Short Note

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Kanamycin Potential of Papaya Fruit Stem Exudate in E. Coli

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Abstract

Fruit stem exudate of a Papaya was collected and antibacterial activity was evaluated against *E. Coli* colony culture. The activity was done by an agar well diffusion method. Two concentrations of crude papaya exudate of 300 and 500 µg/disc were adsorbed and allowed for diffusion. A kanamycin standard of the 30µg / disc was compared with the above two concentrations of papaya exudate and found non-significant difference between the zone of inhibitions. The results potentiated papaya fruit stem exudate to the kanamycin type of antibiotic, which might be a potential natural antidote and antibiotic for future decades of medicinal applications.

Key words: Kanamycin, Papaya Fruit Stem Exudate, Zone Of Inhibition

Introduction

Papaya, *Carica papaya* is a herb tree with a stem of spongy, soft wood that is hollow in the center and bears melon-like fruit. It is an interesting tree, in that the male and female parts exist in different trees, and trees may grow to a height of twenty to thirty feet. Papaya contains papain, a remarkable, protein-dissolving enzyme that eases many stomach ailments and is an exceptional aid to digestion. It is also a rich source of minerals and vitamins A, C and

E[1] Ripe and unripe papaya fruits (epicarp, endocarp, sds) except that of leaves produced very significant antibacterial activity on *Staphylococcus aureus*, *Bacillus cereus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Shigella flexneri*[2].

The leaves of the papaya plants contain chemical compounds of karpain, a substance which kills microorganisms that often interfere with the digestive function[3]. Papaya leaf-extracts have

phenolic compounds, such as protocatechuic acid, p-coumaric acid, 5, 7-dimethoxycoumarin, caffeic acid, kaempferol, quercetin, and chlorogenic acid [4 5].

The use of *C. papaya* L (*Caricaceae*) in traditional medicine relies on papain, the active principle which exerts an ulcer protective effect. The *C. papaya* possesses antimicrobial, antioxidant, and anti-inflammatory activities. It is reported to heal chronic ulcers. Shivananda Nayak et al. [6] examined the wound healing activity of the leaf extract of *C. papaya* in experimentally induced excision and dead space wounds in diabetic rats. The wound healing processes are further worsened by the entry of pathogens. It is a common traditional practice to treat the wound with the leaf-extract of papaya to accelerate the healing action. There are many reports available which demonstrate the wound-healing property of the papaya leaves. In addition, papaya leaves possess antibacterial activity which might prevent the multiplication of wound infection-causing bacteria. During the last few decades, considerable progress has been achieved regarding the therapeutic properties of papaya. However, little is known about the biological activity of its' various parts like fruit stem exudate. Here, in order to explore the antibacterial activity we examined the fruit stem exudate of papaya on *E. Coli* as a preliminary proof of natural antibiotic potentiality with that of kanamycin, a naturally occurring antibiotic.

Materials and Methods

Materials:

Agar, petri dish was purchased from the local market. Kanamycin was used as analytical grade. *E. Coli* DH α

strain was cultured from glycerol stock in LB media, which was donated by the microbiology department of the Rajshahi University. Bactotryptone, Yeast extract, NaCl and Paper disc of Hi-media method was also purchased from the local market.

Methods:

Papaya fruit stems exudate collection:

Papaya fruit stem is the cylindrical stem bark between the fruit and tree (Figure 1). The fruit stem bark was scratched well with sharp knife and allowed to exudate. The milky white exudate was collected carefully avoiding any kind of contamination.

E. Coli culture, inoculation and antibacterial activity:

LB media was prepared using bactotrypton, yeast extract, NaCl and *E. Coli* from 80% glycerol stock was moved to inoculate the LB. The inoculated LB was then incubated at RT for an hour. Then antibacterial activity was done using agar well diffusion method [7]. For this 20 ml of sterile Mueller-Hinton Agar (Hi-media) was poured into a sterile autoclaved petri dish. After solidification, the sterile cotton swab was dipped into the bacterial culture. The entire agar surface of each plate was evenly inoculated by swabbing. Two concentrations of Papaya exudates 300 $\mu\text{g}/\text{disc}$ and 500 $\mu\text{g}/\text{disc}$ were used and allowed to diffuse for at least 45 minutes.

The plates were then incubated at 37° C for 24 hrs. Triplicate plates were prepared for each treatment and the average zone of inhibition excluding well was recorded. The antibacterial potential of exudate was compared with that of standard Kanamycin (30 $\mu\text{g}/\text{disc}$) with paper disc (Hi-media) method.

Figure 1: Papaya fruit stem, which was scratched for collecting exudates. The exudate was collected in apertures and measured as drop weight by micropipette.

Figure 2:

Anti-bacterial activity of papaya fruit stem exudate in *E. Coli* strain DHα. White disk is the control Kanamycin and black disk is the papaya fruit stem exudate. A zone of inhibition, ZI values of papaya were higher than that of kanamycin on dose dependent manner.

Results and Discussion:

The antimicrobial properties of plants have been investigated by a number of studies worldwide and many of them have been used as therapeutic alternatives because of their antimicrobial properties[8]. Plants are the cheaper and safer alternative sources of antimicrobials [9, 10, 11] extracted bioactive compounds from leaf and root of *C. papaya* using water and organic solvents, which were investigated for antibacterial activity against some human pathogenic bacteria. We found average zone of inhibitions 26.2 mm. 28.6 mm respectively against *E. Coli* for papaya fruit stem exudate and that of Kanamycin 23.3 mm (Figure 2). The exudate was used as crude without any dilution. Increasing the dose of exudate allowed the ZI value higher depending on the concentration. This is a proof of antibacterial potentiality with that of Kanamycin, which is an aminoglycoside and bactericidal, isolated from the bacterium *Streptomyces kanamyceticus*[12]

Nam Dang and colleagues in Japan have documented papaya's dramatic anticancer effect against a broad range of lab-grown tumours, including cancers of the cervix, breast, liver, lung and pancreas[13].

Dang and his colleagues also documented for the first time that papaya leaf extract boosts the production of key signaling molecules called Th1-type cytokines[14]. This regulation of the immune system, in addition to papaya's direct anti tumour effect on various cancers, suggests possible therapeutic strategies that use the immune system to fight cancers. The papaya extract did not have any toxic effects on normal cells, avoiding a common and devastating consequence of many cancer therapy regimens.

Here we have shown that papaya fruit stem exudate has got the same or more potential in respect of antibacterial activity of a naturally occurred antibiotic Kanamycin, where papaya doesn't show any toxicity in biological system so far reported elsewhere. Our results suggest to explore the biological activity of papaya fruit stem exudate in the days ahead.

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