Ancient Science of Life Vol : XXIII(1) July, August, September 2003 Pages 40 - 43

ANTIBACTERIAL ACTIVITY OF STEM EXTRACTS OF *TINOSPORA CORDIFOLIA* (Willd) Hook. f & Thomson

R. Jeyachandran, T. Francis Xavier and S.P. Anand

Department of Botany, St. Joseph's College (Autonomous), Thiruchirapalli.

Received : 11-12-2002 Accepted: 10-04-2003

ABSTRACT: *The antibacterial activity of the aqueous, ethanol and chloroform extracts from the stems of Tinospora cordifolia was studied using disc diffusion method against Escherichia coil, Proteus vulgaris, Enterobacter faecalis, Salmonella typhi (Gram-negative), Staphylococcus aureus and Serratia marcesenses (Gram-positive). Results suggest that the ethanolic extract has significant antibacterial activity against tested bacteria. The present study justifies the claimed uses of Tinospora cordifolia in the traditional system of medicine to treat various infectious diseases.*

Key words: *Antibacterial activity, Tinospora cordifolia, Inhibition zones, Infection diseases.*

INTRODUCTION

Plant-derived medicines have been part of traditional health care in most parts of the world for thousands for year[1]. More than 80% of the population in developing countries depends on plants for their medical needs[2,3]. In India, medical plants are widely used by all sections of people either directly as folk remedies or in different indigenous medicinal plants and their therapeutic values[5]. However, few of these have been investigated for their antimicrobial properties; the vast majority has not yet been adequately evaluated[6,4]. One of the plants known for having many medicinal use in traditional system of medicinal *Tinospora cordifolia* (Wild) Hook. & Thomson (Menispermeaceae). It is common climbing shrub found in tropical deciduous forest of south Indian peninsular plains. In Tamil it is called as chindil. The plant has been reported to contain Tinosporin, Columbin and Tinosporin acid[7]. It is well reputed in traditional system of medicine to treat various aliments such as fevers, inflammations, skin infections and urinary infections etc[8]. Considering he uses of *Tinospora cordifolia* in traditional system of medicine, we have proposed to work on this aspect to evaluate its antibacterial activities.

MATERIALS AND METHODS

Plant material

The plant material was collected from wild population around Tiruchirappalli district and identity was confirmed in the Rabinat Herbarium, St. Joseph's College Tiruchirappalli district. From the collected plant materials stems were separed and washed, dried in shade and crushed to coarse powder.

Extraction

Powdered stem materials (1g) were extracted with 10 ml of water, ethanol and chloroform for 30 minutes in a water ultrasound bath. The extracts were then filtrates taken to dryness in front of the fan. These extracts were resuspended in water, ethanol and chloroforms to yield 100mg residue/ml solvent.

Culture media and microorganisms
Nutrient Broth and Nutrient Agar medium manufactured by Himedia laboratories, Mumbai, India were used for the cultivation of bacteria.

The test bacteria namel *Escherichia coli, Proteus vulgaris, Enterbacter faecalis, Salmonella typhi* (Gram-negative), *Staphylococus aureus* and *Serratia marcescens* (Gram-positive). The laboratory bacterial strains were collected from the Department of Microbiology, Institute of Basic Medical Science, Chennai.

Determination of zone of inhibition
The antibacterial activity of the stem extracts was tested *in vitro* using disc diffusion assay[9]. A diluted (0.2ml) bacterial culture of respective strains poured in sterile 9 cm petriplates containing 10 ml of Nutrient agar medium and spread over agar plates using sterile glass L-rod, 0.2 ml of the each extracts was applied per filter paper disc (Whatman no. 1, 6mm diameter) and was allowed to dry before being placed on to the top layer of the agar plates. The plates were incubated at 37^0C for 24 hours. The experiments were carried out in triplicate and the average diameter of zone of inhibitions was recorded. Results were expressed as mean ± standard deviation.

RESULTS AND DISCUSSION

Results of antibacterial screening of the stem extracts of *Tinospora cordifolia* were measured in terms of inhibition. The zones of inhibition in diameter (cm) recorded for ethanol, chloroform and aqueous are depicted in table – 1. It is revealed that the ethanolic extracts exhibited significant antibacterial activity against *Proteus vulgaris, Escherichia coli* and moderate activity was observed against *Enterobacter faecalis.* In the same extract less inhibition was observed against *Salmonella typhi, Staphylococus aureus* and *Serratia marcescens.* However, these stem extracts with chloroform showed moderate inhibition against *Escherichia coli, Proteus vulgaris, Enterobacter faecalis* and less inhibition was associated with *Salmonella typhi* where as in the same extract there was no activity against *Staphylococus aureus* and *Serratia marcescens.* The aqueous extract of stem having less antibacterial activity against *Proteus vulgaris, Enterobacter faecalis, Salmonella typhi, Staphylococus aureus* and *Serratia marcescens.*

From the results it dictates that the greater activity resides in ethanolic stem extracts of plant since other extracts including chloroform and aqueous did not effectively inhibit the growth of the bacteria. This may due to the chemical constituents responsible for the antibacterial activity are more soluble in ethanol extracts. It can be interpreted that the antibacterial activity against microorganisms is due to any one or more alkaloids of the plants[10]. Present findings support the applicability of *Tinospora cordifolia* in traditional systems for it's claimed uses like fever inflammations, urinary and skin diseases. Further work is necessary to isolate and purification compounds in *Tinospora cordifolia* stem extracts, which will allow the scientific community to recommend their utilization as an accessible alternative to synthetic antibiotics.

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TABLE – 1

Antibacterial activity of *Tinospora cordifolia* stem extracts

S. No.	Test organisms	Extraction	Inhibition zones (cm)
1	*Escherichia coli*	Aqueous	0.1 ± 0.04
		Ethanol	0.3 ± 0.09
		Chloroform	0.2 ± 0.08
2	*Proteus vulgaris*	Aqueous	……..
		Ethanol	0.4 ± 0.00
		Chloroform	0.2 ± 0.04
3	*Enterobacter faecalis*	Aqueous	……..
		Ethanol	0.2 ± 0.00
		Chloroform	0.2 ± 0.04
4	*Salmonella typhi*	Aqueous	……..
		Ethanol	0.1 ± 0.00
		Chloroform	0.1 ± 0.04
5	*Staphylococcus aureus*	Aqueous	……..
		Ethanol	0.1 ± 0.04
		Chloroform	……..
6	*Serratia marcescens*	Aqueous	……..
		Ethanol	0.1 ± 0.04
		Chloroform	……..