Antibacterial activity of root bark extract of Actinodaphne lanata Meissner

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Received 19 October 2014; accepted 03 November 2014

Abstract
Actinodaphne lanata Meissner of family Lauraceae endemic to Nilgiris Biosphere Reserve and critically endangered. The present investigation deals with the antibacterial potentials of the methanol, petroleum ether, ethyl acetate and aqueous extracts from powdered root bark of Actinodaphne lanata were tested against the test organisms viz., bacterial strains (Streptococcus pyogenes, Staphylococcus aureus, Bacillus subtilis, Klebsiella pneumonia, E.coli and Pseudomonas aeruginosa) by disc diffusion method. The methanolic extract of A.lanata had maximum zone inhibition against Bacillus subtilis. Aqueous extract of the plant at different concentration showed less inhibition on the tested organisms. The result of this study supports the use of plant as therapeutic agents for the treat several diseased caused by the pathogenic bacterial populations.

Key words: Antibacterial activity, Actinodaphne lanata, Disc diffusion method.

INTRODUCTION
Medicinal plants are important role in protecting against dreadful and dangerous microbial species. These plants are being used in various traditional systems due to have better immune potential and activity against numerous diseases, as compared to synthetic drugs. The medicinal activity may be slow with the plant extracts, but has permanent cure against various diseases[1].Due to the indiscriminate use of antimicrobial drugs the microorganisms have developed resistance to many antibiotics. This has created immense clinical problem in the treatment of infectious diseases. There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action for new and re-emerging infectious diseases [2]. Medicinal plants are finding their way into pharmaceuticals, neutralceuticals, cosmetics and food supplements.

The genus Actinodaphne belongs to the family Lauraceae with about 100 species occurs mainly in tropical-subtropical Asia and is an important component of tropical forests. Actinodaphne lanata Meissner of family Lauraceae is tall tree, evergreen (or) rarely deciduous between 1500 and 1800 m. Endemic to Nilgiris Biosphere Reserve and critically endangered [3]. Many plants have been used because of their antimicrobial tarts, which are due to compounds synthesized in the secondary metabolism of the plants. These products are known by their active substances, for example, essential oil from Stem bark of Cinnamomum tamala and Cinnamomum zeylanicum was evaluated for the antimicrobial activity against several microorganisms [4]. The objective of this work was to evaluate antibacterial effects of different solvent extract of the root of A.lanata against six pathogenic bacteria.

MATERIALS AND METHODS

Plant materials
The roots of Actinodaphne lanata were collected from Tropical Gene pool Garden, Gudalur, Western Ghats of Nilgirs district, Southern India. Plant materials were cleaned with demonized water and dried in room temperature under shade.

Extraction procedure
The roots were shaded dried and powdered. 50g of fine powder was packed with what man No.1 filter paper and placed is soxhlet apparatus along with solvent petroleum ether and followed by methanol. The residues were collected and dried at room temperature 30ºC after which yield was weighed and then performed to activity. Bacterial pathogens

Antimicrobial activity of crude extract was tested against bacterial pathogens belong three gram-positive bacteria such as Staphylococcus aureus, Streptococcus pyogenes and Bacillus subtilis and three gram-negative bacteria such as Escherichia coli, Klebsiella pneumonia and Pseudomonas aeruginosa were obtained from PSG medical college, Coimbatore, Tamilnadu, India. They were grown in nutrient broth medium and incubated at 37ºC for 48 h.
followed by frequent sub culturing (at every 48 h) on to the refresh medium.

**Antibacterial activity**

The agar diffusion method was used to evaluate the antibacterial effect of the root extracts [5], Inoculum of each of the microbial strain was suspended in 2 ml of respective broth solution and incubated overnight at 37°C. To screen for antibacterial activity, sterile agar plates were used according to the disc diffusion assay. The contents of media (15 ml) were poured into a sterile clean and dry petri plates. Then allowed the media to settle down. A bent glass (L-rod) was used for spreading diluted culture on the plates. The antibacterial activity was applied by using Nutrient agar medium. Discs were made by No.1 filter paper (6 mm) and the disc was dipped with 1mg/ml sample test solution and ampicillin was the standard reference antibiotics. After impregnated disc were placed on the microorganism inoculated medium and then plates were incubated in the upright position at 37 °C for 24h. The plates were periodically checked for microorganism growth after the incubation period and the consequential zones of growth inhibition were accurately measured and expressed in millimetres. Assays were run in triplicates and mean values were tabulated.

**RESULTS AND DISSCSSION**

**Antibacterial activities of different extract of A. Lanata root bark.**

Antibacterial activities were tested using different extracts of A.lanata root bark. The higher zone of inhibition was noted against Bacillus subtilis (21.7±1.51) followed by Staphylococcus aureus (17.9±1.42), E.coli (17.6±0.90), Streptococcus pyogenes (16.4±1.02), Pseudomonas aeruginosa (16.1±1.17) and Klebsiella pneumonia (14.4±1.10) when methanol extract was used. Moderate zone of inhibition was noted Bacillus subtilis (19.1±1.27) and Klebsiella pneumonia (16.3±0.64) when petroleum ether extract was used, (Table 1). The lowest zone was recorded in Bacillus subtilis (3±1.01) when aqueous extract was used. All extract showed antibacterial activity but not the same level.

The methanol extract of the leaves of Lawsonia inermis showed significant antibacterial activity, comparable to Ciprofloxacin against the Gram-negative microorganisms with special reference to E.coli, Vibrio cholerae and Shigellas pecies[6]. Root extracts of A. lanata in petroleum ether, ethyl acetate, methanol and aqueous were effective against Gram negative and Gram positive bacteria tested. Earlier studied the extracts of Cyperus rotundus for antibacterial activity against Escherichia coli, Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa and Proteus vulgaris by disc diffusion method and reported the significant antibacterial activity by the acetone and methanol extracts [7]. With this finding, our result is in great coincidence.

**CONCLUSION**

The present study highlights that the A.lanata can also be strongly recommended as a potential bioactive compounds with antibacterial property.

**REFERENCES**


| Table 1. Antibacterial activities of petroleum ether, ethylacetate, methonal and aqueous of root bark extract of A. lanata. |
|----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Bacterial pathogens             | Ampicillin      | Petroleum ether | Ethyl acetate   | Methanol        | Aqueous         |
| Streptococcus pyogenes          | 19.8±1.17       | 11.5±1.39       | 10.4±1.26       | 16.4±1.02       | 4±1.04          |
| Staphylococcus aureus           | 20.1±0.78       | 13.7±0.70       | 9.8±1.52        | 17.9±1.42       | 3.0±1.04        |
| Bacillus subtilis               | 29.5±0.86       | 19.1±1.27       | 14.7±1.05       | 21.7±1.51       | 3±0.10          |
| Klebsiella pneumonia            | 18.8±1.32       | 16.3±0.64       | 11.1±0.82       | 14.4±1.10       | 4±1.15          |
| E.coli                          | 18.6±0.97       | 14.1±1.25       | 11.0±0.60       | 17.6±0.90       | 3.9±1.42        |
| Pseudomonas aeruginosa          | 19.3±1.04       | 13.1±1.71       | 10.0±1.34       | 16.1±1.17       | 3.4±0.80        |

Values are mean ±SD(n=3)


Source of support: Nil; Conflict of interest: None declared