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Antibacterial Activity of Syzygium Cumini Seed Aqueous Extract

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Abstract: *The study explores the antibacterial activity of Syzygium cumini seed aqueous extract, a tropical evergreen plant with numerous therapeutic properties. The plant's seeds contain active compounds such as myricetine, β-sitosterol, myricyl alcohol, betulinic acid, friedeanol, epifriedeanol, eugenin, ß-sitosterol-D-glucoside, Kamepferol-3-0-glucoside, quercetin, astragalin, and gallic acid. The edible part of fruits contains gallic acid, tannins, anthocyanins, and vitamin C. Syzygium cumini is widely used in traditional and folk medicine due to its therapeutic qualities. The leaves of the plant are used to treat various skin conditions and are also used as an anesthetic in many South American cultures. Research has been conducted to understand the characteristics, safety, and effectiveness of these plants against diseases. The study used methanol, petroleum ether, and ethanol extracts of powdered Syzygium cumini seeds to conduct antibacterial activities. Four different extracts were tested against two Gram positive pathogenic bacteria (Staphylococcus aureus and Bacillus subtilis) and two Gram negative pathogenic bacteria (Escherichia coli and Salmonella typhi). The cup plate method was employed in this investigation, and it was found that the methanolic extracts exhibited more antibacterial activity than the other three. In conclusion, the study highlights the strong antibacterial properties of Syzygium cumini seed and the potential of its extracts in treating various illnesses. The study provides valuable insights into the potential of plant extracts in treating various diseases and their potential applications in traditional medicine.*

Keywords: Syzygium cumini, Antibacterial activity, Disc diffusion method, Escherichia coli and Salmonella typhi

I. INTRODUCTION

Roughly 80% of the world's population depends mostly on plants for their healthcare requirements, and about 25% of prescription drugs come from plant sources. Traditional medicine is widely used in underdeveloped countries, and plant metabolites have long been investigated for possible medical use. Tropical evergreen Syzygium cumini is utilized extensively in traditional and folk medicine due to its well-known therapeutic qualities. Myricetine, β-sitosterol, myricyl alcohol, betulinic acid, friedeanol, epifriedeanol, eugenin, ß-sitosterol-D-glucoside, Kamepferol-3-0-glucoside, quercetin, astragalin, and gallic acid are among the active compounds found in the plant (Qamar, M., *et al.*,2021). The edible part of fruits contains gallic acid, tannins, and anthocyanins in addition to vitamin C.The seeds of Syzygium cumini possess antibacterial, anti-inflammatory, hypolipidemic, anti-diabetic, and antipyretic qualities. Glibenclamide, an oral hypoglycemic or antidiabetic drug, was found to be less successful in treating type 2 diabetes than Syzygium cumini seed extracts given to rats at a dose of 5 grams/kg of bodyweight. In many South American cultures, tea brewed from the leaves of Syzygium cumini is used as an anesthetic due to its antipyretic properties, which reduce fever. S. cumini leaves are also used to treat a variety of skin conditions.(Aziz, A. and Banerjee, S., 2018; Ayyanar, M. and Subash-Babu, P., 2012).

Traditional medicine in industrialized and developing nations relies on plants with therapeutic properties to treat various illnesses. Research has been conducted to understand their characteristics, safety, and effectiveness against

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disease. Common wild medicinal plants, such as S. cumini, are widely used as home medicines and raw materials for the pharmaceutical industry. S. cumini is a common antibiotic with significant medicinal activity. The plant's bark and leaves, used to treat bleeding gums and diarrhea, have antibacterial properties against various bacteria. The seeds of the plant are also used in this regard. The assessment of conventional plant extracts is used to discover antibacterial compounds from natural sources. This work describes the antibacterial activity of S. cumini seed aqueous extract against harmful microorganisms.(Devi, A., Dahiya*et al.,* 2020; Muruganandan, S., *et al* 2001).

II. MATERIALS AND METHODS

Drugs/ Material

The Syzygium cumini seed powder were purchased from Shree Dhanvantari Herbals (Pune).
The Methanol, Ethanol, Petroleum Ether was collected from Thomas Baker (Chemicals) Pvt. Ltd.

Preparation of extraction.

The Crude *S. Cumini* seed powder is deeped in the ethanol as concentration ratio 1:10 for percolation extraction. After 24 hours the mixture is filtered by Whatman filter paper and stored at 4°C for further use.

Antibacterial Test:

Preparation of culture media and inoculation:

- The nutrient agar medium and the petriplates were sterilized at 120˚C for 20 minutes.
- The remaining steps of the process were completed under laminar air flow.
- In the sterile petriplates, around 20 milliliters of the medium were added, and they were left to solidify.
- Using cotton swabs, the bacterial organisms were swabbed onto the medium once it had hardened.

Disc diffusion method:

Disc diffusion was used to examine the seed extracts' antimicrobial properties. In aseptic settings, sterile nutrient agar plates were created for bacterial strains and injected using the spread plate technique. Whatman's No. 1 filter paper, a 5 mm diameter disc, was made and sterilized. The seed extracts that were going to be evaluated each hole 10 microliter holding capacity. Using framed forceps, the sterile impregnated disc containing plant extracts was put on the agar surface and gently pushed down to guarantee that the disc makes full contact with the agar surface.

Table. 1: Antibacterial activity of syzygium cumini seed extract verses water

Test Organism	Zone of Inhibition (in mm)			
	Methanol	Petroleum ether	Ethanol	Water
Staphylococcus aureus	23.4	20.9	10.5	9.7
Salmonella typhi	19.5	17.4	10.8	9.8
Bacillus subtilis	17.3	16.6	9.2	8.7
Escherichia coli	22.5	21.3	17.1	11.1

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Observations:

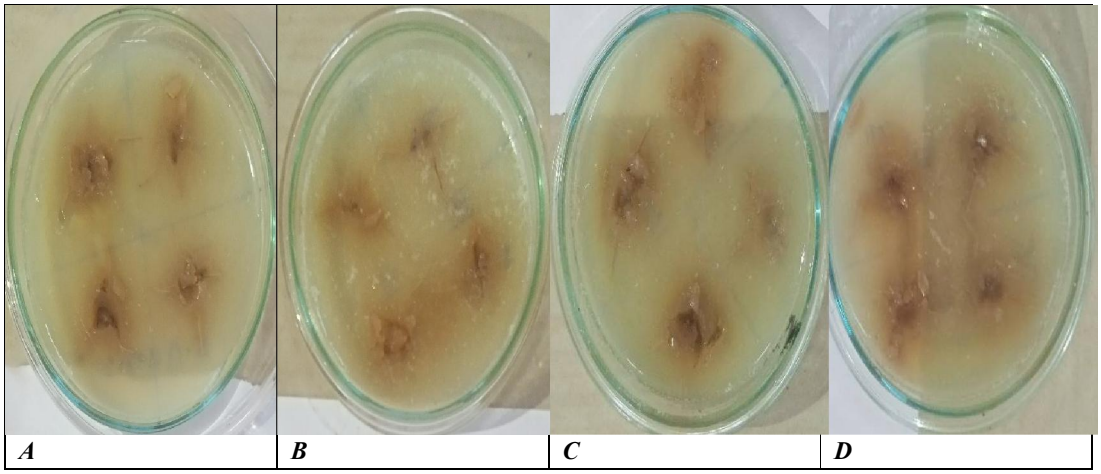

Fig. 1: Antimicrobial activity of crude extract of S. cumini seeds extract against different pathogenic bacteria: (A) S. aureus, (B)S. typhi, (C) B. subtilis (D) E. coli.

III. CONCLUSION

The study on antibacterial Strong antibacterial properties are present in S. cumini seed. In this study, methanol, petroleum ether, and ethanol extracts of powdered Syzygium cumini seeds were used to conduct antibacterial activities. Using four different extracts - methanol, petroleum ether, ethanol, and aqueous extract (distilled water) - the antibacterial study was conducted against two Gram positive pathogenic bacteria (Staphylococcus aureus and Bacillus subtilis) and two Gram negative pathogenic bacteria (Escherichia coli and Salmonella typhi). The cup plate method was employed in this investigation. Table No. 1 displays the zone of inhibition for each extract against the tested bacterial strains. Therefore, it is discovered that the methanolic extracts exhibit more antibacterial activity in comparison to the other three.

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