Antimicrobial activity of banana

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The experience of human misery in the form of disease is perhaps as old as the inception of man on the earth. The history of medicine beyond record of human civilization is shrouded in the misery of obscurity; it almost touches the boundaries of mythology, both East and West alike. Several pharmacological industries have evaluated new era for the search of effective antibiotics throughout the world but on the other hand resistance to these an antibiotic by microorganisms has increased.

The increasingfailureof chemotherapeutics and antibiotic resistance exhibited by pathogenic microbial infectious agents has led to the screening of several medicinal plants for potential antimicrobial activity. They have a long evolution of resistance against microbial agents which has lead to alternative directions in drug development. The development of antibacterial agents derived from micro-organisms and chemotherapeutic agents from plants is a research area of the utmost importance. The present study was designed to evaluate the antimicrobial activity of banana (Musa sapientum Linn.)

Blossom extract against Gram-positive and Gram-negative bacteria (Staphylococcus aureus and Escherichia coli). The appropriate extraction process with an outstanding antibacterial activity of the extract was the alcoholic extraction with 80% ethyl alcohol for 48 hours. The antimicrobial activities of the extract were evaluated using paper disc diffusion methods and assay plates. ?-sistosterol, 12- hydroxystrearic acid, palmitic acid and d-malic acid and tannic acid, the bioactive compounds isolated from Musa Sapientum Linn.

can retain their inhibitory effect against bacterial growth in model media based on the inhibitory zone minimally. Contents Page Title Pagei Abstractii Table of Contentsiii I. Introduction1 II. Materials and Methods Flow Chart5 Preparation of Dried Samples6 Extraction of Fresh and Dried Banana Inflorescence6 Preparation of 0. 5 McFarland Standard7 Preparation of Nutrient Broth and 7 Adjustment of Turbidity Preparation of Assay Plates and Cotton-Swabbing7 Paper Disc Diffusion Method8 Reading the Assay Plates9 Analyzing the Results9 III. Results and Discussions10

IV. Conclusions and Recommendations13 V. Acknowledgement14 VI. References15 VII. Appendices16 Introduction The experience of human misery in the form of disease is perhaps as old as the inception of man on the earth. The history of medicine beyond record of human civilization is shrouded in the misery of obscurity; it almost touches the boundaries of mythology, both East and West alike. Human or Animal sacrifices on altars of temples of god was a common practice even during the days when Indus, Nile, and Greek Civilizations were on their climax.

Though these acts did not have any direct or otherwise bearing on thehealthof diseased or wounded, it had its own convincing or satisfying effects. In order to find remedy for illness and for providing relief to the wounded the man discovered its first resort in plants. Several pharmacological industries have evaluated new era for the search of effective antibiotics throughout the world but on the other hand resistance to these an antibiotic by microorganisms has increased. It is known that microorganisms have the genetic ability to transmit and acquire resistance towards drugs.

The increasing failure of chemotherapeutics and antibiotic resistance exhibited by pathogenic microbial infectious agents has led to the screening of several medicinal plants for potential antimicrobial activity. They have a long evolution of resistance against microbial agents which has lead to alternative directions in drug development. Most of green plants represent a reservoir of effective chemotherapeutants and can provide valuable sources of natural drugs, natural pesticides and bio-fertilizers.

Therefore, extracts of plants and phytochemicals are getting more importance as they have the great potential sources for microbial and viral inhibitors during the recent decade. Plant parts used for this purposes are bulb, gel, leaves, roots, barks, peels etc. Different class of plantfamilyand their respective parts has been used to treat threat throughout humanculture. Among the most ancient recorded uses of medicinal plants are those found in China and India, where historic approach to the treatment of human diseases is still practiced.

Bananas are the fourth most importantfoodcrop in developing countries, after rice, wheat, and maize, with nearly 90% of the crops being grown for small-scale consumption and local trade. Banana plants are cultivated in more than 100 countries throughout the tropical and subtropical regions, occupying around 10 million hectares, with an annual fruit production of approximately 88 million metric tons. It possesses many curative properties and prevents many kinds of illnesses and conditions. Different parts of plant are used very 2

frequently in different worship ceremonies by the Indians among them banana have many beneficial nutritional properties. They are a good source

of vitamins C, B6, A, potassium, high content of carbohydrates and fiber, while they are low in protein. Several references have been reported for hot and cold extraction method of banana plant. Pharmacological investigations revealed that banana blossoms are screened for antidiarrhoeal activity (Rabbani et al. , 1999, 2001), antiulcerative activity (Pannangpetch et al. 2001; Goel and Sairam, 2002; Jain et al.

2007), antimicrobial activity (Richter and Vore, 1989; Ahmad and Beg, 2001; Mokbel and Hashinaga, 2005; Alisi et al. , 2008; Fagbemi et al. , 2009; Mumtaz Jahan, 2010), Hypoglycemic activity (Ojewole and Adewunmi, 2003; Mallick et al. , 2006; Mallick et al. , 2007; Singh et al. , 2007); Hypocholesterolaemic activity (Vijayakumar et al. , 2009), antioxidant activity (Yin et al. , 2008), Diuretic activity (Jain et al. , 2007), Wound healing activity (Agarwal et al. 2009), Anti-allergic activity (Tewtrakul et al. , 2008), Antimalarial activity (Kaou et al. , 2008), Anti-snake venom activity (Borges et al.

2005). Literature reviews indicated that banana fruits and flowers contain antibacterial principles and no reports available for antibacterial activities from corm of banana plants. 3 Phytochemical screening confirmed the presence of active compounds like glycosides, tannins, saponnins, phenols, steroids and flavonoids in the M. sapientum flower ethanolic extract. It was revealed that tannins have the highest concentration value of 88. 31 mg/ 100 g. This is probably the reason why banana blossom has a good antimicrobial and antioxidative activity (Sumathy et al. , 2011). 4 Materials and Methods

The procedure in conducting this research investigation consists of several steps. They are shown in the following methodology flowchart. Preparation of Plant Material Banana inflorescences were bought from the local market. The buds of the inflorescences were separated from the bracts, cleaned and sun-dried at under constant ventilation. Dried samples were diced finely. They were ready to be given at the Department ofScience and Technologyfor extraction. Extraction of Fresh and Dried Banana Inflorescence The dried samples were weighed exactly 121. 57 grams in an Erlenmeyer flask.

They were treated with sufficient 80% ethyl alcohol in order to completely submerge the sample. The Erlenmeyer flask was covered with the stopper and the soaked samples were homogenized for 24-48 hours. The soaked samples were filtered through Buchner funnel with gentle suction. The flask and the soaked sample were rinsed with fresh portions of alcohol. The washings and soaked samples were transferred to the funnel and the washings were combined with the first filtrate. Gentle suction was applied to complete the collection of the plant extract. The plant residue was discarded.

The filtrate under vacuo at temperature below 50°C to about 20 mL was concentrated. The concentrated extract was measured exactly 90 mL. It was then stored in a refrigerator at temperature 0°C for further experimentation. 6 Preparation of 0. 5 McFarland Standard 0. 5 mL of 0. 048 M Barium chloride (BaCl2) (1. 175%w/v BaCl2 • 2H2O) to 99. 5 mL of 0. 36 N Sulfuric acid (H2SO4) was mixed. 5 mL of solution was distributed into screw-cap tubes of the same dimension as those to be used in preparing the culture suspension. Screw-cap tubes were tightly sealed and stored in the dark at room temperature.

Preparation of Nutrient Broth and Adjustment of Turbidity of the Inoculum The preparation of 1000 mL solution was prepared according to the indicated label. A loopful of bacteria, gram positive or gram negative, from the culture was taken and inoculated in 50 mL nutrient broth. The culture broth was incubated for 18-24 hours at 35°C. The culture broth for turbidity was observed. 5 mL of the culture broth was aseptically transferred in the sterile screw-capped tubes. The bacterial suspension was agitated on a vortex mixer and was immediately compared against the 0. 5 McFarland standard prepared.

Preparation of Assay Plates and Cotton-Swabbing The assay plates were prepared depending on the number of test organism and replications required. Approximately 15 mL of 7 melted nutrient agar was poured into dry and sterile petri dishes and let the medium solidify. A sterile cotton swab was moistened into the inoculum suspension. It was used with wooden applicator handles. The sterile cotton swab was dipped into a suspension of the inoculum. The moistened swab was pressed and rotated firmly against the wall of the tube just above the fluid level to remove the excess liquid.

The inoculum was swabbed aseptically into a solidified nutrient agar by streaking the swab over the entire surface of the agar plate three times. The plate was rotated 60 degrees after each application to ensure an even distribution of the inoculum on the surface of the medium and then the swabbed plates were stood for 5 minutes. Paper Disc Diffusion Method One paper disc was picked out using the forceps and immersed into the plant extract. The moistened filter disc was laid gently on the seeded agar plate.

The disc was tapped gently with forceps to ensure maximum full contact of the disc with the agar medium.

The inverted plates were then incubated. 8 Reading the Assay Plates The discs were observed and a halo was formed. This is the sign of the zone of inhibition. The plates were inverted and measured using the ruler for each inhibition zone in millimeters. Analyzing the Results 19 mm may also be expressed as very active. 9 Results and Discussion Table 1. 1 shows the zone of inhibition in millimeters and the parameter Parameter Zone of Inhibition (mm) Staphylococcus aureus Trial 1 Trial 2 Trial 3 Average Rommel Joshua 22 25 24 24 Escherichia coli Trial 1 Trial 2 Trial 3 Average

Carlo Allison 25 25 21 24 The result obtained in the antibacterial activity obviously indicated that the ethanolic extract showed its antibacterial activity against Staphylococcus aureus and Escherichia coli. ?-sistosterol, 12-hydroxystrearic acid, palmitic acid and d-malic acid and tannic acid were bioactive compounds isolated from Musa Sapientum Linn. The zone of inhibition was more than 19 millimeters in diameter which means it is very active. According to this investigation, it could be indicated that antimicrobial activity of the ethanolic extract of Musa sapientum L.

is due to the present of those bioactive compounds. Graph 1. 1 shows the zone of inhibition of E. coli 11 Graph 1. 2 shows the zone of inhibition of S. Aureus 12 Conclusions and Recommendation Based on the findings of the study, the researchers' arrived at a conclusion: The appropriate extraction process with an outstanding antibacterial activity of the extract was the alcoholic extraction with 80% ethyl alcohol for 48 hours. The ethanol showed

an antibacterial activity against the tested microorganisms. The study show that the natural antimicrobial compounds of Musa sapientum Linn.

can retain their inhibitory effect against bacterial growth in model media based on the inhibitory zone. But, there is no significant difference of the banana blossom in inhibiting the growth of S. aureus and E. coli. Based on the conclusion drawn, the following recommendations are given: The researchers' would like to recommend further analysis on the other parts of the banana plant that can display an antibacterial activity. 13 Acknowledgement Foremost to God Almighty, the greatest author of all times, for His guidance and blessings who gave the researcher the strength and determination to finish this piece of work. Mrs. Letecia S.

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