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ANTIBACTERIAL ACTIVITY OF *WRIGHTIA ARBOREA* (DENNST.) MABB. LEAF EXTRACTS

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ABSTRACT

Wrightia arborea (Dennst.) Mabb. leaf extracts were tested for their *in vitro* antibacterial activity by cup plate method, against three Gram positive bacteria, viz. *Staphylococcus aureus*, *Bacillus subtilis* and *Staphylococcus epidermidis* and two Gram negative bacteria viz. *Echerichia coli* and *Pseudomonas aeruginosa*. By using different types of individual extracts like aqueous, 70% ethanol, methanol and successively in increasing order of polarity with petroleum ether, dichloromethane, ethyl acetate and chloroform extracts. Methanol extract was found to have more antibacterial activity as compared to other extracts, but less than that of standard drug ciprofloxacin.

Key words: *Wrightia arborea*, Cup plate method, Antibacterial activity, Zone of inhibition.

INTRODUCTION

Microorganisms are the causative agents of almost all kinds of acute and chronic diseases. Many kinds of diseases have been treated with herbal medications throughout the history of mankind. The plant based antimicrobials have enormous therapeutic potentials. They are effective in the treatment of infectious diseases while simultaneously mitigating many of the side effects that are often associated with synthetic antimicrobials. The search for newer antibacterial agents with new modes of action will always remain an important and challenging task[1]. Many commercially proven drugs, used in crude form, in traditional or folk healing practices or for other purposes are potentially useful and have biological activity, but lack scientific documentation[2] .

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Wrightia arborea (Dennst.) Mabb (Apocynaceae) is a shrub often with slender cord like branches. Leaves opposite, densely tomentose, elliptic, caudate acuminate and the flowers are yellowish with orange coronal scales and cymes. The plant is reported to possess beneficial components in seeds; antidiarrhoeal and relief from toothache, when chewed in case of leaves; bark is useful in menstrual and renal complaints[3]. The stem bark and root bark are believed to be useful in snake- bite and scorpion- stings[4] .

Higher plants have been described as chemical factories that are capable of synthesizing unlimited number of highly complex and unusual chemical substances. Antimicrobial agents are chemicals that either kill or inhibit the growth of microorganism. The purpose of present work is to analyse the antibacterial activity of different solvent extracts of the plant *Wrightia arborea* leaf. However, very less work has been subjected on the leaf part than that of other parts of the plant, which is also having terpenoid as one of the constituent identified by preliminary qualitative chemical analysis. It will be responsible for healing of wounds.

EXPERIMENTAL

Materials and methods

Plant collection and identification

The plant was collected from the Hills of Shevaroys at Salem district and authenticated (BSI/SC/5/23/08-09/Tech.) by Botanical Survey of India, Tamil Nadu Agricultural University, Coimbatore. Mueller Hinton agar was purchased from HiMedia and bacterial strains were procured from National Chemical Laboratory, Pune. All the reagents used were of Analytical grade.

Preparation of extracts

The leaves of *Wrightia arborea* were collected and dried in shade. The leaves were than powdered and extracted individually with 70% ethanol, methanol, water and successively in the increasing order of polarity for a period of 36-48 h with petroleum ether, dichloromethane, ethyl acetate and chloroform in a Soxhlet extractor[5-7]. The extracts were then concentrated, dried and stored in a dessicator.

Antibacterial activity determination

Mueller - Hinton agar plates were prepared and then marked and inoculated with

three Gram positive bacteria and two Gram negative bacteria aseptically[8]. After 5-10 min, 9 wells were cut in the medium using a sterile cork borer.[9]

The extracts were screened for their antibacterial activity by cup plate method against Gram positive bacteria *Staphylococcus aureus* NCIM 5021, *Bacillus subtilis* NCIM 2010, *Staphylococcus epidermidis* NCIM 2493 and Gram negative bacteria *Escherichia coli* NCIM 2911 and *Pseudomonas aeruginosa* NCIM 5029 using dimethyl sulphoxide and distilled water (Table 1). Ciprofloxacin 20 μg/30 μL was used as the standard. The standard drug solution (30 μL) was introduced into one of the well using a micropipette and dimethyl sulphoxide (DMSO) was added in another well, which served as a control. In the remaining 7 wells, saturated solutions of the extracts were introduced. The test plates were then refrigerated for one hour to facilitate uniform diffusion of the drug. The plates were then incubated at 37°C for 18-24 h and the zone of inhibition were measured [10].

Table 1: Antibacterial activity of leaf extracts of *Wrightia arborea*

Treatment	Zone of inhibition (mm)				
	Gram positive strains (NCIM)			Gram negative	
	Staphylococcu aureus	***Staphylococcus epidermdiis***	***Bacillus subtilis***	***Escherichia coli***	***Pseudomonas aeruginosa***
AAq	-	15.66 ± 0.33	-	-	-
A70E	12.33 ± 0.88	-	13.66 ± 1.2	13.0 ± 1.1	13.0 ± 1.0
AM	21.66 ± 0.88	-	13.33 ± 0.88	20.0 ± 1.0	14.66 ± 0.88
APES	-	-	-	-	-
AEAS	-	-	8.66 ±0.33	-	-
ACS	-	-	10 ± 0.57	11.0 ± 1.1	-
AD	-	-	10.66 ± 0.33	-	-
Standard Ciprofloxacin	32.66 ± 0.66	34 ± 0.57	36.66 ± 0.66	30.3 ± 0.88	40.33 ± 0.88
Control - DMSO	-	-	--	-	-

Values are expressed as mean ± SEM of triplicate observations.

(-) denotes no activity

AAq : *Wrightia arborea* aqueous extract

A70E : *Wrightia arborea* 70% ethanol extract

AM : *Wrightia arborea* methanol extract

APES : *Wrightia arborea* petroleum ether successive extract

AEAS : *Wrightia arborea* ethyl acetate successive extract

ACS : *Wrightia arborea* chloroform successive extract

AD : *Wrightia arborea* dichloromethane successive extract

RESULTS AND DISCUSSION

The methanol extract was found to have more antibacterial activity, which showed promising activity against Gram positive and Gram negative bacteria, when compared to the other extracts but less than that of the standard drug ciprofloxacin.

The extract were active against both Gram positive and Gram negative bacteria. In the present work, the antibacterial activity of *Wrightia arborea* suggests its potential usefulness in traditional medicines for the treatment of antidiarrhoeal and relief from tooth ache, when the leaves are chewed. The related species as *Wrightia tinctoria* seeds showed antibacterial activity; the bark showed wound healing activity. Our results are also correlated with the earlier studies. The leaf extract of *Wrightia tinctoria*, when mixed with oil, is employed for psoriasis due to Gram positive bacteria. Therefore, *Wrightia tinctoria* can be used to treat wound, burn infections, dermatitis, pneumonia and food poisoning due to Gram positive bacteria and Gram negative bacteria.

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