



**STUDIES ON ANTIMICROBIAL ACTIVITY OF *BOSWELLIA OVALIFOLIOLATA* AGAINST
XANTHOMONAS – CITRI AND *SALMONELLA TYPHYNURIUM***

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ABSTRACT: *Boswellia ovalifoliolata* is an endemic and endangered plant species. It has very rich medicinal value. Preliminary phytochemical screening yielded so many important secondary metabolites in different solvents like Ethanol, Methanol, Chloroform, water and Hexane. The antimicrobial activity of stem, stem bark and leaf extracts of *Boswellia ovalifoliolata* were studied against *Salmonella typhimurium* and *Xanthomonas citri* by Agar well diffusion method. Ethanolic extract of stem bark, chloroform extract of leaf and chloroform, hexane extracts of stem showed highest antimicrobial activity against *X.citri* . Hexane extract of stem, water extract of stem bark and chloroform extract of leaf showed highest antimicrobial activity against *S. typhinurium*.

Key words: Antimicrobial activity, *Boswellia ovalipholiolata*, Agar- well method, Phyto chemicals.

INTRODUCTION

The total population of the world utilizes plants as drugs mainly in the developing countries. There are more than 85,000 plant species that have been documented for medicinal use globally. So, plant derived natural product hold great promise for discovery and development of new pharmaceuticals in diverse human ailments. The WHO estimates the therapeutic use of natural products was perhaps the oldest medical practices. Interestingly, 64% of that almost 75% of the world's population had therapeutic experience with herbal remedies. More than 6000 plants in India including endemic are in use in traditional folk and herbal medicine. *Boswellia ovalifoliolata* an endemic, endangered and threatended medicinal tree taxa belongs to the Tirupathi - Kadapa-Nallamali hot spot of India. This 11th hot spot is harbours large number of endemic, endangered, rare, threatended and keystone species due its vivid geographical conditions and climatic factors are favourable for the distribution of unique endemic wealth. *Boswellia* is a deciduous medium sized tree taxa belongs to the family Burseraceae.

The presence of Boswellic acids in almost all species of *Boswellia* is a characteristic of this genus. The triterpenoids present in *Boswellia* are synthesized through isopentynyl pyrophosphate pathway (IPP) from a squalence intermediate and their role is yet to be fully understood though they are certainly involved in defence mechanisms, as many of them have been reported to possess diverse biological activities that include immuno stimulation, anti-microbial, anti-inflammatory anticancer and antiviral properties. This interest is substantiated by recent studies demonstrating beneficial effects of *Boswellia* species. Phytochemical constituents are the basic source for the establishment of several pharmaceutical industries. The constituents present in the plant play a significant role in the identification of the crude drug. Phytochemical screening is very important in identifying new sources of therapeutically an industrially important compounds like alkaloids, flavonoids, phenolic compounds, saponins, steroids, are one of the tool to determine the quality and purity of crude drug. The present study was undertaken to screen the secondary metabolites in stem, stem bark and leaf of *Boswellia ovalifoliolata* to facilitate the research in drug discover process and also the present study was undertaken to determine the antimicrobial activity of plant extracts indifferent solvents against two bacterial pathogens, one is plant pathogen and another is animal pathogen.

MATERIALS AND METHODS

Collection of Plant Material:

Plant sample *Boswellia ovalifoliolata* was collected from Tirumala hills in AP. The specimen was identified with the help of local floras and was further confirmed with authenticated specimen housed at s.v.university and further confirmed by referring book "Flowering plants of chittor district" written by Dr.madhavaiah chetty, s.v.u. The plant material was chopped off into small fragments and shade dried and grounded to give powder separately as stem, leaf and stem bark. The plant material was subjected to phytochemical screening for the analysis of secondary metabolites like alkaloids, phenols, tannins, saponins, flavonoids,terpenoids, cardiac glycosides, reducing sugars, carbonyls, phlobatannins, steroids, ninhydrins.The stem, stem bark and leaf powders (60 gm) of *Boswellia ovalifoliolata* was treated with ethanol, methanol, chloroform , water and hexane using soxhlet apparatus yielded secondary metabolites. The priliminary phytochemical studies were conducted on the active extracts using standard procedures adopted by Harborne (1973) and Gibbs (1974).

Micro Organisms Used:

The antimicrobial activities studied against *Xanthomonas citri*, *Salmonella typhynurium*

Antimicrobial Essay

The antibacterial activity of methanol, ethanol, chloroform, water and hexane extracts of *Boswellia ovalifoliolata* stem, stem bark and leaf were studied against *Salmonella typhinurium* and *Xanthomonas citri* by agar well method. Petridishes containing 18 ml of nutrient agar (at 40⁰) were with 8 mm *X.citri* and *S.typhinurium* innoculum disk at center of the petriplate, media was allowed to solidify and then individual petridishes were marked for the extract used. Wells of 6 mm diameter were cut into solidified agar media with the help of sterilized core border. Different volumes of each extract was poured in the respective well and the plates were incubated at 37⁰ c for seven days. Organic solvents in which extracts were prepared were used as negative control. The experiment was performed in triplicate under strict aseptic conditions. The antibacterial activity for each of the diameter of inhibition (mm) produced by the respective extract at the end of the incubation period.

RESULTS AND DISCUSSION

Phytochemical screening:

The stem of *Boswellia ovalifoliolata* after phytochemical analysis with different solvents ie Ethanol,Methanol, Chloroform, Hexane,Ethyl acetate, Diethyl ether and Water contains tannins, saponins, flavonoids, terpenoids ,cardiac glycosides, reducing sugars, carbonyls, phlobatannins, steroids, ninhydrins, phenols but no alkaloids. Where as in stem bark all the phytochemicals said above are present.Leaf of *Boswellia ovalifoliolata* also contains al lthe phytochemicals mentioned above.But alkaloids are in less quantity in all the stem,stem bark and root extracts.The stem and ieaf is rich inTannins,Terpenoids,Flavonoids and Cardiac glycosides.The stem bark is rich in Terpenoids,,Cardiac glycosides and Carbonyls.

Antimicrobial activity:

The extracts obtained through soxhlation using solvents; Ethanol,Methanol,Chloroform,Hexane and Water were subjected to anti microbial activity showed excellent result against *Xanthomonas citri* and *Salmonella – typhinurium*. Among stem extracts chloroform and hexane extract showed highest antimicrobial activity against *X.citri*. Water extract showed zero result. Ethanol and methanolic extracts also showed remarkable activity. Ethanolic extract of stem bark showed highest anti microbial activity against *X.citri*. Methanolic extracts showed zero result. Chloroform, water and hexane extracts also showed very good zone of inhibition against *X.citri*. Chloroform extract of leaf showed highest activity against *X.citri*. Here methanol extracts showed zero result. Ethanol,water and hexane extracts also showed wonderful zone of inhibition against the pathogen. Among all extracts of stem, stem bark and leaf chloroform and hexane extracts of stem of *B.ovalfoliolata* showed highest antimicrobial activity against *X.citri*.

Table 1. Phytochemical Analysis with Stem bark, Stem & Leaf of *B. ovalifoliolata*

S.NO	P.COMPOUNDS	E	M	C	H	E.A	E.E	W
1	TANNINS	Stem Bark	+	+	-	+	+	+
		Stem	+	+	+	+	+	+
		Leaf	+	+	+	+	+	+
2	SAPONINS	Stem Bark	-	-	+	+	-	-
		Stem	+	-	+	-	-	-
		Leaf	+	+	-	-	-	-
3	FLAVONOIDS	Stem Bark	-	+	+	-	+	+
		Stem	+	+	+	-	+	+
		Leaf	+	+	+	+	+	+
4	TERPENOIDS	Stem Bark	+	+	+	+	+	+
		Stem	+	+	+	+	+	+
		Leaf	+	+	+	+	+	+
5	CARDIAC GLYCOSIDES	Stem Bark	+	+	+	+	+	+
		Stem	+	+	+	+	+	-
		Leaf	+	+	+	+	+	+
6	REDUCING SUGARS	Stem Bark	-	-	-	-	-	-
		Stem	+	+	-	-	+	-
		Leaf	+	-	-	-	+	-
7	CARBONYL	Stem Bark	+	+	+	+	+	+
		Stem	+	-	+	-	-	-
		Leaf	+	+	+	-	-	-
8	PHILOBATANINS	Stem Bark	+	+	-	-	-	-
		Stem	+	+	-	+	-	+
		Leaf	+	+	-	+	+	+
9	STEROIDS	Stem Bark	-	-	+	-	+	-
		Stem	-	-	-	-	+	-
		Leaf	-	-	-	-	+	-
10	NINHYDRIN TEST	Stem Bark	+	+	-	-	-	-
		Stem	+	+	-	-	+	-
		Leaf	+	+	-	-	-	-
11	Alkaloids	Stem Bark	+	+	-	-	-	-
		Stem	-	-	-	-	-	-
		Leaf	+	-	-	-	-	-
12	Phenols	Stem Bark	+	+	+	-	-	-
		Stem	+	-	+	-	-	-
		Leaf	+	+	+	-	-	-

When coming to antimicrobial activity against *Salmonella typhynurium* hexane extract of stem showed highest antimicrobial activity. Ethanol, Methanol and Chloroform extracts showed zero result. Coming to stem bark extracts Water extract of stem bark showed highest zone of inhibition followed by Water and Methanolic extracts respectively. chloroform extract of leaf showed highest inhibition zone. Hexane, Water and Chloroform extracts also exhibited remarkable zone of inhibition. Among the three parts of *B. ovalifoliolata* i.e., stem, stem bark and leaf chloroform extract of leaf showed highest inhibition zone when compared to stem and stem bark against *Xanthomonas citri*. When compared to stem, stem bark and leaf extracts chloroform extract of leaf showed highest zone of inhibition against *S. typhynurium*.

Table 2. Antimicrobial activity with Stem extracts of *B. ovalifoliolata* against *X.citri* and *S.typhynurium*

<i>X.citri</i> Zone of inhibition					<i>S.typhynurium</i> Zone of inhibition			
40	60	80	100	Solvent	40	60	80	100
8	10	12	14	Ethanol	—	—	—	—
8	10	12	14	Methanol	—	—	—	—
14	16	17	18	Chloroform	—	—	—	—
—	—	—	—	Water	8	10	10	11
12	13	14	18	Hexane	13	14	15	18

Table3. Antimicrobial activity with Leaf extracts of *B. ovalifoliolata* against *X.citri* and *S.typhynurium*

<i>X.citri</i> Zone of inhibition					<i>S.typhynurium</i> Zone of inhibition			
40	60	80	100	Solvents	40	60	80	100
12	12	13	14	Ethanol	—	—	—	—
—	—	—	—	Methanol	10	12	13	14
10	12	13	15	Chloroform	15	17	18	19
10	12	13	14	Water	10	12	13	14
4	6	8	10	Hexane	13	14	15	16

Table 4. Antimicrobial activity with Stem bark extracts of *B. ovalifoliolata* against *X.citri* and *S.typhynurium*

<i>X.citri</i> Zone of inhibition					<i>S.typhynurium</i> Zone of inhibition			
40	60	80	100	Solvents	40	60	80	100
11	12	14	15	Ethanol	—	—	—	—
—	—	—	—	Methanol	10	10	12	13
5	6	10	11	Chloroform	—	—	—	—
10	11	12	13	Water	10	11	13	14
5	8	9	10	Hexane	5	8	10	11

Earlier Savithamma and Sulochana (1998), Yasrib qurishi et al (2010), p.venkateswarlu, Savithamma (2010) reported about Boswellic acids, phytochemical compounds and medicinal use of *Boswellia ovalifoliolata*.

ACKNOWLEDGEMENT: I sincerely thanks to Dr.john and Dr.sudhakar naidu for their kind support during the present work.

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