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Research Article

SCREENING OF ACTIVE PHYTOCOMPOUNDS BY GC – MS STUDY AND ANTIMICROBIAL ACTIVITY IN THE STEM OF *SANTALUM ALBUM*

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ABSTRACT

In the present study, 32 active phytocompounds were identified in the stem extract of *Santalum album* by GC-MS study. The study shows that α-santalol acetate is the acetate compound detected at 31.18 Retention times per minutes and Di-n-octyl phthalate is the plasticizer compound detected at 26.50 Retention times per minutes are present in high concentration and the sesquiterpene alcohol is the only compound having maximum activity among other compounds. The result of antimicrobial activity revealed that the stem of *Santalum album* shows moderate zone of inhibition on the strains of *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia* and *Aspergillus niger*. The results of this study are very encouraging for designing new drugs with the help of these phytocompounds for the treatment of many infectious diseases.

Keywords: Sandal wood, Phytocompound, Antimicrobial activity.

INTRODUCTION

Herbal drugs are essential components of traditional medicines in several countries including China and India[1] Herbal medicines are used by practicing physicians in indigenous systems of medicine for over hundreds of years and they are known to be the oldest healthcare products that have been used by mankind all over the world in the form of traditional medicines [2] About 80% of the world's populations primarily in the developing countries have faith in traditional medicines, particularly plant drugs for their primary healthcare because of their safety, potency and lesser side effects[3] Photochemistry is a branch of pharmocognosy with chemical and biological characters, which studies the obtaining of medicament by natural methods [4]

MATERIALS AND METHODS

Preparation of the plant extract

The stem of the *Santalum album* plant were collected from Mokkombu forest near Tiruchirapalli, Tamil Nadu, India, after getting prior permission from the Forest Department. Since certain compounds get denatured in direct sunlight, the plant materials were dried under shade and powdered[5, 7]

GCMS Studies (Gas chromatography Mass spectrometry)

Procedure

- The sample is dissolved in the organic solvent till it dissolves completely.
- Gas chromatography condition is maintained at 100° C - 280° C as 5°C/ min.
- 2µl of sample is injected in to the column.
- The helium gas moves at 1ml/min through the column.
- The compound split in the ratio of 1:10.
- After the program is runes mass spectrometer scans the compound present with the structure.

Pathogens used for the assay

Bacterial species includes *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Klebsiella pneumonia* and *Pseudomonas aeruginosa* and the fungal species comprised of *Aspergillus niger* and *Aspergillus fumigates*.

Antibacterial Assay

38 g of Muller Hinton media (Hi media) was dissolved in 1000 ml of distilled water and sterilized in an autoclave at 15 lbs for 15min. The sterilized media were poured into the Petri plates and allowed to solidify. The solidified plates were bored with 6 mm diameter cork borer and were loaded with solvent extract finally the plates were incubated at 37°C plus or minus for 24 hours[6]

Antifungal Assay

39.5 g of Potato Dextrose Agar (PDA) was dissolved in 1000 ml of distilled water and sterilized in an autoclave at 15 lbs for 15 min. The sterilized media were poured into the Petri plates and allowed to solidify. The solidified plates were bored with 6mm diameter cork borer and were loaded with solvent extract finally the plates were incubated at 25°C plus or minus for 48 hours[6]

RESULTS

GC-MS Profile of ethanol extract of *Santalum album*

The ethanol extract of ***Santalum album*** was subjected to Gas chromatography/mass spectrometry studies. There were 32 compounds identified in the extract. Two compounds were found to have high percentage of peak and retention times namely α-santalol and Di-n-octyl phthalate.

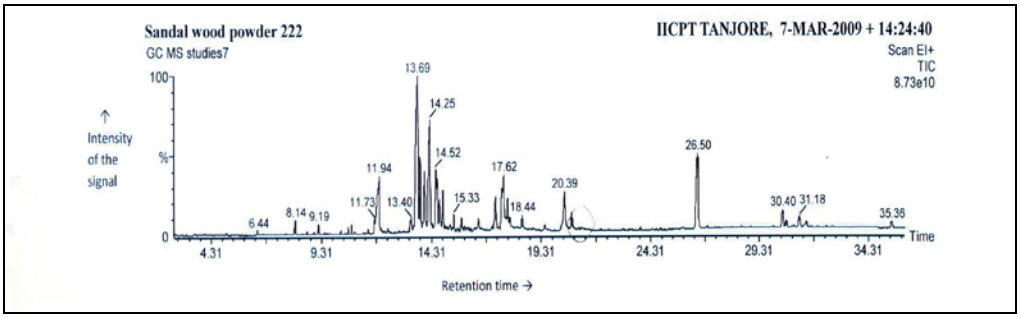

Fig. 1: Chromatogram of ethanolic extract of the stem of *Santalum album*

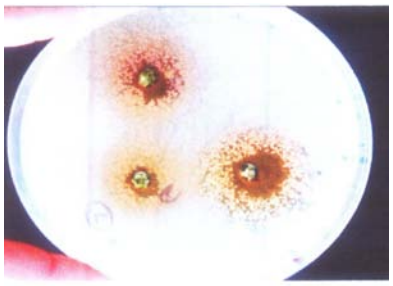

Fig. 2: (*Klebsiella pneumonia*)

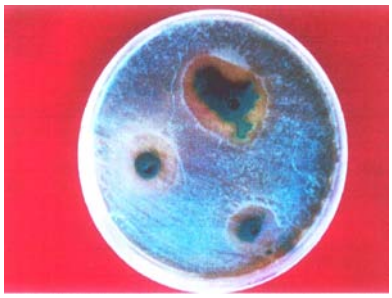

Fig. 3: (*Escherichia coli*)

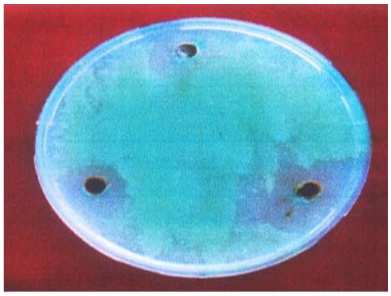

Fig. 4: (*Staphylococcus aureus*)

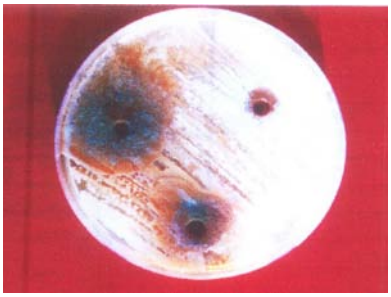

Fig. 5: (*Aspergillus niger*)

Table 1: Antimicrobial activity of *Santalum album* stem by ethanol extract

S. No.	Name of the organism	Zone of inhibition (mm)		
		25mg/well	50mg/well	100mg/well
1	*Klebsiella pneumoniae*	15	19	29
2	*Bacillus subtilis*	-	-	-
3	*Escherichia coli*	10	15	20
4	*Staphylococcus aureus*	07	10	14
5	*Salmonella typhi*	-	-	-
6	*Pseudomonas aeruginosa*	-	-	-
7	*Aspergittus niger*	06	13	25
8	*Aspergillus fumigatus*	-	-	-

Antimicrobial Assay

The antimicrobial activity result reveals that the moderate zone of inhibition by *Staphylococcus aureus* (14mm), *Escherichia coli* (20mm), *Klebsiella pneumonia* (29mm) and *Aspergillus niger* (25mm) (Plate: 1A,1B,2A&2B). No inhibitory effect was found against *Aspergillus fumigates*, *Salmonella typhi*, *Pseudomonas aeruginosa* and *Bacillus subtilis* (Table 1) and the highest activity found in *Klebsiella pneumonia* and *Aspergillus niger* at 100mg/well and the lowest activity found in *Staphylococcus aureus* and *Aspergillus niger* is 25mg/well in concentration (Table 1).

DISCUSSION

In this study the phytocompounds present in the stem of *Santalum album* by GC-MS study results that there are 32 compounds among which two compound showed high percentage of peak and retention time and the antimicrobial activity of *Santalum album* shows moderate zone of inhibition against *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia* and *Aspergillus niger* and these studies will be very much help full in designing a new drugs for the therapeutic values.

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