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A STUDY OF INVITRO COMPARATIVE EVALUATION OF ANTIBACTERIAL EFFICACY OF AVERRHOA CARAMBOLA AND SYZYGIUM AQUEUM PLANT LEAVES AGAINST BACTERIA

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ABSTRACT

This study investigates the antibacterial activity of leaf extracts of syzygium aqueum and Averrhoa carambola extracts against common bacterial pathogens. Both plants have been traditionally used in folk medicine, at their antibacterial properties remain under explored in scientific research. The extracts were prepared using Soxhlet extraction with ethanol as the solvent. Antibacterial activity was evaluated against selected gram positive (lactobacillus acidophilus) and gram negative (klebsiella pneumonia, Escherichia coli) bacterial strains using agar well diffusion method. The minimum inhibitory concentration was determined by dilution method. The antibacterial effects of both plants can be attributed to bioactive compounds. Which were identified through preliminary phytochemical analysis. The crude extracts of syzygium aqueum suppresses the growth of klebsiella pneumonia and Escherichia coli and crude extract of Averrhoa carambola suppresses the growth of lactobacillus acidophilus and klebsiella pneumonia. This shows that the ethanolic extracts of syzygium aqueum and Averrhoa carambola are active against klebsiella pneumonia. This suggest that syzygium aqueum and Averrhoa carambola possess antibacterial properties, supporting their potential use as natural alternatives in treating bacterial infection.

KEYWORDS: Syzygium aqueum, Averrhoa carambola, antibacterial activity, agar well diffusion.

INTRODUCTION

INTRODUCTION TO AVERRHOA CARAMBOLA:

Star fruit (Averrhoa carambola) is a commonly consumed fruit in both tropical and other countries. It is cultivated in many parts of the world (extensively in the South-East Asian Region) to harvest its fruit. It has several nutritional and medicinal uses. Star fruit is considered a rich source of natural antioxidants and minerals The star fruit may be eaten raw or be used in the preparation of juices, salads, pickles, It is considered as a herb in several countries. As it helps with removing rast, it may be used for cleaning utensils. On the other hand, there are case reports and case series in the literature describing nephrotoxicity and neurotoxicity related to star fruit ingestion. In this review, we have summarized the main nutritional benefits of star fruit and outlined the observed effects on different physiological processes. The beneficial pharmacological properties of star fruit and factors influencing a potential safe limit of consumption have been discussed.

Scientific Classification

Kingdom: Plantae Subkingdom: Tracheobionta Super division: Spermatophyta Division: Magnoliophyta Class: Magnoliopsida Subclass: RosidaeOrder: Geraniales Family: Oxalidaceae Genus: AverrhoaAdans Species: Averrhoa carambola



Fig. No. 1: Averrhoa carambola plant.

Vernacular Names Latin: Averrhoa carambola

English: Starfruit, Chinese gooseberry Hindi Kamrakh. Karmal Bengali: Kamranga

Gujarati: Kamrakh Tamil: Thambaratham Telugu: Ambanamkaya Malayalam: Caturappul

INTRODUCTION TO SYZYGIUM AQUEUM

Medicinal plants are considered as an upscale resource of ingredients which may be utilized in drug development either pharmacopeial, non-pharmacopeial or synthetic drugs. A neighborhood from that, these plants play a critical role within the development of human cultures round the whole world. It is grown well in heavy and fertile soils and is sensitive to frost. It is small to medium sized tree growing up to height of 8-10m with branching near the base. Flowers are yellowish white or pinkish in colour. The good interest within the use and importance of medicinal plants in many countries haled to intensified efforts on the documentation of enthnomedicinal data of medicinal plants. Aqueum, commonly referred to as water apple, one among the foremost valuable medicinal plant spices under the Myretaceae.

SCIENTIFIC CLASSIFICATION

- Kingdom : Plantae • Clade Tracheophytes • Clade Angiosperms • Eudicots • Clade · • Clade Rosids :
- Order Myrtales :
- Family Myrtaceae :
- Syzygium • Genus :
- Species : S. aqueum



Fig. No. 2: Syzygium aqueum plant.

VERNACULAR NAMES

- Hindi
- :Gulabjamun. • Guiarati :Gulabiamun.
- Malayalam :Malakkacampa.
- Kannada :Pannerale.
- Telugu :Jambuneredu.
- Marathi : Jamb.
- Assamese
- : Golapi-jamuk. :Champai.
- Tamil

AIMS AND OBJECTIVES

Selection and collection of leaves of Averrhoa carambola and SyzygiumAqueum plants for antibacterial activity. The leaf extract of Averrhoa carambola and Syzygium

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Aqueum was collected by soxhlation technique using Ethanol as solvents. Evaluation of antibacterial activity of ethanol extracts of Averrhoa carambola and Syzygium Aqueum leaves. The results were compared with standard drug (positive control) of two plants for antibacterial activity.

MATERIALS AND METHODS

Collection of Averrhoa carambola and Syzygium Aqueum leaves:

The leaves were collected from the remote areas of Karimnagar district.

Plant authentication: The plant was taxonomically identified and authenticated as Averrhoa carambola and SyzygiumAqueum by Dr. A.H. Naqvi, Department of Botany, SRR Govt. Degree college, Karimnagar, Telangana.

Various extractions of drug: The dried powered of leaf material of Averrhoa carambola and SyzygiumAqueum was extracted with Ethanol using Soxhlet apparatus. After exhaustive extraction the collected Ethanol extracts were subjected to evaporation to obtain the pure extract.

Soxhlet Extraction

The plant material is placed inside a thimble made from thick filter paper, which is loaded into the main chamber of the Soxhlet extractor. This extractor is placed on to a distillation flask containing solvent. The Soxhlet is then equipped with a condenser, and the solvent is heated to reflux. The warm solvent vapor travels up a distillation arm and floods into the chamber through the thimble. When the chamber is almost full, it gets automatically gets back emptied by a siphon side arm back down to the distillation flask. This cycle may be allowed to repeat many times so that the entire contents of the crude drug get extracted to and round bottom flask desired compound gets concentrated in the distillation flask. Then the solvent extracts are fibered and saved.

RESULTS OF PHYTOCHEMICAL SCREENING

The Ethanol extract contains Alkaloids, Triterpenoids, Tannins, Flavonoids, Glycosides.

ANTIBACTERIAL ACTIVITY

The antibacterial activity was evaluated on the Averrhoa Carambola (star fruit) and SyzygiumAqueum(water apple) for preliminary evaluation of antibacterial activity test samples of the extract was preparedfor1000ml of distilled water and add 8gms of nutrient peptone broth and 15gms of agar. For 500ml of distilled water then 4gms of nutrient peptone broth and 10gms of agar taken in a conical flask. the flask should be covered with cotton plug and placed on hot plate for dissolving of agar. Then the conical flask was placed in autoclave with the temperature is 121°C at 15lb pressure for about1hour. For the sterilization of empty petri dishes are placed in hot air oven with temperature is about 60 °C for 2hours. Then the petri plates are covered with the paper 1hour.

For the sterilization of empty petri dishes are placed in hot air oven with temperature is about 60 °C for 2hours. Then the petri plates are covered with the paper. Tween80 of 1ml dissolved in 100ml of distilled water taken as control. for each concentration 4ml of control should be taken for different Concentrations 50µg/ml, 25µg/ml, 12.5µg/ml, 6.25µg/ml of plant extracts and the standard drug respectively. Petri dishes are taken out from the hot air oven. Then pour the agar broth media in the petri plate. After the solidification agar media, the bacterial solution was poured and speeded. Then make the bores with stainless steel borer. In each petri plate 3 wells are created. For control make single bore in another petri dish. Pour the plant extracts and standard drug in the wells. Then petri dishes were placed in incubator at temperature of 37 °C for 48 hours. Measure the zone of inhibition after 2 days. Generally high concentrations produce high zone of inhibition, then the zone of inhibitions of plant extracts compared with standard drug.



Fig. No: 3: Anti bacterial activity of Averrhoa Carambola, Syzygium Aqueum of plants leave.

Organisms	Plant extracts	Concentrations				Control
		50 <i>µg</i> /ml	25 <i>µg</i> /ml	12.5 <i>µg</i> /ml	6.25 <i>µg</i> /ml	
ESCHERECHIA COLI	Syzygiumaqueum ethanolic extract	7mm	2mm	-	-	
	Averrhoa carambola ethanolic extract	5mm	3mm	-	-	-
	Ciprofloxacin	15mm	12mm	10mm	8mm	
KLEBSIELLA PNEUMONIA	Syzygiumaqueum ethanolic extract	6mm	5mm	2mm	-	
	Averrhoa carambola ethanolic extract	-	-	-	-	-
	Ciprofloxacin	8mm	6mm	3mm	-	
LACTO BACILLUS ACIDOPHILUS	Syzygiumaqueum ethanolic extract	-	-	-	-	-
	Averrhoa carambola ethanolic extract	4mm	-	-	-	
	Ciprofloxacin	20mm	15mm	10mm	8mm	

 Table No. 1: Results of Antibacterial Activity.



ANTIBACTERIAL ACTIVITY OF LEAF EXTRACT OFSYZYGIUM AQUEUM (MIC)

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ANTIBACTERIAL ACTIVITY OF EXTRACT OF STANDARD DRUG CARAMBOLA (MIC)

E.C- ESCHERECHIA COLI, K.P- KLEBSIELLA PNEUMONIA, L.A- LACTOBACILLUS ACIDOPHILUS MIC-MINIMUM INHIBITORY CONCENTRATION

DISCUSSION

The results of antibacterial activities of the ethanolic extracts of the leaves of syzygiumaqueum and Averrhoa carambola are given in table no.3. the results indicated that the ethanolic extracts of syzygiumaqueum exhibited antibacterial activity against klebsiella pneumonia and E. coli. While the ethanolic extract of Averrhoa carambola showed antibacterial activity against Klebsiella pneumonia and lactobacillus acidophilus. When the ethanolic extracts syzygium aqueum and Averrhoa carambola compared to standard drug having low antibacterial activity. When comparing with ethanolic extract of of the leaves. Syzygiumaqueum is more active than Averrhoa carambola. Standard drug is more active against all bacteria.

SUMMARY AND CONCLUSION

The results of antibacterial activity of the two extracts suggests the combination of the two extracts for traditional medicine for synergism. These could be more activity of the extracts because of combination. The phytochemicals are responsible for antibacterial activities of extracts. In conclusion the ethanolic extracts of the leaves of syzygiumaqueum and Averrhoa carambola of far potentiallantibacterialpropertyagainst Klebsiella pneumonia

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