

Antimicrobial Activity of Alcoholic Extract of Leaves and Flowers of *Madhuca Longifolia*

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Abstract- The alcoholic extract of leaves and flowers of *Madhuca longifolia* were screened for antimicrobial activities against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Aspergillus oryzae* and *Aspergillus niger*. In general, commercial antibiotic and antifungal drugs causes side effects. However, herbal remedies often do not produce any side effects. Therefore, alternative medicine become popular remedy to various types of ailments. In conclusion, *Madhuca longifolia* extracts have revealed significant antimicrobial activities against test organisms used for the study.

Index Terms- *Madhuca longifolia*, Antimicrobial.

I. INTRODUCTION

M*adhuca longifolia* (Koen.) Macbr. (Syn. *Bassia longifolia* J. Koenig ex. L. *M. longifolia* (Koen.) Macbr. var. *longifolia*) is a large, shady, deciduous tree, both wild and cultivated, dotting much of the Central Indian landscape. The tree is valued for its flowers, fruits, seeds and timber. The expectorant flowers are used to treat chest problems such as bronchitis. They are also taken to increase the production of breast milk. The distilled juice of the flowers is considered a tonic, both nutritional and cooling. The tree wins in fame due to the liquor distilled from the flowers, which is used to make vinegar. The leaves are applied as a poultice to relieve eczema. In Indian folk medicine, the leaf ash is mixed with ghee (clarified butter) to make a dressing for wounds and burns. Mahua preparations are used for removing intestinal worms, in respiratory infections, and in cases of debility and emaciation. The astringent bark extract is used for dental-related problems, rheumatism and diabetes.

II. MATERIALS AND METHODS

Plant material

Plant parts of *Madhuca longifolia* were collected from 25-30 year old trees, from a temple owned grove, in a Village, Rajendrum Arcot of Thanjavur district, Tamilnadu. The identity of the plant specimens was confirmed by the use of local Floras and standard references. The botanical identity was also authenticated by Dr.M.Jegadeesan, Professor and Head, Department of Environmental and Herbal Sciences, Tamil University, Thanjavur. Herbarium specimen of *Madhuca*

longifolia are deposited at Tamil University Herbarium (TUH288).

Preparation of extracts

Fresh leaves and flowers of *Madhuca longifolia* were collected and macerated with 50% ethanol for 7 days with occasional shaking to get alcoholic extracts. The alcoholic extracts were concentrated in a rotary flash evaporator and dried in desicator.

Antimicrobial activity

Antibiotics are an essential part for combating harmful bacterial infections *in vivo*. During the last decade, infectious diseases have played a significant role in the death of millions around the world, especially in developing countries like India. Because of the mutagenic nature of bacterial DNA, the rapid multiplication of bacterial cells and the constant transformation of bacterial cells due to plasmid exchange and uptake, pathogenic bacteria continue to develop antimicrobial resistance, thus rendering certain antibiotics useless. An increased number of pathogens have also developed resistance to multiple antibiotics (Multiple Drug Resistance), threatening to develop complete immunity against all antimicrobial agent and therefore be untreatable. Thus search for novel antimicrobial agents is of the utmost importance.

Plants have been used for centuries as remedy for human disease because they contain components of therapeutic values. They are natural sources of antimicrobial agents primarily because of the large biodiversity of such organisms and the relatively large quantity of metabolites that can be extracted from them. The acceptance of these traditional medicines alternative form of health care has lead researchers to investigate the antimicrobial activity of medicinal plants. A lot of work has been done which aim at knowing the different antimicrobial and phytochemical constituents of medicinal plants and using them for the treatment of microbial infections as possible alternatives to chemically synthetic drugs to which infectious microorganisms have become resistant. The present study was aimed at evaluating the antimicrobial properties of *Madhuca longifolia* extracts using *in vitro* models.

III. DETERMINATION OF ZONE OF INHIBITION

The paper disc diffusion method was used to determine the antimicrobial activities with alcoholic extracts of *Madhuca longifolia*. Muller Hinton Agar media was prepared, sterilized and used as the growth medium for bacterial culture. 20 ml of the

sterilized medium was poured into each sterilized Petri dish, covered and allowed to solidify. The plates were then seeded with the test organism (bacterial culture) by sterile cotton swabs.

For fungal culture Sabouraud Dextrose Agar was prepared and transferred into sterile Petri plates and solidified. The medium plates were then swabbed with fungal culture. The sterilized paper discs were soaked in the prepared solutions of the extracts with different solvents and were dried at 50°C. The dried paper disc was then placed on both plates (Muller Hinton and Sabouraud Dextrose agar) seeded with test micro organisms. The plates were then incubated for bacterial culture at 37°C for 24 hours and for fungus the plates were incubated at room temperature for 48 hours and the zone of inhibition were measured.

IV. PREPARATION OF TEST SOLUTION

The alcoholic extracts of *Madhuca longifolia* were prepared in 5 successive dilutions namely.

50 µg/ml

100 µg/ml

150 µg/ml

200 µg/ml

250 µg/ml

and were subjected to antibacterial and antifungal activities.

V. ORGANISMS USED

Bacteria

Gram positive

Staphylococcus aureus

Bacillus subtilis

Gram negative

Escherichia coli

Pseudomonas aeruginosa

Fungi

Aspergillus oryzae

Aspergillus niger

ANTIBIOTIC DISCS

Ciprofloxacin 5 µg/disc - bacteria

Clotrimazole 10 µg/disc - fungi.

VI. RESULT AND DISCUSSION

Alcoholic extracts of leaves and flowers of *Madhuca longifolia* were screened for antimicrobial activities against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Aspergillus oryzae* and *Aspergillus niger* at dose level ranging from 50 µg/ml to 250 µg/ml (Table 1)

Alcoholic extracts of *Madhuca longifolia* leaves inhibited all the bacterial strains tested. All the doses (50 µg/ml to 250 µg/ml) showed zone of inhibition against all the bacteria, even at a dose of 50 µg/ml of extract exhibited significant zone of inhibition comparable to standard antibiotic (ciprofloxacin) against *B. subtilis*. For *S. aureus* leaf extract exhibited maximum

inhibition (20 mm) which was greater than that of standard. For all other bacteria 100 µg/ml concentration of the extract was sufficient to produce effective inhibition. Alcoholic extract of *Madhuca longifolia* leaves also effectively inhibited growth of two fungi (*A. oryzae* and *A. niger*) comparable and even more than that of standard antifungal agent Clotrimazole. For *A. oryzae* 100 µg/ml concentration produced equal inhibition as that of standard. And for *A. niger*, 150 µg/ml concentration revealed equal inhibition as that of standard.

Alcoholic extracts of *Madhuca longifolia* flowers also showed effective inhibition against all the bacteria and fungi tested. At 50 µg/ml concentration, flower extract showed effective inhibition as that of standard drug against *B. subtilis* and *P. aeruginosa*. For *S. aureus* the extract gave maximum inhibition at 100 µg/ml concentration. Against *E. coli* 150 µg/ml concentration showed maximum inhibitory zone. Flower extract of *Madhuca longifolia* showed maximum inhibitory activity against *A. oryzae* at 100 µg/ml concentration while against *A. niger* at 150 µg/ml concentration which were comparable to standard antifungal agent Clotrimazole. Thus both leaves and flowers of alcoholic extracts of *Madhuca longifolia* were found to be inhibitory against all the bacteria and fungi tested.

Antibacterial and antifungal activities of alcoholic extracts of leaves and flowers of *Madhuca longifolia* could be attributed to the presence of biological compounds like 2-Furan methanol, 4H pyran 4-one, 2,3-dihydro 3,5-dihydroxy-6-methyl, Thiophene, 2-Furancarboxyaldehyde-5-(hydroxymethyl) and 1,4-tetra decanediol

The use of medicinal plants play a vital role in covering the basic health needs in developing countries and these plants may offer a new sources of antibacterial, antifungal and antiviral agents with significant activity against infective microorganisms

VII. CONCLUSION

The present study indicate that madhuca longifolia extracts have broad inhibitory activities to pathogenic microorganism and to act as potential antimicrobial agent from natural sources. In general, commercial antibiotic and antifungal drugs causes side effects such as liver, kidney and gastrointestinal tract toxicity. Severe hepatotoxicity had also been reported in patients undergoing antifungal drug therapy. However, herbal remedies often do not produce any side effects. Therefore, alternative medicine become popular remedy to various types of ailments. In conclusion, *Madhuca longifolia* extracts have revealed significant antimicrobial activities against test organisms used for the study.

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Table 1

Antimicrobial activity of alcoholic extract of leaves and flowers of *Madhuca longifolia*

S. No.	Name of the organisms	Zone of Inhibition (mm)										Standard (Ciprofloxacin/Chlotrimazole)
		<i>Madhuca longifolia</i> (leaves)					<i>Madhuca longifolia</i> (flowers)					
		A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	
1.	<i>Staphylococcus aureus</i>	10	12	15	18	20	10	12	10	10	10	18
2.	<i>Bacillus subtilis</i>	10	15	15	15	15	10	10	10	10	10	10
3.	<i>E. coli</i>	8	10	10	10	10	5	5	8	8	8	10
4.	<i>Pseudomonas aeruginosa</i>	10	10	10	10	15	10	10	8	10	10	15
5.	<i>Aspergillus oryzae</i>	5	10	10	10	10	10	10	10	15	15	10
6.	<i>Aspergillus niger</i>	5	5	10	10	10	8	8	10	10	10	8

A1-50 µg/ml of *Madhuca longifolia* leaves B1-50 µg/ml of *Madhuca longifolia* flowers
 A2-100 µg/ml of *Madhuca longifolia* leaves B2-100 µg/ml of *Madhuca longifolia* flowers
 A3-150 µg/ml of *Madhuca longifolia* leaves B3-150 µg/ml of *Madhuca longifolia* flowers
 A4-200 µg/ml of *Madhuca longifolia* leaves B4-200 µg/ml of *Madhuca longifolia* flowers
 A5-250 µg/ml of *Madhuca longifolia* leaves B5-250 µg/ml of *Madhuca longifolia* flowers