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Phytochemical and Antimicrobial Activity of Aqueous and Alcoholic Seed Extract of *Syzygium Cumini*

Nandesh Mohan P[1] and Shashirekha K.S[2]*

[1,2]Department of Roganidana and VikruthiVijnana, Shree Dharmasthala Manjunatheshwara college of Ayurveda and Hospital. Hassan, Karnataka, India

ABSTRACT

Syzygium cumini is an important medicinal plant in various traditional systems of medicine. *S.cumini* plant extracts have potential bioactive components for the management and treatment of diseases. *S. cumini* are rich in tannins, alkaloids, flavonoids, and phenolic compounds. The seeds are claimed to contain Gum and Mucilage. Present study is concentrated on evaluating the efficacy of aqueous and alcoholic seed extracts of *S. cumini* of different concentration viz., 32µg /ml, 16µg/ml, 8µg/ml, 4µg/ml, 2µg/ml and 1µg/ml against *E.coli*, *Pseudomonas* spp., *Staphylococci* spp., and *Candida albicans* by cork borer method. The inhibitory effect of ethanolic, hot extracts and aqueous extracts from seeds of *S. cumini* were reported. All strains were observed for maximum zone of inhibition. The results revealed the presence of medicinally important phytochemical constituents in the aqueous extracts of *S. cumini* seeds and seeds used as an alternative medicines for the treatment of bacterial diseases.

KEYWORDS

Antibacterial; *Phytochemical*; *Syzygium cumini*

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INTRODUCTION

To understand the active chemistry of the plant a valid scientific investigation of Herbal medicine is required. Herbal medicines are packed with numerous phytochemicals. Alternative medicines are considered to be safe or no side effects. Natural herbal formulations are very effective because of use of fresh and dry plant parts for drug preparation. In preparation of herbal drugs safety and efficacy is very important along with correct knowledge of crude drug. In South Asia *S.cumimi* seeds are used in treating diabetes mellitus as folklore medicine from several centuries. The seed of *S.cumini* with huge phytochemical components used as astringent, diuretic, hypoglycaemic anti-inflammatory antipyretic psychopharmacological hypolipidaemic and antioxidant activities. Essential oils of seed, stems, leaves, and fruits of *S. cumini* and their antibacterial activity was reported[1].

Phytochemicals are natural plant chemicals that helps in disease prevention. Herbal medicinal plants were packed with huge chemical components to protect themselves against pathogenic organism and also humans against diseases is well- known fact[2]. The seed of *S cumini* used as anti-diabetic in folklore medicine. The seeds are astringent to bowels and good for diabetes[3]. *S. cumini* seeds are used to treat various diseases. Various parts of *S. cumini* tree extract were reported for its anti- HIV, anti-diarrheal, antifungal, anti-bacterial , antioxidant and anti-inflammatory, infertility and radio-protective activities[4].

OBJECTIVES

- To extract seeds of *S. cumini* by cold maceration and soxhelt method.
- Qualitative analysis of phytochemicals in seeds of *Syzygium cumini*.
- To study the antibacterial properties of Seed of *Syzygium cumini* against few clinically important microorganisms.

MATERIALS AND METHODS

Source Plant material:

The fully mature *Syzygium cumini* seeds were collected from a single tree in June-July 2018 from Doddakodihalli village in Hassan District, India. *Syzygium cumini* seed powder was been selected for present study after its identification.

Preparation of sample:

Methods:

1. Cold method of extraction

Cold extraction was carried out by soaking the powdered 25gm of seed in 250 ml of distilled water and 25gm of seed in 250 ml

of ethanol Incubated for about 72 hours in an enclosed glass jar with frequent agitation until the soluble matter has dissolved[5].

2. Hot Continuous extraction by Soxhlet method

Finely ground crude drug of *Syzygium cumini* seed weighing 30gms were placed in a porous bag or "thimble" made of strong filter paper, which was then placed in chamber of the Soxhlet apparatus. The extracting solvent (300ml ethanol 98.9%) was filled in the flask were heated and heat converts liquid into vapor form. The condensed extract drips into the thimble containing the crude drug, and extracts it by contact[6].

3. Antibacterial Study

Source of microorganisms:

E.coli. Pseudomonas spp., *Staphylococci* spp., and *Candida albicans*, 0.32gms of seed extraction were weighed and dissolved in 10ml of distilled water. Dissolve completely to make stock solution carrying 32µg/ml of drug concentration. From stock solution different drug concentrations were prepared (16 µg /ml, 8µg/ml, 4µg/ml, 2µg/ml, 1µg/ml).

Table 1 Qualitative Phytochemical analysis of *Syzygium cumini*

Qualitative Phytochemical Study		
Sl no	Tests	Remarks
1	Alkaloids[7]	Positive
2	Flavonoids[8]	Positive
3	Gum and Mucilage[9]	Positive
4	Fixed oils and fats[9]	Negative
5	Saponins[10]	Negative
6	Pholabatanins[10]	Negative
7	triterpenoids and Steroids[3]	Negative
8	Tannins[6]	Positive
9	Phenolic compounds[7]	Positive
10	Glycosides[7]	Negative

These different concentrations of seeds were subjected to antimicrobial sensitivity test by well diffusion method. Sabouraud dextrose agar for fungi and Muller Hinton Agar plate for bacteria were swabbed with standard McFarland inoculums. Eight equidistant wells were made on the plates with the help of sterile cork borer. 100 µl of control, standard and seed extracts of different concentration (32 µg /ml, 16 µg /ml, 8µg/ml, 4µg/ml, 2µg/ml, 1µg/ml,) were added onto the labelled wells. All plates were incubated in an incubator at 37°c for 24 hours, plates were read for zone of inhibition and measured with a ruler in millimeters[12].

Table 2 Zone of inhibition of different concentration of hot extract of *S. cumini*

Sl No	Organisms	Zone of inhibition in millimetres (mm)							
		32 µg	**16 µg**	**8 µg**	**4 µg**	**2 µg**	**1 µg**	**Standard (Amp) 100 µl**	C
1	*Escherichia coil*	26	22	20	18	16	16	35	R
2	*Pseudomonas* spp	24	20	19	14	12	10	R	R
3	*Staphylococcus* spp	20	14	10	18	12	10	R	R
Sl No	Organisms	Zone of inhibition in millimetres(mm)							
		32 µg	**16 µg**	**8 µg**	**4 µg**	**2 µg**	**1 µg**	**Standard (Amph-B) 100 µl**	C
1	*Candida albicans*	22	20	18	16	12	10	20	R

Amp: Ampicillin Amph-B: Amphotericin-B C: control

Table 3 Zone of inhibition of different concentration of ethanolic extract of *S. cumini*

Sl No	Organisms	Zone of inhibition in mm							
		32 µg	**16 µg**	**8 µg**	**4 µg**	**2 µg**	**1 µg**	**Standard (Amp) 100 µl**	C
1	*Escherichia coil*	26	21	18	12	10	09	35	R
2	*Pseudomonas* spp	18	12	14	14	12	10	R	R
3	*Staphylococcus* spp	26	20	16	13	13	10	R	R
Sl No	Organisms	Zone of inhibition in millimetres(mm)							
		32 µg	**16 µg**	**8 µg**	**4 µg**	**2 µg**	**1 µg**	**Standard (**Amph-B**) 100 µl**	C
1	*Candida albicans*	26	24	20	18	16	12	20	R

Amp: Ampicillin Amph-B: Amphotericin -B C: control

Table 4 Zone of inhibition of different concentration of aqueous extract of *S. cumini*

Sl No	Organisms	Zone of inhibition in millimetres(mm)							
		32 µg	**16 µg**	**8 µg**	**4 µg**	**2 µg**	**1 µg**	**Standard (Amp) 100 µl**	C
1	*Escherichia coil*	24	22	18	12	10	10	35	R
2	*Pseudomonas* spp	18	12	14	14	12	12	R	R
3	*Staphylococcus* spp	24	20	15	14	14	10	R	R
Sl No	Organisms	Zone of inhibition in mm							
		32 µg	**16 µg**	**8 µg**	**4 µg**	**2 µg**	**1 µg**	**Standard (**Amph-B**) 100 µl**	C
1	*Candida albicans*	20	18	16	12	10	10	20	R

Amp: Ampicillin Amph-B: Amphotericin -B C: control

DISCUSSION

Results revealed that hot and cold seed extract of *S.cumini* were showing significant antibacterial activity against all the pathogenic bacteria and fungi used in the study. Organisms such as *E. coli*, *Pseudomonas* spp., *Staphylococcus* spp., *Pseudomonas* spp., and *Candida albicans.* Zone of inhibition were ranging from 10mm to 26 mm against *E.coli* and *Staphylococcus* spp., in hot cold and aqueous extract (Table 2,3 and 4). The maximum zone of inhibition (26mm) in aqueous extracts were recorded against pathogenic *Staphylococcus* spp., *E.coli* and *Candida albicans.*

CONCLUSION

Presence of phytochemicals and antibacterial property of *Syzygium cumini* seed were reported in this study. *Syzygium cumini* is a medicinal plant having anti-microbial activity. *S. cumini* seed extracts were done by cold and hot (soxhlet) method. phytochemicals such as flavanoids, gum and mucilage, alkaloids,

fixed oils and fats, Saponins, pholabatanins, triterpenoids and steroids, tannins, phenolic compounds and glycosides were checked. Antibacterial activity of the *S. cumini* against clinical pathogens was done by cork borer method. The results of the hot extract, ethanol and aqueous extracts of seed exhibited good antibacterial activity against all the tested microorganisms. Aqueous extracts were highly effective than the hot and ethanol extracts against all the tested microorganisms. *S. cumini* seed extract revealed the presence of phytochemicals and with significant antibacterial activity against a few clinical pathogenic bacteria. The seeds can be used in treating microbial infections.

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