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In vitro antibacterial activity of *Emblica officinalis* essential oil against *Staphylococcus aureus*

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ABSTRACT: The antibacterial effect of *Emblica officinalis* essential oil was investigated against *Staphylococcus aureus*. The solvents used for extraction of essential oil were methanol, dichloromethane, hexane and chloroform. *In vitro* antibacterial activity was performed by agar well diffusion method. The results obtained in the present study suggest that *Emblica officinalis* essential oil used the treatment of *Staphylococcus aureus* causing diseases.

Key words : Essential oil, antibacterial activity, solvent, *Emblica officinalis*, *Staphylococcus aureus*.

I. INTRODUCTION

Essential oils are natural aromatic compounds found in the seeds, bark, stems, roots, flowers, and other parts of plants. They can be both beautifully and powerfully fragrant. Essential oils have been in use for thousands of years. The Egyptians were some of the first people to use aromatic essential oil extensively in medical practice, beauty treatment, food preparation and in religions ceremony.The essential oils find wide and varied application in many industries such as cosmetics perfumes, beverage, ice creams,confectionary and backed food products etc (Asghari *et al.,* 2012).

Bacterial infection is a serious problem of India. Bacterial infection in hospital must be added to the problem of bacteria resistance to antibiotics. The most common antibiotic resistance bacteria are *S. aureus*. *Staphylococci* are facultatively anaerobic Gram positive cocci that occur in grape like clusters. Common infection caused by *S. aureus* including Boils and abacesses infection of the skin, Meningitis – infection of the membrane lining the brain, Pneumonia-infection of lung, Endocarditis- infection of the heart values, a hospital acquired infection also known as nosocominal infection is an infection whose development is favoured by a hospital environment such as one acquired by a patient during a hospital visit or one developing among hospital staff (Lowy, 1998).

Essential oils obtained from the aromatic plant. The plants derived medicine are relatively safer than synthetic drugs and offering profound therapeutic benefits by providing alternative and effective treatment for chronic disorder and various diseases (Burt, 2004).

Amla can grow in light as well as the heavy soils. It is grown under the tropical conditions. The Amla fruit is the richest source of Vitamin C and is a diuretic, aperient, Laxative and hair dye. It cures insomnia and is healthy for hair. It is used as the cardio protective useful in hemorrhage, menprrhagia, leucorrhoea and discharge of blood from uterus. Amla is show the antibacterial activity is used to treatment of chronic diseases.Amla power and oil are used traditionally in Ayurvedic applications for the treatment of scalp. Amla is also used to treat constipation and is used as a cooling agent to reduce the effects of sun strokes and sun burns (Bhattacharya *et al* .,1999).

The wide use of antibiotics in the treatment of bacterial infections has led to the emergence and spread of resistant strains. The emergence of multiple drug resistant bacteria (*S.aureus*) has become a major cause of failure of the treatment of infectious disease (Chao *et al*., 2008). These problems therefore necessitate a constant search for new antimicrobials agent. The purpose of study was to determine the efficacy of group of essential oil as antimicrobial agents for commercial purpose.

II. MATERIALS AND METHODS

Collection of plant material: Fresh fruit of *Emblica officinalis* was collected from Bhopal. Fruit part of plant was collected and dried at room temperature. The dried and ground plant part will be extracted with different solvent (hexane, dichloromethane, methanol, chloroform) by maceration for 3 days at room temperature.

Extraction of essential oil: Raw plant material consists fruits is put into distillation apparatus over water. As the water is heated the steam passes through the plant material, vaporizing the volatile compound. The vapour flow through a coil where they condense back to liquid which is then collected in the receiving vessel.

Microbial strains: In the present study, *Staphylococcus aureus* is taken as the test microorganism. The culture was maintained on nutrient agar slants and stored at 40^0C. Stock culture was subculture at regular intervals.

Agar well diffusion method: The antibacterial test of *Emblica officinalis* essential oil was tested on *S.aureus* using agar well diffusion method. 0.2 ml of a 24h broth culture of *S.aureus* spread using bent sterile glass rod on the surface of gelled sterile Nutrient agar medium. The essential oil of required concentration 25%, 50%, 75% were prepared by dissolving the oils into appropriate quantities of dimethyl sulfooxide. One well of 3.0 mm in diameter were aseptically punched or each agar plate using a sterile cork borer and 10µl of essential oil (at various concentration) were delivered into the well. 5% DMSO was used as negative control and Penicillin (5µl /ml), Gentamicin (5µl /ml) was used as positive reference standard to determine the sensitivity of the test strain.The plates were incubated 37°C for 24h and inhibition zones were measured.

III. RESULT AND DISCUSSION

The antibacterial activities of *Emblica officinalis* oil extract was examined and the results were shown in table 1.The results as shown in the table 1 clearly indicate that methanol extract was found most effective against *S. aureus.* Further , the results of *Emblica officinalis* oil extract obtained through varies extracts showed the following order methanol > dichloromethane> hexane > chloroform.

Table 1. In *vitro* antibacterial activity of *Emblica officinalis* essential oil was measured by the agar well diffusion method against *Staphylococcus aureus.*

Source	**Solvent**	***Staphylococcus aureus* Concentration of essential oil**		
		25% ZOI (mm)	**50% ZOI (mm)**	**75% ZOI (mm)**
Emblica officinalis	Methanol	9	20	7
	Dichloromethane	9	-	5
	Hexane	-	9	7
	Chloroform	8	6	-
Standard	Penicillin	21		
Standard	Gentamicin	17		

ZOI- Zone of inhibition

Data recorded in table 1showed that results of 50% concentration of methanol solvent fruit extract of *Emblica officinalis* oil exhibited maximum activity as 20mm compared to the different concentration of dichloromethane, hexane, chloroform solvent fruit extract of *Emblica officinalis* oil and standard antibiotics are Penicillin (5µl/ml) and Gentamicin (5µl/ml) against *Staphylococcus aureus*.

Antimicrobial resistance is an important concern for the public health authorities at global level. However, in developing countries like India, recent hospital and some community based data showed increase in burden of antimicrobial resistance (Vyas and Patil, 2011).

The most common antimicrobial resistance bacteria are *Staphylococcus aureus* found in environment. About 20% of the human populations are long term carriers of *S. aureus.* They are spherical, cocci, approximately 1µm in diameter arranged characteristically in grape like clusters. Cluster formation is due to cell division occurring in three planes with daughter cell tending to remain in close with daughter cell tending to remain in close proximity they are nonmotile and nonsporing (Sievert 2002.Wilkinson, 1997).

Bacterial infection from someone else who has been infected by an antibiotic-resistant strain, you too will now have an infection that may not respond to antibiotics. Without powerful antibiotics to destroy these bacteria, your health is at serious risk — and life-threatening complications may result.

The continues spread of multi drug resistant pathogens has become a serious threat to public health and a major concern for infection control practitioners worldwide. Thus, there is a need for discovery for new antimicrobial agents from natural sources including plants. Plants produce a diverse range of bioactive molecules making them rich source of different types of medicine.Medicinal plants and plants secretions such as essential oils are interesting for their antimicrobial potency and may be a solution to these preoccupants' problems (Salehi, 2005).

The essential oils represents a highly complex class of natural product chemistry having well defined role in the economic development of a country. Moreover, essential oils and extracts derived from plants have proved the useful in controlling bacterial diseases (Baratta *et al.,* 1998).

The present study showed that methanol solvent fruit extract of *Emblica officinalis* essential oil strong inhibitory effect against *S. aureus* compared to the other solvents extracts of essential oil and positive control Gentamicin.

IV. CONCLUSION

In concluded that the present investigation comes out with the fact that *Emblica officinalis* essential oil are required so that better, safe and cost effective drugs for treating *S. aureus* causing diseases.

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