

Antimicrobial activity of various extracts of *Mucuna pruriens* leaves

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ABSTRACT

The antimicrobial activity of hexane, chloroform and methanol extracts from *Mucuna pruriens* leaves has been evaluated, *invitro* against *Xanthomonas compestris*, *Agrobacterium rhizogenes*, *Pseudomona aeruginosa*, *Alternaria solani*, *colletotricum capsici*, *Rhizoctonia solani*, *Penicillium expansium*, *Fusarium oxysporum*, *Ustilago maydis* and *Curvalaria lunata*. All extracts except *Mucuna Pruriens* leaves exhibited antimicrobial activity against different species of bacteria and fungi. But hexane extract does not showed any effect on bacteria tested the methanol extract of *Mucuna Pruriens* showed highest antimicrobial activity against all the bacterial and fungal species tested. Whereas chloroform extracts showed moderate antimicrobial activity against both bacterial and fungal species. The results of present study indicate that *Mucuna Pruriens* plant may be a good candidate as antimicrobial agent.

Key words: *Mucuna Pruriens*, antimicrobial activity, Microorganisms.

INTRODUCTION

Microbial infections pose a health problem throughout the world with the alarming increase in the rate of infection by antibiotic resistant microorganisms⁷. The increasing resistance of most synthetically derived antimicrobial agents in of utmost concern. The development of drug resistance in human pathogens against commonly used antibiotics has necessitated a search for new antimicrobial substances from other sources including plants¹³. The WHO has also recommended the evaluation of the effectiveness of plants in conditions where we lack safe modern drugs. Evaluation of antimicrobial medicinal plants in essential because phototherapy is cheaper and locally available.

Mucuna pruriens (Linn.) belongs to Fabaceae, commonly known as common cowhage, cowhage, kavach, velvet bean, kapikachhu and naikaranam. It is an indigenous leguminous plant,

is well known for producing itch. It is one of the most popular drugs in the Ayurvedic system of medicine. All parts of *Mucuna pruriens* posses valuable medicinal properties³. The roots are bitter, sweet thermogenic, emollient, stimulant, purgative and diuretic. The seeds are astringent, laxative, antihelmentic, alexipharmic and tonic²². The leaves are broadly ovate, elliptic or rhomboid ovate, unequal at base. Leaves used as Aphrodisiac, antihelmentic, tonic and are useful in Stomach ulcers, Inflammation, Helminthiasis, Cephalalgia and general debility²¹. *Mucuna pruriens* posses a wide range of pharmacological activities such as anti inflammatory¹² neuroprotective activity¹⁶ anti oxidant activity²³ anti diabetic^{7,8} anti protozoal activity¹⁹ antimicrobial activity¹⁰. Therefore, in the present investigation efforts have been made to study the antimicrobial activity of hexane, chloroform and methanolic extracts from *Mucuna pruriens* leaves against various bacterial and fungal species *in vitro*.

MATERIAL AND METHODS

Collection of plant material

Fresh leaves of *Mucuna pruriens* were collected from Bhimavaram, West Godavari District, Andhra Pradesh. The leaves were washed thoroughly with running tap water, shade dried and grinded to powder using a table model grinder. Sieving method was used to separate the fine plant powder and stored in air tight bottle.

Preparation of extracts

Plant extracts were prepared accordingly to the method of Alade and Irobi² with little modification. 10gms shade dried, powdered plant material were soaked separately in 100ml of hexane, chloroform and methanol for 72 hours with periodical stirring and mixing. Then the extracts were separately filtered through cheese cloth. The crude extracts were evaporated to dryness under reduced pressure at 40°C. The residues were weighed and appropriate

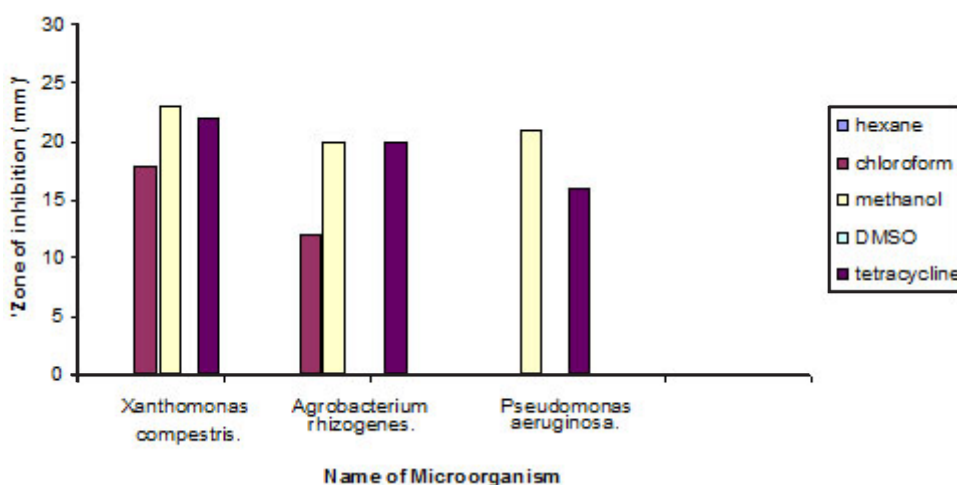


Fig.1: Antimicrobial activity of *Mucuna pruriens* and Tetracycline

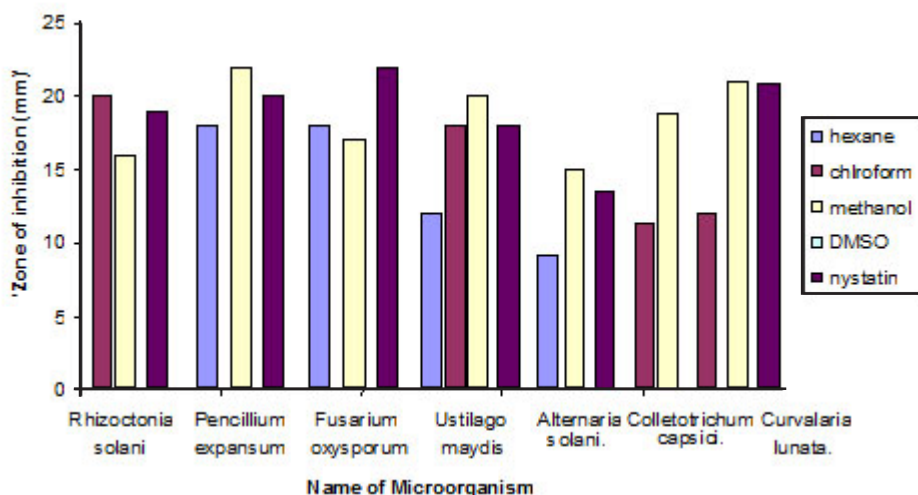


Fig. 2: Antimicrobial activity of *Mucuna pruriens* and Nystatin

quantities were dissolved in Dimethyl sulfoxide (DMSO) to obtain a final concentration of 1mg/ml.

Microorganisms used

The following test organisms namely *Xanthomonas compestris*, *Agrobacterium rhizogenes*, *Pseudomonas aeruginosa*, *Alternaria solani*, *colletotricum capsici*, *Rhizoctonia solani*, *Penicillium expansum*, *Fusarium oxysporum*, *Ustilago maydis* and *Curvalaria lunata* were used in this study. These bacterial and fungal strains were obtained from Institute of Microbial Technology (IMTECH), Chandigarh, India. The obtained bacterial species were grown in nutrient broth (Himedia Pvt. Ltd, Bombay) at 37°C and maintained on nutrient agar slants at 4°C and stored at -20°C. The fungal cultures were maintain in sabouraud dextrose agar and stored at -20°C.

Antibacterial activity

Antibacterial activity was carried out by Agar cup diffusion method¹⁵. The nutrient agar was dissolved in distilled water and P^H of the medium was adjusted to 7.0. The medium was cooled to 40-50°C. 20 ml aliquots of inoculated nutrient agar poured into sterile Petri plates and allowed to solidify. In each plate 3 wells with 6 mm in diameter were made using a sterile cork borer. 45-50ml (100mg/ml) of different extracts was filled in each well by using Finn pipette adjustable volume digital pipette. After that the plates were incubated at 37°C for 24 hrs. Three replicates were maintained for each extract against each of the test organism. Simultaneously control was also maintained without extract. After 24 hours of incubation the inhibition zones were measured by OMNICON antibiotic zone reader and average mean values were presented in table.

Antifungal activity

The antifungal activity was studied employing the standard cup-plate method¹⁶ Instead of nutrient agar Sabouraud dextrose agar was used. The inoculated plates were incubated at 25°C for 3 to 4 days. Two drops of 5 % streptomycin sulphate was added to the agar for fungal medium to prevent bacterial growth. After 4 days of incubation, the inhibition zones were measured and results are presented in the table. DMSO served as negative control while tetracycline and Nystatin as positive control for bacteria and fungi, respectively.

Table 2: Antimicrobial activity of various extracts of *Mucuna pruriens* leaves

S. No	Microorganisms Name of extract	Zone of inhibition in mm± SD						
		<i>Rhizoctonia solani</i>	<i>Penicillium expansum</i>	<i>Fusarium oxysporum</i>	<i>Ustilago maydis</i>	<i>Curvalaria lunata</i>	<i>Alternaria solani</i>	<i>Colletotrichum capsici</i>
1.	Hexane extract (50µl /well)	-	18±0.49	18±0.36	12±0.28	-	12±0.36	-
2.	Chloroform extract (50µl /well)	20±0.45	-	-	18±0.27	12±0.27	-	15±0.36
3.	Methanol extract (50µl /well)	16±0.36	22±0.36	17±0.36	20±0.49	21±0.49	20±0.36	25±0.28
4.	Nystatin (+ve control, 30µg/ml)	19±0.63	20±0.36	22±0.28	18±0.54	21±0.27	18±0.28	27±0.49

* Diameter of well = 6 mm
Values represent the mean ± SD of 3 replicates.

Table 1: Antimicrobial activity of various extracts of *Mucuna pruriens* leaves

S. No	Name of extract	Microorganisms		
		Zone of inhibition in mm± SD		
		<i>Xanthomonas compestris</i>	<i>Agrobacterium rhizogenes</i>	<i>Pseudomonas aeruginosa</i>
1.	Hexane extract (50µl /well)	-	-	-
2.	Chloroform extract (50µl /well)	18±0.63	12±0.54	20±0.36
3.	Methanol extract (50µl /well)	23±0.29	20±0.36	21±0.54
4.	Tetracycline (+ve control, 30µg/ml)	22±0.28	20±0.54	16±0.54

Values represent the mean ± SD of 3 replicates.

RESULTS AND DISCUSSION

The antimicrobial activity of *Mucuna Pruriens* leaves against tested microorganisms is summarized in table 1&2. All extracts except hexane of *Mucuna Pruriens* leaves shows antibacterial activity against tested bacteria. Hexane extract does not have any effect on tested bacteria. But it has moderate antifungal activity against fungal species tested. The methanolic extract of *Mucuna Pruriens* showed highest antimicrobial activity against all the bacterial species tested. Chloroform extract showed moderate antimicrobial activity against tested microorganisms. Antimicrobial activity of *Mucuna Pruriens* in our study may be due to the secondary metabolites. It is evident from the literature that the *Mucuna Pruriens* possess a wide range of pharmacological uses such as anti-inflammatory, neuroprotective, antioxidant activity, antidiabetic and antiprotozoan activity.

Rajeswar *et al*²⁰ reported that the tissues of *Mucuna Pruriens* showed antibacterial activity against gram positive and gram negative bacteria. The wound healing potency of crude extract of leaf,

stem, seed, bark, kernel and leaves of *Mucuna momosperma* was also reported by Manjunath *et al*⁵. In the present study, it has also been observed that, the chloroform extract of *Mucuna Pruriens* exhibited pronounced activity against microorganisms tested and it may be due to the presence of terpenoids, steroids, flavonoids, tannin and kerotonins. This study gets support from the work of Ahmad and Beg¹ who reported that the flavonoids are found to be effective antimicrobial substances against a wide range of microorganisms, probably due to their activity to complex with extra cellular and soluble protein and to complex with bacterial cell wall²⁴.

CONCLUSION

All these findings in the present study raise some interesting expectation about the antimicrobial activity of the *Mucuna Pruriens* and it is possible that the identification and elucidation of the constituents in this plant may lead to the development the new and effective drugs for treating various diseases.

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