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## Research Article

### ANTIBACTERIAL ACTIVITY OF SPINY CORIANDER (ERYNGIUM FOETIDUM LINN.) ON GRAM POSITIVE AND GRAM NEGATIVE BACTERIA

**\*Sayeri Dutta<sup>1</sup>, Abhishek Bhattacharjee<sup>1</sup>, Monika Yadav<sup>3</sup>, Priyadarshani Shougrakpam<sup>1</sup>, Rikrak G Monin<sup>1</sup>, Ananya Das<sup>1</sup> and Meena Devi N<sup>1</sup>**

<sup>1</sup>Department of Pharmacology, Regional Institute of Medical Sciences, Imphal, Manipur

<sup>2</sup>Department of Microbiology, Regional Institute of Medical Sciences, Imphal, Manipur

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Eryngium foetidum, spiny coriander, antibacterial activity, methanol extract, aqueous extract, disk diffusion

#### ABSTRACT

The objective of the study was to evaluate antibacterial activity of aqueous and methanol extract of *Eryngium foetidum* against *E. coli*, *Staph aureus* and *Ps. aeruginosa*. Phytochemical screening was done followed by antibacterial activity by disc diffusion method. Three different concentrations of the plant extracts were taken and for comparison ciprofloxacin, ceftriaxone, ampicillin and amikacin were taken as standards. The zone of inhibition was measured for their antibacterial activity. The methanol extract of *Eryngium foetidum* showed mild to moderate antibacterial activity against *Staph. aureus* whereas there was no antibacterial activity shown by aqueous extract. Phytochemical screening of the plant revealed the presence of tannins, saponins and triterpenoids. The results of this study concludes that methanol extract of *Eryngium foetidum* possess antibacterial activity against gram positive bacteria and further studies are required to confirm the phytoconstituents responsible for its antibacterial activity.

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#### INTRODUCTION

Plant-derived medicines have been part of traditional healthcare in most parts of the world for thousands of years and there is increasing interest in plants as sources of agents to fight microbial diseases (Chariandy *et al*, 1999). Bacterial and fungal pathogens have evolved numerous defence mechanisms against antimicrobial agents, and resistance to old and newly produced drugs is on the rise. Given the alarming incidence of antibiotic resistance in bacteria of medical importance there is a constant need for new and effective therapeutic agents (Monroe and Polk, 2000; Bhavnani S and Ballow C, 2000).

The increasing failure of chemotherapeutics and antibiotic resistance exhibited by pathogenic microbial infectious agents has led to the screening of several medicinal plants for their potential antimicrobial activity (Colombo and Bosisio, 1996; Scazzocchio *et al*, 2001).

There are several reports in the literature regarding the antimicrobial activity of crude extracts prepared from plants (El-Seedi *et al*, 2002; Rojas *et al*, 2003; Duraipandiyani *et al*, 2006; Parekh and Chanda, 2007). *Eryngium foetidum* L. is a biennial herb which is used extensively as a medicinal plant in

most tropical regions. It is of increasing importance as a spice plant cultivated in India, Vietnam, Australia and elsewhere. Chemical evaluation of the leaves of *Eryngium foetidum* indicated the presence of many polyphenolic compounds such as flavonoids, tannins, saponins and several triterpenoids. A significant constituent of the essential oil of the plant is E-2-dodecenal ("eryngial"), with isomers of trimethylbenzaldehyde being present in lesser proportions. It possess a wide range of ethno medicinal uses including treatment for burns, earache, fever, hypertension, constipation, fits, asthma, stomach ache, worms, infertility complications, snake bites, diarrhoea and malaria. These findings suggest the need for further research of this herb and its products (Paul *et al*, 2011).

#### MATERIALS AND METHODS

##### Plant collection

*Eryngium foetidum* leaves were collected from Lamphel area in the month of November 2015. The plant was identified and authenticated by Prof. P. Kumar Singh, Dept. Of Life Sciences, Manipur University. Authentication no. 000213.

\*Corresponding author: Sayeri Dutta

Department of Pharmacology, Regional Institute of Medical Sciences, Imphal, Manipur

**Plant extraction**

**Aqueous extract**

The leaves were cleaned and air dried under shade, powdered by a mixture grinder and 50 grams of the powder was obtained and stored in airtight container.

The aqueous extract of *Eryngium foetidum* Linn. (AEEF) was prepared by the method described by Verma SCL and Agarwal SL (1962). 50 grams of the powder was extracted with distilled water using soxhlet apparatus. The extracts obtained was evaporated, scraped out and stored in airtight container for future use. The yield was 14%

**Methanol extract**

The powdered plant material (50 g) was packed into a soxhlet apparatus and extracted up to 4 h with petroleum ether (60-80°C) for defatting. It was then extracted with methanol for further 4 h. The extract was filtered, and the solvent was then removed and air dried and stored in a freezer until use as described by Dhiman A et al (2011).

**Phytochemical screening**

The freshly prepared extracts were subjected to standard phytochemical analyses to test for the presence of the phytoconstituents like tannins, saponins, terpenoids etc.

**Organisms**

ATCC strains of *Staphylococcus aureus* 25923, *E.coli* 25922, *Pseudomonas aeruginosa* 27853 and some clinical isolates were prepared in lawn culture of the particular organisms.

**Determination of antimicrobial activity**

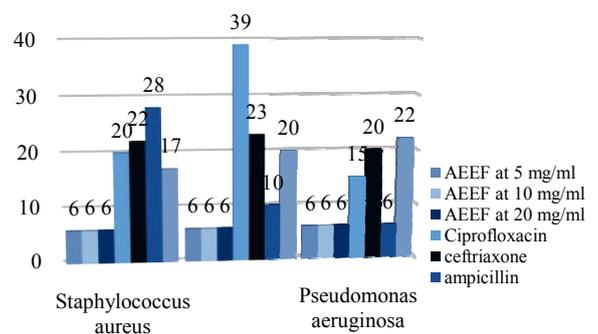
Antimicrobial activity of the aqueous and organic extracts of the plant sample was evaluated by the disc diffusion method (Bauer et al, 1966). For determination of antibacterial activity, bacterial cultures were adjusted to 0.5 McFarland turbidity standard and inoculated onto nutrient agar plates. Sterile filter paper discs (diameter 6mm) impregnated with extract at concentration 50µl, 100µl and 200µl were placed on the agar plates. Standard discs of antibiotics of Ampicillin, Ciprofloxacin, Ceftriaxone and Amikacin were used for comparison. The plates were then placed in an incubator and left overnight for incubation. After overnight incubation the zone of inhibition (ZOI) were measured and grading was done.

**RESULT**

According to the phytochemical analysis of aqueous and methanol extracts of *Eryngium foetidum* (AEEF and MEEF) revealed the presence of active phytoconstituents like tannins, flavonoid, protein, amino acids, reducing and non-reducing sugars, saponins and steroid. AEEF also showed the presence of alkaloids, triterpenoids and terpenoids. The antibacterial activity was measured as the diameter of zone of inhibition (ZOI) including the disc diameter. The antibacterial activity of aqueous and methanol extracts of *Eryngium foetidum*, as performed by disc diffusion method was measured against ATCC strains of three organisms *Staphylococcus aureus* 25923, *Escherichia coli* 25922 and *Pseudomonas aeruginosa* 27853.

The ZOI of standard antibiotic discs and disc of aqueous extract of *Eryngium foetidum* (AEEF at 50 µg/disc, 100 µg/disc and 200 µg/disc) are shown in Table 1 and Figure 1. Disc of AEEF did not show any antibacterial activity against *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*.

The ZOI of standard antibiotic discs and disc of methanol extract of *Eryngium foetidum* (MEEF at 50 µg/disc, 100 µg/disc and 200 µg/disc) are shown in Table 2 and Figure 2. Disc of MEEF did not show any antibacterial activity against *Escherichia coli* and *Pseudomonas aeruginosa*. However, MEEF disc at 50ug/disc and 100 µg/disc showed slight and at 200 µg/disc showed moderate antibacterial activity against ATCC strain of *Staphylococcus aureus*. Figure 3 (a-c)



**Figure 1** Histogram showing antibacterial activity of aqueous extract of *Eryngium foetidum* using disc diffusion method

**Table 1** Antibacterial activity of aqueous extract of *Eryngium foetidum* using disc diffusion method

ATCC Strains	Discs of AEEF			Standard discs			
	50µg/disc	100µg/disc	200µg/disc	ciprofloxacin	ceftriaxone	ampicillin	amikacin
<i>Escherichia coli</i>	6mm	6mm	6mm	39mm	23mm	10mm	20mm
<i>Staphylococcus aureus</i>	6mm	6mm	6mm	20mm	22mm	28mm	17mm
<i>Pseudomonas aeruginosa</i>	6mm	6mm	6mm	15mm	20mm	6mm	22mm

**Table 2** Antibacterial activity of methanol extract of *Eryngium foetidum* using disc diffusion method

ATCC Strains	Discs of MEEF			Standard discs			
	50µg/disc	100µg/disc	200µg/disc	ciprofloxacin	ceftriaxone	ampicillin	amikacin
<i>Escherichia coli</i>	6mm	6mm	6mm	39mm	23mm	10mm	20mm
<i>Staphylococcus aureus</i>	8mm	10mm	12mm	20mm	22mm	28mm	17mm
<i>Pseudomonas aeruginosa</i>	6mm	6mm	6mm	15mm	20mm	6mm	22mm

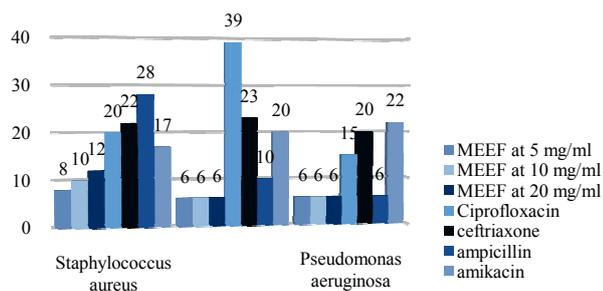


Figure 2 Histogram showing antibacterial activity of methanol extract of *Eryngium foetidum* using disc diffusion method.



Figure 3a ZOI against *E. coli*



Figure 3b ZOI against *Staph. aureus*



Figure 3c ZOI against *Ps. aeruginosa*

## DISCUSSION

Aqueous and methanol extracts of *Eryngium foetidum* were tested for anti bacterial property against 3 organisms of ATCC strains, them being *E. coli*, *Staph. auerus*, *Ps. aerugenosa*. For this purpose the extracts were tested for 3 different concentrations along with standards.

Aqueous extract showed no antibacterial activity where as methanol extract showed mild to moderate antibacterial activity. Different solvents have been reported to have the capacity to extract different phytoconstituents depending on their solubility or polarity in the solvent. Methanol extracts in this study might have had higher solubility for more

phytoconstituents, consequently the highest antibacterial activity (Setty *et al*, 2007).

The antibacterial activity exerted by methanol extract of *Eryngium foetidum* was only seen in one of the microorganism that is *Staph. aureus* where as *E. coli* and *Ps. aeruginosa* showed no activity.

All the three concentration of the methanol extract viz. 50µg, 100µg and 200µg showed antibacterial activity against *Staph. aureus* 8mm, 10mm, 12mm respectively. *Staph. aureus* is a gram positive organism where as *E. coli* and *Ps. aeruginosa* are gram negative organism, this result shows MEEF might have antibacterial activity against only gram positive and not gram negative.

## CONCLUSION

From this study it was concluded that Methanol extract of *Eryngium foetidum* possess antibacterial activity whereas aqueous extract failed to show any antibacterial activity. However, further studies are required which can explain the main phytoconstituent responsible for its antibacterial activity.

## References

- Chariandy, C.M., Seaforth, C.E., Phelps, R.H., Pollard, G.V. and Khambay, B.P.S., 1999. Screening of medicinal plants from Trinidad and Tobago for antimicrobial and insecticidal properties. *Journal of Ethnopharmacology*, 64(3), pp.265-270.
- Monroe, S. and Polk, R., 2000. Antimicrobial use and bacterial resistance. *Current opinion in microbiology*, 3(5), pp.496-501.
- Bhavnani, S.M. and Ballow, C.H., 2000. New agents for Gram-positive bacteria. *Current Opinion in Microbiology*, 3(5), pp.528-534.
- Colombo, M.L. and Bosisio, E., 1996. Pharmacological activities of chelidonium majusl. (papaveraceae). *Pharmacological research*, 33(2), pp.127-134.
- Scazzocchio, F., Cometa, M.F., Tomassini, L. and Palmery, M., 2001. Antibacterial activity of Hydrastis canadensis extract and its major isolated alkaloids. *Planta medica*, 67(06), pp.561-564.
- El-Seedi, H.R., Ohara, T., Sata, N. and Nishiyama, S., 2002. Antimicrobial diterpenoids from Eupatorium glutinosum (Asteraceae). *Journal of ethnopharmacology*, 81(2), pp.293-296.
- Rojas, R., Bustamante, B., Bauer, J., Fernández, I., Albán, J. and Lock, O., 2003. Antimicrobial activity of selected Peruvian medicinal plants. *Journal of ethno pharmacology*, 88(2), pp.199-204.
- Duraipandiyan, V., Ayyanar, M. and Ignacimuthu, S., 2006. Antimicrobial activity of some ethnomedicinal plants used by Paliyar tribe from Tamil Nadu, India. *BMC complementary and alternative medicine*, 6(1), p.35.
- Parekh, J. and Chanda, S., 2007. In vitro antibacterial activity of the crude methanol extract of Woodfordia fruticosa Kurz. Flower (Lythraceae). *Brazilian Journal of Microbiology*, 38(2), pp.204-207.
- Paul, J.H., Seaforth, C.E. and Tikasingh, T., 2011. *Eryngium foetidum* L.: a review. *Fitoterapia*, 82(3), pp.302-308.

VERMA, S. and Agarwal, S.L., 1962. Studies on *Leptadenia reticulata*: II. Preliminary chemical investigations. *The Indian journal of medical research*, 50, pp.439-445.

Setty, S.R., Quereshi, A.A., Swamy, A.V., Patil, T., Prakash, T., Prabhu, K. and Gouda, A.V., 2007. Hepatoprotective activity of *Calotropis procera* flowers against paracetamol-induced hepatic injury in rats. *Fitoterapia*, 78(7), pp.451-454.

Bauer, A.W., Kirby, W.M., Sherris, J.C. and Turck, M., 1966. Antibiotic susceptibility testing by a standardized single disk method. *American journal of clinical pathology*, 45(4), p.493.

Dhiman, A., Nanda, A., Ahmad, S. and Narasimhan, B., 2011. In vitro antimicrobial activity of methanolic leaf extract of *Psidium guajava* L. *Journal of Pharmacy and Bioallied Sciences*, 3(2), p.226.

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