

# Efficiency of phytobiotics of Indian medicinal plant *Tridax procumbens* L. against wound infecting bacteria

## Abstract

Many pathogenic bacteria are becoming increasingly resistant to many commonly used antibiotics including penicillins, macrolides and aminoglycosides. Hence in the present study efficacy of phytobiotics of *Tridax procumbens* (Linn) was assessed against the *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Pseudomonas aeruginosa* cultured from wound swab samples of 50 patients of diverse types of wounds. The crude extract of leaves of *Tridax procumbens* L. was used and compared with cephalosporin, amoxicillin and streptomycin as control. The results of antibacterial resistant profile of *Tridax procumbens* L. showed that there is an increase in the efficacy up to 16-24% for *E. coli*; 9-18% for *Streptococcus pyogenes* and 15-30% for *Pseudomonas aeruginosa*. The results are on par with all selected antibiotics for *Staphylococcus aureus*. Hence it is recommended that an alternative to antibiotics are the phytobiotics of *Tridax procumbens* (Linn) for the rapid healing of wounds.

**Keywords:** phytobiotics, *Tridax procumbens* L., leaf extract, wound infection bacteria

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## Introduction

Widespread antibiotic usage exerts a selective pressure that acts as a driving force in the development of antibiotic resistance. The association between increased rates of antimicrobial use and resistance has been documented for nosocomial infections as well as for resistant community acquired infections.<sup>1,2</sup> As resistance develops to “first-line” antibiotics, therapy with new, broader spectrum, more expensive antibiotics increases, but is followed by development of resistance to the new class of drugs.<sup>3</sup> An alternative to antibiotics are the phytobiotics which can be used as potential resource in the treatment of infected wounds. *Tridax procumbens* Linn (*Tridax*) is commonly known as coat buttons<sup>7</sup> in English because of the appearance of its flowers and in Tamil Vettukkaaya thalai. It has been extensively used in ayurvedic system of medicine. It is a wild herb distributed throughout India. The leaf extract possesses antiseptic, insecticidal and anti parasitic properties. It is also used to check haemorrhage from cuts, bruises and wounds. The use of plants and plant bioactive compounds dates back thousands of years to the ancient Egyptians, Chinese, Indians and Greeks.<sup>4,5</sup> Indian herbal medicines have been used for many centuries for treating various human diseases.<sup>4,6-8</sup>

Herbal medicines are well known for its fast remedy and cheap source of availability. Several Indian medicinal weeds are popular for its medicinal value in healing wounds and treating other ailments. Recent studies also impart the identification and isolation of new therapeutic compounds of medicinal importance from the higher plants for specific diseases. Natural products from higher plants may contribute to the search for new drugs by indicating new modes of pharmacological action. Hence the present study is focused to determine the pharmacological role of leaf extracts of *Tridax procumbens* against the wound infecting bacteria such as *E. coli*, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Pseudomonas aeruginosa*. Phytobiotic resistance profile was compared with cephalosporin, amoxicillin and streptomycin.

## Materials and methods

The leaves of *Tridax procumbens* (Linn) collected from various areas of Namakkal District were crushed and extract was taken in

sterilized petri dishes. Air dried crude extract powder of *Tridax* biotics was taken in different concentrations of 0.2, 0.4, 0.6, 0.8 and 1mg for the study. The antibacterial activity of the extracts was analyzed and compared with the standard antibiotics Cephalosporin, Streptomycin and Amoxicillin.

## Collection of microbes

Bacterial strains such as *Escherichia coli*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* were isolated from diverse wounds of 50 patients which were collected on cotton swabs. The isolated microbes were maintained in Nutrient agar Broth and cultured in Nutrient Agar medium.

## Preparation of medium and inoculum

Nutrient agar medium was prepared by dissolving 2.8g of nutrient agar in 100ml of distilled water. The solution was sterilized in an autoclave at 121°C for 15min. It was cooled and poured into sterile Petri dishes to solidify. Each wound infecting bacterium is inoculated on agar by streaking with the swab containing inoculums. Rotate the plate by 60° and repeat the rubbing procedure. This will ensure an even distribution of the inoculums.

## Disc diffusion method

Antibiotic discs were kept on the surface of the inoculated plates. The *Tridax* biotic disc was prepared by dipping the 6mm Whatman No1 Filter paper in the 0.2, 0.4, 0.6, 0.8 and 1mg aqua extract of *Tridax*. Phytobiotic discs were kept in the incubator for complete drying. Maximum of 5 discs were kept in the petriplate.

## Results and discussion

Results for concentrations 0.2, 0.4, 0.6, 0.8 and 1mg *Tridax* biotics and the same concentrations of standard antibiotics act on wound infecting bacteria were recorded with reference to the zone of inhibition in cm. (Table 1 & Figures 1-4). The result was found to be most effective against all tested microorganisms. Maximum inhibition concentration of phytobiotics is 0.8 to 1mg which is effective against all wound infecting bacteria (Figure 1-4). The results pertaining to the

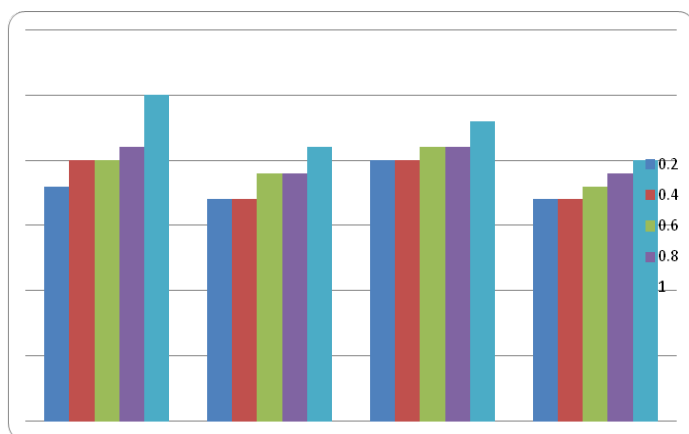
antibiotic activity of *Tridax procumbens* Linn (leaf extract) against the wound infecting pathogen *Staphylococcus aureus* is on par with the selected antibiotics. The infected wounds containing bacterial pathogens such as, *Staphylococcus aureus*, *Streptococcus pyogens*, *Pseudomonas aeruginosa* and *Escherichia coli* were treated with phytobiotics of *Tridax* showed the maximum zone of inhibition (ZOI) as follows 2.1>2.2>2.3>2.5(cm) *Escherichia coli* was controlled by the antibiotics from the range 1.9 to 2.1cm as maximum zone of inhibition, where as the concentration of 0.4mg phytobiotics of *Tridax*

showed maximum zone of inhibition up to 2.5cm. Next to *Escherichia coli*, *Pseudomonas aeruginosa* was controlled maximum by *Tridax* biotics .This was confirmed in terms of 2.3cm zone of inhibition. The maximum zone of inhibition for *Staphylococcus aureus* and *Streptococcus pyogens* was 2.1cm and 2.2cm respectively. Similar kind of experimental results of,<sup>9-11</sup> showed the efficacy of bioactive compounds of various herbal medicinal plants against infectious pathogens.

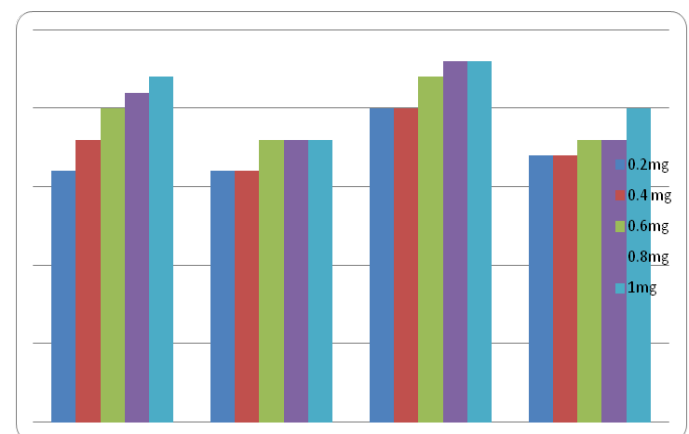
**Table 1** Effect of *Tridax procumbens* against wound infection bacteria (Diameter of inhibition zone in cm)

Antibiotics & phytobiotics	<i>E.coli</i>	<i>Staphylococcus aureus</i>	<i>Streptococcus pyogens</i>	<i>Pseudomonas aeruginosa</i>
Cephalosporin	2.1	1.9	1.8	1.8
Streptomycin	2	2.1	2.3	2
Amoxicillin	1.9	2	2	2.1
<i>Tridax</i> biotics	2.5	2.1	2.2	2.3

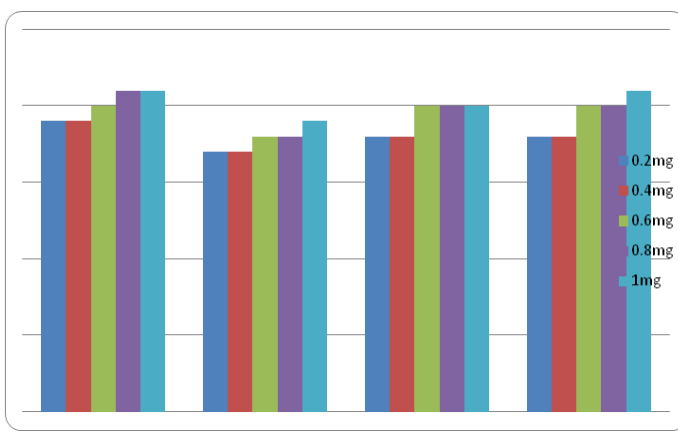
\*Results are expressed as the mean value of triplicates.



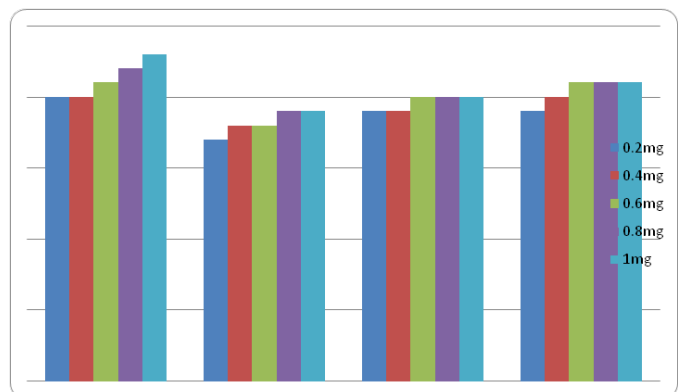
**Figure 1** Antibiotic and *Tridax* biotics resistance Profile for *E.coli* (concentration in mgVs zone of inhibition in cm).



**Figure 2** Antibiotic and *Tridax* biotic resistance Profile for *S.pyogens* (concentration in mgVs zone of inhibition in cm).



**Figure 3** Antibiotic and *Tridax* biotic resistance Profile for *S.aureus* (concentration in mg Vs zone of inhibition in cm).



**Figure 4** Antibiotic and *Tridax* biotic resistance Profile for *P.aeruginosa* (concentration in mgVs zone of inhibition in cm).

### Conclusion

The response of wound infection pathogenic bacteria for the

Tridax biotics are in the following order:

*Staphylococcus aureus* > *Streptococcus pyogenes* > *Pseudomonas aeruginosa* > *Escherichia coli*

From the present investigation of resistance profile of wound infection causing bacteria, it is suggested that usage of antibiotics could be reduced by the proper dosage of phytobiotics. Hence the Tridax biotics can be used as potential resource in the treatment of infected wounds.<sup>12,13</sup>

## Acknowledgments

None.

## Conflicts of interest

The authors declare that there is no conflict of interest.

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