



Short Communication

Formulation and evaluation of antibacterial activity from various plant extracts against *Streptococcus* species

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Abstract

Three medicinal plants such as *Thespesia populnea*, *Ricinus communis* and *Catharanthus roseus* were screened for antibacterial activity against *Streptococcus* species with the different combinations. Coconut oil, Neem oil and Aloe vera gel were mixed with the medicinal plants separately to screen them for their antibacterial activity. Agar well diffusion technique was carried out. Among these three plants *Thespesia populnea* fruit with coconut oil and aloe vera gel showed high zone of clearance when compared to others.

Keywords: Agar well diffusion, antibacterial activity, medicinal plants, *Thespesia populnea*, zone of clearance, *Streptococcus* species.

Introduction

Today a substantial amount of drugs has been developed from plants¹ which are active against a number of diseases. Medicinal plants characterize a rich source of antimicrobial agents. Plants are used medicinally in different countries and are a source of many potent and powerful drugs. Role of herbal plants to treat various diseases is crucial among tribal people. They prepare medicine not only from single plant but combinations are also used². An extensive range of medicinal plant parts are used for extract as raw drugs, and they retain varied medicinal properties. People from various regions possess rich traditional knowledge and medicinal plants play a major role in curing diseases³.

Plant contains primary and secondary metabolites. Primary metabolites are carbohydrates, amino acids etc. Secondary metabolites include flavanoids, tannins, alkaloids, saponin and so on. These metabolites have some antimicrobial properties and the presence of these metabolites in plant samples were checked qualitatively and quantitatively by phytochemical screening^{4,5}. *Thespesia populnea* belongs to the family Malvaceae. It is found in coastal forest and tropical regions of India. Secondary metabolites such as glycosides, phytosterols, alkaloids, oils, saponins, phenols and flavanoids were expected to exhibit the antibiotic properties which are present in the of *T. Populnea*⁶. *Catharanthus roseus* belongs to the family Apocynaceae in which phytochemicals like Alkaloids, Phenols, tannins, Flavonoids, Glycosides, and Quinines are found⁷. *Ricinus communis* belongs to mangrove type of plants. Secondary metabolites such as alkaloids, flavonoids, glycosides, saponins, tannins; triterpenoids/sterols are present in *Ricinus communis*⁸.

Bacteria and fungi are the causative agent for the infectious diseases which affect millions of people worldwide. Agar well diffusion technique is sensitive than disc diffusion technique. Mostly agar well diffusion and disc diffusion were used for antimicrobial activity⁹. Such sensitivity tests were carried out to screen antimicrobial potency. Medicinal plants were subjected to antimicrobial activity and standard antibiotics were also screened to compare the results of our sample with the antibiotic¹⁰⁻¹². Some microorganisms show resistance towards antibiotics. Due to arise of new bacterial strains, which are multi-drug resistant, there is a need for new herbs with high antimicrobial properties¹³.

Streptococcal species are gram positive bacteria which colonize in throat and soft tissues like skin. The people who are feeble and frail are at greater risk for the invasion of *streptococci* species. The infection due to *Streptococcus* species is increasing¹⁴. This present study involves in the identification of specific combination of various plants extracts with some oils to measure its antibacterial activity.

Materials and methods

Collection of plants: *Thespesia populnea*, *Ricinus communis* and *Catharanthus roseus* were collected from the gardens of Vivekanandha College of Engineering for Women, Elayampalayam, Tiruchengode, Tamilnadu, India.

Extraction of plant materials: Fresh leaves and fruits along with the seed of *Thespesia populnea* were washed crushed separately and the combination of both also crushed. Fresh leaves and flowers of *Catharanthus roseus* were washed crushed separately and the combination of both also crushed.

Fresh leaves and fruit of *Ricinus communis* were washed under tap water crushed separately and the combination of both also crushed. Crushing was done by using mortar and pestle by adding little water in all the combinations to get the consistency. Finally all the mixtures were filtered using cloth and stored for further use. Totally nine filtrates were made.

Neem oil, Coconut oil and Aloe vera gel (in the form of liquid) were used as solvents for this entire study. All the three solvents were mixed with nine filtrates in the ratio of 1:1(i.e) 1 ml of filtrate with 1 ml of solvent. These results in 27 extracts and all these were prepared with the different combinations.

Collection of microorganism: *Streptococcus* species were collected from the Cell Biology Laboratory, Department of Microbiology, Vivekanandha College of Arts and Sciences for Women, Tiruchengode, Tamilnadu, India. They were subcultured in Luria Bertani Broth and maintained at 4°C.

Antibacterial activity: Agar well diffusion technique is used to estimate the antimicrobial activity. Twenty seven extracts of three medicinal plants with different combinations were used for this assay.

The medium used for screening antibacterial assay was Luria Bertani Agar. 24 hours of *Streptococcus* species culture was swabbed on the media. Wells were formed using gel puncture. 100µl of the extracts were inoculated in the wells and in each plate one well is left as control. Antibacterial assay plates were maintained at 37°C. Diameter of the zone of clearance was observed after 24 hours.

Results and discussion

This study is to compare the results of samples with different combinations. *Thespesia populnea* fruit with aloe vera showed high zone of clearance compared with others. *Thespesia populnea* fruit with coconut oil also showed zone of clearance. Combination of *Thespesia populnea* fruit and leaf showed little zone of clearance with the combination of coconut oil and aloe vera. *Ricinus communis* leaf and seed combination showed little zone of clearance. *Catharanthus roseus* flower showed little zone with coconut oil and aloe vera whereas leaf does not showed any activity. Many extracts with neem oil did not show any antibacterial activity.

However, negative results do not illustrate the absence of bioactive constituents, nor that the plant is inactive. Active compound(s) may be present in mere amount in the crude extracts to show activity with the dose levels employed. And also extracts may be viable against other bacterial species which were not tested.

Aloe vera combinations with the crude extracts of plants showed antibacterial property. It may indicate that aloe vera gel itself has antibacterial potency. Aloe vera gel has medicinal properties and bioactive compounds¹⁵.



Figure-1: *Thespesia populnea* with coconut oil.

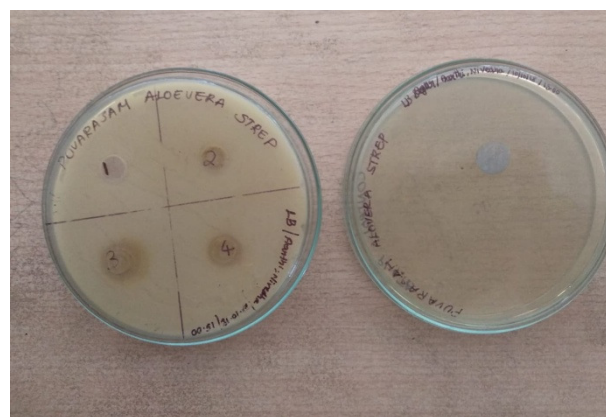


Figure-2: *Thespesia populnea* with aloe vera gel.

Table-1: Antibacterial activity against *Streptococcus* spp. Indications for the symbol '+' = less than 10mm, '-' = no zone.

Plant extracts with various combinations	Zone of clearance (mm)		
	Neem oil	Coconut oil	Aloe vera liquid
<i>Thespesia populnea</i> leaf	-	+	+
<i>Thespesia populnea</i> fruit	+	12	14
Combination of <i>Thespesia populnea</i> leaf and fruit	+	12	11
<i>Ricinus communis</i> leaf	-	-	+
<i>Ricinus communis</i> seed	-	+	+
Combination of <i>Ricinus communis</i> leaf and seed	-	+	+
<i>Catharanthus roseus</i> leaf	-	-	-
<i>Catharanthus roseus</i> flower	-	+	+
Combination of <i>Catharanthus roseus</i> leaf and flower	-	-	+

Conclusion

Various herbs were used to cure so many diseases because of their anti-microbial properties. In this study, we have used three herbs with three different combinations to estimate its antibacterial activity against *Streptococcus* species. From our study we are concluding that, *Thespesia populnea* leaf and fruit has higher antibacterial activity against *Streptococcus spp* when comparing with others. So, this combination *Thespesia populnea* leaf and fruit mixed with coconut oil and Aloe vera gel can be used as supplementary additives in the formulation of drugs against skin disorders caused by *Streptococcus spp*.

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