Antibacterial Activity of Selected Medicinal Plants from Parangipettai Coastal Regions; Southeast Coast of India

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Abstract: The present study deals with the leaf extracts of 4 coastal living medicinal plants Viz., Ocimum canum, Acalypha indica, Eclipta alba and Lawsonia inermis for their antibacterial potential. The maximum antibacterial activity was observed with Acalypha indica and Lawsonia inermis against tested pathogens. Proteus mirabilis, Shigella dysenteriae and Staphylococcus aureus were found susceptible to all the extracts. Methanol and chloroform were used for the preparation of extracts, the solvents using for the preparation of extracts has a key role in the expression of activity.

Key words: Missing

INTRODUCTION

Medicinal plants constitute an effective source of both traditional and modern medicine. Herbal medicine has been shown to have genuine utility and about 80% of rural populations depend on it as their primary health care [1]. The world health organization recently compiled and inventory of more than 20,000 species of medicinal plants. Indian medicinal plants and their products are used to control diverse disease such as catarrh, bronchitis, pneumonia, ulcers and diarrhea.

In India, medicinal plants are widely used by all sections of people either directly as folk remedies or in different indigenous systems of medicine or indirectly in the pharmaceutical preparations of modern medicines. According to National Health Experts, 2000 different plants as used for medicinal preparations for both internal and external use in India alone. Among them only 200 are of animal origin and 300 of mineral origin, while 1500 drugs are extracted various plants. A survey by UNCTAD has shown that 33% of total drugs produced by the industrialized nations are plant derived microbes and 60% of natural origin [2].

In every developing country it is necessary that the documentation of medicinal plants be treated as a matter of extreme urgency plant based antimicrobials represent vast untapped source for medicines and further exploration of plant antimicrobials needs to occur. Antimicrobials of plant origin have enormous therapeutic potential [3]. Human infections particularly those involving microorganisms i.e. bacteria, fungi, viruses, that cause serious infections in tropical and subtropical countries of the world. In recent years, multiple drug resistance in human pathogenic microorganism has been developed due to indiscriminate use of commercial antimicrobial drugs commonly used in the treatment of such diseases the problem of microbial resistance is growing and the out look for the use of antimicrobial drugs in the future is still uncertain. Therefore, actions must be taken to reduce this problem for example, to control the use of antibiotic and develop research to better understand the genetic mechanisms or resistance and to continue studies to develop new drugs, either synthetic or natural [4, 5]. In general, bacteria have the genetic ability to transmit and acquire resistance to drugs, which are utilized as therapeutic agents [6].

There has been a lot of interest in the investigation of natural materials as sources of new antibacterial agents [7]. The use of plants for healing is as ancient and universal as medicine itself plant act generally to stimulated and supplement the body’s healing forces, they are the natural food for human being [8, 9].

Medicinal plants discovered by traditional societies are proving to be an important source of potentially therapeutic drugs. This approach is actually one of several methods that can be applied in selected plants for pharmacological studies. Herbal medicines, which formed the basis of health care throughout the world since the earliest days of man kind, are still widely used and have considerable importance in international trade.
Recognition of their clinical, pharmaceutical and economic value is still, growing, although it varies widely between countries. Medicinal plants is important for pharmacological research and drug development, not only when plant constituents are used directly as therapeutic agents, but also as stating materials for the syntheses of drugs or as models for pharmacologically active compounds. Until natural products have been approved as new antibacterial drugs, there is an urgent need to identify novel substances active towards highly resistant pathogens [10, 11].

Hence the present study deals with the screening of coastal plants for antibacterial activity. The pathogenic organisms were selected for the study on the basis of their clinical, pharmaceutical importance as well as for their potential drugs.

MATERIALS AND METHODS

Collection of Samples: Plant materials were collected from bank of Vellar estuary Parangipettai which is situated Lat 11º 26 N; Log 79º 46 E, in fresh condition from the Parangipettai coastal areas and identified after critical examination and the plants were washed with tape water, dried at room temperature and used for dry extract preparation.

Solvents Used: Organic solvents like methanol and chloroform were used to prepare different extracts. All the solvents used were of analytical grade.

Dry Extraction: The dried sample were ground to coarse powder and placed in soxhlet apparatus and extracted successively with methanol and ethanol for 36 to 48 hours at a temperature of 50 to 55ºc. The extracts obtained were concentrated, under reduced pressure in a rotary evaporate and stored in refrigerator.

Bacterial Strains Used for Assay: Microbial strains viz. Vibrio cholerae, Staphylococcus aureus, Shigella dysenteriae, Salmonella paratyphi, Shigella bodii, Pseudomonas aeruginosa, Proteus mirabilis, Klebsiella pneumoniae were obtained from the Department of Medical Microbiology (Raja Muthiah Medical College and Hospital), Annamalai University, Annamalai Nagar, The bacterial stock cultures were maintained on Muller Hinton Agar.

Antibacterial Assay: The agar diffusion method was followed for antibacterial susceptibility test [12]. The 6mm discs were impregnated with 20ìl of the extracts and placed in the inoculated Muller Hinton agar. The inoculated plates were incubated at 35°C for 24 -28hrs. Control was maintained with solvent alone.

RESULTS

Ocimum Canum (Sims): The chloroform and methanol extracts showed maximum activity against Shigella dysenteriae (10mm) and Klebsiella pneumoniae (9mm) respectively and the minimum activity against Klebsiella pneumoniae (3mm) and Shigella bodii (4mm) (Fig. 1).

Acalypha indica Linn: The chloroform and methanol extracts showed maximum activity against Proteus mirabilis (18mm) and Pseudomonas aeruginosa (11mm) respectively and the minimum activity against Shigella bodii (2mm) and Staphylococcus aureus (2mm) (Fig. 2).

Eclipta alba Hassk: The chloroform and methanol extracts showed maximum activity against Salmonella paratyphi (10mm) and Staphylococcus aureus (10mm) respectively and the minimum activity against Staphylococcus aureus (4mm) and Proteus mirabilis (6mm) (Fig. 3).
All the extracts of the plants showed antibacterial activity for their antibacterial potential against eight pathogens. Srinivasan et al.,[13] screened fifty medicinal plants belonging to 26 families for antibacterial activity of which 54% and 16% showed antibacterial and antibacterial and antifungal activity respectively. Shahidi Bonjar [15] reported 64 plants samples in 37 families among 195 plant samples in 76 families showed antibacterial activity against at least one pathogen among five pathogen tested.

From the results of the antibacterial studies the methanol extract had more activity on the organisms than the chloroform extracts. The result of this work indicates that the differences in the zones of inhibition of different plants extracts might be related to the susceptibility of each test organisms to the extracts tested. The factors responsible for this high susceptibility of the bacteria to the extracts are not exactly known but may be attributed to the presence of secondary plant metabolites which is soluble in solvents tested.

The variation of antibacterial activity among different crude extracts of this investigation might be due to distribution of varied antimicrobial substance. Similar observations were made by Vlachos et al., [16] and Alam et al., [17]. As for the effectiveness of the extraction methods, some studies showed that methanol extraction yielded higher antimicrobial activity than n-hexane and ethyl acetate [18]. The present study also in conformity with the earlier reports that methanol extract of the test plants showed better antimicrobial activity than the chloroform extracts. Whereas in others, chloroform was better than methanol and benzene [19].

In this study all the plants showed inhibitory effect against all the tested pathogens. Among which Lawsonia inermis showed better response than the other three plants. Chand Pasha et al., [20], observed that Lawsonia inermis showed anti salmonella activity against two salmonella strains of three tested strains. The study made by Srinivasan et al., [14] earlier reported that the endophytic fungi isolated from the leaves of A. indica elicited promising antibacterial activity against the three human pathogenic bacteria.

**DISCUSSION**

Recently, much attention has been directed toward plant extracts and biologically active compounds isolated from popular plant species. The use of medicinal plants plays a vital role in covering the basic health needs in developing countries and these plants may offer a new source of antibacterial, antifungal and antiviral agents with significant activity against infective microorganisms [13].

In the present investigation the chloroform and methanol extract of four medicinal plants were screened for their antibacterial potential against eight pathogens. All the extracts of the plants showed antibacterial activity against all the pathogens tested. Srinivasan et al., [14] screened fifty medicinal plants belonging to 26 families for their antimicrobial activity against ten bacterial and four fungal strains. Among 50 plants tested, 72% showed antimicrobial activity of which 54% and 16% showed antibacterial and antibacterial and antifungal activity respectively. Shahidi Bonjar [15] reported 64 plants samples in 37 families among 195 plant samples in 76 families showed antibacterial activity against at least one pathogen among five pathogen tested.

Lawsonia inermis Linn: The chloroform and methanol extracts showed maximum activity against Proteus mirabilis (7mm) and Staphylococcus aureus (11mm) respectively and the minimum activity against Klebsiella pneumoniae (2mm) and Proteus mirabilis (5mm) (Fig. 4).

**Lawsonia inermis**

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