

ANTIBACTERIAL ACTIVITY OF *Tridax procumbens* Linn

V.Bharathi¹, B.Varalakshmi¹, S.Gomathi¹, A.ShanmugaPriya¹, T.Karpagam¹
Shrimati Indira Gandhi College, Tiruchirappalli-620002
Email ID: bharathi2679@gmail.com

ABSTRACT

Tridax procumbens Linn belongs to the family Compositae. The extracts of *Tridax procumbens* have been reported to have various pharmacological effects like mosquito repellent activity, leishmanicidal, hepatoprotective effect on liver antioxidant system, immunomodulatory effect, wound healing activity and antiprotozoal effects. The methanolic and ethyl acetate extracts of *Tridax procumbens* were used for this study. The antibacterial activity of methanolic and ethyl acetate leaf extracts of *Tridax procumbens* Linn (L.) were examined against *Escherichia coli*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Bacillus cereus* and *Staphylococcus aureus*. Antibacterial activity was investigated by disc and agarwell diffusion method. The ethyl acetate extracts of the *Tridax procumbens* showed effective inhibition against the *Staphylococcus aureus* than compared to other organism. Therefore the leaves of *Tridax procumbens* can be considered to be the promising source of antimicrobial compounds.

Key words

Tridax procumbens, Methanolic and ethyl acetate extract, Antibacterial activity.

INTRODUCTION

Traditional medicinal knowledge and its use for finding active chemical structures for medicine is necessary to have co-operative efforts between modern and traditional health workers and researchers (HAMILL *et al.*, 2000, 2003). In developing countries, traditional medicine occupies a central place among rural communities but enough information is not available about the chemical composition and real biological possibilities of most of the plants traditionally in use. (TABUTI, 2003)

For centuries plants have been used for both nutritional and medicinal purposes. In conventional medicine is not cheap and a large population of the people depends on traditional medicine for their healthcare needs. Over the years, these herbal drugs have been shown to be effective (Awe and Omojasola, 2003). Many plants and their parts are used for the treatment of various diseases in different parts of the world, and are being screened for antimicrobial activities and the results obtained from these scientific studies have aided in the rationalization of medical use of these plants (Abo *et al.*, 1999;

Plants have limitless ability to synthesize aromatic substances, most of which are phenols or their oxygen substituted derivatives. Most are secondary metabolites. At least 12,000 have been isolated, a number estimated to be less than 10% of the total. These substances serve as plant defense mechanisms against predation by microbes, insects, herbivores. Some terpenoides are plant pigment, some are plant flavoring agents and some are have medicinal properties. The present study has been undertaken to establish the antibacterial activity of *Tridax procumbens*.

MATERIALS AND METHODS

The leaves of the plants were collected from Cauvery river areas of Tiruchirappalli District, shade dried, powdered and extracted using methanol and ethyl acetate using soxhlet apparatus and the antimicrobial activity of both the extracts were analyzed and compared with the standard antibiotic streptomycin.

Collection of microbes

Bacterial strains such as *Escherichia coli*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Bacillus cereus*, *Staphylococcus aureus* were used for the study and were collected from NFMC, Bharathidasan University, Tiruchirappalli. The collected microbes were maintained in Nutrient agar Broth and cultured in Nutrient Agar medium. (Hi Media (P) Ltd Mumbai)

Preparation of the medium

Nutrient agar medium was prepared by dissolving 2.8 g of nutrient agar in 100 ml of distilled water. The solution was sterilized in an autoclave at 121°C for 15 min. It was cooled and poured into sterile Petri dishes to solidify. The agar depth of the medium was measured (4 cm).

Disc Diffusion method and Agar Well Diffusion method were adopted to study the antibacterial activity of the plant extracts in triplicates and compared with the standard antibiotic streptomycin. (500 µg/disc).

RESULTS AND DISCUSSION

The antibacterial activity of *Tridax procumbens* was determined against *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Escherichia coli* and *Bacillus cereus*. All the organisms responded to both methanol and Ethyl acetate extracts by using Disc Diffusion and Agar Well Diffusion method.

DISC DIFFUSION METHOD

The result of antibacterial activity of *Tridax procumbens* by disc diffusion method with ethyl acetate extract showed in the (Table 1). The ethyl acetate extract showed significant zone of inhibition against selected bacterial species. Three bacterial strains viz *Staphylococcus aureus*, *Salmonella typhi* and *Bacillus cereus* showed greater zone of inhibition (1.5, 1.3, 1.3 cm) than other two bacterial strains viz *Klebsiella pneumoniae* and *Escherichia coli* which showed lesser inhibition zone.

In methanolic extract of *Tridax procumbens* showed no antimicrobial activity for three bacterial strains viz *Klebsiella pneumoniae*, *Salmonella typhi* and *Bacillus cereus*, where as *Staphylococcus aureus* and *Escherichia coli* showed significant zone of inhibition. (Table 1)

Table I - Antimicrobial activity of Methanolic and Ethyl acetate extracts of *Tridax procumbens* against selected bacteria by Disc diffusion method

Organism	Diameter of inhibition zone in cm		
	Ethyl acetate extract	Methanolic extract	Streptomycin
<i>Staphylococcus aureus</i>	1.5 ± 0.74	1.5 ± 0.63	2.3
<i>Klebsiella pneumoniae</i>	0.2 ± 0.54	–	2.4
<i>Salmonella typhi</i>	1.3 ± 0.48	–	2.1
<i>Escherichia coli</i>	0.1 ± 0.36	1.1 ± 0.53	2.2
<i>Bacillus cereus</i>	1.3 ± 0.48	–	2.0

AGAR WELL DIFFUSION METHOD

The result of antibacterial activity of *Tridax procumbens* by agar well diffusion method with ethyl acetate extract showed in the (Table II). The ethyl acetate extract showed significant zone of inhibition against selected bacterial species viz., *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Escherichia coli* and *Bacillus cereus* (1.8, 1.6, 1.2, 1.1, 1.7 cm).

In methanolic extract of *Tridax procumbens* showed no antimicrobial activity for *Bacillus cereus*, where as *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Salmonella typhi* and *Escherichia coli* showed significant zone of inhibition (0.8, 1.8, 1.5, 1.4cm). (Table II)

Table II - Antimicrobial activity of Ethyl acetate and methanol stem extracts of *Tridax procumbens* against bacteria by Agar well diffusion method

Organism	Diameter of inhibition zone in cm		
	Ethyl acetate extract	Methanolic extract	Streptomycin
<i>Staphylococcus aureus</i>	1.8 ± 0.71	0.8 ± 0.22	2.3
<i>Klebsiella pneumoniae</i>	1.6 ± 0.58	1.8 ± 0.69	2.0
<i>Salmonella typhi</i>	1.2 ± 0.32	1.5 ± 0.64	2.2
<i>Escherichia coli</i>	1.1 ± 0.28	1.4 ± 0.57	2.4
<i>Bacillus cereus</i>	1.7 ± 0.63	–	2.1

DISCUSSION

The activity of plant extracts against bacteria have been studied for years, but in a more intensified way during the last three decades. During this period, numerous antimicrobial screening evaluations have been published based on the traditional use of Chinese, African and Asian plant-based drugs (Suffredim et al. 2004). In the present study, the methanolic and ethyl acetate extracts of *Tridax procumbens* inhibited the growth of all selected bacterial species but their effectiveness varied. The ethyl acetate extracts were more effective than the methanolic extracts in Disc diffusion and Agar well diffusion methods adopted. Result from the present study is possibly giving insight on the reason for this age long practice.

Plants remain the most common source of antimicrobial agents (Bibitha et al. 2002; Maghrani et al. 2005). Many aromatic plants have been used traditionally in folk medicine as well as to extend the shelf life of foods, showing inhibition against bacteria, fungi and yeast (Hulin et al. 1998). Biologically active compounds from natural sources have always been a great interest for scientists working in infectious diseases (Perumal Samy and Ignacimuthu 2000).

Phytochemical constituents such as alkaloids, flavanoids, glycosides and several other aromatic compounds are secondary metabolites in plants that have alleviated the pathogenic and environmental stress (Lutterodt et al. 1999;)Plant based antimicrobials have enormous therapeutic potential as they can serve the purpose with no or lesser side effects due to an array of secondary metabolites (Lee et al.1999).

This investigation has opened up the possibility of the use of this plant in drug development for human consumption for the treatment of wound infection and various diseases.

References

- [1] Adamu, H. M., Abayeh, O. J., Agho, M. O., Abdullahi, A. L., Uba, A., Dukku, H. U. (2005). An ethanobotanical survey of Bauchi state herbal plants and their antimicrobial activity. *Journal of Ethanopharmacology* 13: 1-4.
- [2] Abo KA, Ogunleye VO, Ashidi, JS (1999). Antimicrobial Potential of *Spondias mombin*, *Croton zambesicus* and *Zygotritonia crocea*. *Phytother. Res.* 13(6): 494-497.
- [3] Awe S, Omojalasola PF (2003). Antibacterial screening of three medicinal plants used for diarrhea treatment in Ilorin, Nigeria. *Nig. J. Pure and Appl. Sci.* 1: 1375-1379.
- [4] A. Rosas Romero AJ. (2000): Bioactivity studies of extracts
- [5] from *Tridax procumbens*. *Phytomedicine*, Jun 7: 3 235-8.
- [6] Bibitha B, Jisha VK, Salitha CV, Mohan S, Valsa AK 2002. Antibacterial activity of
- [7] .Bissa, S., Songara, D. and Bohra, A. (2004). Antibacterial activity of some important standard antibiotics against human and plant pathogenic bacteria. *Journal of Current Agriculture.* 28: 75-78.
- [8] Hulin V, Mathot AG, Mafart P, Dufosse L 1998. Les proprietes anti-microbiennes des huiles essentielles et composees daromes. *Sci Aliments*, 18: 563-582.
- [9] Lee KI, Rhee SH, Park KY 1999. Anticancer activity of phytol and eicosatrienoic acid identified from perilla leaves. *Journal of Ethanopharmacology*, 28: 1107- 1112.
- [10] Lutterodt GD, Ismail A, Basheer RH, Baharudin HM 1999. Antimicrobial effects of *Psidium guajava* extracts as one mechanism of its antidiarrhoeal action. *Malaysian J Med Sci*, 6 (2):17-20
- [11] Maghrani M, Zeggwah N, Michel J, Eddouks M 2005. Antihypertensive effect of *Lepidium sativum* in spontaneously hypertensive rats. *J Ethnopharm* 102(1-2):193-197.
- [12] .Morel, A. F., Gralbnr, I. B., Porto, C. and Dalcoll, I. (2006). Study on the antimicrobial activity of *Hymatanthus sucubal*. *Fitoterapia.* 77: 50-53.

- [13] Suffredini IB, Sarder HS and Goncalves AG. 2004. Screening of antibacterial extracts from plants native to Brazilian amazon Rain Forest and Atlantic Forest. *Brazilian J. Med. Biol. Res.* 37:379-384
- [14] Srinivasan D, Perumalsamy LP, Nathan S, Sures T 2001. Antimicrobial activity of certain Indian medicinal plants used in folkloric medicine. *J Ethnopharm*, 94: 217-222.
- [15] Tabuti, j.r.s.; lye, k.a.; dhillion S.S. 2003. Traditional herbal drugs of Bulamogi, Uganda: plants, use and administration. *J. of Ethnopharmacology* 88:19-44.