



Antibacterial Activity of *Syzygium Cumini* and *Phyllanthus Acidus* Seed Extract against Clinical Pathogens

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ABSTRACT

Natural products have been a significant source of commercial medicines and drug leads. Screening of crude plants Extracts paves the way for discovery of novel Bioactive compounds, and elucidation of their Structures can open the door for new Synthetic preparations. The present study was undertaken to check the antibacterial activity of two different seed viz., *Syzygium cumini* and *Phyllanthus acidus* against clinical pathogens. Four clinical pathogens viz., *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pneumoniae* and *salmonella typhi* were procured from Department of Microbiology, RMMCH Annamalai University, Chidambaram. The Two different Seed extracts were prepared using Methanol (*Syzygium cumini* and *Phyllanthus acidus*). Among the Two tested Seeds, Jamun Seed exhibited maximum zone of inhibition ($21 \pm 0.4\text{mm}$) against *Staphylococcus aureus*. The minimum Antibacterial activity exhibited by Star Gooseberry Seed towards the tested bacterial pathogens.

Keywords: *Syzygium cumini*, *Phyllanthus acidus*, Clinical pathogens, Methanol extract.

Introduction

In ancient times, medicinal herbs have been use in one form or another, under Indigenous systems of medicine like Ayurveda, Siddha and Unani 1 Herbal medicines are promising choice Over modern synthetic drugs as they show minimum Or no side effects and are considered to be safe 2 According to WHO, 80% of the world's inhabitants Problem should treated by medicinal herbal drug for There is a worldwide interest in identifying antibacterial compounds, especially from underutilized fruits, against the increasing resistance of various disease causing organisms. According to the traditional medicinal systems of India, various parts of the plant are claimed to have medicinal properties. There are a huge number of herbal products containing metals and minerals within them. In India due to the diversity in climate, soil,

altitudes and other eco-geographical conditions, rich resource of jamun fruits are available. The large number of herbal products has been reported by (Parmar *et al.*).

JAMUN SEED: *Syzygium cumini* (Jamun) of the family Myrtaceae is a large evergreen tree, grown widely in the indagangetic plains and also in the Cauvery delta of Tamil Nadu, India(Kister Henry *et al.*,1992) . The seeds of *Syzygium cumini* are known to possess high medicinal value. *Syzygium cumini* (Jamun) seeds have hypoglycaemic (Nascimento *et al.*,2000;Rekha *et al.*, 2008), anti-inflammatory(Poole 1996;Spiegel 2006), antipyretic(Poole *et al.*,1990) , psychopharmacologica(Anderson 1987;Warner 1976), hypolipidaemic, and antioxidant activities. It grows naturally in tropical as well

as in subtropical zones. The juice is carminative, diuretic and gives a soothing effect on human digestive system (Perry Robert 1984). The phytochemicals, such as ellagic acid, gallic acid, quercetin and oleanolic acid present in jamun also possess radio protective effects. *Myrtaceae* is a large family of plants consisting of trees and shrubs found in the tropics and subtropics and comprises about 150 genera and 3,600 species (Cronquist 1981). *Syzygium cumini* L. better known as Jamun is an important member of this family widely distributed all over the Indian sub-continent. The fruits and seeds of *S. cumini* are used to treat diabetes mellitus for several centuries in folklore medicine of south Asia. The seeds are used as astringent and diuretic (Bhatia & Bajaj 2005). Pathogen Resistance to synthetic drugs and antibiotics Already in use makes search for plants with Antimicrobial activity more important, as they can substitute for synthetic antibiotics and Drugs. Present study was aimed at Investigation on antibacterial activity of *Syzygium cumini* seed extracts.

Jamun seeds also increase the availability of insulin.” This jamun seed powder helps in maintaining a healthy weight and blood sugar level. It also helps maintain healthy lipid levels and in detoxification of the body. Apart from managing blood sugar levels and indigestion, the jamun seed powder offered by Herb Essential helps in lightening dark spots, preventing acne, and oily skin, the company claims. Besides, the product is 100% vegan, paraben-free, and with no artificial colours or fragrance.

Shade dried seeds are made into powder and taken orally thrice a day in the treatment of diabetes. It is also added to milk or water and consumed the first thing in the morning to keep diabetes in control. It is used as an effective therapy even in traditional medicine to lower the debilitating impact of diabetes on the body slowly. In addition to using as a traditional medicine to reduce the debilitating impact of diabetes on the body slowly, jamun seeds also lower the blood pressure. A study published in the Asian Specific Journal of Tropical Biomedicine, seed extract of jamun lowered the blood pressure by 34.6% in people drinking the extract regularly. The anti-hypertensive effect

was attributed to the presence of ellagic acid, which is a phenol antioxidant. Read more on hypertension.

Star Gooseberry Seed: *Phyllanthus acidus*, is a plant belonging to the Euphorbiaceae family. It is generally recognized as the Country gooseberry. It is usually cultivated for ornamentation and its local name is Arenelli (Tamil). The fruits of *Phyllanthus acidus* are collected from different agroclimatic zones of Tamil Nadu. The plant is an intermediary between trees and shrubs with edible small yellow berries fruits. Various significant chemical constituents are found in this plant. The plant has medicinal usage, too. The peppered leaves are utilized to make a poultice to treat sciatica, lumbago and rheumatism (but have been observed to cause low blood pressure when combined with nitrates), At the same time, the seeds are used as a cathartic and the root, if prepared with care, as a purgative. The syrup is used to medicate the stomach, and in India the fruit is used as a blood-enhancer for the liver. *Phyllanthus acidus* contains 4-hydroxybenzoic acid, kaempferol, adenosine, caffeic acid, and hypogallic acid. The medicinal activities of *Phyllanthus* species are antipyretic, analgesic, anti-inflammatory, anti-hepatotoxic and antiviral [1-5]. *Phyllanthus* has a remarkable diversity of growth forms including annual and perennial herbaceous, arborescent, climbing, floating, aquatic, pachcaulous, and phyllocladous. *Phyllanthus acidus* L. (Family: Euphorbiaceae) is an annual erect little branched herb, 10-50 cm high. Leaves are simple, oblong, acute, or obtuse, slightly oblique to 14 mm long and 6 mm broad and bear the inconspicuous flowers in pairs in their axils. Each pair of flowers comprises one male and one female. The capsule is flattened globose about 2 mm in diameter (Jagessar et al., 2008). *Phyllanthus acidus* is commonly known as Arboroi or Harbori in Bangladesh and gooseberry or star gooseberry in India. The medicinal activities of *Phyllanthus* species are antipyretic, analgesic, anti-inflammatory, antihepatotoxic and antiviral (Unander et al., 1995; Chang et al., 2003; Zhang et al., 2004; Sousa et al., 2007).

Materials and Method:

Sample Collection: The fresh fruits of *Syzygium cumini* and *Phyllanthus acidus* were collected from the local region of city Chidambaram, Tamil Nadu, India in second week of April 2022. The collected fruits were washed under running tap water to remove the dust particles, fruit pulp was separated, and seeds were cleaned thoroughly, dried at room temperature for 1-2 weeks and finally crushed into the powder by using electrical grinder.

General Methods

Cleaning of Glassware: All the glassware were soaked in cleaning solution 100 g potassium dichromate was added to 100 ml of distilled water followed by addition of 500 ml of concentrated sulphuric acid for about 12 hours and washed in tap water. They were thoroughly rinsed in tap water and dried. They were sterilized at 180°C for 3 hours in Hot air oven.

Sterilization: All the media were sterilized in an autoclave at 15 lbs pressure for 20 minutes the glass wares were sterilized at 180°C for 3mis, in Hot air oven.

Sample Preparation: Fully grown seeds of *Syzygium cumini* and *Phyllanthus acidus* were weighed (10g) and distilled water (100ml). The seed dried into grain with powder. Then stored into airtight container. 10g *Syzygium cumini* and *Phyllanthus acidus* seeds were taken in 100ml Methanol was done for 3 days or 1 week to get the clear solution. The above cooled content was filtered by using Whatman filter paper and then the filtrate was used for Agar well diffusion method.

Test Organisms: The test organisms were procured from the Department of Microbiology, RMMCH, Annamalai University. Bacterial strains such as *Staphylococcus aureus*, *Escherichia coli* and *Streptococcus pneumoniae*, *Salmonella typhi* were used as test organisms for antibacterial activity.

Preparation of Inoculum: Stock cultures of bacterial and strains were maintained at 4°C on slopes of Nutrient agar respectively. Active cultures for experiments were prepared by transferring a loopful of cells from the stock cultures to test tubes of Muller Hinton broth for

bacteria that were incubated without agitation for 24 hours at 37°C for bacteria.

Determination of Antimicrobial Activity: The antibacterial tests were carried out by the well diffusion method.

Antibacterial Activity: Antibacterial activity of methanol extract of *Syzygium Cumini* and *Phyllanthus acidus* seeds the powder was evaluated separately by agar well diffusion method (Valgas et al. 2007). The test bacterial strains were inoculated into Mueller-Hinton broth and incubated at 37°C for 24 hours. After incubation a sterile cotton swab was immersed in the bacterial suspension and swabbed aseptically on the surface of Muller-Hinton agar medium and allowed to dry for about 3 minutes. Well of 6mm diameter was punched into the agar medium and filled with 100 micro litre of *Syzygium Cumini* and *Phyllanthus acidus* seeds extracts (25 mg/ml, 50 mg/ml, 70 mg/ml and 100 mg/ml in 10% DMSO of different concentration were used. Gentamicin (50 mg/ml) was used as positive control and 10% dimethyl sulfoxide (DMSO) was used as a negative control. The plates were incubated in an upright position at 37°C for overnight in an incubator. Antibacterial activity was evaluated by measuring the zone of inhibition against the test organisms. (Praveen et al, 2010).

Result: In this study, different seeds were test against certain bacteria. The different seeds showed antibacterial activity against the four types of bacteria. It has been exhibited by well diffusion techniques. Antibacterial activity of *Syzygium cumini* Seed Extract against bacterial pathogens were given in Table 1. Antibacterial activity of *Phyllanthus acidus* Seed Extract against bacterial pathogen were given in Table 2. The zone of inhibition was measured, *Syzygium cumini* better than *Phyllanthus acidus*. Among the two different seeds, *Syzygium cumini* exhibit a maximum zone of inhibition against *Escherichia coli* range between (17 mm), *Staphylococcus aureus* (21 mm), *Streptococcus Pneumoniae* (16mm) and *Salmonella typhi*(16mm). The minimum zone of inhibition exhibited by *Phyllanthus acidus* towards the tested bacterial ranges between (13 mm - 14 mm).

Antibacterial activity of *Syzygium cumini* Seed Extract against pathogen



Figure: 1



Figure: 2



Figure: 3



Figure: 4

Figure 1: Antibacterial activity of *Syzygium cumini* Against *Escherichia coli*.

Figure 2: Antibacterial activity of *Syzygium cumini* Against *Salmonella typhi*

Figure 3: Antibacterial activity of *Syzygium cumini* Against *Staphylococcus aureus*

Figure 4: Antibacterial activity of *Syzygium cumini* Against *Streptococcus pneumoniae*.

Antibacterial activity of *Phyllanthus acidus* Seed Extract against pathogen



Figure: 1



Figure: 2



Figure: 3



Figure: 4

Figure 1: Antibacterial activity *Phyllanthus acidus* Against *Escherichia coli*

Figure 2: Antibacterial activity *Phyllanthus acidus* Against *Streptococcus pneumoniae*

Figure 3: Antibacterial activity *Phyllanthus acidus* Against *Staphylococcus aureus*.

Figure 4: Antibacterial activity *Phyllanthus acidus* Against *Salmonella typhi*.

Table 1: Antibacterial Acitivity of *Syzygium Cumini* Methanol Seed Extract.

S. No	Name of The Organisms	Zone of Inhibition(mm)			
		25 µl	50 µl	75 µl	100 µl
1	<i>Escherichia coli</i>	12 ±0.1	14 ±0.2	15±0.3	17 ±0.3
2	<i>Staphylococcus aureus</i>	15 ±0.2	17 ±0.4	19 ±0.4	21 ±0.4
3	<i>Streptococcus pneumoniae</i>	10 ±0.2	12 ±0.3	14 ±0.2	16 ±0.4
4	<i>Salmonella typhi</i>	11 ±0.1	13 ±0.1	14 ±0.3	16 ±0.3

Table 2: Antibacterial Acitivity of *Phyllanthus Acidus* Methanol Seed Extract

S. No	Name of The Organisms	Zone of Inhibition(mm)			
		25 µl	50 µl	75 µl	100 µl
1	<i>Escherichia coli</i>	10 ±0.2	11 ±0.1	11 ±0.3	13 ±0.2
2	<i>Staphylococcus aureus</i>	11 ±0.1	11± 0.2	12 ±0.2	12 ±0.3
3	<i>Streptococcus pneumoniae</i>	09 ±0.2	12 ±0.3	13 ±0.2	13 ±0.2
4	<i>Salmonella typhi</i>	10 ±0.3	13 ±0.3	12 ±0.1	14 ±0.3

Discussion: Medicinal plant are important with respect to new drugs and pharmacological research development. Our Earth has been

blessed with the billions of diverse plant species and these medicinal plant have been known to be useful to a lots of people all over the world.

Plants are a source of large amount of drug which claimed to possess the antibiotic properties in the traditional system. In the present study antibacterial activity of *Syzygium cumini* methanol seed extract has shown maximum antibacterial activity against the *Staphylococcus aureus* and *Salmonella typhi*. The similar findings were reported by Banerjee S et al.,2018 showed that *Syzygium cumini* methanol seed extract have more potent antibacterial activity against *Staphylococcus aureus*.

Conclusion:

In conclusion, we reported that methanolic seed extract of *Syzygium cumini* has potent antibacterial activity against *Staphylococcus aureus*. The antibacterial potential of methanolic seed extract of *Syzygium cumini* can be exploited perfectly to treat infections in place of commonly used antibiotics in our day to day life. The results obtained in this study suggest a potential application of *Syzygium cumini* for treatment of skin wounds and further investigations should be conducted in order to explore this application. Among the Two different Seeds, *Syzygium cumini* Seed exhibited maximum zone of inhibition against bacteria, followed by *Phyllanthus acidus* Seed. The minimum Antibacterial activity exhibited by Seed *Phyllanthus acidus* towards the tested bacteria.

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