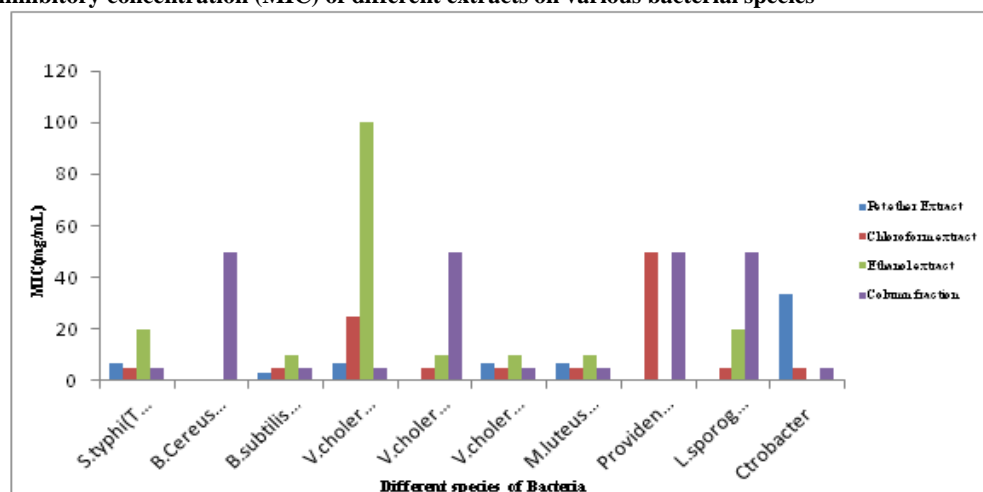
Different strain of isolated gram positive bacteria and gram negative bacteria were used for this study. After performing the antibacterial activity, it has been noticed that minimum inhibitory concentration (MIC) of the different *Barleria prionitis* Linn. (Acanthaceae) leaf extract was found to be 5 mg/mL for both Chloroform extract and Column fraction in *Salmonella typhi*, 50 mg/mL for Column fraction in *Bacillus cereus*, 3.33 mg/mL for Petroleum ether extract in *Bacillus subtilis*, 5 mg/mL for Column fraction in *Vibrio cholerae* (DN – 6), 5 mg/mL for Chloroform extract in *Vibrio cholerae* ( 793 ), 5 mg/mL for Chloroform extract and Column fraction in *Vibrio cholerae* ( 813 ), 5 mg/mL for Chloroform extract and Column fraction in *Micrococcus luteus*, 50 mg/mL for Chloroform extract and Column fraction in *Providencia*, 5 mg/mL for Chloroform extract in *Lactobacillus sporogenus*, 5 mg/mL for Chloroform extract and Column fraction in *Citrobacter* shown in (Table 1).

Table 1: Comparative study of MIC among the all extract on different bacterial species

Name of Strains	Pet. Ether extract (mg/mL)	Chloroform extract (mg/mL)	Ethanol extract (mg/mL)	Column fraction (mg/mL)
<i>Salmonella typhi</i>	6.66	5	20	5
<i>Bacillus cereus</i>	N.A.	N.A.	N.A.	50
<i>Bacillus subtilis</i>	3.33	5	10	5
<i>Vibrio cholerae</i> (DN – 6)	6.66	25	100	5
<i>Vibrio cholerae</i> ( 793 )	N.A.	5	10	50
<i>Vibrio cholerae</i> ( 813 )	6.66	5	10	5
<i>Micrococcus luteus</i>	6.66	5	10	5
<i>Providencia</i>	N.A.	50	N.A.	50
<i>Lactobacillus sporogenus</i>	N.A.	5	20	50
<i>Citrobacter</i>	33.33	5	N.A.	5

N.A. = Not Active

Fig 1: Minimum inhibitory concentration (MIC) of different extracts on various bacterial species



**DISCUSSION**

Antimicrobial activity in terms of Minimum inhibitory concentration (MIC) for chloroform extract (5 mg/mL) and Column fraction (5 mg/mL) were found to inhibit the growth of bacteria against highest number of selected bacterial species in comparison to others where as petroleum ether extracts of the plant showed least MIC (3.33 mg/mL) against the *Bacillus subtilis* shown in (Fig 1). The highest activity of chloroform extracts is supposed to have better permeability of chloroform across the cell membrane of bacterial species among the others.

**CONCLUSION**

Above results conclude that the bacterial activity were frequently inhibited by chloroform extract and Column fraction in a concentration in 5 mg/mL as MIC (Fig 1) and further study may be performed taking the chloroform extract and Column fraction of the plant *Barleria prionitis* Linn. as traditional medicine is still beneficial than synthetic drugs due devoid of side effects in herbal medicine.

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