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Antibacterial Potential and Phytochemical Analysis of *Barleria Mysorensis* Leaf Extracts

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ABSTRACT

The intention of the present study was to evaluate the antimicrobial potent and phytochemical analysis of the leaves extracts of *Barleriamysorensis*. Acetone, aqueous, dimethyl ether, chloroform and ethanol extracts were prepared from dried and ground plant materials using Soxhlet apparatus. The antimicrobial activities of the extracts were evaluated by agar well diffusion method. The extracts significantly inhibited the growth of bacterial and fungal pathogens and the ethanol extracts of leaf showed more activity followed by chloroform extract. The qualitative and quantitative phytochemical analysis demonstrated the presence of alkaloids, flavonoids, tannins, phenols, terpenoids and saponin. This study supports the traditional use of *B. mysorensis* for the treatment of microbial infectious diseases and might be helpful for further investigation of the plants to assess their chemical prospective in future research.

KEYWORDS: Plant extracts, Phytochemicals, Antibacterial, *Barleriamysorensis.*

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INTRODUCTION

India is endowed with a wealth of medicinal plants, which have been a valuable source of natural products for maintaining human health. Plants are the richest resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs.[1]Medicinal plants are widely used for the treatment of human diseases all over the world because they contain components with therapeutic value.[2]Since immemorial times, nature has been a source of these medicinal agents as these secondary metabolites are synthesized by plants in response to microbial infection.[3]According to World Health Organization (WHO) more than 80% of the world's population relies on traditional medicine for their primary healthcare needs.

Natural products play in important role in drug development in the pharmaceutical industry.[4] There are many reports on the use of medicinal plants in traditionally used by either tribal people or indigenous population.[5]The use of plants and plant products as medicines could be traced as far back as the beginning of human civilization. Research on the biological activities of plants during the past two centuries has yielded numerous compounds for the development of modern drugs.[6]The medicinal value of plants lies in some chemical substance that produces a definite physiological action on the human body. The most important of these bioactive compounds are alkaloids, saponins, flavonoids, tannins and phenolic compounds.[7]

B.mysorensis is a xerophytic plant and belongs to the family Acanthaceae. It is mainly found in India and Sri Lanka and commonly known as *Barleria*. It is a under shrub, perennial, branched, stems are terete with simple thorns and leaves are sub sessile, elliptic-ovate or orbicular. Flowers are solitary, axillary, bract spinescent.[8]The present study deals with the invitro antibacterial activity and phytochemical analysis of the plant extracts of *B. mysorensis*.

MATERILAS AND METHODS

Plant Sample

*B. mysorensis*leaves were collected and washed in running tap water to remove dust particles, shade dried at room temperature and ground into fine powder using electric chopper. About 30g of coarsely powdered leaves were successively extracted using Soxhlet apparatus with different solvents. The solvents used were Acetone, Chloroform, Dimethyl ether, Ethanol and Distilled water. The extracts were concentrated by gentle heating and stored for future use.

Antimicrobial Activity

Antibacterial activity of the plant extracts were determined by agar well diffusion methodagainst ten bacterial and five fungal pathogenic organisms.[9] The bacterial pathogens include *Bacillus cereus, B. subtilis, Enterococcus faecalis, Staphylococcus aureus, S.epidermidis*, *Escherichia coli, Klebsiella pneumonia, Proteus mirabilis, Salmonella tophi* and *Shigelladysentriae.* Fungal pathogens used this study were *Aspergillusniger, A. fumigatus*, *Penicliiumchrysogenum*, *Rhizopusstolonifer* and *Mucorstrictus.* Briefly, fresh bacterial cultures of 0.1 ml having 108 colony forming unit were spread onto Muller Hinton Agar plate using sterile cotton swab and fungal cultures were spread onto Potato Dextrose Agar. The wells were punched off into agar medium with sterile well puncture and each well was filled with 30 µl of plant extract using micro pipette in aseptic condition. All the plates were then kept in a refrigerator to allow pre-diffusion of the extract for 30 min. Then, thebacterial plates were incubated at 37 °C for 24 h and fungal plates at 30 °C for 48-72 h.

Phytochemical Analysis

Qualitative phytochemical screening were performed for detecting the presence of different phytochemicals, which includes alkaloids, vitamin C, flavonoids, tannins, steroids, phenols, phlobatannins, terpenoids, glycosides and saponins.[10] After that, the major phytochemical constituents such as alkaloids, flavonoids, tannins, phenols and terpenoids were quantitatively estimated by standard protocols.

RESULTS

Antimicrobial Activity

Antibacterial activities of the extracts were evaluated by a zone of inhibition and the values are measured in mm. Among bacterial pathogens, acetone extract of the plant *B. my sorensis*showedmoderate inhibition activity against *S. epidermidis* (10 mm), *K. pneumonia* (11 mm), *B. cereus*, *B. subtilis*& *S. typhi* (8 mm); chloroform extract on *E. coli*, *K. pneumoniae*, *S. dysentriae* (10 mm), *B. cereus*, *E. faecalis* (9 mm), *B. subtilis* & *S. typhi* (8 mm); dimethyl ether extract on *S. epidermidis* (10 mm); and ethanol extract on *B. subtilis* (11 mm), *B. cereus*, *E. faecalis* (10 mm), *S. aureus*(9 mm), *P. mirabilis* &*S. dysentriae* (8 mm), but in fungi, ethanol extract showed significant inhibition activity against *R. stolonifer* (10 mm) &*M. strictus* (12 mm) (Fig. 1).

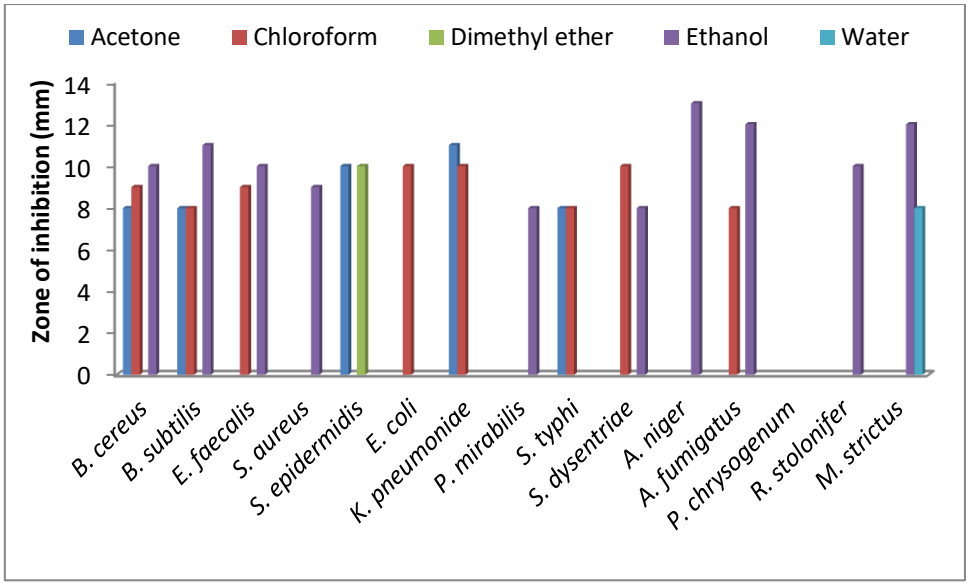

Figure 1: Antimicrobial activity of *B. mysorensis* leaf extracts

Qualitative Phytochemical Screening

The acetone extract of the plant *B. mysorensis* showed positive for flavonoids, tannins and terpenoids; chloroform extract for flavonoids, tannins, phenols and terpenoids; dimethyl ether extract for tannins, phenols and terpenoids; ethanol extract for alkaloids, flavonoids, tannins and terpenoids; and water extract for showed positive for alkaloids, flavonoids, phenols, terpenoids and saponin. Overall, the plant extracts showed positive for alkaloids, flavonoids, tannins, phenols, terpenoids and saponin (Table 1).

Table 1: Phytochemical screening of *B. mysorensis*leaf extracts

Phytochemical Constituents	Acetone	Chloroform	Dimethyl ether	Ethanol	Water
Alkaloids	-	-	-	+	+
Vitamin C	-	-	-	-	-
Flavonoids	+	+	-	+	+
Tannins	+	+	+	+	-
Steroids	-	-	-	-	-
Phenols	-	+	+	-	+
Phlobatannins	-	-	-	-	-
Terpenoids	+	+	+	+	+
Glycosides	-	-	-	-	-
Saponins	-	-	-	-	+

Presence (+) or absence (-) in different solvents

Quantitative Phytochemical Analysis

The leaf extract of *B. mysorensis* contained 1.16 mg/g of alkaloids, 0.41 mg/g of flavonoids, 1.27 mg/g of tannins, 1.32 mg/g of phenols and 0.87 mg/g of terpenoids.

DISCUSSION

The bacterial pathogens were significantly inhibited and the zone of inhibitions ranged from 8 to 11 mm. Also, the fungal pathogens were highly inhibited by the plant extracts, inhibition values ranged from 8 to 13 mm. Among the five solvents used, the ethanol extract affected more organisms followed by chloroform extract of *B. mysorensis.* The preliminary phytochemical investigation of the plantextracts revealed the presence of major secondary metabolites such as alkaloids, flavonoids, tannins, phenols, terpenoids and saponin. Among five solvents used ethanol and chloroform shows greatest positive results in phytochemical screening. The plant extracts demonstrated the large amount of major phytochemical constituents such as alkaloids, flavonoids, tannins, phenols and terpenoids.

The phytochemical constituents of the plant products serve as a defense mechanism.[9]These metabolites possess a broad range of activities, which may help in protection against persistent diseases[11] and suggests great potential for the plant as a source of useful phytomedicines. Alkaloids have a wide range of pharmacological activities including antimalarial, antiasthma, anticancer, antiarrhythmic, antibacterial and ant hyperglycemic activities.[12,13] Flavonoids and resins might be responsible for its use as anti-inflammatory recipe in Chinese folkloric medicine as some flavonoids has anti-inflammatory effect on both acute and chronic inflammation.[14] The presence of tannins have astringent properties, which accelerate the healing of wounds and inflamed mucous membrane due to their physiological activities such as anti-oxidant, antimicrobial and anti-inflammatory properties.[15]Steroids have been described to have antibacterial properties.[16]Phenols are largest group of plant metabolites, which have many biological properties such as ant apoptosis, ant ageing, ant carcinogen, anti-inflammation and cell proliferating activities.[17] Terpenoids exhibit various important pharmacological activities i.e., anti-inflammatory, anticancer, antimalarial, inhibition of cholesterol synthesis, antiviral and antibacterial activities.[18]Plant containing saponins are believed to have antioxidant, anti-cancer, anti-inflammatory, and anti-viral properties. Also have a wide range of medicinal applications.[19]The result from this work has revealed the medicinal potential of these plants in the treatment of bacterial diseases.

CONCLUSION

The present study revealed that, the extracts of *Barleriamysorensis*leaf was rich in medicinally important class of phytochemical compounds like alkaloids, flavonoids, tannins, phenols, terpenoids and saponin. Also, the extracts of the plant showed significant antimicrobial activities against human pathogenic microorganisms.

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