



Comparative evaluation of antibacterial, antifungal activity and phytochemical screening of leaf and bark extract of *Solanum trilobatum* L.

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ABSTRACT

Solanum trilobatum is indigenous medicinal plants most commonly occur in Asia-pacific region. Main aim of this study is to investigate presence of phytochemical such as alkaloids, phenol, glycosides, saponins, phytosterols, flavonoids, tannins, steroids, and terpenoids and antibacterial and antifungal potential of methanolic extract of both leaf and bark of *Solanum trilobatum* by using four different bacterial pathogens and two different fungal pathogens by agar-well diffusion assay. In antibacterial activity, Methanolic extract of bark showed maximum antibacterial activity for *Staphylococcus aureus* - MTCC 737 (3.7 mm of zone of inhibition). Similarly, 3.3 mm zone of inhibition against *Pseudomonas aeruginosa* - MTCC 424. In case of Leaf it shows, 1.7 mm and 2 mm of zone of inhibition respectively. In antifungal activity, leaf shows good activity when compared with methanolic extract of bark. Leaf extracts of *Solanum trilobatum* shows antifungal activity against *Aspergillus brasiliensis* – MTCC1344 (2 mm), *Aspergillus fumigatus* – MTCC 343 (2.7 mm) zone of inhibition. Thus the above studies proved that, clinical importance of bioactive compound from *Solanum trilobatum*. In future, we can go for further purification and characterization biological active compound from these kinds of medicinal plants.

Keywords: *Solanum trilobatum*, antibacterial, antifungal, phytochemicals, agar well diffusion

INTRODUCTION

Solanum trilobatum L. is belongs to the family of solanaceae. It is perennial bright leaves are triangular and irregular in shape, purplish – blue flower and red fruit, mostly available in southern India [1]. It is believed that there are totally 2, 50, 000 to 5, 00, 000 species of plants exist in the earth. Most of the developing country depends on plants. India has great knowledge on both preventive and curative medicine. Phytopharmaceuticals are reservoir of chemotherapeutics to many ailments such as fever, cold, psychic problem, diarrhea, dental hygiene and birth control through the world [2], Moreover plants have steroids, alkaloids, tannins, phenolic compound, resins, flavonoids, gums and fatty acid are the secondary metabolites in the plants which are capable of producing physiological action of body [2]. The plant traditionally practical in ayurveda and siddha to treat various diseases and microbial infection. It is Natural, Safe rich mineral element compare to the synthetic drug [3].

Solanum trilobatum is used as medicine for vomiting of blood, several kind of leprosy, decreases the blood glucose level. *Solanum trilobatum* is found to be an antibacterial, antioxidant, antitumor, antifungal antimetabolic. *Solanum trilobatum*, Leaves contain rich amount of iron, carbohydrate, calcium, phosphorous, fat, minerals, protein, and crude fibre [4]. Improve the immune system, production of cytokines [5]. The WHO (World Health Organization) estimates that approximately 80% of the world inhabitants on traditional medicine of the primary health care.

Solanum trilobatum is a medicinal plant and traditionally medicine because the plant derivate having antipyretic effect [6]. The plants are contact with different microorganism like viruses, bacteria and fungi [7] and This plant posses important antimicrobial agent [7,8].

Solanum trilobatum contains steroids fruits and leaves used for steroidal drug production, The Juice of the leaves that cure dullness of hearing and asthma, the leaves that used to treat all kind of lung and respiratory disease, Flower improves the mental ability, dried and powdered fruits used to cure gastric problem, constipation and pneumatism, The traditional plant has been used for curing various ailments [9].

EXPERIMENTAL SECTION

Plant sample collection and identification

Plant samples were collected from tucicorin, Tamil Nadu, India. The plant sample was identified to be *Solanum trilobatum* by Botanical Survey of India, TNAU, Coimbatore, Tamil Nadu [ID No. BSI/SRC/5/23/2013-14/Tech/1688]. The leaf and bark of plant samples were washed thoroughly with running water to remove the dirt from these samples. These samples were blotted dry with tissue papers. The collected and cleaned leaf and bark of plant sample was shade dried for 3 – 4 days till samples were free of moisture. The dried samples were powdered using clean mechanical blender to obtain fine sized leaf and bark powder sample.

Test organisms

Bacterial cultures such as *Bacillus subtilis* – MTCC 121, *Klebsiella pneumoniae* – MTCC 109, *Pseudomonas auruginosa* – MTCC 424 and *Staphylococcus aureus* – MTCC 737 and two fungal isolates *Aspergillus brasiliensis* – MTCC1344, *Aspergillus fumigatus* – MTCC 343 were collected from Microbial Type Culture Collection (MTCC), Institute of Microbial Technology (IMTECH), Chandigarh. These bacterial and fungal pathogens were preserved at 4°C in the recommended broth (IMTECH) as stock cultures and were sub-cultured for 24 h at 37°C prior to use.

Preparation of extracts

About 10 g of powdered samples was extracted with 100 mL of methanol in a soxhlet for 20 cycles. Extracts were then concentrated using flash evaporator. Each sample was made to the concentration of 100 µg/mL using DMSO [10].

Phytochemical analysis

The phytochemicals like phenol, saponins, flavonoids, tannins, steroids, and terepenoids and Cardiac glycosides present in the methanolic extracts of both leaf and bark of *Solanum trilobatum* were estimated [11-12].

ANTIMICROBIAL ACTIVITY

Preparation of inoculums

A loop full of each bacterial and fungal pathogens was suspended in 500 µl of sterilized broth respectively taken in eppendorfs and was used as test organisms for evaluating the antimicrobial potential of leaf and bark extracts of *Solanum trilobatum*.

Antibacterial and antifungal activity testing by Agar-Diffusion method

Antibacterial and antifungal activity of the extracts was performed with 5 different bacterial pathogens and 2 fungal pathogens. Mueller Hinton and yeast potato dextrose agar was prepared, sterilized, poured over the plates and allowed to solidify. Both bacterial and fungal isolates were sub-cultured in the nutrient and yeast potato broth and were streaked over the plates. In solidified plates, well created and were poured with 20 µL of the extracts of concentration 100 µg/mL in DMSO. 20 µL of Streptomycin and Nystatin (20 µg/mL in DMSO) was used as a positive control and 20 µL of DMSO was used as a negative control and plates were incubated at ambient temperatures.

RESULTS AND DISCUSSION

Phytochemical extraction and analysis

The results of phytochemical analysis of *S. trilobatum* leaf and bark extracts revealed the presence of Phenols, tannins, saponin, flavonoids, steroids, and trepenoid, etc (Table 1).

Table 1. Phytochemical screening of leaf and bark extract of *Solanum trilobatum*

Phytochemical constituent	Leaf - Methanolic extract	Bark - Methanolic extract
Phenols	+	+
Tannins	+	+
Saponin	+	-
Flavonoids	+	+
Steroids	+	-
Terpenoids	+	+
Cardiac glycosides	-	-
Anthroquinones	-	-
Phlobatannins	-	-

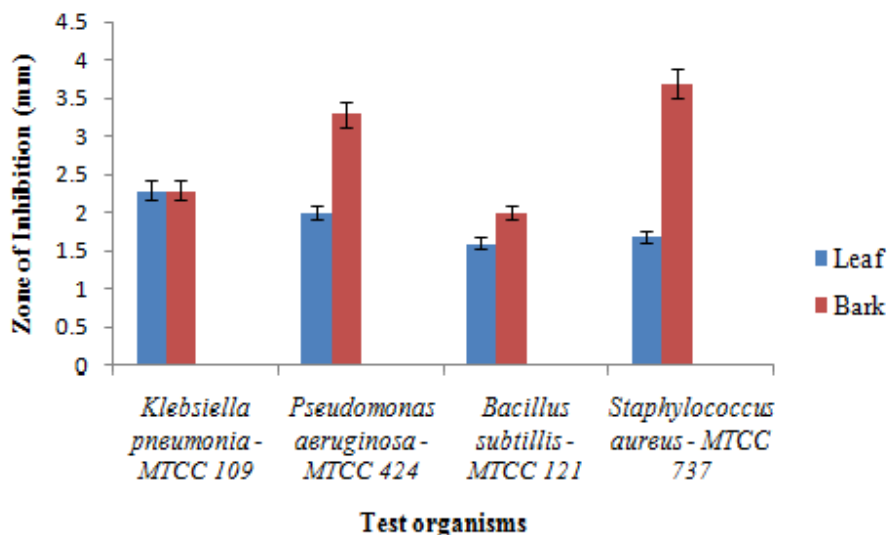
+ Indicates the presence of the phytochemical constituents

- Indicates the absence of the phytochemical constituents

ANTIMICROBIAL ACTIVITY

Antibacterial activity

The methanol extract of both leaf and bark extract of *Solanum trilobatum* shows good antibacterial activity against all four bacterial pathogens (Figure 1). In these studies, Methanolic extract of bark shows maximum zone of inhibition against *Staphylococcus aureus* MTCC- 737 (3.7 mm) and Methanolic extract of leaf shows 1.7 mm of Zone of inhibition against *Bacillus subtilis* MTCC- 121. Overall, Methanolic extract of barks shows very good antibacterial activity against all four bacterial pathogens when compared with leaf. Similarly, various solvent extract of *S. trilobatum* leaf shows good antibacterial activity against 3 gram positive and 5 gram negative bacterial pathogens [4]. Previous reports showed that, four different species of Methanol extract of *Solanum* shows significant antibacterial activity [13]. This plants showed significant antimicrobial activity against some bacterial pathogens such as *E.coli*, *Klebsiella pneumoniae*, and *Proteus mirabilis* [14].

Figure 1: Antibacterial activity of methanolic extract of leaf and bark of *Solanum trilobatum*

Antifungal activity

In these antifungal studies, both leaf and bark extract shows good antifungal activity against *Aspergillus brasiliensis* – MTCC1344, *Aspergillus fumigatus* – MTCC 343 (Figure 2). When comparing antifungal of activity of bark, leaf

shows *Aspergillus brasiliensis* – MTCC1344 (2 mm), *Aspergillus fumigatus* – MTCC 343(2.3 mm) zone of inhibition. In case of Bark shows, 1.7 mm against *Aspergillus brasiliensis* – MTCC1344, and 2 mm against *Aspergillus fumigatus* – MTCC 343. Previous studies reported that, Ethanolic extract of leaf shows antifungal activity against *Aspergillus niger*, *Fusarium sp*, and *Aspergillus flavus* [6].

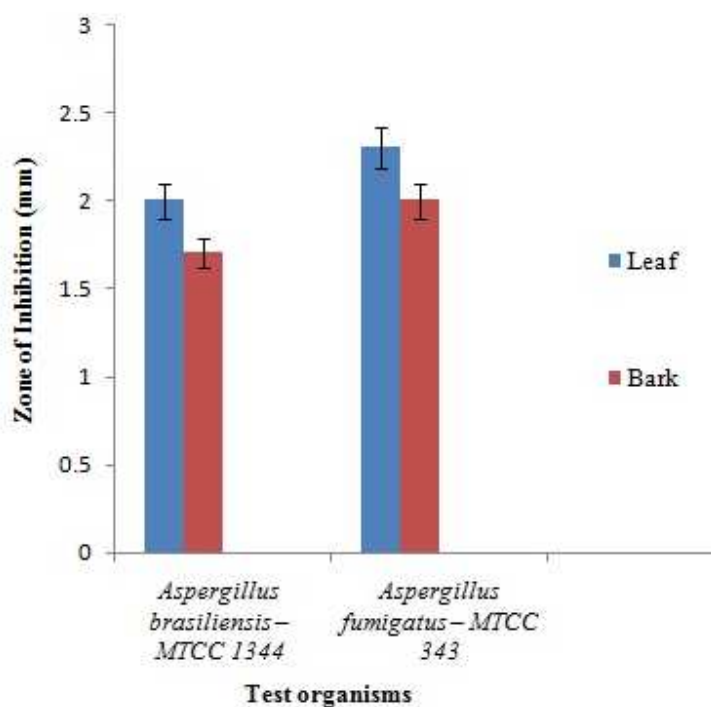


Figure 2: Antifungal activity of methanolic extract of leaf and bark of *Solanum trilobatum*

CONCLUSION

From these studies, methanol extract of leaf and bark of *Solanum trilobatum* shows presence of various photochemical and it possess good antibacterial activity and some extent antifungal activity against some human pathogens. Thus, the present study concluded that both leaf and bark extract of *Solanum trilobatum* shows presence of Phenols, Tannins, saponin, flavonoids, Terpenoids and Steroids. In antibacterial activity, Bark shows very good antibacterial activity against all four bacterial pathogens when compared with leaf. Similarly, leaf extract of *Solanum trilobatum* showed good antifungal activity when compared with bark extract of *Solanum trilobatum*. Further studies are in progress to isolation and purification of antimicrobial substance from *Solanum trilobatum*.

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