

## Research Article

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## In-vitro antimicrobial activity of methanolic extract of *Ficus racemosa* Linn. fruits

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### Abstract

The antimicrobial activity methanol extracts of *Ficus racemosa* Linn., belonging to the family Moringaceae, was determined in vitro, using disc diffusion method against human pathogenic bacteria fungi. The displayed a potential antibacterial activity against all the tested four Gram negative and Gram positive bacteria: *Staphylococcus aureus*, *Bacillus subtilis*, *Vibrio cholera*, *Bacillus cereus*, *Salmonella typhi*, *Shigella dysenteriae*, *Pseudomonas aeruginosa*, *Klebsiella species* and *Proteus species* as well four fungi: *Alternaria spp.*, *Colletotrichum spp.*, *Curvularia spp.* and *Fusarium spp.* The highest zone of inhibition was found in the concentration of 200 µg/disc for *Staphylococcus aureus* (18mm) and in the concentration of 150 µg/disc for *Fusarium spp.* (12mm). The consequences of this investigation suggest that the extracts of *Ficus racemosa* can be used to discover antibacterial agent for developing new pharmaceuticals to control studied human pathogenic bacteria responsible for severe illness.

**Keywords:** *Ficus racemosa* Linn, Antimicrobial, Disc Diffusion and Atifungal.

### Introduction

Due to availability in the local area of Chittagong, the medicinal plant *Ficus racemosa* was chosen for study. Its medicinal values have been well documented in traditional and folklore medicine. Many *Ficus* species have long been used in folk medicine as astringents, carminatives, stomachics, vermicides, hypotensives, anthelmintics and anti-dysentery drugs.<sup>1</sup> *Ficus racemosa* Linn. (Family; Moraceae) is used in traditional system of medicine for the treatment of several disorders. It is one of the herbs mentioned in all ancient scriptures of Ayurveda, Siddha, Unani and Homeopathy. Various plant parts such as bark, root, leaf, fruits and latex are used as astringent, carminative, vermifuge and anti-dysentery. It is believed to be a good remedy for visceral obstructions and extract of the fruit is used in leprosy, diarrhea, circulatory and respiratory disorders and menorrhagia.<sup>2, 3, 4</sup>

Roots of *Ficus racemosa* are used in dysentery, pectoral complaints, diabetes, applied in mumps, other inflammatory glandular enlargements. They act as a powerful tonic. According to Ayurveda, roots are useful in hydrophobia.<sup>5, 6, 7</sup> Bark is acrid, cooling, galactagogue and good for gynaecological disorders. The stem bark is used to treat menorrhagia, leucorrhoea, gonorrhoea, urinary diseases, hemorrhage and skin diseases.<sup>8</sup> The bark is also used for the treatment of dysentery.<sup>6, 7, 9, 10</sup> The bark is highly efficacious in threatened abortion and also recommended in urological disorders, diabetes, hiccough, leprosy, asthma and piles.<sup>8</sup>

According to Unani system of medicine, the leaves are astringent to bowels and good in case of bronchitis. The leaves are used to treat dysentery, bilious infection and as a mouthwash in spongy gum.<sup>11</sup> The tender leaf buds are applied on the skin, in the form of paste, to improve the complexion. A decoction of the leaves is a good wash for wounds and ulcers. The infusion of bark and leaves is also employed as a mouth wash to spongy gums and internally in dysentery, menorrhagia, effective remedy in glandular swelling, abscess, chronic wounds, cervical adenitis and haemoptysis.<sup>8</sup> Hence, the present study was undertaken specifically to investigate the antimicrobial and antifungal activity of sequential extracts of *Ficus racemosa* Linn. fruits.

## Materials and Methods

### Plant materials

The fruits of *Ficus racemosa* were collected during March 2010 from the local market in Bahadderhat Bazar of Chittagong city, Chandanish pourashava, and Bagichar hat, Chandanish, Chittagong and identified by National Herbarium, Mirpur, Dhaka-1216, Bangladesh.

### Extraction

The fruits *Ficus racemosa* were cut in ½ inches and dried in air and finally in a mechanical dryer at 60-70°C. The dried samples were ground to a coarse powder with a mechanical grinder and extracted with methanol for 7 days with occasional shaking in a beaker. The extract was filtered. The filtrate was dried at 50°C to 60°C and the yielded percentage was calculated.

### Bacterial Media (Agar Media)

36g Nutrient Agar Media was mixed with distilled water and then sterilized in an autoclave at 15lb pressure for 15 minutes. The sterilized media were poured into petri dishes. The solidified plates were bored with 5mm diameter cork bearer. The plates with wells were used for the antibacterial studies.

### Fungal Media (Potato dextrose sugar)

200g of potato slices were boiled with distilled water. The potato infusion was used as a water source for media preparation. 20g of dextrose was mixed with potato infusion. 20g of agar was added as a solidifying agent. These constituents were mixed and autoclaved. The solidified plates were bored with 6mm diameter cork

borer. The plates with wells were used for antifungal studies.

### In Vitro Antimicrobial screening

The antimicrobial activity of the compounds *Ficus racemosa* Linn, were measured by disk diffusion.<sup>12, 13</sup> The prepared culture plates were inoculated with different selected strains of bacteria and fungi using the streak plate method. Wells were made on the agar surface with 6mm cork borer. The extracts were poured into the well using sterile syringe. The plates were incubated at 37°C±2°C for 24 hours for bacterial and 25±2°C for 48 hours for fungal activity. The plates were observed for the zone clearance around the wells.

The methanol extract was dissolved in sterile distilled water to form dilution such as 100µg, 150µg and 200µg. Each concentration of the plant extract was tested against different bacterial pathogens and fungal species. The zone of inhibition was calculated by measuring the diameter of the inhibition zone around the well (in mm) including the well diameter.

## Results

The present study showed that fruit extract of *Ficus racemosa* Linn (methanol extract) exhibited both antimicrobial activity and antifungal activity against the tested microorganisms and fungi at the concentrations of 100, 150 and 200µg/disc. The potential sensitivity of the extract was obtained and the zone of inhibition was recorded and presented below in the tabulation drawn in Table 1 (antimicrobial activity) and Table 2 (antifungal activity).

**Table 1:** In vitro Antimicrobial activity of the methanol extract of *Ficus racemosa* Linn. fruits

Name of the Bacteria	Zone of inhibition in mm			
	Kanamycin (standard)	<i>Ficus racemosa</i> Linn.		
	30µg/disc	100µg/disc	150µg/disc	200µg/disc
<i>Staphylococcus aureus</i>	30 mm	12	15	18
<i>Bacillus subtilis</i>	29 mm	11	13	16
<i>Vibrio cholera</i>	25 mm	11	12	15
<i>Bacillus cereus</i>	28 mm	12	14	16
<i>Salmonella typhi</i>	30 mm	11	14	16
<i>Shigella dysenteriae</i>	32 mm	13	15	17
<i>Pseudomonas aeruginosa</i>	27 mm	12	14	17
<i>Klebsiella species</i>	29 mm	12	14	16
<i>Proteus species</i>	24 mm	11	13	15

**Table 2:** In vitro Antifungal activity of the methanol extract of *Ficus racemosa* Linn. fruits

Name of the Fungi	Zone of the inhibition in mm		
	Nystatin (Standard)	<i>Ficus racemosa</i> Linn	
	30µg/disc	100µg/disc	150µg/disc
<i>Alternaria spp.</i>	30mm	5	8.5
<i>Colletotrichum spp.</i>	25mm	0	8
<i>Curvularia spp.</i>	29mm	10	11
<i>Fusarium spp.</i>	30mm	10	12

## Discussion

At different concentrations (100, 150 and 200 µg/disc) of methanolic extracts showed sustained activity against all the tested bacterial strains and fungi. Though, the highest activity observed was against *Staphylococcus aureus* at concentrations of 200 µg/disc having 18 mm in diameter. However, The fruit extract of *Ficus racemosa* showed a broad-spectrum antibacterial activity with a zone of inhibition of 11 to 18 mm. The activity observed of standard drug, Kanamycin was found higher than these active concentrations showing 24-30 mm in diameter against all the tested bacterial strains. Moreover, the extract was also active against fungal species. However, the extract showed maximum against *Fusarium spp.* fungal

strains. The activity of methanolic extract was found lowest against *Colletotrichum spp.* having zone of inhibition 0 and 8 mm at concentrations of 150 and 200 µg/disc respectively.

The entire data suggested that the methanolic extract of *Ficus racemosa* fruits was active against all the microbes against which standard (Kanamycin and nystatin) was found to have maximum activity. Therefore, more studies need to be conducted to search for new compounds responsible for their antimicrobial activity. Our results revealed the importance of the *F. racemosa* aqueous as well as ethanolic extracts when associated with antibiotics, to control resistant bacteria, which are becoming a threat to human health.

## Conclusion

From the observations made, the extract of *Ficus racemosa* was found to show antimicrobial activity when compared to the standard drug. Results of antimicrobial assay showed that the methanol extract of the plant possesses inhibitory activity at all concentration tested against all bacterial strains and the fungal strain used for the experiment. The results suggest that *Ficus racemosa* fruits are very promising as an antimicrobial agent with special reference to *Staphylococcus aureus* infections as three concentrations of methanol extract was active against this bacterial strain. This antimicrobial profile of *Ficus racemosa* fruits can be exploited for developing a novel antimicrobial agent of high potential. Plants are an important source of potentially useful structures for the development of new chemotherapeutic agents.

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