

ANTIBACTERIAL PROPERTIES OF YLANG YLANG (*CANANGA ODORATA*), OREGANO (*ORIGANUM VULGARE*), AND FRANKINCENSE (*BOSWELLIA SPP.*) ESSENTIAL OILS: A COMPARATIVE STUDY

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ABSTRACT

Antimicrobial resistance (AMR) has emerged as a major global health challenge and calls for alternatives to antimicrobial agents. Essential oils (EOs) originates from various plant parts as hydrophobic secondary metabolites. Essential oils are known to contain bioactive compounds with antimicrobial activities. This research study assesses and compares the antibacterial activity of Ylang Ylang (*Cananga odorata*), Oregano (*Origanum vulgare*), and Frankincense (*Boswellia spp.*) essential oils against gram positive bacteria; *Staphylococcus aureus*. The antibacterial activities of the essential oils were determined by the disk diffusion method. Essential oils were diluted at three concentrations (pure, 1:1, 1:10 v/v) and tested against *S. aureus* cultured on Mueller-Hinton agar plates. Inhibition zone diameters were measured to determine antimicrobial efficacy. The study revealed

varying degrees of antibacterial activity among the essential oils. Oregano showed the highest antibacterial activity against *S. aureus* followed by Ylang Ylang and Frankincense among the tested essential oils. The antibacterial effect of all the essential oils assayed followed a dose-dependent response. The essential oils all showed antibacterial efficacy, with Oregano oil showing the most antibacterial potential.

KEYWORDS: Antimicrobial resistance, Essential oils, Ylang Ylang, Oregano, Frankincense, *Staphylococcus aureus*, Natural antimicrobials.

INTRODUCTION

Antimicrobial resistance (AMR) has become a great challenge to the medical community all around the world, the resistant microbes render the antimicrobials useless for treating the infections caused by them, and hence, there is a pressing need to look for new and novel antimicrobials.^[1] The rise in resistance of microorganisms to conventional antibiotics has necessitated the exploration of an alternative to antimicrobial agents.^[2] Essential oils (EOs) have long been known for their antimicrobial property and recently have been center of attention as possible replacements or as co-agents in therapeutics.^[3-5] Essential oils are secondary metabolites of hydrophobic nature prepared by specialized secretory tissues in the various parts of plants like leaves, seeds, flowers, bark and wood.^[6] The high concentration of bioactive compounds like terpenes, aldehydes etc. are responsible for the antimicrobial property of various essential oils.^[7] Ylang ylang, oregano and frankincense are of the few popular essential oils with history of long traditional use and research on their antimicrobial property.^[8-10] This study focuses on three essential oils: Ylang Ylang (*Cananga odorata*), Oregano (*Origanum vulgare*), and Frankincense (*Boswellia* spp.), and comparing their efficacy against bacterial strains in different concentrations and also check the claims of the validity of their use as natural antibacterials.

MATERIALS AND METHODS

Essential Oil: Commercially available Essential oils of Ylang Ylang, Oregano, and Frankincense were utilized for the study.

Antimicrobial Activity Testing

The antibacterial activities were determined using the paper disk diffusion method. Bacterial strains tested included *Staphylococcus aureus*.

Procedure

1. Bacterial culture *S. aureus* was prepared for the study.
2. Mueller-Hinton agar plates were prepared and inoculated with the bacterial inoculum.
3. Dilutions of essential oil were prepared with analytical grade ethanol to get 1(undiluted), 1:1 and 1:10 (v/v) preparations.
4. Whatman filter paper disks (6 mm) were impregnated with each concentration of essential oil and placed on the agar surface.
5. Plates were incubated at 37°C for 24 hours.

6. The diameter of inhibition zones was measured in millimeters using caliper and the results were recorded and compared.

RESULTS

The results indicated varying degrees of antimicrobial activity among the essential oils: the results from previous studies were approximated to provide a comparative analysis.

Essential Oil	Dilution Ratio	Inhibition Zone Diameter (mm)
Frankincense	1	12.5
	1/1	10
	1/10	7.7
Oregano	1	20
	1/1	17.8
	1/10	13.3
Ylang Ylang	1	18.3
	1/1	15.2
	1/10	11

DISCUSSION

Antibacterial efficacy against *S. aureus*

Among the three essential oils, Oregano had the highest overall antibacterial activity followed by Ylang Ylang while Frankincense had the least antibacterial effect against the bacteria.

The findings of research study correlate with the earlier studies, which reported that Oregano essential oil had high potent antimicrobial effects^[11, 12] against several microbial pathogens.

Impact of dilution: the difference in concentration presented differences in antibacterial activity of the essential oils. Higher concentrations of essential oils resulted in larger inhibition zones thus confirming a dose-dependent relationship between the concentration of essential oils and their antimicrobial efficacy.

CONCLUSION

This study demonstrates that essential oils of Ylang Ylang, Oregano, and Frankincense show antimicrobial activity against *S. aureus*. Among them, Oregano showed better potential as a natural antimicrobial agent. Therefore, this finding would also place on a better grade of further applications in food preservation and therapeutic uses.

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