Available online at www.scholarsresearchlibrary.com

Scholars Research Library

J. Nat. Prod. Plant Resour., 2013, 3 (6):34-37
(http://scholarsresearchlibrary.com/archive.html)

ISSN : 2231 – 3184
CODEN (USA): JNPPB7

Anti-bacterial potential of *Tridax procumbens* leaf extracts against some clinical pathogens

Kale M [1*] and Dhake A[2]

[1*]*Government College of Pharmacy, Osmanpura, Aurangabad, Maharashtra, India*
[2] *S.M.B.T. College of Pharmacy, Igatpuri, Nashik, Maharashtra, India*

ABSTRACT

Plants are known to provide biologically active molecules with reduced or no toxicity. Tridax procumbens plant has been used in traditional medicine to cure several ailments. Keeping this view in mind, the in-vitro antimicrobial activity of hot water and methanolic extracts of the leaves of Tridax procumbens was tested by plate diffusion method against five bacterial pathogens: Staphylococcus aureus, Escherchia coli, Klebsiella pneumonia, Proteus vulgaris and *Pseudomonas aeruginosa. Both the extracts showed antibacterial activity against the tested strains as compared to standard; except for Klebsiella pneumoniae. The methanolic extract was found to be more effective than water extract against all bacteria and exhibited a higher inhibition activity against Escherichia coli, Proteus vulgaris and Pseudomonas aeruginosa. The present screening results demonstrated that the methanol leaf extract of Tridax procumbens has potent antibacterial activity the plant may be new source for novel antibacterial active constituents.*

Key words: *Tridax procumbens*, Antibacterial activity, Plate diffusion, Pathogenic bacteria.

INTRODUCTION

During the last decade, the use of traditional medicine has expanded globally and is gaining popularity. Plants have formed the basis of sophisticated traditional medicine and have been used for thousands of years by people in India and many other countries. It has been espimated that herbal medicines serve about 80% of the world's population health need for millions of people in the rural areas of developing countries and more than 65% of the global population use traditional medicine for basic health care [1]. Amongst these, the plants with antimicrobial potential has become the need of today's research because inspite of the antibiotic era, mankind is now faced with the global problem of emerging resistance in virtually all pathogens [2]. The high cost of existing synthetic antibiotics, their side effects and toxicities justifies the need to search newer antimicrobial agents from plant origin. Although hundreds of plant species have been tested for antimicrobial properties, the vast majority have not been adequately evaluated [3].With this objective, we thought it worthwhile to explore the antimicrobial potential of the leaves of *Tridax procumbens* Linn which has been used in folklore medicine since ancient times for various medicinal purposes.

Tridax procumbens Linn (family-Asteraceae) is a green perennial plant and is available in all seasons in many parts of India [4]. It is listed as a weed and a pest plant, it has been known by several names including coat buttons in

English, Jayanti veda in Sanskrit, ghamra in Hindi, dagadi pala in Marathi, herbe caille in French and thata poodu in Tamil. It habitats in waste places, road sides and hedges throughout India [5]. It also grows wildly in tropical Africa, Asia and Australia and is available in all seasons and in most of the parts of the country [6]. Some of the reported chemical constituents present in the aerial parts of the plant are phytosterols; beta-sitosterol, stigmasterol, campesterol [7] and a characteristic triterpene; beta-amyrin.

The leaves of this plant including other aerial parts except flowering tops have been claimed to be useful in the treatment of inflammatory conditions. It is also known for several other potential therapeutic activities like antiviral, antioxidant, antibacterial, wound healing, insecticidal and activities. In the Indian traditional medicine, it has been used as anticoagulant, hair tonic, antifungal and insect repellent, in bronchial catarrh, diarrhoea, dysentery, and wound healing [8].

Since it also exhibits antiseptic activity, the present study was undertaken to assess its antimicrobial potential.

MATERIALS AND METHODS

Preparation of crude extracts

The plant material of *Tridax procumbens* were collected from the local areas of Nashik and authenticated from the Department of Botany, N.D.M.V.P Samaj's, K.T.H.M College Nashik-2, Maharashtra, India. The freshly collected leaves of the plant were dried under sunlight and coarsely powdered. The powdered leaves (30g) were extracted with methanol and distilled water separately in Soxhlet extractor for 24 hours. After this procedure, each of the extracts was filtered through Whatman No.1 filter paper. These crude samples were then subjected to antibacterial evaluation.

Bacterial strains

The bacterial strains *Staphylococcus aureus* (MTCC 29212), *Escherchia coli* (ATCC 25922), *Klebsiella pneumoniae* (ATCC 15380), *Proteus vulgaris* (MTCC 1771) and *Pseudomonas aeruginosa* (ATCC 27853) were procured from the laboratory of Department of Microbiology, N.D.M.V.P Samaj's, K.T.H.M College Nashik-2, Maharashtra, India. These strains were maintained in nutrient agar, routinely subcultured and used as pathogens for the testing of antibacterial activity.

Screening for antibacterial activity

The antibacterial activity was performed by plate diffusion method [9]. In this method, sterile 20 ml petri dishes were used and approximately 3ml sterile Mueller-Hinton agar at only 4 mm deep was poured into each plate. The pH level of the agar was maintained between 7.2 and 7.4. The wells were prepared in the plates using a sterile cork borer. These plates were then inoculated by streaking a few colonies of each pathogenic bacteria taken from previously maintained nutrient agar and were incubated at 37°C overnight to form bacterial lawn. Water and methanol extracts (20µl each) of the plant leaves were poured into the wells of the plates and incubated further at 30ºC for 24h. The diameters of the inhibition zones were measured using a scale in millimeters (mm). The experiment was repeated three times to obtain standard results and the maximum zone of inhibition (ZOI) against the pathogens was noted. The inhibition to bacterial growth shown by extracts is depicted in Table 1 as average zone of inhibition. Positive control of gentamycin (10 mg/ml) while the solvents were employed as negative control.

Statistical analysis

The method was checked for statistical significance by using analysis of variance (ANOVA). Significant differences between means were determined by Duncan's multiple range tests. *P* values < 0.01 were regarded as significant [10].

RESULTS AND DISCUSSION

Currently, much research work has been focused on the investigations of antimicrobial potential of medicinal plants [11, 12]. The antibacterial activity of Tridax procumbens leaf extracts was examined against 5 pathogens causing illness in humans [13]. The extractions were carried out using water and methanol solvents in Soxhlet extractor. The antibacterial activity of these solvent extracts showed varying magnitudes of inhibition patterns with standard positive control depending on the susceptibility of the tested microorganism. Both the extracts showed antibacterial activity against the tested strains as compared to standard; except for *Klebsiella pneumonia* where minimum zone of

inhibition was observed. The methanolic extract was found to be more effective than water extract against all bacteria. The most effective activity shown by this extract with maximum zone of inhibition ranging from 12 mm was against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The mean inhibitory zone of these solvent extracts against the five bacterial species is summarized in Table 1.

Thus, the study suggests that the plant extracts exhibit antibacterial activity against the selected microorganisms. However, to prove this scientifically, the determination of minimum inhibitory concentrations (MICs) and minimum bactericidal concentrations (MBCs) are still understudy. The findings, still suggest that the leaves of Tridax procumbens have a potential broad spectrum antibacterial activity. From the chemical point of view, *Tridax procumbens* leaves are reported to contain pentacyclic triterpenes [14], one of which has been identified to be β-amyrin [15]. Also, antimicrobial activity in the plants has been suggested to be due to pentacyclic triterpenes [16].

Table 1. Inhibitory effect of hot water and methanolic extracts of leaves of *Tridax procumbens* against various pathogenic bacteria

Zone of inhibition (mm)					
Solvent extract	*Staphylococcus aureus*	*Escherchia coli*	*Klebsiella pneumoniae*	*Proteus vulgaris*	*Pseudomonas aeruginosa*
Water	11±0.5	12±0.5	6±0.0	10±0.4	11±0.0
Methanol	13±0.4	12±0.0	8±0.5	10±0.0	13±0.0
Standard	14±0.4	13±0.0	11±0.0	14±0.0	15±0.5
Control	-	-	-	-	-

±- mean standard deviation of triplicates, concentration of extract- 20 µl /well, (-) - No zone of inhibition observed, All the values demonstrated P < 0.01, which was considered as significant for the study.

CONCLUSION

Tridax procumbens leaves have been traditionally used worldwide for its versatile therapeutic properties. In the present study, the leaf extracts of the plant have demonstrated good inhibitory activities against the tested bacteria and also comparable to the standard. Hence, *Tridax procumbens* can be an important source in finding new leads to discover future antibacterial drug candidates. In the light of our results, we can also suggest that β-amyrin found in the leaves of this plant could be responsible for its antimicrobial activity. Nevertheless, we cannot reject the fact that other reported chemical constituents in the plant leaves could show some activity against particular kinds of microorganisms.

Acknowledgments
The authors express their thanks to the authorities of NDMVP Samaj's College of Pharmacy, Nashik, Maharashtra, India for providing laboratory facilities for the research work.

REFERENCES

[1] General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine. World Health Organization, Geneva, Switzerland **2001**, 1.
[2] LR Peterson, Dalhoff A. *J Anti Chemo*, **2004**, 53: 902-905.
[3] MF Balandrin, JA Klocke, ES Wurtele, WH Bollinger. *Material Science*, **1985**, 228: 1154-1160.
[4] The Wealth of India, Council of Scientific and Industrial Research, New Delhi, **1976,** 10 (sp-w): 292.
[5] C Pai, U Kulkarni, M Borde, S Murali, P Mrudula, Y Deshmukh. *British Journal of Pharmaceutical Research*, **2011**, 1(4):164-173.
[6] PY Gaitonde, JW Airan. *Sci Culture*, **1961**, 27, 199-200.
[7] AP Gadre, SY Gabhe. *Indian J. Pharm. Sci*, **1992**, 54(5): 191-192.
[8] L Suseela, A Sarsvathy, P Brindha. *Journal of Phytological Research*, **2002**, 15(2): 141–147.
[9] CH Collins, PM Lyne, JM Grange. Microbiological Methods, 6th ed., Butterworths publications, London, **1989**, pp. 155-168.
[10] S Bolton. In Pharmaceutical Statistics: Practical and Clinical Applications, 3rd ed., Vol.80, Marcel Dekker, New York, **1997**, pp. 265-279.
[11] C Kamaraj, AA Rahuman, C Siva, M Iyappan, A Kirthi, *Asian Pacific Journal of Tropical Disease*, **2012**, S296-S301.
[12] EA Palombo, SJ Semple. *Journal of Ethnopharmacology*, **2001**, 77: 151-157.
[13] JC Setubal, LM Moreira, AC Da Silva. *Curr Opin Microbiol*, **2005**, 8: 595-600.
[14] AP Gadre, SY Gabhe. *Indian Drugs.* **1993**, 30, 288-289.

[15] DK Verma, SK Singh, G Nath, V Tripathi. *Indian Drugs*, **1997**, 34(7), 390-392.
[16] UV Mallavadhani , A Mahapatra, K Jamil, PS Reddy. *Biol Pharm Bull*, **2004**, 27(10):1576-1579.