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## RESEARCH ARTICLE

### Evaluation of antimicrobial activity of *Luffa acutangula* (L.) Roxb. var. *amara* (Roxb.) Clarke

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#### Abstract

*Luffa acutangula* var. *amara* was used in skin and in stomach infections in folk medicines. To validate this use the *in vitro* antimicrobial activity of methanolic and aqueous extracts of different plant parts like fruits, leaves, roots and seeds of *L. amara* were evaluated against selected microorganisms named *E. coli*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Proteus vulgaris*, *Candida albicans*, *Aspergillus niger*, and *fusarium species*, etc. by well diffusion assay. Methanolic and aqueous extracts of different plant parts showed antimicrobial activity at significant levels. The maximum inhibition was recorded for methanolic fruit extract with certain exceptions.

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#### Introduction

Most people in the rural areas of the world depend largely on the herbs for the treatment of several ailments because medicinal herbs constitute indispensable components of tradition medicine practice due to low cost, easy access and ancestral experience (Davis, 1982). Inflammatory responses are mostly associated with pathological disorders (Dapkevicius, 1998). Even today, plant materials continue to play a major role in primary health care as therapeutic remedies in many developing countries (Zakaria, 1991). In last three decades numbers of new antibiotics have produced, but clinical efficiency of these existing antibiotics is being threatened by the emergence of multi drug resistant pathogens (Bandow *et al.*, 2003). According to World Health Organization (WHO) medicinal plants would be the best source to obtain a variety of drugs (Santos *et al.*, 1995). Antibiotic resistance has become a global concern (Westh *et al.*, 2004). Growing concern regarding search for new antimicrobial substances from different sources like the medicinal plants, number of plant families have been screened out up till now. A number of studies have been reported dealing with antimicrobial screening of extracts of medicinal plants (Perumalsamy *et al.*, 2000). The screening of plant extracts and plant products for antimicrobial activity has shown that higher plants represent a potential source of novel antibiotic prototypes (Afolayan, 2003). Family Cucurbitaceae is the most useful and ancient family. The family Cucurbitaceae comprises members that are cultivated throughout the world as source of food, fiber and indigenous medicines (Nayar and More, 1998). *Luffa acutangula* var. *amara* commonly known as 'ridge gourd' in English and 'kadu dodaka' in Marathi, belonging to family Cucurbitaceae is an annual herb found in all parts of India, especially along the costal lines. The plant is used as a laxative, carminative. It is used to cure *Vata*, *Kapha*, liver complaints, leucoderma, piles etc. (Chopra *et al.*, 1986). It is used as a bitter tonic. The plant has pharmacological actions like demulcent, diuretic, bitter tonic, nutritive and expectorant (Biswas and Ghosh, 1973). All parts of plant are strictly bitter. The current study is based on screening of antibacterial and antifungal activities of methanolic and aqueous extracts of different plant parts like leaves, roots, fruits and seeds against selected microorganisms named *E. coli*, *Staphylococcus aureus*, *klebsiella pneumonia*, *Proteus vulgaris*, *Candida albicans*, *Aspergillus niger*, and *fusarium species*, etc.

#### Material and Methods

##### Plant collection

The plant materials including roots, leaves, fruits and seeds of *Luffa acutangula* var. *amara* were collected from Aachara, Sindhudurga district, Maharashtra, India. The materials are washed thoroughly and cleaned. Materials are shade dried and powdered. The powders are extracted in distil water and methanol by following standard methods.

**Microorganisms used:**

The following bacterial and fungal strains were obtained from National Chemical Laboratory, Pune, India. *E. coli* (NCIM2849), *Staphylococcus aureus* (NCIM2602), *Klebsiella pneumonia* (NCIM2719), *Proteus vulgaris* (NCIM2813), *Candida albicans* (NCIM3100), *Aspergillus niger* (NCIM501), and *fusarium species* (NCIM894), etc.

**Experimental setup:**

To validate medicinal potential of the species, the *in vitro* antimicrobial activity of the methanolic and aqueous extracts of fruits, leaves, seed and root of *Luffa acutangula* (L).var. *amara* (Roxb) were studied against bacteria and different fungal strains. The inhibition zones obtained are recorded in tables. The suspensions of above listed microbes were prepared in nutrient broth under aseptic conditions and kept for incubation in incubator at 37°C for 24 hrs. The agar plates were prepared by using two types of agars nutrient agar for bacteria and Sabourds agar for fungi. The antimicrobial activities were screened by well diffusion method.

**Results**

The antimicrobial activity of *Luffa acutangula* var. *amara* was proved effective against different microorganisms. The results were recorded in Table 1 (showing antibacterial activity) and Table 2 (showing antifungal activity). The methanolic extract of seed possessed more inhibitory action against *E.coli* and *Staphylococcus aureus*. The methanolic extracts of fruit and leaves were showing inhibition of *Klebsilla pneumonia*. Methanolic extracts of fruit and root were effective against *Fusarium sp.* as compared to other plant parts. Both aqueous and methanolic extracts of leaf proved inhibitory in action against *Aspergillus niger*. Seeds showed least antifungal properties. Antimicrobial activity seemed solvent dependent, with methanolic extract it was most potent and in aqueous extract the least.

**Table: 1 Study of Antibacterial activity of *Luffa acutangula* var. *amara***

\*(Results given are mean of three replicates).

Plant part used	Medium of extract	Zone of inhibition (mm)			
		<i>Escherichia coli</i>	<i>Staphylococcus aureus</i>	<i>Klebsiella pneumonia</i>	<i>Proteus vulgaris</i>
Fruit	Aqueous	5.00	4.00	Nil	4.00
	Methanolic	3.00	7.00	8.00	3.00
Leaf	Aqueous	6.00	Nil	Nil	1.00
	Methanolic	5.00	3.00	7.00	1.00
Seeds	Aqueous	7.00	7.00	Nil	Nil
	Methanolic	9.00	6.00	Nil	Nil
Roots	Aqueous	Nil	2.00	3.00	3.00
	Methanolic	2.00	Nil	1.00	3.00

**Table: 2 study of Antifungal activity of *Luffa acutangula* var. *amara***

\*(Results given are mean of three replicates).

Plant part used	Medium of extract	Zone of inhibition (mm)		
		<i>Candida albicans</i>	<i>Aspergillus niger</i>	<i>Fusarium sp.</i>
Fruit	Aqueous	6.00	Nil	4.00
	Methanolic	2.00	Nil	9.00
Leaf	Aqueous	1.00	11.00	Nil

	Methanolic	Nil	13.00	Nil
<b>Seeds</b>	Aqueous	Nil	1.00	Nil
	methanolic	Nil	Nil	2.00
<b>Roots</b>	Aqueous	Nil	Nil	7.00
	Methanolic	3.00	Nil	13.00

## Discussion

Use of ethno-pharmacological knowledge is one attractive way to reduce empiricism and enhance the probability of success in new drug-finding efforts (Patwardhan, 2005). The synthetic drugs are not only expensive and inadequate for the treatment of diseases but also often with adulterations and side effects. Therefore, there is need to search new infection fighting strategies to control microbial infections (Menghani *et al.*, 2011). The ethanol and ethyl acetate extracts of *Luffa operculata* and *Peltophorum. pterocarpum* can be used as herbal medicines in the control of *E. coli* and *S. aureus* induced medical diseases, following clinical trials (Jagessar, 2007). *Luffa* is one of the important genera of family. Different species of *Luffa* are screened by researcher for their medicinal potential. Antibacterial and antifungal activity of leaf extracts of *Luffa operculata* is effective against *Candida albicans*, *Staphylococcus aureus* and *Escherichia coli*. Petroleum ether extract (i.e. crude extract) of fruits of *Luffa cylindrica* exhibited mild to moderate antimicrobial activity (Kottai Muthu *et al.*, 2009). *Luffa cylindrica* seed extracts and oil possess good anti inflammatory, Bronchodilator and antimicrobial activity. (Muthumani *et al.*, 2010) On the same basis different plant parts of *Luffa acutangula* var. *amara* are screened for antimicrobial activity. The results clearly indicate that *Luffa acutangula* var. *amara* has significant antimicrobial activity.

## Conclusion

The results of the above study clearly demonstrate that the Methanolic extract of *Luffa acutangula* var. *amara* exhibit moderate antibacterial and anti fungal activities which might be helpful in preventing the progress of various infectious diseases and can be used in alternative system of medicine. The bioactive principle will be identified and characterization will be done based on their chemical nature. The ecological and pharmacognostic studies are under progress.

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