In-Vitro antimicrobial activity of methanolic extract from the fruit pulp of SYZYGIUM CUMINI.

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Abstract: A well-known traditional medicinal plant is Syzygium cumini. The plant's therapeutic qualities are caused by its phytochemical components. Syzygium cumini's seed, leaves, and bark fruit and pulp were studied using crude methanol, ethanol, and aqueous extracts (Magnoliopsida: Myrtaceae). The extract's antibacterial effectiveness was evaluated against typical bacterial strains utilizing the agar well diffusion technique. The chemical classes found in the extracts of seed, leaves, and bark according to phytochemical research include flavonoids, alkaloids, glycosides, steroids, phenols, saponins, terpenes, cardiac glycosides, and tannins. Inhibitory action against clinical isolates was evident in the extracts. Salmonella typhi, Pseudomonas aeruginosa, and Escherichia coli are examples of gram-negative bacteria. Bacillus subtilis and Staphylococcus are examples of gram-positive bacteria. The gram-positive bacteria, Salmonella typhi, Pseudomonas aeruginosa, and Escherichia coli, Contrary to expectations, the methanol and ethanol extract reduced the growth of bacteria like Bacillus subtilis and Staphylococcus aureus a liquid extract. The pulp's methanolic extract was discovered to be a more effective antibacterial agent than the extracts of the leaves and bark.The current investigation supports the use of various Syzium Cumini parts as effective antibacterial agents for field use, and sustainable and environmentally friendly management of various bacterial strains as well as additional research is needed.

Key words: Syzygium cumini L, Plup extract, Phytochemical screening, Antibacterial activity.

INTRODUCTION: The majority of industrialized and emerging nations use traditional medicine to treat various diseases by using substances obtained from medicinal plants. In order to better understand the plant's characteristics, components, safety, and effectiveness against sickness and disease-causing substances, research was done on them (Cowan, 1999; Mubassara et al., 2015; Singh et al., 2019).To advance pharmacological research and the production of novel drugs, medicinal plants from various regions were investigated (Singh et al., 2018; Singh et al., 2020). According to Rates (2001) and Nayami et al. (2016), common wild medicinal plants were widely employed as DIY cures and acknowledged as source

materials for the pharmaceutical sector. S. cumini is a common antibacterial agent and is thought to have potent therapeutic potential. The plant is versatile since it has uses for each of its sections as well as therapeutic and medical benefits (Singh et al., 2019). S. cumini bark acts as an antibiotic against various bacteria, leaves are used to cure bleeding gums, and seeds are used to treat diarrhea and dysentery (Pushpahasni et al., 2015). As a result, one method for finding antibacterial compounds from natural sources is based on the analysis of conventional plant extracts. We describe the antibacterial activity of S. cumini pulp , L. seeds, leaves, and bark extract against pathogenic microorganisms in too under the current investigation.

Materials and Methods: Syzygium cumini L. leaves, bark, seeds, and pulp were gathered from the Dayananda Sagar University campus in Bangalore, India. Then the pulp was extracted separately from the seeds, leaves, and bark and was cleaned before being air-dried at room temperature. The dried pulp was then powdered to a fine consistency and used for more research. By mixing 5g of dried powder into 50 ml of heated solvent, extracts were made. For 24 hours, solutions were maintained in a shaking incubator. The Whatman filter paper was used to filter the mixture, and the filtrate was collected and kept for later use at 4°C.

The well diffusion method was used to investigate the antibacterial activity of the crude plant extract against pathogenic microorganisms. Escherichia coli, Pseudomonas aeruginosa, Salmonella typhi, Bacillus subtilis, and Staphylococcus aureus were the five test organisms that were procured from the Dayananda Sagar University, Bangalore. Nutrient agar slants were used to sustain and preserve the cultures. The pure preserved culture was injected into the broth medium throughout the experimental investigation. Chemical tests were carried out following the guidelines provided by (Gowri et al., 2010; Hasanuzzaman et al., 2016).

b. Antimicrobial activity: The Agar well diffusion method, was used to conduct antibacterial activity (Perez et al., 1990). 100 l of crude plant extract was added to each well, with pure organic solvents serving as the control. The diameter of the inhibition zone (in mm) formed by each extract is used to measure its antibacterial activity. The dilution technique was used to evaluate the minimum inhibitory concentration of crude plant extracts against pathogenic strains (Sathyabama et al., 2011). The crude extract used to evaluate each plant

Chloramphenicol was utilized as the control in the preparation of nutrient agar plates. Test organisms were cultured on nutrient agar plates, and 100 l of methanolic and ethanolic plant extracts, including seeds, leaves, and bark, were added to each well. The plates were incubated for 24 hours at 37°C. It was discovered that the crude plant extract in the wells was inhibiting bacterial development.

Results and Discussion: With the exception of the aqueous extract, the crude extracts of S. cumini in methanol and ethanol exhibit antibacterial properties. Alkaloids, saponins, tannins, and some flavonoids were present in all of the extracts. Analyses of phytochemicals: Alkaloids, saponin, and steroids were found in pulp extracts, it also revealed flavonoids' existence.

Test for phyto-constituents	Methanol Extract			Ethanol Extract		
	Seeds	Leaves	Bark	Seeds	Leaves	Bark
Mayer's test for alkaloids Barfoed's test for	+	+	+	+	+	+
carbohydrates	+	-	+	+	-	+
Foam test for saponins	+	+	+	+	+	+
Test for steroids	+	+	+	+	+	+
Test for tannins	+	+	-	+	+	-
Test for flavinoids	-	+	-	-	+	-
Test for amino acids	-	-	-	-	-	-
Test for terpenoids	+	-	+	+	-	+
Follin's test for proteins	+	-	-	+	-	-

Table 1: Presence of different phytoconstituents in a methanolic and ethanolic crude extract of seeds, leaves, and bark of Syzygium cumini

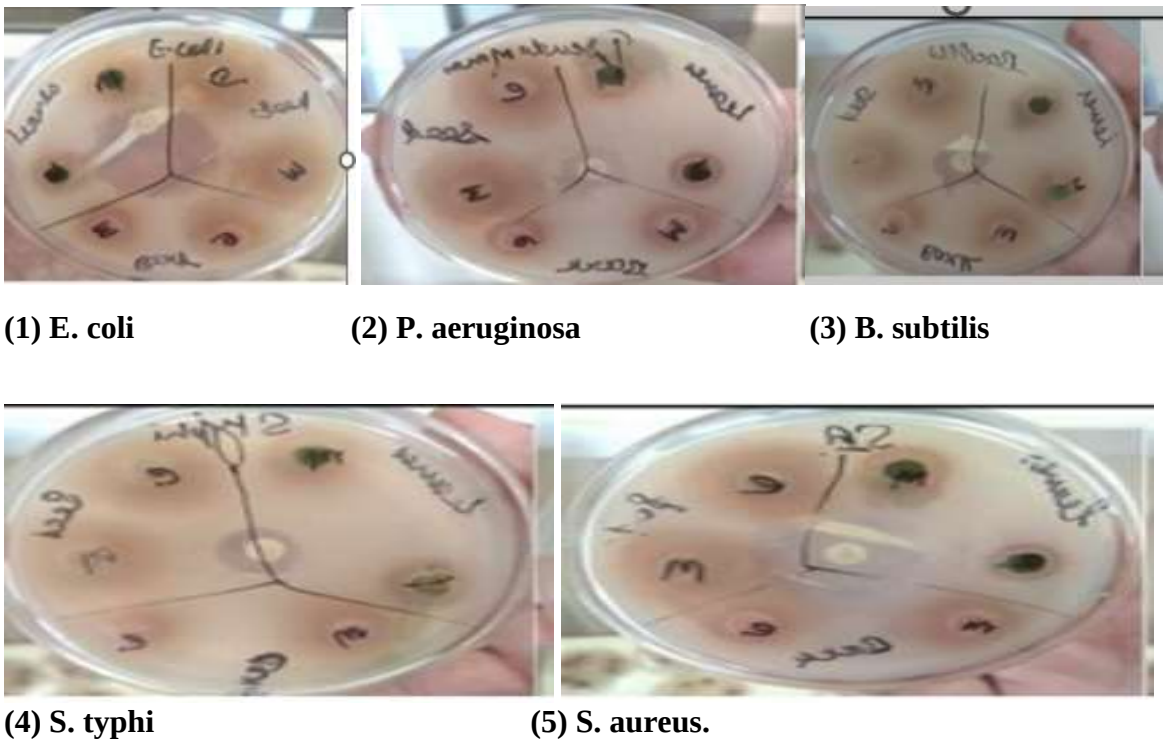
TEST-ORGANISM	METHANOL –EXTRACT-pulp	ME-leaf	ME-BARK	CONTROL-CHLORAMPHENICOL	
E.Coli	**17**	**13**	**10**	**24**	
P.Auruginosa	**12**	**12**	**10**	**14**	
B.Subtilis	**13**	**11**	**11**	**16**	
S.Aureus	**12**	**14**	**12**	**18**	
S.T17yphi	**12**	**12**	**12**	**14**	

Table 2: Antimicrobial assay (in mm) of methanolic crude extract of Pulp leaves and bark vs chloramphenicol as control with test organisms.

Pulp extracts with an exception did not contain any amino acids or proteins (Jagetia, 2017). Alkaloids, flavonoids, tannins, saponins, steroids, and terpenoids were abundant in S. cumini leaves. table 1. The leaf methanolic13mm, and so forth. With a zone of 12–13 mm, comparative study with the bark extract inhibits S. typhi growth (Bhatia and Bajaj 1975). According to the afore mentioned findings, S. cumini seed extracts had effective activity against pathogenic bacteria in various extracts and were comparable to the control drug chloramphenicol (Gangadhar et al., 2011; Sharma et al., 2012). Gowri and Vasantha (2010) observed similar actions involving S. cumini leaves in methanol extract.

The studies by Yadav et al. (2017) using methanolic and ethanolic extracts demonstrated similar inhibitory activity against clinical isolates of gram-positive bacteria like B. subtilis and S. aureus as well as gram negative bacteria like S. typhi, Shigella dysenteriae, Klebsiella pneumonia, and P. aeruginosa.

MIC (minimal inhibitory concentration) determination for pulp extracts. The pulp extract's lowest concentration at its maximum dilution needed to prevent the tested bacterium from growing visibly was known as the MIC (MIC Table 3; Fig.)



(1) E. coli **(2) P. aeruginosa** **(3) B. subtilis**

(4) S. typhi **(5) S. aureus.**

Fig. 1: Antimicrobial activity of crude extract of S. cumini Pulp leaves and bark against different pathogenic bacteria

ORGANISMS	PULP	LEAF	BARK
E.Coli	83.25	33.3	83.25
P.Aureginosa	41.62	83.25	41.62
B.Subtilis	83.25	83.25	83.25
S.Aureus	33.25	33,33	33.33
S.Typhi	83.25	83.25	83.25

Table 3: The minimum inhibitory concentration of different plant extracts against selected pathogenic bacterial species.

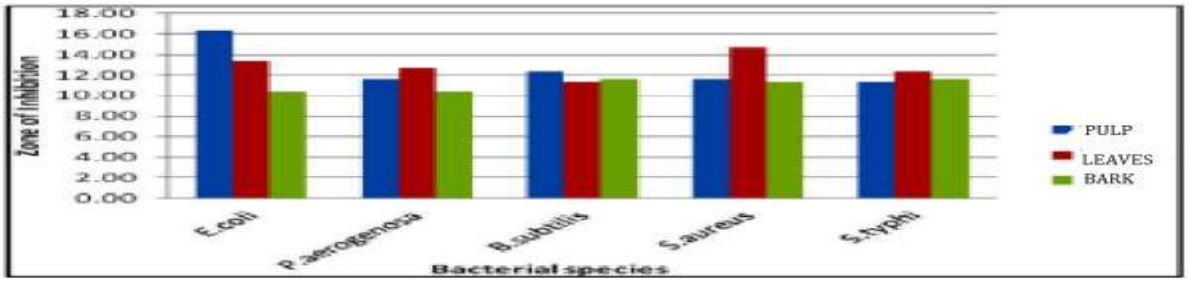


Fig. 2: Inhibitory action of methanolic extracts of pulp, leaves and bark. (Data as mean ± SE values of three replicates).

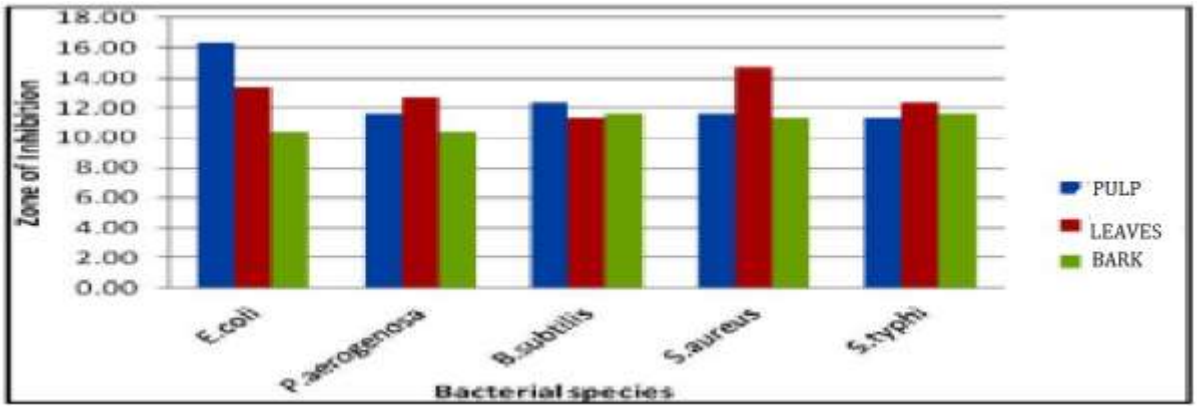


Fig. 3: Inhibitory activity of ethanolic extract of pulp, leaves and bark. (Data as mean ± SE values of three replicates)

Conclusions: The potential bioactive compound of natural plant extracts has been shown by the current investigation. We tested S. cumini's seeds, leaves, and bark extract for the presence or lack of several phytochemicals and antibacterial activity. In comparison to bark extract, the pulp extract of seeds in methanol and ethanol shows significant antibacterial activity. The activity can be utilized as a herbal medicine substitute for antibiotics and to combat bacteria that are resistant to many drugs.

According to this investigation, S. cumini seed petroleum ether extract shows strong antibacterial properties. The extracts from the seeds of S. cumini were discovered to have effective efficacy against pathogenic bacteria in several preparations. The great therapeutic effect of the seed extract against pathogenic microorganisms has been established.

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