

Antibacterial Activity of *Tinosporacordifolia* (Gulvel)

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Abstract: *In the present study the aqueous, methyl alcohol, ethyl alcohol and acetone extract of Gulvel, leaves extract was tested for antimicrobial property against E. coli, S. aureus and S. typhi. Extracts made using acetone displayed wide range of antimicrobial property against pathogenic bacteria than the ethyl alcohol and methyl alcohol extract, while extracts made from distilled water were shown considerably greater antimicrobial properties activity as compared ethyl alcohol and methyl alcohol extracts. Antimicrobial properties of various leaf extracts of Tinospora cordifolia, were found efficacious as an antimicrobial.*

Keywords: *Tinospora cordifolia*, leaves extracts, antibacterial activity

1. Introduction:

Plants are the most abundant source of medications in ancient medical systems, contemporary medications, health supplements, nutraceuticals, folk treatments, pharmaceutical precursors, and important chemical constituents as precursors for synthetic chemicals (Hammer et al., 1999) [7]. Entire plant and plant derivatives were being used as medicines since the unknown time. The first written evidence of the medical plants uses in Indian culture are being recorded in the "Rigveda," that is considered as the first collection of human knowledge, was written around 4500 and 1600 B. C. It is Ayurveda the science of life, the Indian culture's basis of medicinal science, which in its eight divisions deals with specific elements of medicines as well as many fields of life sciences and the art of healing and mitigating (Rastogi and Mehrotra, 2002) [17]. It is Ayurveda, the Hindu culture's basis of medicinal science, which in its eight divisions deals with specific features of pharmaceuticals as well as many areas of life sciences and the art of cure and mitigation (Rastogi and Mehrotra, 2002) [17].

The rise of diseases caused by MDR (multidrug - resistant) pathogens has been noted as world's most prevalent deaths (Reddy et al., 2009) [10], contributing around 68% of fatalities in the year 2012. (WHO, 2020) [22]. Several pathogens are resistant to synthetic drugs, that has become a significant concern for health infrastructure facilities worldwide; hence, an alternate treatment is required (Tambekar and Dahikar, 2011) [21].

Tinosporacardifolia is a massive evergreen climber shrub native to India. Guduchi, Giloy, or Amrita are the ayurvedic names for the plant. In India, the plant's extract is utilized in the treatment a variety of ailments, including diabetes mellitus and hepatitis. The plant is notable for its use in indigenous medicine system in many sections of India. Journal of Pharmacognosy and Phytochemistry has made Comprehensive phytochemical, pharmacological, and

clinical research have all been conducted on the drug., with several intriguing results reported (Nadkarni, 2005) [14].



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Lots of researchers have researched antimicrobial activity of other plant parts of Giloy, Neem, and Tulsi, which are used to treat numerous infectious illnesses in folk medicines, but unfortunately very limited research has been carried on antimicrobial activities of *Tinospora cordifolia*. To show the efficacy of ayurvedic medicines, the current study examined the antibacterial screening of *Tinosporacordifolia*, leaf against human microbial infections.

2. Materials and Methods

2.1 Collection of Sample

The sample was collected from Sangola Science college's Botanical Garden, Sangola, Maharashtra in the Summer and the authentication of the sample is done by Department of Botanical Sciences, Sangola Science college, Sangola Maharashtra.

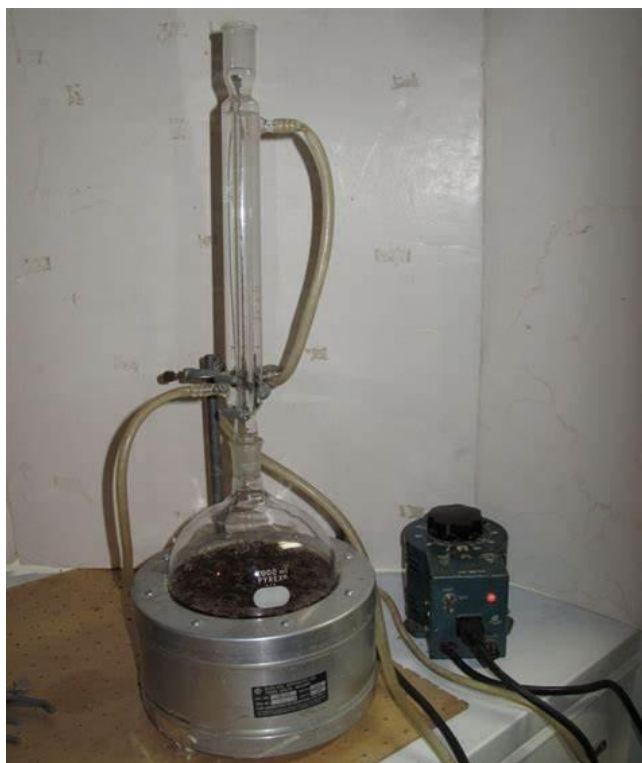
2.2 Preparation of the sample

The collected sample of leaves was dried at the room temperature. The processed samples were pulverized. Sample were extracted independently using 100gm of selected solvents like water, ethyl alcohol, methyl alcohol, and acetone, ranging from polar to nonpolar in the order of their polarity. The residues were recovered after the

extracting with the solvents from a rotary evaporator, after that obtained extracts were suspended in the appropriate solvent for investigation.

2.3 Production of extracts

In method of solvent extraction 30 grammes of dried powder from *Tinospora cordifolia*, leaves were extracted for 48 hours with water, ethanol, methanol, and acetone using a Soxhlet device. The extracts were filtered using Whatman filter paper No.1 and utilized to determine antibacterial activity.



Soxhlet Apparatus

2.4 Antibacterial assay

Table 1: Bacterial cultures used in study (Department of Microbiology, Dayanand College, Solapur, Maharashtra)

Sr No.	Bacterial Pathogens	MTCC Number
1	<i>Staphylococcus aureus</i>	ATCC 6538
2	<i>S. Typi</i> ,	ATCC 4859
3	<i>Escherichia coli</i>	ATCC 8739

2.4.1 Preparation of nutrient broth slants and sub-culturing of microorganisms

Agar 1gm, beef extract 500mg, peptone 500mg, and NaCl 250 mg were used to make nutrient agar medium and is dissolved in 50ml distilled water, boiled and then placed inside the test tubes, which was then closed with cotton plug and autoclaved at 15 pounds pressure (1210 C) for fifteen minutes. The test tubes which were containing the agar nutritional medium were placed in an inclined position for 30 minutes following sterilization. Thereafter, in an aseptic setting, pure cultures of *S. aureus* (ATCC 6538), *S. Typi*, and *E. coli* (ATCC 8739) were streaked over the surface of slants and the petri dishes were incubated at 37° C for 24 hours.

2.4.2 Production of growth medium for antibacterial sensitivity test:

20gm Agar, beef extract 10gm, peptone 10gm, and NaCl 5gm were mixed together and in 1000 ml boiling distilled water to create nutrient agar medium (pH 7.2). After that it was autoclaved in an autoclave at 15 pounds of pressure (1210 degrees Celsius) for exact 15 minutes. Following sterilization, the medium was allowed to cool to 45° C. before being placed into sterile Petri plates in a sterile manner, an amount of 20 - 25 ml of media poured into each petri plate. Medium from the petri plate was then kept aside to solidify at room temperature.

2.4.3 Inoculation of suspension of microbes on agar medium:

Sterilized, cotton plugs were dipped in to each standardized isolates (turbidity is adjusted so as to get consistent growth on the Petri plates) accompanied by whole petri plate surfaces were streaked with the swab three times exactly, the plates were rotated at 60° angle during streaking. After that the inoculums were dried for 1 - 5 mins while covering during entire process. Then bore was punched on the prepared plates by using sterile well (8mm). The 100µl dose of standard medicine Ciprofloxacin was loaded in each bore accordingly in sterile conditions using a sterile micropipette. Plates were kept at an ambient temperature for at least 30 min and then cultured at 37° C for at least 24 hours. The diameters of the zones of inhibition were calculated with scale in millimeters.

3. Results and Discussion

The medicinal herb Giloy, has been used historically for the treatment of inflammatory conditions, healing of the wounds, to prevent spread of the infection, inflammation of stomach and treatment of Diabetes mellitus. The antimicrobial actions are being attributed to several active components in the extracts. *Tinospora cordifolia* showed strong antimicrobial actions against tested microbes. However, it has shown a non-satisfactory antimicrobial action against *S. typhi* in the lower concentrations, with a MIC of around 500 µg. The whole climber has been evaluated for scientific tests exhaustively and a variety of biomolecules that belong to various families have been confirmed from plant including lignans, flavones, terpenoids, alkaloids, cardiac glycosides etc. (Bansal et al., 2012) that may be responsible for the antimicrobial property of this drug.

Table 2

Medicinal Plant under study	Solvent extract used	<i>Staphylococcus aureus</i>	<i>S. Typi</i> ,	<i>Escherichia coli</i>
<i>Tinospora cordifolia</i>	Aqueous	28	-	-
	Ethanol	25	18	22
	Methanol	26	12	21
	Acetone	27	15	22
Negative control	Aqueous	-	-	-
	Ethanol	-	-	-
	Methanol	-	-	-
	Acetone	-	-	-
Positive control	Ciprofloxacin 100µl	18	20	21



4. Conclusion

The results obtained in this study are promising. *Tinospora* has shown some promising results which can be employed in complicated diabetic wound healing where single drug often prone to resistance. As per findings obtained in this research, it advised that the historical medicinal use of *Tinospora cordifolia*, be carried on and more scientific studies to be carried out. Such more focused studies on molecular entities found in the plant may help to create more efficacious synthetic as well as semisynthetic medicines.

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