EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 5
Issue: 11
461-465
Year: 2018

A REVIEW ON ANTI MICROBIAL AND WOUND HEALING ACTIVITY OF TRIDAX PROCUMBENS

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Article Received on 17/09/2018 **Article Revised on 08/10/2018** **Article Accepted on 29/10/2018**

ABSTRACT

Aim: The aims of this article to review the antimicrobial and wound healing activity of *Tridax Procumbens*. Its common names include coat buttons and Tridax daisy. Callus and suspension culture was obtained using different explants. The different solvent extracts of Tridax plant and callus was checked for antimicrobial activity against *Escherchia coli, Staphylococcus aureus, Pseudomonas aerogenosa, Aspergillus niger and Penicillium chrysogenum*. The plant was also tested for the presence of different phytochemicals. **Methodology:** The materials used to review the anti microbial and the wound healing activity of *Tidax procumbens* is from 1995 to 2018. The eleven years research articles were used to report this review. **Results:** The results lend credence to the folkloric use of this plant in treating microbial infection and showed that *Tridax procumbens* leaves and stem could be exploited for new potent antimicrobial agents. And it also shows the effective wound healing activity. Histopathological observations showed increase in granulation and rapid collagen turnover. **Conclusion:** The innumerable medicinal properties and therapeutic uses of *Tridax procumbens* as well as its phytochemical investigations and its antimicrobial activity and wound healing activity prove its importance as a valuable medicinal plant.

KEYWORDS: Tridax Procumbens, Antimicrobial Activity, Wound Healing Activity.

INTRODUCTION

Tridax procumbens, commonly known as coatbuttons[1] or tridax daisy, is a species of flowering plant in the daisy family. It is best known as a widespread weed and pest plant. It is native to the tropical Americas, but it has been introduced to tropical, subtropical, and mild temperate regions worldwide. It is listed as a noxious weed in the United States and has pest status in nine states.[2]

Its common names include coatbuttons and tridax daisy in English, *jayanthi* in Kannada, *cadillo chisaca* in Spanish, *herbe caille* in French, *jayanti veda* in Sanskrit, *ghamra* in Hindi, *bishalya karani* in Oriya, *kambarmodi* in Marathi, *gayapaaku & gaddi chemanthi* in Telugu, *vettukaaya poondu or kinatruppasan* in Tamil,[3] *kotobukigiku* in Japanese and *tīn túkkæ* in Thai.[4]

Traditionally, *Tridax procumbens* has been in use in India for wound healing and as an anticoagulant, antifungal, and insect repellent. The juice extracted from the leaves is directly applied on wounds. Its leaf extracts were used for infectious skin diseases in folk medicines. It is used in Ayurvedic medicine for liver disorders, hepatoprotection, gastritis, and heartburn.[5] *Tridax procumbens* is also used as treatment for boils, blisters, and cuts by local healers in parts of India.[6]

Effects of the whole plant extract (WPE), aqueous extract (AE), butanol fraction (BF) and petroleum ether fraction (PEF) of *Tridax procumbens* on dead space wound healing were studied in albino rats. Granuloma tissue harvested from 10 day old wounds was used for estimation of lysyl oxidase activity, tensile strength and other biochemical parameters. Lysyl oxidase activity, protein and nucleic acid contents as well as the tensile strength were all increased significantly in animals treated with WPE and AE. On the other hand, BF- and PEF-treated animals showed a decrease in all these parameters except tensile strength. In these two groups the hexosamine levels were increased ($p < 0.001$). Overall, WPE seems more active as compared to the other extracts.[7]

Tridax procumbens Linn. is a medicinal plant which is used from time immemorial for various disorders especially cuts, wounds and burns. The objective of the study presented here was to verify the traditional claims by using aqueous and ethanolic extracts of the whole plant of *Tridax procumbens* Linn. for its wound healing

property by using animal models. For both excision and incision wound model the animals were divided into four groups of control and treatment. In incision wounds, tensile strength of the wound in the drug treated animals were increased much more significantly as compared with control group animals. In excision wound model the rate of wound contraction was assessed as healing parameter at every 3rd day. On day 15th biochemical tissue markers like Hydroxyproline, Collagen and Hexosamine were determined from excised tissue and they were significantly increased in plant extract treated groups. Statistically significant reduction in the wound area was found in the treated groups compared to control untreated group ($P<0.05$). It has been studied previously that stage of wound healing involves acute inflammatory phase followed by the synthesis of collagen and other extra cellular macromolecules, which is later removed to form a scar. In the present experiment, histopathological observations showed increase in granulation and rapid collagen turnover.[8]

In-vitro antibacterial and antifungal activity of *Tridax procumbens* plant parts (leaf and stem) were investigated by agar well diffusion method. The petroleum ether, methanol and aqueous extracts of the plant parts were tested against two bacterial strains *i.e., Bacillus subtilis* and *Escherichia coli* and two fungal strains *i.e., Trichoderma reesei* and *Fusarium oxysporium*. The results of antibacterial activity showed that methanol extract was effective and aqueous extract was devoid of any significant activity. Methanol extract of *Tridax procumbens* showed maximum antifungal activity. The results lend credence to the folkloric use of this plant in treating microbial infection and showed that *Tridax procumbens* leaves and stem could be exploited for new potent antimicrobial agents.[9]

Treatment of infections continues to be problematic in modern time because of the severe side effects of some of the chemically prepared drugs and the growing resistance to antimicrobial agents. An extract of the leaves of *Tridax procumbens Linn* possesses antiseptic, antipyretic, anticoagulant, antifungal and insect repellent; in bronchial catarrh, diarrhoea and dysentery. Crude extracts of different parts of the plant were prepared from the plant *Tridax procumbens Linn* a tropically distributed medicinal plant in India. Antimicrobial activity of extracts of the plants was investigated by agar disc well-diffusion method against bacterial pathogens gram positive organisms *Bacillus cereus, Staphylococcus aureus* and gram-negative organisms: *Escherichia coli, Proteus mirabilis* and *Klebsiella pneumonia* ampicillin as standard. The plant extracts from stem and whole plant showed higher inhibitory activity against the tested human pathogens, Phytochemical screening of the plant revealed the presence of tannins, flavonoids,saponins and alkaloids. In conclusion, this study scientifically validated the use of plant in traditional medicine.[10]
Mango bacterial canker disease (MBCD) caused by Xanthomonas campestris pv. mangiferaeindicae (Xcmi) is one of the important diseases of mango affecting a number of commercial cultivars. The pathogen affects different plant parts like leaf, stem and fruit. Favorable environmental conditions cause severe loss to the crop. Leaf extract of various plants were tested against Xcmi; out of them, antibacterial activity of leaf extract of Tridax procumbens was studied against 25 strains of Xcmi collected from different parts of Marathwada region of Maharashtra. The in vitro studies have been performed by using cup-plate method to examine the activity. Fresh leaf extracts of T. procumbens plants was used for the antibacterial assay. The maximum activity was recorded against Xcmi.15 (Mean activity zone – 22.09 mm) followed by Xcmi.16 (Mean activity zone – 21.68 mm) and minimum against Xcmi.07 (Mean activity zone – 18.04 mm) strain under investigation. The ultimate aim of the research work was to develop economically and technically viable field formulations for the farmers, which will be Bio-ecologically compatible for management of plant bacterial diseases.[11]

To evaluate the aqueous as well as ethanolic extracts of *Tridax procumbens* L., (Asteraceae) against various bacterial pathogens including strains obtained from communit acquired and nosocomial infections. After authentication of the plant, extracts were prepared from the leaves of *T. procumbens* using Soxhlet apparatus. Aqueous and ethanolic extracts were tested against some standard strains as well as clinical isolates of different bacteria by agar well diffusion technique. Nosocomial strains of *Pseudomonas aeruginosa* from different clinical samples were also tested. While the aqueous extract had no antibacterial activity, the alcoholic extract showed significant antibacterial activity against *Pseudomonas aeruginosa*. The antibacterial activity of the ethanolic extract against the nosocomial strains of *Pseudomonas* was significantly more compared to that of antibiotics such as augmentin, cefotaxime, and ciprofloxacin. Narrow spectrum preparations like extracts of *Tridax* leaves may be useful for successful therapy against multidrug resistant pathogens like *Pseudomonas aeruginosa*.[12]

The aim of the present study was to investigate the phytochemistry and bioactive nature of Tridax procumbens. The ethanol, benzene and petroleum ether extracts of dried roots of this plant were investigated for phytochemistry and antibacterial analysis. The antibacterial activity was evaluated against different bacterial strains viz. Escherichia coli, Staphylococcus aureus, Salmonella typhii, Klebsiella pneumoniae and Shigella flaxineri by detecting zone of inhibition. The zone of inhibition was compared with standard discs of Gentamicin. From these extracts, two of them (ethanolic and pet-ether extracts) revealed significant results as compared to benzene extract. The qualitative analysis revealed the presence of flavonoids, pholabatannins, resins, tannins, phenols, lipids and fats and carbohydrates.[13]

The aim of the present study was to identify the bioactive compounds and to investigate the antibacterial activity from the leaves of *Tridax procumbens*. The antibacterial activity of *T. procumbens* phytochemical extracts was determined by agar disc diffusion and minimum inhibitory concentration (MIC) against *Staphylococcus aureus*, *Escherichia coli*, *Proteus mirabilis*, and *Vibrio cholerae*. The phytochemicals of the plant extract were analysed by thin layer chromatography (TLC) and antibacterial compounds were determined by TLC-bioautography. Furthermore, the structural elucidation of the antibacterial compound was confirmed by IR, Mass spectrum and NMR. Significant inhibitory activity was observed with terpenoid extract of the plant against the test bacteria while less antibacterial activity was observed in alkaloid, flavonoid and glycoside extracts. Terpenoid compound treated microbes resulted in the leakage of reducing sugars and proteins through the membrane. It also induced the activity of respiratory chain dehydrogenase. Therefore it was justified that terpenoid compound was able to destroy the permeability of bacterial membrane. We also concluded that the plants rich in terpenoids can be used as an alternative for bactericidal drugs.[14]

The antibacterial activity of the plant parts extracts (stem, root, leaf, flower and whole plant) of *Tridax procumbens* L. was studied against *Escherichia coli*, *Klebsiella pneumoniae* and *Proteus vulgaris* (Gram-negative), *Bacillus subtilis* and *Staphylococcus aureus* (Gram-positive) by the agar well diffusion method. The ethanol and methanolic extracts displayed broad spectrum activity against all the test organisms but root extracts of chloroform and Petroleum ether showed no activity against Gram-negative bacteria. The antibacterial activity of the extracts was compared to the drug Tetracycline. The minimum inhibitory concentration (MIC) of the ethanol and methanol extracts of leaf and whole plant determined by the agar dilution method ranged between 1.96-19.5 and 1.96 with that of *Staphylococcus aureus* being the least. Phytochemical screening of the plant revealed the presence of tannins, alkaloids, flavonoids and saponins. The results of this study support the traditional use of *Tridax procumbens* L. whole plant as an antibacterial agent.[15]

Tridax procumbens has an eminent identity as medicine in traditional Ayurveda practices for variety of disorders. Several pharmacological activities like anti-diabetic, anti-inflammatory, anti-cancer, hepatoprotective, bloods clotting etc. are associated with it. Phytochemical screening and antimicrobial activity of acetone and methanolic extracts of Tridax *procumbens* L. and its blood clotting activity. The phytochemical screening and antibacterial activity of the acetone and methanolic extracts of plant parts was determined by using agar well diffusion assay on both gram positive and gram negative bacteria. Extracts showed considerably good antibacterial activity against gram positive and gram negative bacteria such as *Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus cereus*, *E. coli and serettia marsescens*. The qualitative phytochemical analysis of powdered extracts show presence of Phytoconstituents as tannins, alkaloids, saponins, flavonoids, phenols steroids, anthocyanins, proteins, amino acids and carbohydrate. Aqueous extract of leaves showed the enhanced blood clotting activity in its presence. Crude extracts showed significant antimicrobial activity and aqueous leaves extract showed enhanced blood clotting activity which can be used for therapeutic purpose which is need of the hour.[16]

Tridax procumbens Linn is a tropically distributed medicinal plant. Antimicrobial activity of aqueous and methanol extracts of this plant was investigated by agar disc and well-diffusion method against bovine mastitis causing *Staphylococcus aureus* strains. The plant extracts showed inhibitory activity against the tested organisms. Phytochemical screening of the plant revealed the presence of tannins, flavonoids, saponins and alkaloids. The study scientifically validates the use of this plant in traditional and ethnoveterinary medicine.[17]

Herbs are natural remedies for the disease with higher safety profile and efficacy . India is gifted with varieties of large number of medicinal herbs because of variety of climatic conditions and seasons favorable for growth of many species of plants. Amongst the large number of herbal drugs existing in India, very few have been studied systematically so far. Tridax procumbens (L) is a highly valuable drug and is one of the essential ingredients in the most of the compound preparations included in Ayurvedic literature. It is well known for number of pharmacological activities like hepatoprotective activity, anti-inflammatory, wound healing, Antidibetic activity, hypotensive effect, immunomodulating property, bronchial catarrh, dysentery, diarrhea and to prevent falling of hair, promotes the growth of hair, and antimicrobial activity against both gram-positive and gram-negative bacteria. The leaf juice shows antiseptic, insecticidal and parasiticidal properties, against conjunctivitis and is used also to check hemorrhage from cuts, bruises and wounds insect repellent. It is also used as bioadsorbent for chromium. Here we try to make attempt for focusing on antimicrobial activity of Tridax procumbens flowers. Their antibacterial activities were evaluated in vitro against clinical bacterial isolates. In effort to identify novel bacterial agents, this study was initiated to evaluate the antimicrobial properties of Tridax procumbens flowers extract against E. coli and Staphylococcus aureus by using disc-diffusion assay. The flower plant extracts demonstrated good antimicrobial activity against these bacteria tested with inhibition zones. The minimal inhibitory concentration (MIC) values of extract against the tested bacteria were found to 67.3 mg/ml and 48.20 against E.coli and Staphylococcus aureus respectively. The methanolic extract of flowers exhibited a pronounced activity against E. coli and Staphylococcus

aureus. The minimum inhibitory concentration was found in methanolic Extracts of Tridax procumbens against test organisms.[18]

Antibacterial activity of hexane, petroleum ether, chloroform and methanol extracts obtained from the aerial parts (leaf, flower and stem) of Tridax procumbens was tested against both gram positive (Staphylococcus aureus and Bacillus subtilis) and gram negative (Enterobacter aerogenes) bacteria using the agar well diffusion method. The susceptibility of the test bacteria varies with the types of solvents and plant parts used. The flower posses potent antibacterial activity with 20 mm of zone of inhibition against E. aerogenes in hexane extract whereas the leaf showed antibacterial activity in all the solvents used. The stem exhibited moderate inhibitory effect on the test bacteria. The potentiality of the leaf against the test bacteria as evaluated by minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) indicated the presence of more active compounds in methanol than in hexane extracts. Chloroform extracts was found to be least active, whereas, petroleum ether possessed moderate effect on the test bacteria. These results may suggest the distribution of antibacterial potential in different aerial parts of T. procumbens that can be explored further for the isolation and charachterization of the compound agent in pharmaceutical industries.[19]

Tridax procumbens Linn. is renowned for its traditional use as ayurveda in folk medicine all over the world. In this study, the plant was screened to ascertain its bioactive compounds and to determine the antimicrobial activity against different pathogenic microorganisms. Methanolic extract of the leaves of *T.procumbens* L. was examined at different concentrations on both bacteria and fungi by disc diffusion method and agar well diffusion method. Both gram positive and negative bacteria including *E.coli, V. cholera, B. subtilis, B. cereus* and *S. aureus* showed sensitivity to 250 µg/ml and 500 µg/ml plant extract except *Salmonella typhi* was resistant to both concentrations. Their zone of inhibition was within 8-14mm range in diameter for both concentrations. Several fungal species including *C. albicans*, *A.niger* and *A. fumigatus* were also tested for its susceptibility to methanol extract and showed significant value within the range of 9-15mm zone of inhibition with great potency against *C. albicans.* MIC and MFC was also determined at different concentrations to evaluate the efficacy of methanol extract. The findings of current study suggested that *T. procumbens* L. can be used as a potential source of alternative drugs in present days to combat the drug resistance phenomenon of different micro organisms.[20]

Tridax procumbens Linn belongs to the family Compositae. The extracts of *Tridax procumbens* have been reported to have various pharmacological effects like mosquito repellant 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.[21]

Estimation of the antimicrobial property of *Tridax procumbens*'s leaf was carried out by the use of chloroform, petroleum ether, ethyl alcohol and hexaneas solvents. Leaf extract of *Tridax procumbens* obtained by soxhlet extractor, using the above mentioned solvents were examined against *Escherichia coli, Bacillus subtilis*, and *Pseudomonas vulgaris.* The antimicrobial activity of *Tridax procumbens* performed by using agarwell diffusion method showed a result showcasing an effective limit when as opposed to *Pseudomonas vulgaris*for ethyl alcohol being used as solvent for extract. In conclusion *Tridax procumbens* leaf extract terminates most propitious source.[22]

REFERENCES

1. Tridax procumbens. Natural Resources Conservation Service Plants Database. USDA. Retrieved 15 December 2015.
2. Tridax procumbens L. at the Encyclopedia of Life
3. Saxena, V. K.; Albert, Sosanna (2005). "B-Sitosterol-3-O-β-D-xylopyranoside from the flowers of Tridax procumbens Linn". Journal of Chemical Sciences, August 1, 2016; 117(3): 263-6.
4. ตีนตุ๊กแก" (in Thai). qsbg. Retrieved August 1, 2016
5. Wani, Minal; Pande, Snehal; More, Nitin. "Callus induction studies in Tridax procumbens (PDF). International Journal of Biotechnology Applications, 2010; 2(1): 11–4.
6. Nallella, Sreeramulu; Suthari, Sateesh; Ragan, A; Raju, Vatsavaya S. "Ethno-botanico-medicine for common human ailments in Nalgonda and Warangal districts of Telangana, Andhra Pradesh, India" Annals of Plant Sciences, 2013; 2(7): 220–9.
7. A.L. Udupa, et. al., Effect of Tridax Procumbens Extracts on Wound Healing, International Journal of Pharmacognosy, Volume 33, Issue 1, 1995
8. Yogesh P Talekar, et. al., Evaluation of wound healing potential of aqueous and ethanolic extracts of tridax procumbens linn. in wistar rats, Asian Journal of Pharmaceutical and Clinical Research, 2012; (5).
9. Ankita Jain, et. al., A study on antimicrobial potential of Tridax procumbens (l.) against clinical isolates, International Journal of Pharmaceutical Sciences and Research, 2015; 1330-1335.

10. Veena Gayathri Krishnaswamy, et. al., Antibacterial Activity of different parts of Tridax procumbens against Human Pathogens, International Journal of Current Research and Academic Review, Volume 3 Number 6 (June-2015): 211-218.
11. PAWAR B.T, Antibacterial activity of leaf extracts of Tridax procumbens against Xanthomonas campestris pv. Mangiferaeindicae, Research Journal of Chemical and Environmental Sciences, 2014; 2(6): 69-72.
12. Chitra Pai, et. al., Antibacterial Activity of Tridax procumbens with Special Reference to Nosocomial Pathogens, British Journal of Pharmaceutical Research, ISSN: 2231-2919, 1(4) (October-December).
13. Ahmad Mir S, et. al., Analysis of Phytochemistry and Antimicrobial activity of Tridax procumbens Linn, Chemical Sciences Journal, 2016
14. Sathya bama s, et. al., Antibacterial activity of different phytochemical extracts from the leaves of t. Procumbens linn.: identification and mode of action of the terpenoid compound as antibacterial, International Journal Of Pharmacy And Pharmaceutical Sciences, 2012; 4(1).
15. Aniel Kumar O, et. al., Antibacterial potential of tridax procumbens l. against human pathogens, pharma science monitor,An International Journal Of Pharmaceutical Sciences, 2(2): s-21-s-30.
16. Sowmya B. Jhample, et. al., Phytochemical screening and in vitro antimicrobial activity of Tridax procumbens, Research Journal of Life Sciences, Bioinformatics, Pharmaceu,tical and Chemical Sciences, 2015; 44-53.
17. Rangasamy Dhanabalan, et. al., Invitro phytochemical screening and antibacterial activity of aqueous and methanolic leaf extracts of Tridax procumbens against bovine mastitis isolated Staphylococcus aureus.
18. D.S. Mohale, et. al., Antimicrobial Activity of Methanolic Extract of Flowers of Tridax procumbens, Indian Journal of Pharmacy and Pharmacology, 2014; 1(1).
19. Syed Mohd. Danish Rizvi, Evaluation and distribution of antibacterial potential in the aerial parts of wild Tridax procumbens, Journal of Chemical and Pharmaceutical Research, 2011; 3(2): 80-87.
20. Shovon Lal Sarkar, et. al., In vitro evaluation of phytochemical components and antimicrobial activity of the methanolic extract of Tridax procumbens L. against pathogenic microorganisms, Journal of Pharmacognosy and Phytochemistry, 2016; 5(9): 42-46.
21. V.Bharathi, et. al., Antibacterial activity of Tridax procumbens Linn, International Journal of Pharma Sciences and Research (IJPSR), 2012; 3(4): 364-367.
22. S.Santhosh Kumar, et. al., Antimicrobial activity of Tridax procumbens leaf, International Journal of Pharma Sciences and Research (IJPSR), 03 Mar 2015; 6: 517-518.