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Evaluation of Antimicrobial Activities of Crude and N-Butanol Fraction Latex of *Carica papaya L.* (Caricaceae)

Kandikonda Maneesha[1], Kanakam Vijayabhaskar[1], Heena Firdouse[1], Pingali Srinivasa Rao[1*], Mothukuri Prajwitha[1], Sreeramula swetha[1]
[1]St. Peter's Institute of Pharmaceutical Sciences, Vidyanagar, Hanamkonda, Warangal urban, Telangana-506001-INDIA.

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***Corresponding Author Email:** pingali99@gmail.com

Abstract
The current study was aimed to evaluate the antimicrobial properties of crude and N-Butanol fraction latex of C. papaya. Methods: *in vitro* antimicrobial activity the test organisms were P. vesicularis, streptococcus faecalis, Aeromonas hydrophilia, Salmonela typhae, Stphylococcus cohni, Serratia ficaria and E. coli. Ciprofloxacin was used as a control for investigating the bacterial species. The Zone of inhibition was determined for concentration ranging from 12.5mg/ml to 50mg/ml. (12.5mg/ml, 25mg/ml, 37.5mg/ml, and 50mg/ml). Antibacterial activity tested for well diffusion method. Conclusion: It is concluded that the latex of *C.papaya* probably contains some valuable antimicrobial compounds that are crucial for inhibiting the growth of a wide variety of bacteria, especially Gram-negative bacteria and suggesting this for applying the treatment of a variety of bacterial infections.

Keywords
Antimicrobial activity, Bacteria, Escherichia coli, N-Butanol, Petri plates, *Carica papaya*, Disk diffusion, Latex. Zone inhibition.

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INTRODUCTION
Most important tools in combating bacterial infections and saving human life from severe invasion of many infectious diseases. However, from the past few decades, these health opportunities are under risk as many frequently used antibiotics have become less effective against certain illnesses. This not only because of creating toxic reactions, but also due to the emergence of multi drug-resistant strain of bacteria and the recent appearance of strains with reduced susceptibility to antibiotics (1,2) in spite of major systematic advancement in chemistry, antibiotics derived from plants still make a massive contribution to drug discovery and continue to be a main source of bioactive compound for fighting against communicable diseases for a long time especially in developing countries(3). papaya belongs to the family Caricaceae. The plant is narrated as a fast growing, erect, typically unbranched tree or shrub, trunk of about 20 cm in diameter, hollow with prominent leaf scars and spongy-fibrous tissue, having extensive rooting system and 7-8 m tall containing copious latex in all part of the plant. It is commonly familiar for its food and nutritional values throughout the world; the leaves, fruits, roots and latex obtained from papaya plant are medicinally usable parts for treatment (4). The fruits juicy in taste enriched with antioxidant nutrients like carotene, vitamin C, vitamin B, flavonoids, folate, pantothenic acids and minerals such as potassium and magnesium, and also a good source of fiber, playing an important role to maintain the functions of

cardiovascular system and provide protection against colon cancer(5,6). Plant parts act as analgesic, amebicide, antibacterial, cardiotonic, cholagogue, the latex and the seeds are used in the treatment of gastrointestinal nematode infections and showing anthelmintic activity (7). Evidently the bioactive component of papaya has been used for a long time against a wide variety of microorganisms and contributing a major role of curing various types of infectious disease. Due to failure of chemically synthesized antibiotic to protect the emergence of multi drug resistant bacteria, so there is a principle need to evaluate the antibacterial activity of the latex of papaya for the purpose of searching out newer, safer and more sustainable antibacterial drug. Considering all views of points, the present study evaluates the efficiency of antibacterial activity of *C. papaya* latex can be used new tools for novel drug development.

METHODS

Collection of plant materials:

Fresh latex was collected from locally grown C. papaya initially by 4-6 longitudinal incisions were made on the young fruit using a stainless-steel knife. The exuded fresh latex was allowed running down the fruit and dripping into collecting devices attached around the trunk. With the help of micropipette 500 µl collected latex was transferred immediately to eppendorf tube. And fractionate with butanol solvent in column chromatography the 500 µl butanol was added into this eppendorf tube and shaken for 5 minutes to dissolve the latex into butanol uniformly.

Collection and maintenance of Microbial culture:

The strains were collected from the Pinnacle Biomedical Research Institute (PBRI), Bhopal. The bacterial strain such as (P.vesicularis, sterptococcusfaecalis, Aeromonas hydrophilia, Salmonela typhae, Stphylococcus cohni, Serratia ficaria and E.coli.) were inoculated in a nutrient broth at 37^{0}C for 24 hour in incubator. The 36g of Muller Hinton agar (Himedia)was mixed with distilled water and then stabilized in autoclave at 15lbs pressure for 15 min. The sterilized media was poured into Petri dishes; the solidified plates were bored with 5mm diameter cork bearer. The plates with wells were used for the antimicrobial studies. The various extracts were tested against the P.vesicularis, streptococcus faecalis, Aeromona shydrophilia, Salmonella typhae, Staphylococcus cohni, Serratia ficaria and E.coli for antimicrobial activity. Wells of equal size were cut, and the antibiotic was added into it for positive control; respective solvent sacting as a negative control. The plates were incubated at 37^{o}C, overnight.

Antibacterial sensitivity:

The antibacterial activity of crude plant extracts of *Carica papaya* were determined by well diffusion method. Plates were prepared by pouring sterile Muller Hinton agar (Hymenia) into sterile Petri dishes that were previously autoclaved. Sterilized cotton swabs were dipped in the bacterial culture in nutrient broth and then swabbed on the agar plates. Wells of equal size were cut with proper gaps in the medium and the plant extracts were added into it. Then the plates were incubated at 37^{o}C and observed for zones of growth inhibition after 24 hours.

RESULTS AND DISCUSSION

The antibacterial activity of latex of C. papaya against different strains of Gram-negative (E. coli, Agro bacterium sp., Rhizobium sp.) and Gram-positive bacteria (B. subtitles) was screened by the agar disk diffusion method. The antibacterial activity was shown in the form of zone of inhibition. The inhibitory action of latex showed dose-dependent activities as well as having good inimical response on the basis of strain of bacteria. The paper disks contain different concentrations (12.5mg/ml, 25mg/ml, 37.5mg/ml, and 50mg/ml) of papaya latex. Among all of the doses showed remarkable inhibition performances. This prospected bioactive compound exhibited strong inimical activity against E. coli and having a zone of inhibition of average 6±0.66.37±0.477.52±0.418.5±0.40 respectively (Table.1). While the significant antibacterial activity of the latex was also observed against. P. vesicularis14.25±2.04 18.12±1.6210±1.627.95±0.33, streptococcusfaecalis7.25±0.57.5±1.356.75±0.648.9 ±0.66 Aeromonas hydrophilia 7.12±1.31 7.15±1.39.17±0.907.17±0.43 Salmonela typhae7.75±1.70 7.25±1.047.45±1.316.95±0.49 Stphylococcuscohni 7.25±1.25 7.12±0.856.75±0.439.97±0.30 Serratiaficaria 10±1.637±0.114.1±0.9515.02±1.48. Zone of inhibition of this potential antibacterial compound were compared with one standard commercial antibiotic (ciprofloxacin 50 µg). The results demonstrated that the significant inhibition of the bacterial growth against both strains of the tested organisms has especially been Gram-negative above mention results, the current study clearly indicated that the latex extract of C. papaya has antibacterial properties to some bacterial species and the prospected dose (12.5mg/ml, 25mg/ml, 37.5mg/ml, and 50mg/ml)) is sufficient to inhibit for bacterial growth. Further study needed to carry out for

discovering the lead compound and proceeding for the development of new pharmaceutical drug.

CONCLUSION

The latex of fruits of C. Papaya plant has shown antagonistic activity against some bacterial species probably due to the presence of some important secondary metabolites. Therefore, these plants can be used to discover activities and suggesting for using as potential antimicrobial agent to cure bacterial infection.

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Table. No. 1. The zone of inhibition for different concentrations is reported in

Microbial Strains	Zone of inhibition			
Dose	**12.5mg/ml**	**25mg/ml**	**37.5mg/ml**	**50mg/ml**
P.vesicularis	14.25±2.04	18.12±1.6	10±1.62	5±0.33
streptococcus faecalis	7.25±1.25	7.12±0.8	6.75±0.43	7±0.30
Aeromonas hydrophilia	7.12±1.31	7.15±1.39	7±0.90	7±0.43
Salmonella typhae	7.5±1.70	7.25±1.04	5±1.31	5±0.49
Staphylococcus cohni	7.25±0.57	7.5±1.35	6.75±0.11	8.9±0.66
Serratia ficaria	10±1.63	14.1±0.9	14.1±0.9	15.02±1.48.
E. coli	6±0.66	37±0.47	77.52±0.4	18.5±0.40

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