



Effectiveness of *Tinospora cordifolia* stem extract on bacteria *Salmonella typhi*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Shigella dysenteriae*

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Abstract

The antibacterial activities of *Tinospora cordifolia* (Willd) stem extract prepared with methanol (hot and cold) were evaluated on bacterial strains *Salmonella typhi*, *Staphylococcus aureus*, *Shigella dysenteriae*, *Escherichia coli* and *Pseudomonas aeruginosa*. The in vitro antibacterial activity of hot and cold methanol stem extracts was performed by cup plate agar diffusion method using ciprofloxacin in Dimethyl sulphoxide as a standard drug for the comparing antibacterial activity. Experiment done with hot methanol extract of *Tinospora cordifolia* (Willd), produce considerable antibacterial activity. Maximum antibacterial activity of hot and cold methanol extracts was exhibited against *Staphylococcus aureus* when compared with standard drug Ciprofloxacin.

Key-Words: Anti-bacterial, Stem extract, MO

Introduction

Tinospora cordifolia (Willd.) Hook. f. and Thoms. (*Guduchi*) *T. cordifolia* is a large, glabrous, perennial, deciduous, climbing shrub of weak and fleshy stem found in tropical Indian subcontinent and China, ascending to an altitude of 300 m. The stem of *T. cordifolia* is rather succulent with long filiform fleshy aerial roots from the branches. The bark is creamy white to gray, deeply left spirally the space in between being spotted with large rosette-like lenticels. The leaves are membranous and cordate. The flowers are small and yellow, the male flowers are clustered and female flowers are usually solitary. The drupes are ovoid, glossy, succulent, red and pea sized. The seeds are curved. Fruits are fleshy and single seeded. Flowers grow during summer; and fruits, during winter. The stem of varying thicknesses, ranging from 0.6 to 2 cm in diameter; young stems are green with smooth surfaces and swellings with hard bitter in taste. In Hindi, the plant is commonly known as *Giloe*, Other common synonyms are *Guduchi*, *Amrita*, *Amritavalli* etc. *T. cordifolia* is reported to possess anti-inflammatory, anti-allergic, anti-diabetic and anti-spasmodic, properties. It is generally prescribed in general debility, diabetes, fever, jaundice, skin diseases, rheumatism, urinary diseases, dyspepsia etc.

T. cordifolia has been used in Ayurvedic preparations for the treatment of various ailments throughout the centuries. It is used as a *rasayana* to improve the immune system and body resistance against infections. The root of *T. cordifolia* is known to be used traditionally for its anti-stress activity. The leaves are given for the cure of gonorrhoea and is said to smooth the smarting and scalding. It is also used externally as a cooling and soothing application in prurigo, eczema, impetigo. A decoction of the stem is used for washing sore eyes and syphilitic sores. The methanolic stem extract of *T. cordifolia* is used as an anti-bacterial and anti-fungal agent. Stem crushed with bonduc nuts in water are given for stomachache, especially in old age patients and children. The leaves are crushed with honey and applied to ulcers. The present study is based on anti-bacterial activity of *T. cordifolia*.

Material and Methods

Collection of the healthy plant material was performed in the month of August- 2011 from forests of deistic Rewa (M.P.) for the preparation of extract.

Preparation of Hot methanol extract

Mature Healthy stem of *Tinospora cordifolia* with 1.5mm diameter is dried in shed for about 30 days. These dried stem is then powdered and packed by 900 gm in soxhlet apparatus and was subjected with Methanol by continuous hot extraction for about 48hrs. The extract was filtered by Whatmann filter paper no.1

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and then concentrated on a water bath. A dark brown extract of 20.13% by weight is obtained.

Preparation of Cold methanol extract

The previously dried *Tinospora cordifolia* stem powder is taken in stopper flask and was macerated with Methanol for 24-72 hrs with continuous stirring. The extract was then filtered through Whatmann filter paper no 1 and concentrated under shed in air. The extract obtained is of 14.15% by weight.

The freshly prepared hot and cold Methanol extract of *Tinospora cordifolia* were diluted with DMSO of concentration 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50mg/ml respectively and then is subjected to antibacterial analysis.

Calculation of antibacterial activity

The Cup plate agar diffusion method was used for antibacterial sensitivity test. The experimental extract solution is prepared as 1ml of each bacterial strain was initially inoculated in 100 ml of sterile nutrient broth and incubated for $35^{\circ}\pm 1^{\circ}\text{C}$ for 24 hrs. 0.2 ml of each test Bacteria from stock is taken and inoculated in 100 ml of sterile nutrient broth and incubated for $35^{\circ}\pm 1^{\circ}\text{C}$ for 24 hrs. This broth is cooled to 48°C to 50°C in a sterile Petridish. As the nutrient agar medium solidifies, four holes of uniform diameter (6 mm) were

made using sterile gel puncture. 0.2 ml of each hot, cold methanol extracts, standard solution of concentration 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50mg/ml and vehicle control (DMSO) were placed in each hole separately. The plates were then kept in incubator at 30°C for 3 hrs. All the bacterial plates were then incubated at $35^{\circ}\pm 1^{\circ}\text{C}$ for 24 hrs and the zone of inhibition was measured in cm including the diameter of the bore (6 mm). The results were summarized in table 1.

Results and Discussion

Both Hot and cold methanol extracts of *Tinospora cordifolia* stem contain significant antibacterial activity against all test bacterial strains but hot methanol extract of *T. cordifolia* stem showed more significant activity against all tested bacterial organisms. The maximum antibacterial activity of hot and cold Methanol extract was shown against Gram-positive *Staphylococcus aureus* when compared with standard drug Ciprofloxacin. The antibacterial activity medicinal plant *Tinospora cordifolia* on the test microorganisms could be used to cure diseases caused by these organisms.

Table 1: Antibacterial activity of the methanolic stem extract of *Tinospora cordifolia*

Extract	Conc. (mg/ml)	Diameter of the zone of inhibition in (cm)			
		S. aureus (G+)	B. subtilis (G+)	S. typhi (G-)	P. aurigenosa (G-)
Hot Methanol Extract	10	2.1	2.0	1.7	2.2
	20	2.3	2.2	2.2	2.1
	30	3.0	2.8	2.1	2.1
	40	3.3	2.6	2.3	2.5
	50	3.7	3.1	2.6	2.7
Cold Methanol Extract	10	2.0	1.9	1.5	1.7
	20	2.2	2.2	1.8	1.9
	30	2.4	2.1	1.9	2.1
	40	2.5	2.3	2.1	2.5
	50	2.9	2.6	2.2	2.5
Ciprofloxacin	10	3.7	3.2	3.1	2.8
	20	4.0	3.6	3.2	3.3
	30	3.9	3.0	3.3	3.1
	40	4.1	3.2	3.5	3.4
	50	4.2	3.3	3.6	3.7

(G+) gram positive bacteria, (G-) gram negative bacteria

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