



Antibacterial activity of *Bridelia scandens* (Roxb.) Willd. and *Bridelia retusa* (L.) A.Juss.

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Received: 11 January 2019 / Accepted: 30 January 2019/ Published Online:15 March 2019

<http://www.gtrpcompany.com/jpr.htm>

Citation: Maridass M, Ganapathy Raju G. Antibacterial activity of *Bridelia scandens* (Roxb.) Willd. and *Bridelia retusa* (L.) A.Juss.. Botanical Report,2019;8(1):10-12.

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Abstract

This study was carried out with an objective to investigate in the preliminary phytochemicals and antibacterial potentials of both species of *Bridelia scandens* (Roxb.) Willd. and *Bridelia retusa* (L.) A.Juss. The aim of the present study was to investigation of phytochemical and antibacterial activity of methanolic extracts of both species on selected bacteria. The antibacterial activity was determined in the both extracts were used agar disc diffusion method. The results showed that both plants active against remarkable inhibition of the bacterial growth. The phytochemical analyses of the both plants *B. scandens* (Roxb.) Willd. and *B. retusa* (L.) A.Juss were revealed that alkaloids, flavonoids, terpenoids, tannins and saponins. The bacterial activity of the *B. scandens* (Roxb.) Willd. and *B. retusa* (L.) A.Juss. maybe act as identification of secondary metabolites. Hence, these plants can be used to discover bioactive plant products that may serve as leads in the development of new pharmaceuticals research activities.

Keywords: *Bridelia scandens* (Roxb.) Willd. and *Bridelia retusa* (L.) A. Juss, in vitro antibacterial activity, phytochemicals

1 INTRODUCTION

The plant and plant parts are globally valuable sources of new drugs [1-4]. They were treated to several diseases such as cancer, tuberculosis and bacterial and fungal diseases in worldwide. Now, over 1300 medicinal plants used in Europe, of which 90 % are harvested from wild resources in the United States. About 118 of the top 150 prescription drugs are based on natural sources [5]. Furthermore, up to 80 % of people in developing countries are totally dependent on herbal drugs for their primary healthcare, and over 25 % of prescribed medicines in developed countries are derived from wild plant species [4]. With the increasing demand for herbal drugs, natural health products, and secondary metabolites of medicinal plants, the use of medicinal plants is growing rapidly throughout the world [1,6]. The unprecedented emergence of microbial resistance to antimicrobials and side effects associated synthetic antimicrobial agents, has resulted in increased interest in plant derived extracts or compounds recently. Thus, there is an urgent need to search for new infection-fighting strategies to combat microbial infections in the current era of emerging infectious diseases.

Approximately 60 species of *Bridelia*, (Phyllanthaceae) are found throughout tropical and subtropical regions of the world, mainly in Africa and Asia. Several *Bridelia* species are used in popular medicines as antiamebic, antianemic, antibacterial, anticonvulsant, anti-diabetic, antidiarrhoeal, antihelmintic, anti-inflammatory, antimalarial, antinociceptive, antiviral, hypoglycemic and for abdominal pain, cardiovascular, gynecological and sexual diseases [7]. In the present study investigated the antibacterial properties of both species of *Bridelia scandens* (Roxb.) Willd. and *Bridelia retusa* (L.) ethnobotanically used in the Kanis tribe of Southern Western Ghats.

2 MATERIALS AND METHODS

2.1 Plant materials

The collection of plant materials of *Bridelia scandens* (Roxb.) Willd. and *Bridelia retusa* (L.) were collected from Tirunelveli hills, Southern Western Ghats, Tirunelveli, Tamil Nadu. The leaves of *B. scandens* and *B. retusa* were air dried at room temperature and powdered in a mechanical mill.



2.2 Preparation of plant extracts

The powdered plant materials were extracted with successively in methanol for 4hr in Soxhlet apparatus. Solvents were evaporated under reduced pressure and stored at °C for use. Preliminary phytochemical analysis tests were carried out on the powdered materials for using the methods [8].

2.3 Antibacterial Activity

2.3.1 Subculturing of bacterial strains

The bacterial media were prepared by standard method for used. Nutrient broth was used for sub culturing of bacterial strains. Bacterial cultures were inoculated on nutrient broth and incubated at overnight at 37 °C. Nutrient agar media (Difco laboratories) pH 7.2 and nutrient broth media (Difco laboratories) pH 6.8 were used. The antibacterial activity of *M. capitellatum* L. leaf extract was measured by agar disc diffusion method [9]. 10mg/ml of extract was applied for the experimental disc. Control as methanol used for negative control.

2.4 Data analysis

All the experiments were independently repeated three times, and average zone of inhibition of test extracts relative to negative control was calculated using Microsoft Excel 2019 software.

3 RESULTS AND DISCUSSION

3.1 Preliminary Phytochemicals

The results of preliminary phytochemical identification of the methanolic extracts of both plants of *B. scandens* and *B. retusa* have revealed the presence of alkaloids, essential oils, flavonoids, phenols, saponins, sterols, and tannins (Table -1). Previously, tannins was isolated from the bark of *B. scandens* [7], bridely alcohol and phlobatannin were isolated from leaves [10], taraxenone and taraxenone was from roots [11].

Table-1: Investigation of active compounds of *Bridelia scandens* (Roxb.) Willd. and *Bridelia retusa* (L.)

Sl. No	Active compounds in leaves	Results (Present/ Absent)	
		<i>B. scandens</i>	<i>B. retusa</i>
1.	Alkaloids	+++	+++
2.	Essential oils	+++	+++
3.	Phenolic Compounds	++	++
4.	Tannins	+++	+++
5.	Saponins	++	+
6.	Flavonoids	++	++

Active compounds “+++” Maximum; “++” Medium; “+” Low quantity

Table-2: Antibacterial activity of *Bridelia scandens* (Roxb.) Willd. and *Bridelia retusa* (L.)

Sl. No	Pathogen Name	Activity (Present/ Absent) Zone of Inhibition	
		<i>Bridelia scandens</i>	<i>Bridelia retusa</i> (L.)
1.	<i>B. subtilis</i>	12	16
2.	<i>Staphylococcus aureus</i>	14	13
3.	<i>Escherichia coli</i>	11	14
4.	<i>Pseudomonas aeruginosa</i>	14	11
5.	<i>S. typhi</i>	11	17
6.	<i>Klebsiella sp.</i>	13	15

3.2 Antibacterial activity

The results of the antibacterial activity of both plants of *B. scandens* and *B. retusa* were active against *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Staphylococcus aureus* seen in the table-2. The medicinal plants of *B. scandens* was observed by highest active against *Pseudomonas aeruginosa* and *Staphylococcus aureus*. *Bridelia retusa* (L.) was highest active against *S. typhi*. Previous studies on methanolic extract on *Euphorbia hirta* was active against three species such as *E. coli*, *P.*

aeruginosa and *S. aureus* [12]. Acetone extract of *Bridelia spinosa* bark was found effective against *Staphylococcus aureus* [13]. Antimicrobial activity were screened for different extracts of stem bark and leaf of *B. scandens* against *Staphylococcus aureus* [14]. Previously, antibacterial activities of properties of leaf and fruit extracts of *B. scandens* active against on *S. aureus*, *E. coli*, *P. aeruginosa*, and *S. typhi* [18]. Ethanolic extract of *B. retusa* was exhibit strong inhibitory effect against *E. coli*, *K. pneumoniae*, *B. subtilis*, *S. typhi*, *S. aureus* and *P. aeruginosa* [15]. Medicinal plants synthesize antimicrobial compounds as part of their defence



against invasion by microbial pathogens. It is estimated that almost 50% of synthetic medicines are derived from or patterned after phytochemicals [16]. In the medicinal plant family secondary metabolites such as alkaloids, phenolics and other compounds have contributed the largest number of antimicrobial drugs in the pharmacological industry. The safer, biodegradable plant-derived compounds offer a promising solution to the problem of resistant microbes [17]. The conclusion of the present study observed that the crude extract of both species of *B. scandens* and *B. retusa* leaves active against the selected bacteria for good antibacterial activity. These plants can be used to discover new bioactive principle that may serve as leads in the development of new drug with less side effects and resistance risks.

4 ACKNOWLEDGEMENT

The authors thank to UGC, New Delhi for financial assistance for this work.

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