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Antibacterial Screening Of Folklore Medicinal Plant *Elephantopus Scaber* Linn Using Different Solvents

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ABSTRACT

Medicinal plants are gifts of nature to cure limitless diseases among human beings. It has been well known since ancient time that plant species have antibacterial activity. *Elephantopus scaber* is a tropical species of flowering plant in the sunflower family Asteraceae. It is native to tropical Africa, Eastern Asia, Indian Subcontinent, Southeast Asia, and Northern Australia. In folk medicinal practices, various parts of the plant and even the whole plant of *E. scaber* have been used in many countries for the treatment of a number of diseases. The Antibacterial activity was investigated by Disc diffusion method. The antibacterial activity of *Elephantopus scaber* Linn by using petroleum ether, ethanol and aqueous extract were examined against the bacteria *Staphylococcus aureus*, *Klebsiella pneumoniae*, *E.coli*, *Proteus vulgaris* and *Entero bacter*. The *Elephantopus scaber* showed effective zone of inhibition against the five bacterial pathogens. Therefore the *Elephantopus scaber* can be considered to be the promising source of antibacterial compounds.

INTRODUCTION

The genus *Elephantopus* was established in Asteraceae family by Linnaeus in 1753. It is a genus of about 32 species centered in the Central America and Northern South America to Southern Brazil, Europe, Asia, Australia and Africa (Kurokawa and Nakanishi, 1970; Kiritikar and Basu, 1991; Taylor *et al.,* 1995; Hui and But, 1998; Singh *et al.,* 2005; Than *et al.,* 2005; Wright *et al*., 2007). Among the 32 species, only one species, namely, *Elephantopus scaber*, is known to grow in India (Geetha *et al.*, 2012).

Elephantopus scaber Linn is a common wild weed that forms undergrowth in shady places. It is a rather coarse, rigid, erect, hairy herb. Stems are forked and stiff, while leaves are mostly in basal rosette and oblong-ovate to oblong-lance and often very much notched on the margins. It contain purple flowers and each flower head comprises about 4 flowers. Flowering heads are borne in clusters at the end of the branches and are usually enclosed by 3 leaf-like bracts which are ovate to oblong-ovate and heart-shaped at the base. The fruits are achenes, ribbed and pappus with rigid ristles. The plant has been abundantly found throughout India, for example Western Ghats, and widely distributed in the forest of

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Achanakmar, Chhattisgarh State. It is popularly known as prickly leaved elephant foot or elephant's foot (Kiritikar and Basu,1991).

Elephantopus scaber has been widely used in traditional medicine for various diseases in many countries of the world. Decoction of whole plant is most commonly used in countries such as India, China, Vietnam, Hong Kong, Philippines, Thailand, Madagascar, Nepal and Brazil as an anti-inflammatory, antipyretic, diuretic, anticough agent, antibiotics, emollient and tonic (Kiritikar and Basu, 1991; Poli *et al*., 1992; Rasoanaivo *et al.,* 1992; Hammer and Johns, 1993; Hui and But, 1998; Chuakul *et al*., 2006; Inta *et al.,* 2008; Udayan *et al.,* 2008).

MATERIALS AND METHODS

The *Elephantopus scaber* plant was collected from Pechipparai, Kanniyakumari district, Tamil Nadu, India. Dried under shade condition. It is cut into small pieces, pulverized in a grinder and store in sterile container for further use.

Test Organisms:

The test microorganisms used for antibacterial analysis *Staphylococcus aureus* (MTCC 6571), *E.coli* (MTCC 15223), *Klebsiella pneumoniae* (MTCC 33495), *Proteus vulgaris* (MTCC 426) and *Entero bacter* (MTCC 9125) were collected from Microbial Type Culture Collection and Gene Bank (MTCC) Chandigarh. The bacterial strains were maintained on Nutrient Agar (NA).

Solvents Extraction

About 10 gm. of powdered plant material was soaked separately in 100 ml of petroleum ether, ethanol, and aqueous for 3 to 4 days at room temperature in dark condition. The extracts were filtered by using Whatman No.1filter paper. The filtrate was concentrated to dryness under reduced pressure at 40°C using a rotary evaporator and stored at 4°C for further use. Each extracts was re-suspended in the respective solvents and used for the antibacterial activity.

Nutrient Broth Preparation:

Pure culture from the plates were inoculated into Nutrient Agar plate and sub cultured at 37ºC for 24 hours. Inoculum was prepared by aseptically adding the fresh culture into 2 ml of sterile 0.145 mol/L saline tube and the cell density was adjusted to 0.5 McFarland turbidity standard to yield a bacterial suspension of 1.5×108 cfu/ml. Standardized inoculum was used for antibacterial test.

Antibacterial Test:

Antibacterial activity was carried out by using Disc diffusion method (Bauer *et al*., 1996). The medium was prepared by dissolving 38 g of Mueller-Hinton Agar Medium (Hi

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Media) in 1000 ml of distilled water. The dissolved medium was autoclaved at 15 Lbs pressure at 121 ^{0} C for 15 minutes (pH 7.3).

The autoclaved medium was cooled, mixed well and poured into Petri plates (25ml/plate). The plates were swabbed with pathogenic bacterial culture *Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus, Proteus vulgaris* and *Entero bacter*. The Sample loaded disc was then placed on the surface of Mueller-Hinton Agar medium. The standard drug streptomycin 30 mcg concentration disc was used for positive control and empty sterile disc was used for negative control. The plates were kept for incubation at 37°C for 24hours. At the end of incubation, inhibition zones were examined around the disc and measured with transparent ruler in millimetres. The size of the zone of inhibition (including disc) was measured in millimetres. The absence of zone inhibition was interpreted as the absence of activity (Kohner *et al.,* 1994; Mathabe *et al.*, 2006). The experiment was repeated triplicates.

RESULTS AND DISCUSSION

The antibacterial activity of *Elephantopus scaber* using Petroleum ether, Ethanol, and Aqueous extract against bacterial pathogens *Staphylococcus aureus, E.coli, Klebsiella pneumoniae, Proteus vulgaris* and *Entero bacter* were studied.

The results obtained from antibacterial activity of *Elephantopus scaber* were presented in Table-I, Plate-I and Figure-I.

Table – I Antibacterial activity of *Elephantopus scaber* by using different solvents

S.No	Zone of inhibition (mm)				
	Pathogens	**Aqueous**	**Ethanol**	**Petroleum ether**	**Control (amikacin)**
1	*Klebsiella pneumonia*	12.33±0.26	22.66±0.55	13.33±0.33	17±3.74
2	*Staphylococcus aureus*	12.66±10.31	16.33±0.45	16.66±0.28	22±0.51
3	*Escherichia coli*	-	15.66±0.13	14.66±0.26	18±0.38
4	*Proteus vulgaris*	17.33±0.31	19.66±0.16	15.66±0.26	24±0.37
5	*Entero bacter*	15.33 ±0.12	17.33±0.62	12.66±0.21	24.33±0.66

***Each value is a mean of three data *NZ- No zone *mm- millimeter**

***Each value is after minising the standard disc value 5mm**

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Figure – I Antibacterial activity of *Elephantopus scaber* by using different solvents

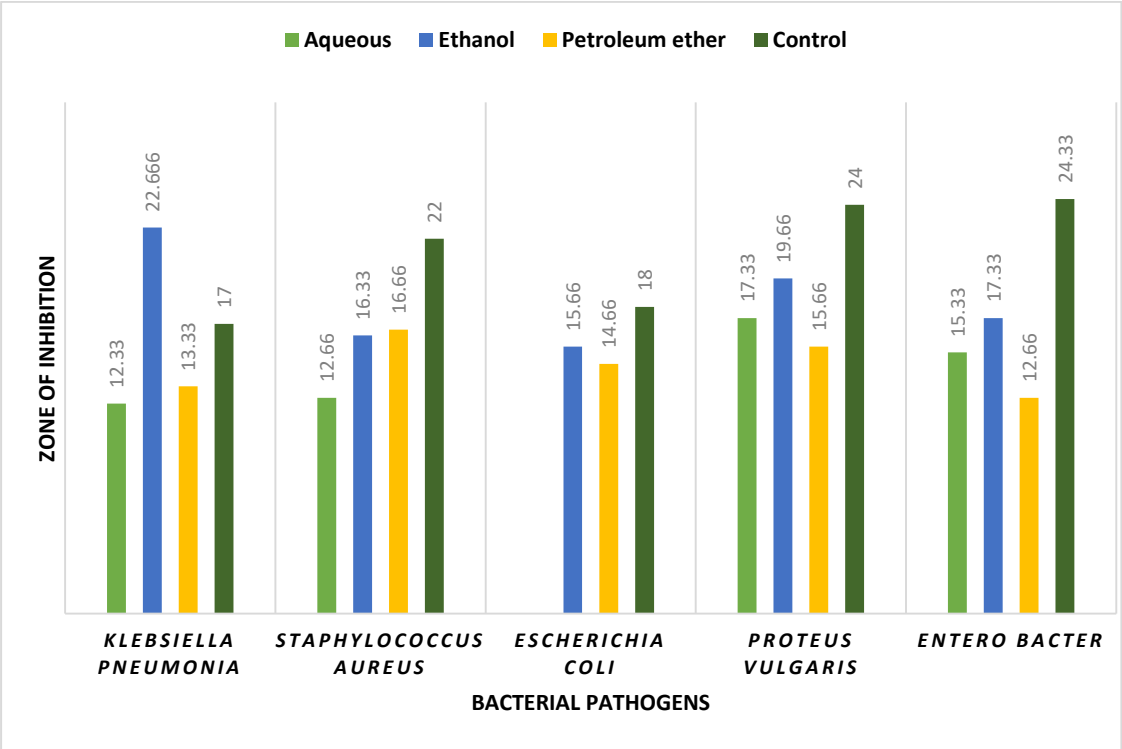
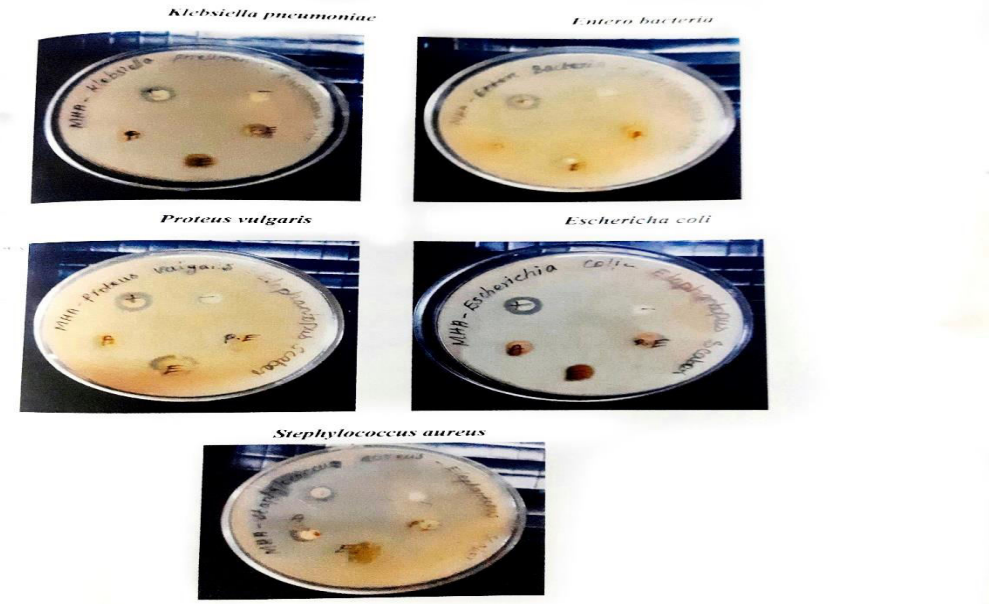


Plate – I Antibacterial activity of *Elephantopus scaber* by using different solvents



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The ethanol extract showed the maximum zone of inhibition in *Klebsiella pneumoniae* (22.66 ± 0.55) followed by *Proteus vulgaris* (19.66 ± 0.16 mm), *Entero bacter* (17.33 ± 0.62), *Staphylococcus aureus* (16.33 ± 0.45) and minimum zone of inhibition (15.66 ± 0.13) in the pathogen *E.coli*. In aqueous extract highest activity in *Proteus vulgaris* (17.33 ± 0.31), followed by *Entero bacter* (15.33± 0.12), *Staphylococcus aureus* (12.66 ± 10.31) and lowest activity in *Klebsiella pneumoniae* (12.33 ± 0.26). In aqueous extract there is no zone of inhibition against the pathogen *E.coli*. In Petroleum ether extract the maximum zone of inhibition (16.66 ± 0.28) was observed against the pathogen *Staphylococcus aureus* followed by *Proteus vulgaris* (15.66 ± 0.26), *E.coli* (14.66 ± 0.26), *Klebsiella pneumoniae* (13.33 ± 0.34) and minimum zone of inhibition (12.66 ± 0.21) in the pathogen *Entero bacter.*

DISCUSSION

Many infection disease have been known to be treated with herbal remedies throughout the history of mankind. Natural products either as pure compounds or as standardized plant extract, provide unlimited opportunities for new drug leads because of the unmatched availability of chemical diversity. (Bandow *et al*., 2003).

Jenny *et al*., (2012) reported that petroleum ether extracts of the *Elephantopus scaber* were investigated for its antibacterial potential against *Staphylococcus aureus, Klebsiella pneumonia and Escherichia coli. Staphylococcus aureus* showed maximum zone of inhibition.

Avani and Neeta (2005) reported promising antibacterial activity against the pathogens such as *E.coli and Staphylococcus aureus* at this juncture, antibacterial activity was confirmed against *Staphylococcus aureus* and absence of activity against *E.coli*. The present study correlated with Avani and Neeta (2005).

CONCLUSION

Medicinal plants are important to human beings in maintaining health. There are growing interests in the pharmacological evaluation of medicinal plants used in Indian traditional system of medicine. This study also highlights the selected medicinal plant *Elephantopus scaber* would be a highly potential and promising source of bio active compounds which will helpful in the pharmaceutical industry. Thus further research needs to be carried out for effective utilization and conservation of the plant.

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