



Antibacterial activity of *Centella asiatica*. Linn on some human pathogens

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Abstract

Centella asiatica (L) is also known as Indian penny work. It is a small creeping herbaceous plant belongs to the family Apiaceae. It has been referred in the traditional Indian ayurvedic and siddha medicine. It has many medicinal purposes. The present investigation was carried out to study the antibacterial activity of different solvents of *Centella asiatica* against the selected pathogens such as *Bacillus subtilis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *Salmonella typhi*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* by agar well diffusion method. The organic solvents such as chloroform, ethyl acetate, acetone ethanol and aqueous were employed. The results showed the potential antibacterial effects of ethanol extract against *Salmonella typhi* in *centella asiatica*. The other extracts of this plant were also found to be effective antibacterial agents against the selected human pathogens. Further studies showed be undertaken to elucidate the exact mechanism of action by which extracts exert their antibacterial effect to identify the active ingredients which can be used in drugs development program for safe health care services.

Keywords: *Centella asiatica*, Antibacterial activity, solvents, extracts

Introduction

India has a rich heritage of knowledge on plant-based drugs both for use in preventive and curative medicines. A country like India is very much suited for development of drugs from medicinal plants. India has about 45,000 plant species and among them, several thousand have been claimed to possess medicinal properties against human diseases (Geyid *et al*, 2005) [1]. More reports are available on the use of several plant by-products which possess antimicrobial properties on several pathogenic bacteria and fungi (Kilani, 2006) [2]. Today nearly 80% of the global population turn to plant derived medicines as their first line of defence for maintaining health and combating diseases. Currently people of Asia and India are utilizing plants as part of their routine health management (Samy *et al*, 2008) [3]. Various medicinal plants have been used for years in daily life to treat diseases all over the world. They have been used as a source of medicine. The widespread use of herbal remedies and healthcare preparations such as those described in ancient texts like the Vedas and Bible has been traced to the occurrence of natural products with medicinal properties. In plants produce a diverse range of bioactive molecules making them a rich source of different types of medicines (Farombi, 2003) [4]. The medicinal values of plants lay some substance that produce a definite physiological action on the human body. The most important substances are the bioactive substances. The bioactive compounds of plants are alkaloids, flavonoids, tannins, phenolic compounds etc. In recent years secondary plant metabolites previously with unknown pharmacological activities have been extensively investigated as a source of medicinal agents (Krishnaraju *et al*, 2005) [5]. Synthetic drugs are not only expensive and inadequate for the treatment of diseases but are also often with adulterations and side effects. Therefore there is a need to search for new infection- fighting strategies to control microbial infections numerous studies have identified compounds with in herbal plants that are effective antibiotics.

Centella asiatica (L) is a small creeping herbaceous plant Belongs to the family Apiaceae. It ohas been referred in the traditional Indian ayurvedic and siddha medicine. It has many medicinal purpose. Dash *et al* (2011) [6] has been suggested antimicrobial activity of petroleum ether, ethanol, chloroform, n- hexane and water extracts of *Centella asiatica* herb by agar well diffusion assay. The tested bacterial strains were *Proteus vulgaris*, *Staphylococcus aureus*, *Bacillus subtilis* and *Escherichia coli* and fungal strains were *Aspergillus niger* and *Candida albicans* The petroleum ether, ethanol and chloroform extracts of *Centella asiatica* have higher antimicrobial activities. *Centella asiatica* was extracted with methanol, ethanol and water. The extracts were then tested for efficacy against *Aspergillus niger* and *Bacillus subtilis* by disc diffusion method. The study showed that ethanol extract of *Centella asiatica* had higher antimicrobial followed by methanol and water. In this study, (Idris & Nadzir, 2017) [8].

The objectives of the present study is to observe the potential antibacterial activity of common medicinal plant *Centella asiatica* against the human pathogens such as *Bacillus subtilis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *Salmonella typhi*, *Pseudomonas aeruginosa* and *E.coli*

Materials and Methods

Fresh *Centella asiatica* L. (vallari) were collected from different locations of Agastheswaram taluk, Kanyakumari district. The plants were identified taxonomically. *Centella asiatica* is a prostrate herb, rooting at the nodes. Human pathogenic bacteria such as *Bacillus subtilis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *Salmonella typhi*, *Pseudomonas aeruginosa* and *E. coli* were collected from Scudder Diagnostic Centre, Nagercoil. All the test bacterial species were maintained on nutrient agar media.



Fig 1: Selected plant for study

Preparation of solvent extracts

The plants were washed and the adhering dirt's were removed. And shade dried. The dried parts were stored in sealed and labelled containers for use. The stored plant powder of *Centella asiatica* (10 g) was extracted with 60 ml of respective solvents namely diethyl ether, ethyl acetate, acetone, benzene and ethanol in sterile containers. The extract was kept in refrigerator for 4 days. Therefore, the suspensions were filtered into sterile containers separately using whatman No.1 filter paper. The extracts were allowed to dry at a temperature of 40°C into powder. The powder of the extracts obtained were stored in sealed bottles and kept in a refrigerator at 4°C until further use (Akerle et al, 2008) [9].

Anti-bacterial activity assay

Antibacterial activity of aqueous and the solvent extracts (diethyl ether, ethyl acetate, acetone, ethanol and benzene) were determined by disc diffusion method on nutrient agar medium (Anonymous, 1996) [10]. Sterile whatmann filter

discs (6mm diameter) were obtained and inoculums containing bacteria were spread on the petriplates with sterile swab moistened with bacterial suspension. Then 0.1 µl each of all aqueous and solvent extracts were placed in the discs and placed on petriplates. The plates were incubated for 24h at 37°C and zone of inhibition if any around the discs were measured in mm.

Result and Discussion

The antibacterial activity of *Centella asiatica* extracts were tested against selected human bacterial pathogens. The zone of inhibition exhibition by the pathogen like *Bacillus subtilis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *Salmonella typhi*, *Pseudomonas aeruginosa* and *E.coli* were measured and tabulated. The zone of inhibition was measured in mm. Benzene, ethyl acetate, acetone, ethanol, diethyl ether and aqueous extracts were used for the investigation. Amikacin is the standard control used in this study. *Centella asiatica* plant extract exhibited antibacterial activity against the selected pathogens (Table 1).The ethanol extract of *Centella asiatica* showing maximum inhibition zone of (22mm) against *Salmonella typhi*. The next highest activity was recorded in the acetone extract against *Bacillus subtilis* (18mm). The moderate activity (11mm) was noticed in diethyl ether against the pathogens *Pseudomonas aeruginosa*, *E.Coli*, *Bacillus subtilis* and *Salmonella typhi* benzene extract against *Pseudomonas aeruginosa*. The low activity was noticed in ethyl acetate and aqueous against all the tested pathogens. The ethyl acetate extract also showed low activity against all the tested pathogens except *E.Coli*. The no activity was noticed in aqueous extract against *E.Coli*.

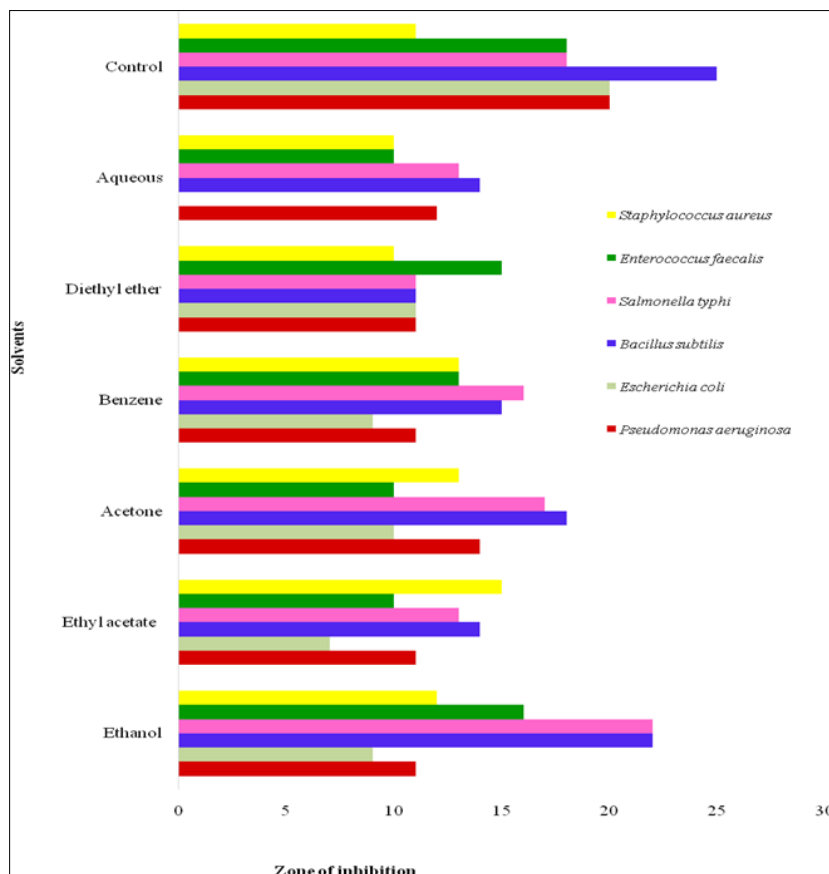


Fig 2: Different extracts of *Centella asiatica* showing antibacterial activity

The pathogens *Salmonella typhi* showed the maximum inhibition in the ethanolic extraction. This results was correlated with the results of Samy *et al* (2011) [7].

The ethanol extracts showed more activity when compared to other extracts. This study supports the previous finding of Idris and Nadzir (2007) [8].

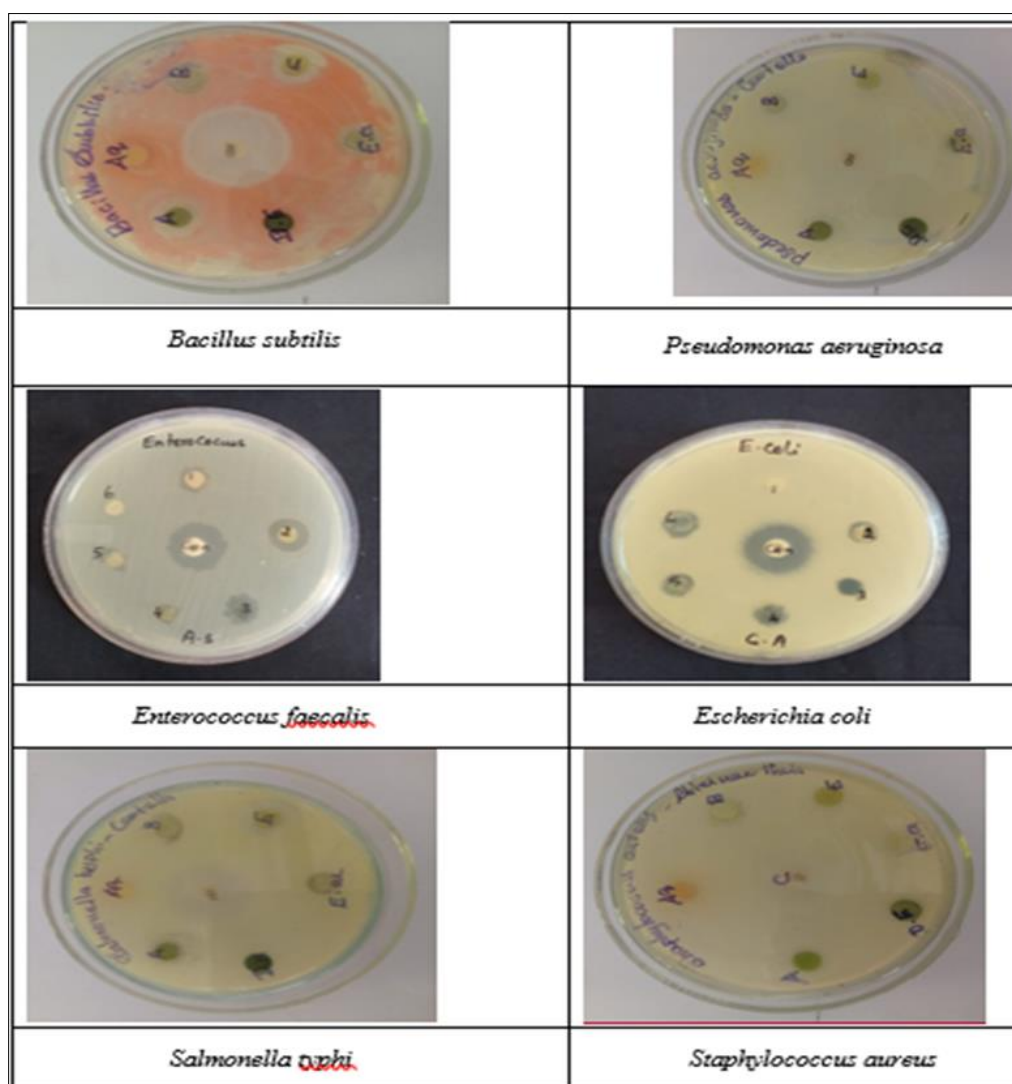


Fig 3: Different extracts of *Centella asiatica* showing inhibitory activity in the selected test organisms

Conclusion

In this study antibacterial activities of common medicinal plant *Centella asiatica* was assessed by agar well diffusion method. The results showed the potential antibacterial effects of ethanol extracts against *salmonella typhi* in *Centella asiatica*. The other extracts of this plant were also found to be effective antibacterial agents against human pathogens. Further studies showed be undertaken to elucidate the exact mechanisms of action by which extracts exert their antibacterial effect to identify the active ingredients which can be used in drug development program for safe health care services.

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