

Antimicrobial investigation on *Morinda tomentosa* Heyne ex Roth.

S.P. Rothe^{1*}, A.S. Pethe², K.V. Kothale³

¹Associate Professor, P.G Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola, India

²P.G Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola, India

³Assistant Professor, Department of Botany, GVISH Amravati, India

Abstract

Ayurveda is the traditional system of medicine widely practiced in India and was popular before the advent of modern medicine. Modern medical science considered that microbes are believed to be primary causative agents of various diseases. Medicinal plants have been an important source of drug for treatment of diseases. The species of *Morinda tomentosa* was collected from Akola district of Vidarbha region. Plant extract like leaves and fruit extract was studied for its antimicrobial activity against human pathogens. In present investigation six clinical isolates bacteria were studied for their susceptibility to leaf and fruit extract. Among six pathogens *Staphylococcus aureus* and *K. pneumoniae* were highly sensitive to *M. tomentosa* leaf and fruit extract.

Keywords: Antimicrobial activity, *Morinda tomentosa* Heyne ex Roth

INTRODUCTION

Genus *Morinda* belongs to family Rubiaceae. *Morinda tomentosa* is commonly found in our region, which well adapted to drier conditions with densely tomentose leaves. In Ayurveda, Unani medicines root fruit leaves and bark are used in different preparation (Parihar & Bohra, 2006). Many antibiotics of microbial origin and of the chemotherapeutic agents are employed for treatment of bacterial diseases in modern medical science. Microorganisms have remarkable resistance capacity to survive under unfavorable condition. The major critical problem is the development of antibiotic drug resistance especially in bacteria. Multidrug resistance also occurs in many bacteria (Chopra, 2002). Many antibiotics producing adverse effects on human health. Herbal medicines are now a day's very popular. It does not have any side effect (Nadkarni, 2000). Considering the development of drug resistance among bacteria and high cost of antibiotics it's adverse effect alternative antibacterial herbal drug is required to introduce). In present investigation *M. tomentosa* was undertaken for its antimicrobial activity. This plant has various medicinal uses. The plant extract show different antibacterial activity (Rao and Reddy, 2006).

The plant contain phenolics, acetyl choline, 6- sitosterol, capric acid, (Rastogi and Mehrotra, 1993). Plant extract contains health enhancing attributes that are antibacterial and anti-inflammatory compounds (Marcus *et al.*, 2003).

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*Corresponding Author

S.P. Rothe

Associate professor, P.G Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola, India

Tel: +91-9822239825

Email: srothe@rediffmail.com

MATERIAL AND METHODS

The healthy leaves and fruits of *Morinda tomentosa* was collected from the forest of Vidarbha. Around 100 gms of each were selected for extraction of bio-constituents. The plant material was washed by using sterilized water, to prepare water extract. The washed material was also shade dried. After drying the plant material was powdered by using electric blender. The grounded powder was used for testing antimicrobial activity. The water extracts were prepared by using 10 gms of dried powdered of leaves and fruits in 100 ml. Sterilized distilled water. Then extracts were filtered through Whatmann no.1 filter paper.

The extracts were allowed to dry using rotary evaporator and the concentration was preserved at 7°C temperature in freeze. The soared required concentration by dissolving it in same solvent to test antimicrobial activity by cup plate method.

Cup plate method: In this method pure culture of clinical isolates were inoculated in cooled sterilized nutrient broth. Broth tubes were incubated at 37°C for 24 hours. Then these fresh cultures were applied on agar plates with the help of sterilized cotton swab. Cup of about 5 mm diameter were cut in the medium with sterile cork borer. A drop of melted agar was added to seal the bottom of the cup and filled with the 10, 50, 100 / μ ? lit. Plant extract by micropipette.

The plates were incubated at 37°C and observed for zone of inhibition showing antibacterial activity. Minimum inhibitory concentration (MIC) was decided by above method by using different concentration of plant extract.

OBSERVATION AND RESULTS

Antibacterial activity on fresh and dried leaves extracts of *Morinda tomentosa* were carried out.

Table -1 Antibacterial activity of fresh and dried leaves extract of *Morinda tomentosa*

S.N.	Name of bacteria	Zone of inhibition in mm.	
		Fresh leaves	Dried leaf powder
1.	<i>Saccharomyces aureus</i>	26	20
2.	<i>P. vulgaris</i>	22	19
3.	<i>P. aeruginosa</i>	20	16
4.	<i>E. coli</i>	18	14
5.	<i>S. typhi</i>	16	12
6.	<i>K. pneumoniae</i>	24	21

Table -2: Antibacterial activity of fruit extract of *Morinda tomentosa*

S.N.	Name of bacteria	Zone of inhibition in mm.	
		Fresh	Dried
1.	<i>S. aureus</i>	25	10
2.	<i>P. vulgaris</i>	23	00
3.	<i>P. aeruginosa</i>	20	00
4.	<i>E. coli</i>	18	00
5.	<i>S. typhi</i>	20	00
6.	<i>K. pneumoniae</i>	22	08

Table - 3: Minimum inhibition concentration

S.N.	Name of bacteria	Zone of inhibition (diameter in mm) <i>M. tomentosa</i>									
		Concentration of leaves extract ug/ml					Concentration of fruit extract ug/ml				
		10	25	50	100	150	10	25	50	100	150
1.	<i>S. aureus</i>	---	---	---	21	24	---	---	06	20	22
2.	<i>S. typhi</i>	---	---	8	16	22	---	---	---	19	18
3.	<i>P. vulgaris</i>	---	---	---	13	20	---	---	---	18	18
4.	<i>P. aeruginosa</i>	---	---	---	10	18	---	---	---	15	16
5.	<i>E. coli</i>	---	---	---	09	16	---	---	---	17	14
6.	<i>K. pneumoniae</i>	---	---	10	14	17	---	---	---	14	18

Table - 4: Multidisc antibiotics sensitivity method antibiogram of bacteria

S. N.	Name of bacteria	Ch.	Cd	Co	E	G	Of	P	Va
1	<i>S. aureus</i>	12	15	16	16	14	15	19	19
2	<i>S. typhi</i>	---	17	25	15	14	10	---	---
3	<i>P. vulgaris</i>	---	---	---	---	21	---	---	---
4	<i>P. aeruginosa</i>	---	---	10	---	---	---	---	---
5	<i>E. coli</i>	---	14	12	---	15	20	---	---
6	<i>K. pneumoniae</i>	---	11	---	---	16	---	---	---

Note: (--- = Nil), Ch= Cephalothin (30mcg), G = Gentamycin (10mcg), Cd= Clindamycin (2mcg), Of = Ofloxacin (1mcg), Co = Co-Trimoxazole (25mcg), P = Penicillin G (10 units), E=Erytromycin (15 mcg), V=Vanomycin (30mcg).

DISCUSSION AND CONCLUSION

Table -1

For present investigation clinical isolates were used to test antibacterial activity of *Morinda tomentosa*. Six bacterial species were selected for study. Fresh and dried decoction of *M. tomentosa* leaves and fruits were used for cup plate method. The leaf extract showed active ability to inhibit all six species of bacteria. The most susceptible bacteria to fresh leaf extract were *S. aureus* and *K. pneumoniae* while rest of the bacteria showed moderate activity to fresh and dried leaves extract (100 u/l).

Table -2

Antibacterial activity of fruit extract of *Morinda tomentosa* i.e. fresh and dried fruit was noted. For fresh fruit extract *S. aureus*, *P. vulgaris* and *K. pneumoniae* showed highest sensitivity. While *E. coli*, *S. typhi* and *P. aeruginosa* were susceptible. In case of dried fruit extract mild inhibitory action was noted against *S. aureus* and *K. pneumoniae* negative result was recorded the bacteria *P. vulgaris*, *P. aeruginosa*, *E. coli* and *S. typhi*. The antibacterial test results of leaf and fruit extract are shown in table 1, 2, 3.

Table - 3

Antibacterial activity of fresh leaves, fruit and dried leaves, fruit was studied by MIC method against six bacterial species. In present study 100 & 150 ug/ml concentration of plant extract (leaves & fruit) was with maximum activity against all the bacteria while 50ug/ml was moderately active against two bacterial species. In effective concentrations were 10ug/ml. and 25 ug/ml in both leaves and fruit extract against all six species of bacteria.

Table - 4

Multidisc antibiotic sensitivity method was performed for calibration with standard antibiotic. The octadisc diffusion method was implemented to study the standard antibiogram of six bacterial species. Zone size was measured in millimeters after 24 hours incubation. Maximum sensitivity was shown by *S. aureus* against all antibiotics. All six species of bacteria were resistant to Penicillin and Vancomycin.

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