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## INVITRO ANTIMICROBIAL ACTIVITY OF TABERNAEMONTANA DIVARTICATA FLOWER

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**Abstract:** Tabernaemontana divarticata is a medicinal shrub belongs to the family Apocynaceae. The medicinal properties of its leaves and flowers are well known to the traditional medicine. It acquires many valuable manners with the use of its different parts. Flowers can be used to treat ophthalmic problems, burning sensation and dermatopathic disorders. Leaves and flowers can possess antidiabetic, antioxidant and antibacterial properties. There is no much informations are available related to flowers antibacterial activity. The present investigation was mainly focused on the antibacterial activity of the flowers of Tabernaemontana divaricata. In the study, different flower extracts were tested against standard bacterial strains by disc diffusion method The results of the study indicated that only the methanolic extract of the flower was effective to inhibit the growth of Neisseria mucosa, Streptococcus pneumonia, Mycobacterium kansasii, Salmonella typhimurium, Staphylococcus aureus and Escherichia coli. The study concludes that the flower extract of Tabernaemontana divaricata has significant antibacterial activity against Neisseria mucosa and Streptococcus pneumonia then Staphylococcus aureus Mycobacterium kansasii, Salmonella typhimurium, and Escherichia coli. Therefore, the flower extract in methanol can be taken for the purification of active principle.

**Keywords:** Tabernaemontana divaricata, Antibacterial activity, Neisseria mucosa, Streptococcus pneumonia, Staphylococcus aureus, Mycobacterium kansasii, Salmonella typhimurium



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## INTRODUCTION

Nature is a place for many plants with different medicinal properties. Humans have used plants for the safer medication of diseases from ancient years. People now changed their life style to use herbal medicine instead of synthetic medicines because of least or no side effects. Medicinal plants have been used as an alternative source of therapeutic drug with the use of its different parts. In different countries, several plants are used for herbal preparations as indigenous system of medicine. Naturally occurring antimicrobial compounds have enormous therapeutic potentials and advantages than similar such synthetic compounds. Synthetic antimicrobials are often found to have many biological side effects. However, plant based compounds are believed to have only limited side effects because of the fact that the cellular and molecular mechanism of plant and animal cells are similar in many ways. Many infectious diseases are the main reason for death of general population. These illnesses are caused by bacteria and fungi. Importantly bacteria cause severe infections in human beings and animals. *Staphylococcus aureus* causes food poisoning, local abscesses and superficial skin lesion. 95% of *S.aureus* strains are resistant to antibiotic penicillin around the world. *Escherichia coli* mainly affects gastrointestinal tract and cause diarrhoea especially in children. *Bacillus subtilis* can be responsible for food spoilages including sliminess, production of CO<sub>2</sub> in canned meats and coagulation in milk

***Tabernaemontana divaricata*** (Family: Apocynaceae) is referred as Crape Jasmine, evergreen shrub or small tree grown in tropical countries. In India, it is mainly cultivated as an ornamental plant and it grows wild in hedges and shady forests. Flowers are cooling, fragrant and milky white in colour used to cure blazing feel, ophthalmitis and dermatopathy. However, it is a medicinally important evergreen shrub having various curative properties. In the folk medicine, it holds broad range of beneficial activities like anticancer, anti-infection it has been used for hepatoprotective, anti-inflammation, analgesic effect, astringent anti-tumor effect, antioxidative effect and the effect in neuronal activity. Ash of stem is used for ophthalmic diseases, root for tooth ache and milky latex with coconut oil for headache. Flowers contain  $\alpha$ -amyrin acetate,  $\beta$ -amyrin acetate, lupeol  $\beta$ -sitosterol, stigmasterol and several other alkaloids. Root can be used for tooth ache and milky latex with coconut oil for head ache. Even though, the various medicinal properties of the flowers of *T. divaricata* are well recognized, its role in antimicrobial therapy is not yet well studied. Therefore, the present study was carried out for detecting the antimicrobial potency of the flower extracts of *Tabernaemontana divaricata* against the selected bacterial strains. The present day taxonomic description of the flowers of *T. divaricata* is based on the traditional taxonomic principles. Therefore, the flower extract in methanol can be taken for the purification of active principle.

## MATERIALS AND METHODS

### Flower material

The flowers of *Tabernaemontana divaricata* were collected from nearby places of Visakhapatnam and brought to the laboratory. Then the flowers were rinsed twice with distilled water and air dried on a clean sheet for one week at room temperature. It was made into small pieces using sharp sterile scissors and powdered using sterile mortar and pestle.

### ANTIMICROBIAL STUDIES

**Preparation of the crude extract:** The dried flowers were coarsely powdered. 50 gm powder of flowers was subjected to successive solvent extract. Ether, benzene, chloroform, ethanol, methanol and water using a Soxhlet apparatus at 65° C. After 24 hours it was filtered through 8 layers of muslin cloth and centrifuged at 5000xg for 15min. The supernatant was collected and the solvent was evaporated to make the final volume one-fourth of the original volume and it was stored at 40°C in air tight bottles for further studies.

**Test microorganisms:** Identified microbial strains were collected from MTCC (Microbial type culture centre). and gene bank Chandigarh India . The bacterial strains were, *Neisseria mucosa*, *Streptococcus pneumonia*, *Mycobacterium kansasii*, *Salmonella typhimurium*, *Escherichia coli*, and *Staphylococcus aureus*. They were cultured in nutrient broth for 24 hours and fresh inoculums were taken for the experiments.

**Culture media:** The dehydrated Muller Hinton Agar (MHA) medium purchased from Hi-media Laboratories Pvt. Ltd. Mumbai, India was used. The medium was rehydrated, sterilized in an autoclave and was poured into sterilized petri dishes and allowed to set. The plates were stored at 4-10°C in refrigerator. Before inoculation, the surface of the petriplate was dried in an incubator.

**Agar well diffusion method :**The antimicrobial assay of aqueous extracts was performed by Agar well diffusion method The bacteria studied were *Neisseria mucosa*, *Streptococcus pneumonia*, *Mycobacterium kansasii*, *Salmonella typhimurium*, *Escherichia coli*, and *Staphylococcus aureus*. For each bacterial strain, controls were included. In disc diffusion method Sterile Nutrient agar is poured into each sterile Petri dish of equal size and allows solidifying. Entire surface of the agar plates swabbed with test organism to be tested or the bacterial lawn is prepared on the plate. Individual disc of plant extract was dispensed on the plates. The plates were incubated for 24 hours at 37° C. to allow the diffusion of extracts into the medium. At the end of the incubation period, the diameter of zone of inhibition was measured in millimetres. Clear zone around the discs shows inhibitory nature of the plant extracts. The experiments were repeated three times and the mean values are presented.

**RESULTS AND DISCUSSION**

The antimicrobial activity of flower extracts of *Tabernaemontana divaricata* showed a significant level of antimicrobial activity against all the microbes studied but the concentration required for the impact varied. Among the four bacterial strains *Staphylococcus aureus* showed a significant antimicrobial activity in almost all organisms studied. The study result concluded that the flower extract of *Tabernaemontana divaricata* showed best antimicrobial property against pathogens. Methanolic extract of flowers showed more resistant capacity against *Neisseria mucosa*, *Streptococcus pneumonia*, *Mycobacterium kansasii*, *Salmonella typhimurium*, *E.coli* and *S.aureus* through inhibition zone.

Antimicrobial susceptibility test could be used to identify the effectiveness of extracts against bacterial infections caused by pathogens. The plant extracts had bactericidal at higher and bacteriostatic at lower concentrations respectively. 80% of rural people utilized herbal medicines in their life cycle as primary healthcare. In our normal life, antimicrobial substances could be used for bacterial infections at different time intervals. Because of costs and side effects of some synthetic drugs, there was a need for other products as natural medicines from plants.

**Table 1. Antibacterial activity of flower extracts of *Tabernaemontana divaricata* against standard strains**

Sl. No.	Bacterial Strains	Zone of inhibition of crude extracts in mm			
		500 mg/ml	250 mg/ml	100 mg/ml	50 mg/ml
1	<i>Neisseria mucosa</i>	9 mm	7mm	6mm	--
2	<i>Streptococcus pneumonia</i>	13mm-	7mm	--	--
3	<i>Staphylococcus aureus</i>	8mm	6mm	--	--
4	<i>Salmonella typhimurium</i>	7mm-	6mm	--	--
5	<i>Mycobacterium kansasii</i>	7mm-	6mm	--	--

## CONCLUSION

Tabernaemontana divaricata is a thoroughly studied medicinal plant and possessing an array of medicinal properties, especially in their leaves and flowers. Therefore the present study concludes that the Methanolic extract from aerial parts of flower variety of Tabernaemontana divaricata had inhibitory action against *Neisseria mucosa*, *Streptococcus pneumonia*, *Mycobacterium kansasii*, *Salmonella typhimurium*. Since it is only a preliminary investigation, isolation and detailed pharmacological studies of the active principle are recommended for developing a new antibiotic from the flower extract of Tabernaemontana divaricata.

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