WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 7.523
Volume 6, Issue 5, 994-999. Research Article ISSN 2277– 7105

PHYTOCHEMICAL ANALYSIS AND ANTI-BACTERIAL ACTIVITY OF *SALACIA CHINENSIS* STEM EXTRACT

D. A. Shahira Banu*[1], Dr. S. Karpagam[2] and Dr. B. Janarthanam[3]

[1]Department of Plant Biology and Plant Biotechnology, J.B.A.S. College for Women, Chennai-600 018.

[2]Associate Professor, Department of Botany, Queen Mary's College, Chennai-600 004.

[3]Chief Scientist, Poonga Biotech Research Centre, Chennai-600 094. Tamil Nadu, India.

Article Received on
08 March 2017,

Revised on 26 March 2017,
Accepted on 16 April 2017

DOI: 10.20959/wjpr20175-8391

***Corresponding Author**
D. A. Shahira Banu
Department of Plant Biology and Plant Biotechnology, J.B.A.S. College for Women, Chennai-600 018.

ABSTRACT

The objective of the present study was to analyse the phytochemicals and anti-bacterial activity from the stem extract of *salacia chinensis*. The *Salacia chinensis* stem extracts (Hubili, Karikan and Udipi locations from Karnataka, India) were evaluated for the presence of secondary metabolites using various solvents (aqueous, ethanol, chloroform, petroleum ether and acetone). Different concentrations of *Salacia chinensis* aqueous stem extract of Karikan accession were tested using the agar diffusion technique for the activity against *Bacillus subtilis, Bacillus cereus, Pseudomonas aeruginosa, Staphylococcus aureus and Escherichia coli*. The phytochemical analysis reveals the presence of active ingredients such as tannins, saponins, quinones, terpenoids, steroids, flavanoids, phenols, alkaloids, glycosides, anthocyanin and betacyanin. The anti-bacterial activity of aqueous stem extract of karikan accession shows more activity against *Bacillus subtilis*.

KEYWORDS: *Salacia chinensis*, Karnataka, Phytochemicals, anti-bacterial activity, Disc diffusion.

INTRODUCTION

The *Salacia chinensis* Linn (Celestraceae family) commonly known as Dimal, Modhupal, Ingli, Chinese salacia, Lolly berry and saptarangi in Ayurveda. This is a small erect, woody, climbing shrub, found almost throughout India including Andaman and Nicobar Island. The leaves are elliptic, narrowly ovate-round or obovate-elliptic and glabrous, the petioles are 5-

8 mm long. The fruit has one seed in it. Flowers have five petals and they are yellow or yellowish-green. The plant is well known for its medicinal properties. The root extract shows various activities like, antioxidant, anticaries, antiulcer, antidiabetic, hypoglycemic, antiobesity and skin lightening agent.

Medicinal plants constitute the main source of new pharmaceuticals and healthcare products. Extraction and characterization of several active compounds from the plants have given birth to some high activity profile drugs. Among the different plant derivatives, secondary metabolites proved to be most important group of compounds that showed wide range of anti-bacterial and antifungal activity.[1]

Tannins are polyphenolic compounds present in plants, food, beverages, soluble in water and polar organic solvents. Tannins possesss high antioxidants, antimicrobial, gastroprotective, anti-ulcerogenic ativities, anti-fibrotic effects and free radical scavenging activity.[2] Flavanoids are also widely distributed in plants which have been reported to exert multiple biological effects, including antioxidant, free radical scavenging abilities, anti-inflammatory, anticarcinogenic activity etc.[3] The aim of the present investigation was to evaluate the phytochemicals and antibacterial activity of stem extract of *salacia chinensis.*

MATERIALS AND METHODS

Sample collection

The stem of *Salacia chinensis* were collected from different loations of Karnataka like Hubili, Karikan and Udipi. These plants were identified in Queen Mary's College and authenticated by Dr. P. Jayaraman, Plant Anatomy and Research Centre, West Tambaram, Chennai-600 045.

Extract preparation

The healthy plants were shade dried, powdered and extracted with solvents namely ethanol, acetone, chloroform, aqueous and petroleum ether at 1:3 w/v ratio (Merck, extra pure) for 1 min using an Ultra Turax mixer (13,000 rpm) and soaked overnight at room temperature. The sample was filtered through Whatman No. 1 paper, evaporated under vacuum in a rota-vator at 40°C and redissolved in known volume of methanol, ethanol and water and stored at 18°C until use.

Phytochemical Screening of *Salacia chinensis*

The phytochemical screening of stem extracts were assessed by standard method of Brinda et al.,[4], Siddiqui et al.,[5], Savithramma et al.[6]

Antibacterial activity from stem extracts of *Salacia chinensis*

The aqueous stem extract was used for antibacterial, study by the method given by Ozkan et al.,[7], Janarthanam et al.,[8] Different concentration (50,100 and 150 mg/ml) was tested against *Bacillus subtilis* (MTCC 10224), *Bacillus cereus* (MTCC 10211), *Pseudomonas aeruginosa* (MTCC 14676), *Staphylococcus aureus* (MTCC9542) *and Escherichia coli(*MTCC 1563). The bacterial cultures were grown in Mueller Hinton Agar and Mueller Hinton broth (Himedia).[9] Inhibition zone was measured after incubation for 24 - 48 hours at 37°C.Gentamycin is used as positive control. The data was subjected to annova and means were performed by DMRT using (SPSS ver.16.0).

RESULTS AND DISCUSSION

Phytochemical screening

The phytochemical screening of the stem extract of *Salacia chinensis* was carried out from different locations using different solvents to identify the presence of medicinally active metabolites. (Table- 1-3). The aqueous stem extract of all the three locations were rich in tannins, saponins, quinones, terpenoids, steroids, flavonoids, phenol, cardiac glycosides, coumarins and betacyanin whereas alkaloids are found in Hubili and Karikan accession. The Ethanolic stem extract of all the three locations were rich in tannins, quinones, terpenoids, steroids, flavonoids, phenol and betacyanin, whereas alkaloids is found in Karikan locations, cardiac glycosides are found in Hubili and Karikan locations and coumarins are found in Karikan and udipi location. The Chloroform stem extract of all the three locations were rich in quinones, flavonoids and phenol. The petroleum ether stem extract of all the three locations were rich in quinones, terpenoids, steroids and flavonoids whereas phenol is found in Karikan and Udipi location, saponins and cardiac glycosides is found in Karikan location and betacyanin is found in Udipi location. The acetone stem extract of all the three locations were rich in saponins, quinones and phenol, whereas flavonoids is found in Karikan location. The curative properties of medicinal plants are perhaps due to the presence of various secondary metabolites such as alkaloids, flavanoids, glycosides, phenols, saponins, steroids, etc.[10]

Table 1. Phytochemical screening from stem extracts of *Salacia chinensis* (Hubili Accession)

Phytochemicals Tested	Stem Extracts of *Salacia chinensis*				
	Aqueous	Ethanol	Chloroform	Petroleum ether	Acetone
Tannins	+	+	-	-	-
Saponins	+	+	-	-	+
Quinones	+	+	+	+	+
Terpenoids	+	+	-	+	-
Steroids	+	+	-	+	-
Flavonoids	++	+	+	+	-
Phenol	++	+	+	-	+
Alkaloids	+	-	-	-	-
Glycosides	-	-	-	-	-
Cardiac glycosides	+	+	-	-	-
Coumarins	+	-	-	-	-
Antho cyanin	-	-	-	-	-
Beta cyanin	+	+	-	-	-

Key: - absent + mild ++ moderate +++ present in high amount

Table2. Phytochemical screening from stem extracts of *Salacia chinensis* (Karikan Accession)

Phytochemicals Tested	stem extracts of *Salacia chinensis*				
	Aqueous	Ethanol	Chloroform	Petroleum ether	Acetone
Tannins	++	+	-	-	-
Saponins	++	++	-	+	+
Quinones	++	++	+	+	+
Terpenoids	+	+	-	+	-
Steroids	+	+	-	+	-
Flavonoids	++	+	+	+	+
Phenol	++	+	+	+	+
Alkaloids	+	+	-	-	-
Glycosides	-	-	-	-	-
Cardiac glycosides	+	+	-	+	-
Coumarins	++	+	-	-	-
Antho cyanin	-	-	-	-	-
Beta cyanin	+	+	-	-	-

Key: - absent + mild ++ moderate +++ present in high amount.

Table 3. Phytochemical screening from stem extracts of *Salacia chinensis* (Udipi Accession)

Phytochemicals Tested	stem extracts of *Salacia chinensis*				
	Aqueous	Ethanol	Chloroform	Petroleum ether	Acetone
Tannins	+	+	-	-	-
Saponins	+	-	-	-	+
Quinones	+	+	+	+	+

Terpenoids	+	+	-	+	-
Steroids	+	+	-	+	-
Flavonoids	+	+	+	+	-
Phenol	+	+	+	+	+
Alkaloids	-	-	-	-	-
Glycosides	-	-	-	-	-
Cardiac glycosides	+	-	-	-	-
Coumarins	+	+	-	-	-
Antho cyanin	-	-	-	-	-
Beta cyanin	+	+	-	+	-

Key: .- absent + mild ++ moderate +++ present in high amount

Table 4. Antibacterial a ctivity of the stem extracts of *Salacia chinensis*

S.No	Micro organisms tested		Zone of Inhibition (mm in diameter)*			F Value	P Value
		Gentamycin	Concentrations of extract				
1.	*Salacia chinensis*	Control mm	50 mg/ml	100mg/ml	150 mg/ml		
2.	*Bacillus subtilis* MTCCNo: 10224	21.4	10 ± 1.00^{a}	14 ± 1.00^{b}	22 ± 1.00^{c}	112.000	< 0.001**
3.	*Bacillus cereus* MTCC No:10211	24.6	12 ± 1.00^{a}	15 ± 1.00^{b}	21 ± 1.00^{c}	63.000	< 0.001**
4.	*Pseudomonas aeruginosa* MTCCNo: 14676	19.2	8 ± 1.00^{a}	12 ± 1.00^{b}	17 ± 1.00^{c}	61.000	< 0.001**
5.	*Staphylococcus aeureus* MTCC No:9542	21.1	7 ± 1.00^{a}	9 ± 1.00^{b}	16 ± 1.00^{c}	67.000	< 0.001**
6.	*Escherichia coli* MTCC No:1563	19.8	10 ± 1.00^{a}	13 ± 1.00^{b}	19 ± 1.00^{c}	63.000	< 0.001**

** It denotes significant at 1% level. Different alphabets among concentrations denotes significant at 5% level using DMRT.

Anti-bacterial activity

The Phytochemical analysis of aqueous stem extract of Karikan location showed higher activity when compared to other locations therefore anti-bacterial activity was evaluated only in this location. The anti-bacterial activity of stem extracts were analysed by measuring the zone of inhibition. The activity was tested against five different bacterial isolates such as *Bacillus subtilis, Bacillus cereus, Pseudomonas aeruginosa, Staphylococcus aureus and Escherichia coli*. Different concentrations (50mg/ml, 100mg/ml and 150mg/ml) of aqueous stem extract were subjected for the anti-bacterial assay. The pathogenic activities were more effective in 150 mg/ml concentration(Table 4). The highest activity was shown against *Bacillus subtilis*(22 ± 1.00^{c}) followed by *Escherichia coli* (19 ± 1.00^{c}) followed by *Bacillus cereus* (21 ± 1.00^{c}), followed by *Pseudomonas aeruginosa*(17 ± 1.00^{c}) and *Staphylococcus*

aureus (16± 1.00^{c}), when compared to the control. Similar results were obtained on aqueous leaf extract of *Carica papaya* leaves and seeds, which exhibited anti-bacterial activity.[11]

CONCLUSION

From this study it was concluded that the aqueous stem extract of *Salacia chinensis* (Karikan location) had superior quality of antimicrobial activity. The powerful microbial effect is attributed to the greater amount of tannins and flavonoids present in the aqueous stem extracts of *Salacia chinensis*.

REFERENCES

1. Siddiqui s. Verma. A. Rather. a. Jabeen, F. and Maghvansi MK, Advan Biol., Res., 2009; 3(5-6): 188-195.
2. Ashok, Rajkumar. P. and Kanimozhi M.J. Sci Res. 2010; 5(3): 157-162.
3. Ahmed, A.M.A., Rahman. M.S and Anwat, M.N. antimicrobial activity of extracts and crude alkaloids of Polyalthia longifolia(sonn). Chittagong Univ. J. Sciences, 1999; 23(1): 53-56.
4. Brinda, p., sasikala, p. and purushothaman, k.k. pharmacognostic studies of Merugan kizhangu. Bull. Med. Eth. Bot. Res, 1981; 3: 84-96.
5. Siddiqui, A.A. and Ali, M. Practical Pharmaceutical chemistry. 1st ed. new Delhi, CBS Publisher and Distributors, 1997; 126-31.
6. Savithramma, N., Lingam, R.M. and Bhumi, G. Phytochemical screening of *thespesia populnea*(L) Soland and *Tridax procumbers* L.J. Chem. Pharm. Res, 2011; 3: 28-34.
7. Ozkan, G., Sagdic, O., Baydar, H. Antioxidant and Antibacterial Activities of *Rosa damascene* Flower Extracts. Food Sci Tech Int, 2004; 4(4): 250-256.
8. Janarthanam, B. and Sumathi, E. Antimicrobial activity of gymnema sylvestre leaf and callus extracts. Journals of Tropical Medicinal plants, 2010; 11(2): 143-147.
9. Lopez, A., Hudson m J.P. and Towers, G.H.N. Antiviral and antimicrobial activities of Colombian medical plants. J. Enthopharmacology, 2001; 77: 189-196.
10. Britto, J.D. and Sebastian, S.R. Biosynthesis of silver nano particles and its anti-bacterial activity activity against human pathogens. Int J Pharm Pharm Sci, 2011; 5: 257-9.
11. Akinnibosun F.I., Akinnibosun H.A., Adegha O.M., Osanebi E.,-Evaluation of the anti-bacterial activity of aqueous leaf extract of *Carica papaya* leaves and seeds. Journal of Chemical Biological and Physical Science 2016; 6(3): 988-996.