

ANTIMICROBIAL ACTIVITY OF AQUEOUS EXTRACT OF UNRIPE PAWPAW (*Carica papaya* Linn.) PEEL AGAINST *ESCHERICHIA COLI* AND *BACILLUS SPP*

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ABSTRACT

One of the common plant materials used in treatment of sickle cell disease in Nigeria is unripe papaya. This study examined the aqueous extracts of fresh (wet) unripe papaya peel for possible antimicrobial potencies and compared their antimicrobial property to those of standard antimicrobial drugs such as Ampicillin and Augmentin. Hot aqueous was used to extract phytochemicals from the peel of unripe *Carica papaya* to determine their antibacterial activities. The extract showed maximum zone of inhibition of 27mm, 30mm, against *Escherichia coli* and *Bacillus spp* respectively. However no zone of inhibition was seen for Ampicillin and Augmentin against *Echerichia coli* and *Bacillus spp* respectively. Based on our result, aqueous extract of unripe papaya peel as herbal materials could be of therapeutic use in the management/treatment of diseases caused by antibiotic resistant gram positive and gram negative bacteria.

Keywords: Unripe *Carica papaya peel*, Antimicrobial Properties, Agar well Diffusion, Ampicillin, Augmentin

1.0 INTRODUCTION

One of the most important issues of current medicine is bacterial drug resistance and uropathogenic tract infections and the primary factor of this issue are Uropathogenic *Escherichia coli* strains (Wioletta et al., 2017). *Bacillus spp*, due to their ability to stimulate the immune system are used for a range of different biotechnological applications, such as probiotic dietary supplements for humans and animal feed inoculants (Huang et al., 2008). However, there is an increasing public health concern about the possibility of microbial cultures used as dietary supplements or for food production being potential sources for the transfer of antibiotic resistance genes (Gevers, 2003). This concern is underlined by the fact that *Bacillus spp*. in a number of commercially available probiotic feed supplements for both humans and animals have been shown to be resistant to several antibiotics (Hoa, 2000). Because bacteria is promiscuous in nature, susceptible bacteria may acquire resistance genes from plasmids and other horizontally transferred genetic material, resulting in evolution by leaps which is the cause prevalence of antibiotic resistance (Higgins, 2007).

Papaya consumption has been recommended for preventing vitamin A deficiency which causes childhood blindness in many tropical and subtropical countries based on its accordance to the united states recommended daily allowance for many vitamins, (Guoado et al., 2007). Unripe papaya however is known for its therapeutic use as an antiseptic (Nwofia and Ojmelukwe, 2012). Report by Sade, 2010 has shown that aqueous extract of unripe pawpaw has no harmful effect on kidney functions. Extracts of agro-base wastes such as peels and seeds of fruits are being explored for their antibacterial activities since they are cheaper and could support the drive to reduce waste. (Ashok et al., 2011). Unripe pawpaw peel can be obtained during the preparation of the unripe fruit for meat tenderization (Maiti et al., 2008). Pharmacological properties of natural products are mostly evaluated using in vitro models (Abdulrazaq and Mohammad, 2015). Muhamad et al., 2017 states that reports on antibacterial activities from papaya (*Carica papaya*) peels are still scanty. The aim of the present research was to examine the antimicrobial activity of aqueous extract of fresh (wet) unripe pawpaw peel on *Ecoli* and *Bacillus spp*.

2.1 MATERIALS

Unripe pawpaw was obtained from local market. All chemicals and reagent used were of analytical grade

2.2 SAMPLE PREPARATION

The unripe pawpaw peels were removed using table knife, washed thoroughly with distilled water and diced into tiny pieces.

2.2.1 Extract Preparation

About 25g of the air-dried unripe pawpaw peel was put in a beaker containing 100ml distilled water and heated in a water bath at 60°C for 30min. The aqueous extracts were separated by filtration with Whatmann No. 1 filter paper (pore size 0.45 µm) and then centrifuged at 1000 rpm for 10 min (Abhay, and Rupa, 2016).

2.3 ASSESSMENT OF ANTIBACTERIAL PROPERTY

Antibacterial activity of aqueous extract of unripe pawpaw peel were tested against *Escherichia coli* (Gram negative bacteria) and *Bascillus spp* (Gram positive bacteria).

2.3.1 Test Pathogens

The bacterial strains employed in this work were obtained from the Molecular Biology Laboratory of Covenant University after proper identification by a certified Microbiologist.

2.3.2 Preparation of Sample for Antimicrobial Assay

The extract was kept in the oven at 60°C until it was completely dried (Gloria et al., 2017). The resultant dried extracts were dissolved in Phosphate Buffer Saline (PBS) to a concentration of 4.7g/mL extract solution.

2.3.3 Antibacterial Assay

The antimicrobial potency of the sample was checked using Agar well diffusion method as described by Abhay and Rupa, 2016 with appropriate modifications. In brief, Muller Hinton agar was poured into petri dishes. After solidification of nutrient agar plates, 20 µl of standardized inoculum of the test organism was seeded on respective plates and wells of 5mm diameter were bored using a cork borer. About 50 µl of extract was loaded into the wells. Plates were incubated at 37 °C for 24hrs, and was inspected for Zone of inhibition. The zone of inhibition was compared with that formed by Standard antibiotics: Ampicillin and Augmentin (gram negative and positive antibacterial drugs) against *E.coli* and *Bascillus spp* respectively.

3.0 RESULT AND DISCUSSION

Increase in drug resistance bacteria is as a result of the use and over use of synthetic antibiotics (Llor and Bjerrum, 2014). Natural products such as medicinal plants are non-narcotic, having no side-effect and are easily available at the affordable price. (Verpoorte et al., 2002). Herbalism is the study and use of medicinal properties of plants and plant extracts. Herbal medicine is one of the readily available resources for primary health care system (Khan et al., 2012). Agro-base wastes such as peels and seeds of fruits are been explored for their antibacterial activities since they are cheaper and could support the drive to reduce waste (Ashok et al., 2011). In Nigeria, unripe papaya peel is usually discarded during the preparation of papaya fruit. This study therefore examined the aqueous extract of unripe pawpaw peel for its antimicrobial potency against *E.coli* and *Bascillus spp* and compared its activity to standard drugs viz; Ampicillin and Augmentin. The extract showed maximum zone of inhibition of 27mm, 30mm, against *Escherichia coli* and *Bascillus spp* respectively. However no zone of inhibition was seen for Ampicillin and Augmentin against *Echerichia coli* and *Bascillus spp* respectively.

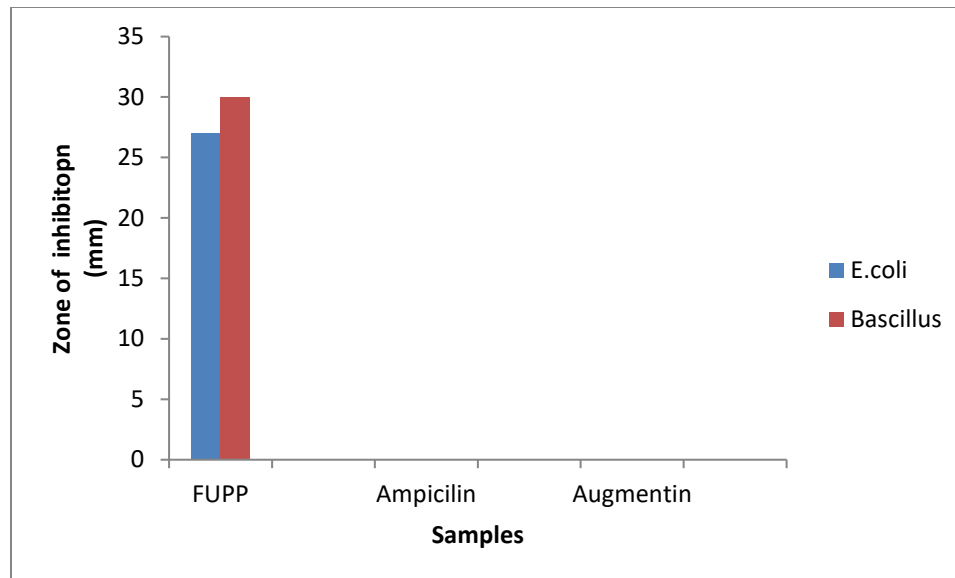


Figure 1: Zone of inhibition of samples

FUPP-Fresh unripe pawpaw peel

4.0 CONCLUSION

Based on our result, aqueous extract of unripe papaya peel as herbal materials could be of therapeutic use in the management/treatment of diseases caused by antibiotic resistant gram positive and gram negative bacteria.

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