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Evaluation of antibacterial activities in *Carica papaya* Linn.

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Abstract

Introduction: *Carica papaya* Linn. is a well-known medicinal plant that has been widely used for a long time to cure various types of infectious disease especially in South Asian countries. This study intended to identify the potential antibacterial properties in *Carica papaya*.
Methods: The leaves of *carica papaya* was collected and thoroughly washed with tap water to remove dust, soil, birds dropping etc, within them. Then the leaves are dried under the shade for one week. The dried powder of papaya leaves was dissolved in 200ml methanol and it was thoroughly shaken to dissolve the powder into the solvent. Antibactrial activity was evaluated by using Cup Plate Method.
Results: The results of this study showed that both extracts showed moderate antibacterial activity against the test bacterial strains (*E. colli*).
Conclusion: The crude methanolic extract of *Carica papaya* showed significant, antimicrobial activities, some of which supports the traditional use of this plant in various diseases.
Keywords: *Carica papaya*, *E. Colli*, antibacterial activities.

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1. Introduction

1.1 *Carica papaya* plant

Medicinal sources are easily and abundantly available in nature since time immemorial, herbal source of active ingredients helps in managing intractable diseases for this reason trade of plant material have been increased. Herbal medicines are always considered to be safe that has led to its increase in demand. *Carica papaya* Linn (Caricaceae) also called as pawpaw. All parts of these plants can be used such as leaves, fruits, seeds, peels, roots, and flowers as medicinal sources.

Papaya is native to the tropics of Americas. The papaya is a tree like plant of 5 to 10m tall in which leaves are 50-70cm in diameter with seven lobes. Fruits are 15-45cm long and 10-30 cm in diameter. Papaya fruit contains high percentage of Vitamins C, A, E, magnesium, potassium, calcium and carbohydrates. Vitamins B, C and E, carotenoid and phenolic compounds are the most abundant antioxidants present in the plant. Papaya leaves contain high calories than papaya fruit.

This plant has been used traditionally in cases of kidney failure, dental care, and heart problems. The leaf extract have been demonstrated to have anticancer, antioxidative, anti-inflammatory, anti-bacterial, nephroprotective, hepatoprotective, hypoglycemic and hypolipidemic effects.

The current study was aimed to carry out the Antibacterial activity against *E.coli*.

The leaves are large, 50 to 70cm diameter, deeply palmately lobed with 7 lobes. The lower trunk is conspicuously scarred where leaves and fruit were borne. The flowers are similar in shape.

Medical uses of plants range from the administration of the roots, barks, stems, leaves, seeds, extracts and decoction of plants can be used as medicinal purpose. Antimalarial and antiplasmodial activity has been noted in some preparations of the plant. The leaves of papaya plants contain chemical compounds of karpain, which kills microorganisms that often interfere with the digestive function.

1.2 Taxonomy:

Kingdom		**Plantae**
Division	:	Tracheophyta
Subdivision	:	Spermatophytina
Clade	:	Rosids
Order	:	Brassicales
Family	:	Caricaceae
Genus	:	Carica
Species	:	*Carica papaya*

1.3 Chemical Constituents:

Fruit: Protein, fat, fibre, carbohydrates, minerals, calcium, phosphorus, iron, vitamin C, thiamine, riboflavin, niacin, and caroxene, amino acid, citric acids and molic acid (green fruits), volatile compounds: linalol, benzylisothiocynate, cis and trans 2, 6-dimethyl 3,6- expoxy-7- octen-2-ol. Alkaloid, α; carpaine, benzyl-β-d glucoside, 2-phenylethyl-β-D-glucoside, 4-hydroxyl - phenyl-2 ethyl-B-D glucoside and four isomeric malonated benzyl-β-D glucosides.

Latex: Proteolyticenzymes, papain and chymopapain, glutamine cyclotransferase, chymopapain A, B and C, peptidase A and B and lysozymes

Juice: N-butyric, n-hexanoic and n-octanoic acids, lipids; myristic, palmitic, stearic, linoleic, linolenic acids-vaccenic acid and oleic acids. Seed-Fatty acids, crude proteins, crude fibre, papaya oil, carpaine, benzyl isothiocynate, benzyl glucosinolate, glucotropacolin, benzyl thiourea, hentriacontane, β sistosterol, caricacin and an enzyme nyrosin.

Root: Arposide and an enzyme myrosin

Leaves: Alkaloids carpain, pseudocarpain and dehydrocarpaine I and II, choline, carposide, vitamin C and E. Bark β-sitosterol, glucose, fructose, sucrose, galactose and xylitol, Flvanoids; Kaempferol, quercetin

1.4 Medicinal uses:

Cancer: Papaya can inhibit the growth of cancer cells. The fiber released from the fruit binds to the cancer causing cell and keeps the cancer cell away from the healthy cells. The nutrient from papaya provides synergistic protection for the cells which is free from radical damage. Men consuming lycopene rich fruits such as *carica papaya*, tomatoes and guava are less likely to be infected with prostate cancer.

Anticoagulant Effect and wound healing: Papain enzyme which is extracted from *carica papaya* can increase prothrombin coagulation. Papaya latex and chymopappain helps in wound healing.

Anti-Inflammatory effect: Protein enzymes such as papain, chymopapain along with Vitamin C and antioxidants are found in *carica papaya*.

Anti-bacterial effect: The *carica papaya* plant also produces the antibacterial effect against the different types of bacteria, such as Escherichia coli, staphylococcus aureus, salmonella typhae etc.

2. Material and Method:

2.1 Collection of plant material and leaves of *Carica papaya*: The leaves of *carica papaya* were collected in month of February 2019 from Sakoli.

2.2 Washing and Drying of *Carica papaya* leaf: At first the leaves were thoroughly washed with tap water to removedust, soil, birds dropping etc, within them. Then the leaves are dried under the shade for one week.

2.3 Grinding and storage of driedsamples: The dried parts were ground to coarse powder with the help ofblender. This process breaks the plant parts to smaller pieces thus exposing internal tissues and cells to solvents thus facilitating their easy penetration into the cells to extract the constituents. Then the powdered sample was kept in clean closed glass containers till extraction. During grinding of sample, the grinder was thoroughly cleaned to avoid contamination with any remnant of previously ground material or other extraneous matters deposited on the grinder. The weight of the total dry powder.

2.4 Extraction of the dried powdered sample: The dried powder of papaya leaves was dissolved in 200ml methanol and it was thoroughly shaken to dissolve the powder into the solvent. Then it was kept for 7days in a cabinet and frequently it was shaken to dissolve the powder properly. After 7days the powder of papaya leaves was filtered using cotton and filter paper.

2.5 Filtrationofextract: After 7 days of macerationof that leaf powdered drug, that extract was filter with the help of filter paper.

2.6 Evaporation of extract: After filtration that extract was evaporated by heating of the extract in water bath, for concentrate that extract.

2.7 Yield of extract: 40gm of dried leaf powder was dissolved in 200ml of methanol solvent extracted by maceration process and obtained 5gm sticky extract, therefore the percent yield is 2.5%, then it dissolved in 5 ml solvent so 5000mg in 5ml therefore 1ml consist 1000mg.

2.9 Antimicrobial activity

2.9.1 Cup Plate Method:

The antimicrobial activity of the leaf extracts was evaluated by cup plate method. Bacteria were grown in Muller Hinton Broth to match the turbidity of 0.5 Mcfarland standards to be inoculated on Muller Hinton agar. After inoculation, plates were dried for 15 min, and the wells were punched using sterile cork brokes.Once wells were formed, they were filled with plant extracts and blanks (water). Commercially available Gentamicin discs were used as appositive control in this study. Plates were incubated for 24 h at 37ºC to allow leaf extract to diffuse through the agar media to form zone of inhibition. The diameters of the zone of inhibition for different leaf extracts againsts different bacteria were measured in millimeter for further analysis. An cup plate method (6mm) showing no zone ofinhibitionwas considered as no antimicrobial activity.

3. Observation

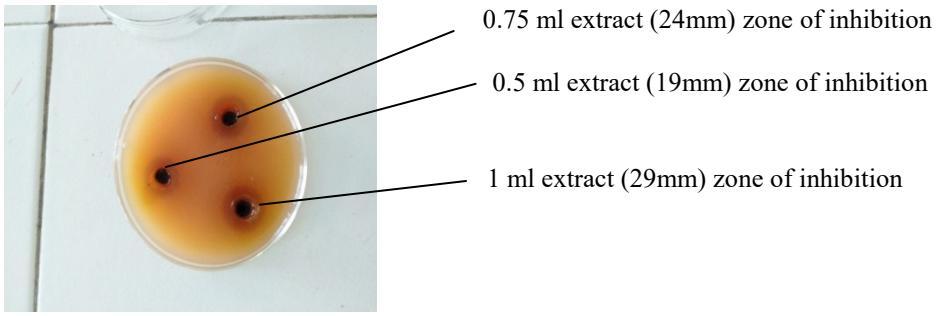

Fig 1: Antibacterial activity of *Carica papaya* leaf extract

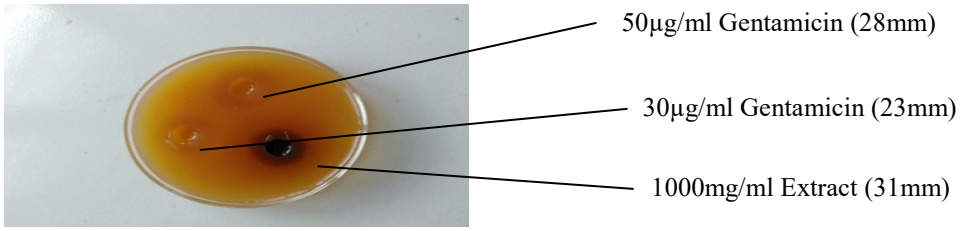

Fig 2: Comparative study of *Carica papaya* leaf extract with Gentamicin drug

Observation table:

Bacteria	Extract	Qty. Of leaf extract (1000mg/ml)	Zone of inhibition(mm)
E.coli	Plant extract	1ml	31

Bacteria	Label	Conc. Of Gentamicin (µg/ml)	Zone of inhibition (mm)
E.coli	Gentamicin	50µg/ml Gentamicin	28
		30µg/ml Gentamicin	23

4. Results

The plant *Carica papaya* shows the antibacterial activity. However the extract contains 1000mg/ml shows the greater zone of inhibition than 50µg Gentamicin against *E.coli*.

5. Conclusion

The presence of antibacterial substances in higher in *Carica papaya* plants. Plants have provided a source of inspiration for novel drug compounds as plants derived medicines have made significant contribution towards human health. Phytomedicines can be used for the treatment of diseases as is done in case of Unani and Ayurvedic system of medicines or it can be the base for the development of a medicine, a natural blue print for the development of a drug. The crude methanolic extract of *Carica papaya* showed significant, antimicrobial activities, some of which supports the traditional use of this plant in various diseases. The plant can be further screened against various diseases in order to find out its unexplored efficacy and can be a potential source of chemically interesting and biologically important drug candidates. Very few compounds are isolated from the *Carica papaya*. Therefore, there is huge potential to find active principles which could be beneficial for mankind for targeting various diseases.

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