Original Article

Absence of antimicrobial activity in alcoholic extract of *Santalum album* Linn

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Abstract

Objective: The objective of the present study was to investigate the antimicrobial activity of seed of *Santalum album* Linn. (Family: Santalaceae) in various microbial strains. **Materials and Methods:** The effects of ethanolic extract of seed of *S. album* were analyzed in different microorganisms at a concentration of 5 mg/ml per disk. **Results:** The result indicated that the ethanolic extract of seed of *S. album* did not show any zone of inhibition against the tested microorganisms. **Conclusion:** The ethanolic extract of seed of *S. album* has no significant antimicrobial activity.

Key words: Dimethyl sulfoxide, disk diffusion, microorganism, *Santalum album* Linn., seed

INTRODUCTION

Santalum album Linn., belonging to family Santalaceae, is a small evergreen tree, a partial root parasite, attaining a height of 12–13 m and girth of 1–2.4 m, with slender, drooping as well as erect branching. In India, *S. album* is found all over the country, covering over 90% of the area in Karnataka and Tamil Nadu.[1,2]

Medicinally, *S. album* is useful in biliousness, fever and thirst. It is commonly used in cosmetics and hair oil. Sandalwood oil relieves itching, heat, pruritus, and inflammation of the skin. Seed oil is used in skin disease. [1,2] Aqueous extract of *S. album* leaf and stem shows antimicrobial activity against *Escherichia coli, Staphylococcus aureus and Pseudomonas.*[3] The sesquiterpenes isolated from *S. album* show antibacterial activity against *Helicobacter pylori.*[4] The methanolic extract of *S. album* stem and leaves inhibits *Bacillus subtilis* bacteria *in vitro.*

Access this article online	
Quick Response Code:	Website: www.pnrjournal.com
	DOI: 10.4103/0976-9234.90224

This study was undertaken to screen the analgesic activity of the seed of *S. album* on microorganisms[5]

MATERIALS AND METHODS

Collection and identification of plant material

S. album seeds were collected from Indore, Madhya Pradesh, India, during August–September 2009. The plant was identified with the help of available literature and authenticated by Botanical Survey of India (BSI), Pune, Maharashtra, India. A voucher specimen (No. VAISA4) was deposited at BSI.

Preparation of ethanolic extract

The collected seeds were washed with water to remove earthy matter. Then, the dried seeds were crushed into a coarse powder using a mixer grinder. The seed powder (250 g) was successively extracted with the solvent petroleum ether (60–80°C) and ethanol (95% v/v) in a soxhlet apparatus. The extracted material was filtered and the solvent was distilled off. The extract was further dried under vacuum. Finally, the extracts were transferred to an airtight amber color glass container and stored for further studies.

Animals

Microbial strains used

The test organisms, i.e. gram-positive bacteria *B. subtilis*

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Table 1: Antimicrobial activity of ethanolic extracts against test microbes

Category	Strain	Concentration (mg/ml)	Mean ± SD of diameter of the zone of inhibition for alcoholic extract (mm)
Gram positive	*B. subtilis*	5.0	9.01 ± 0.35
Gram positive	*S. aureus*	5.0	-
Gram negative	*P. aeruginosa*	5.0	-
Gram negative	*E. coli*	5.0	6.2 ± 1.00
Fungi	*C. albicans*		-

Figure 1: Zone of inhibition of alcoholic extract on nutrient agar by disk diffusion test

(ATCC 6633) and *S. aureus* (ATCC 6538), gram-negative *E. coli* (ATCC 10538) and *Pseudomonas aeruginosa* (ATCC 27853) and fungus *Candida albicans* (ATCC 10239), were obtained from the Microbiology Department, R. C. Patel Art Science and Commerce college, Shirpur (NMU University), Maharashtra, India. The cultures of bacteria were maintained on nutrient agar slant at 4°C and subcultured onto nutrient broth for 24 hours prior to testing.

Screening for antibacterial activity

Disk diffusion[6,7]

Stock solution of the extract was prepared in dimethyl sulfoxide (DMSO) at a concentration of 5000 µg/ml. Accurately weighed 2 g of each extract was dissolved in 400 ml of DMSO solution. The solutions were stored in the refrigerator at 4ºC. Loopful of culture was transferred to a test tube containing 3–4 ml saline preparation and the tube was shaken for proper mixing. The microbial suspensions were spread over the surface of the agar media with the help of a sterile spreader to ensure uniform inoculation and confluent growth. Sterile 6-mm filter paper disks were impregnated with 100 µl of the plant extracts. Disks should be placed on the agar with a forceps which is sterilized by passing it through a Bunsen burner flame and is allowed to cool. Each disk must be pressed down to ensure complete contact with the agar surface. The bacterial plates were incubated at 37 ± 0.1°C for 24 hours, while the yeast plates were incubated at 28 ± 0.1°C for 48 hours in the incubator. Poly disks applied to agar plates by the use of sterilized forceps were used as positive controls and the solvents such as DMSO served as negative control. After incubation, each plate was examined. The diameters of the zones of complete inhibition were measured, including the diameter of the disk, with the help of a ruler which was held at the back of the inverted Petri plate. All tests were performed under sterile conditions in duplicate and repeated three times.

RESULTS AND DISCUSSION

S. album alcoholic seed extract was not sufficiently active against all the five microbes. The growth of microorganism was normal after incubation, while the standard drug significantly showed the zone of inhibition against the microorganisms [Figure 1].

CONCLUSION

S. album alcoholic seed extract at a concentration of 5 mg/ml was not showing zone of inhibition against the microorganisms [Table 1]. In traditional system of medicine, *S. album* wood and its essential oil is used for treating a number of ailments, but the alcoholic extract of seed shows lack of antimicrobial activity. The present study will be helpful to avoid any study repeated in this direction in the future.

ACKNOWLEDGMENTS

The authors are thankful to the authorities of Smt. Sharadchandrika Suresh Patil College of Pharmacy, Chopda, Maharashtra, India, for providing the necessary facilities to carry out the experiments.

REFERENCES

1. Nadkarni K. The Indian Materia Medica, with Ayurvedic, Unani and Home Remedies. Revised and enlarged by Nadkarni A. Reprint. Bombay: Bombay Popular Prakashan PVP; 1954.
2. Kirtikar KR, Basu BD. Indian Medicinal Plants. 1st ed, Vol. 2. Dehradun: International Book of Distributors; 2005.
3. Kumar GM, Jeyraaj IA, Jeyaraaj R, Loganathan P. Antimicrobial activity of aqueous extract of leaf and stem extract of *Santalum album*.

Anc Sci Life 2006;25:3,4.
4. Ochi T, Shibata H, Higuti T, Kodama KH, Kusumi T, Takaishi Y. Anti-Helicobacter pylori compounds from *Santalum album*. J Nat Prod2005;68:819-24.
5. Jirovetz L, Buchbauer G, Denkova Z, Stoyanova A, MurgovI, Gearon V, *et al*. Comparative study on the antimicrobial activities of different sandalwood essential oils of various origin. J Flavfrag 2006;21:465-8.
6. Lalitha M. Manual on Antimicrobial Susceptibility Testing. Under the auspices of Indian Association of Medical Microbiologists. 2006. p. 3-20.
7. Hugo W, Rusell A. Pharmaceutical Microbiology. 7th ed. UK: Blackwell Science Ltd.; 2004.

How to cite this article: Patil V, Vadnere GP, Patel N. Absence of antimicrobial activity in alcoholic extract of Santalum album Linn. J Pharm Negative Results 2011;2:107-9.

Source of Support: Nil. **Conflict of Interest:** None declared.