International Journal of Pharmaceutical Research and Applications
Volume 5, Issue 2, pp: 03-06 www.ijprajournal.com ISSN: 2249-7781

Antimicrobial effects of variety of dried banana peel extracts

*V.Kavitha[1] and G.Manonmani[2]

[1] *Assistant Professor (SG), Department of Costume Design & Fashion, Dr.N.G.P Arts and Science College, Coimbatore.*

[2]*Assistant Professor, Department of Home Science, Mother Teresa Women University, Coimbatore.*

Date of Submission: 02-10-2020 Date of Acceptance: 17-10-2020

ABSTRACT: Banana one of the precious source for sustaining human health. The utilize of banana peel extracts for antimicrobial properties can be of great importance in therapeutic treatments. Objective: This research point to assess the antibacterial activity of dried various banana peel extracts. Materials and Methods: Alcoholic extract of banana peel extracts was subjected to antibacterial efficacy against Gram- positive and Gram- negative bacteria by the well agar diffusion method. Results: The alcoholic extract of dried banana peel exhibited a various inhibitory effect against various microbial isolated. Higher inhibitory effects were noticed on Nendran and Poovan against Staphylococcus Aureus (13.55+ _ 0.04), Bacillus Subtilis (13.26+_) and Pseudomonas aeruginosa(14+_ 000). Conclusion: Alcoholic peel extract of dried banana could be observed as a good antibacterial agent both Gram- positive and Gram-negative bacteria.

Keywords: Banana, Alcoholic banana peel extract, well-agar diffusion, Gram positive and negative bacteria

I. INTRODUCTION

Nowadays assessment of alternate effective and safe medicine from possible medicinal plants is led by the growing antibiotic-resistant microbial infectious agent. The phytometabolites have enormous potential to repress bacteria, fungi, and virus. Various parts of the Plant such as bulb, gel, leaves, roots, barks, peels etc. were used for the extraction of phytometabolites (**1**). The present practice of medicine today has modified a lot from its practice in medieval times. However, in India, we still use convential practice for treatment of various diseases since Vedic period (**2**).

Banana one of the tropical fruit and a member of Musaceae family is grown in several regions of all over the world (**3**). All parts of the banana plant such as flower, pulp, stem, and leaves have a medicinal utilization (**4**). The flowers in bronchitis and dysentery and on ulcers; cooked flowers are given to diabetics; the astringent plant sap in cases of hysteria, epilepsy, leprosy, fevers, hemorrhages, acute dysentery and diarrhea, and it is used for hemorrhoids, insect and other stings and bites; young leaves are put on as poultices on burns and other skin afflictions; the astringent ashes of the unripe peel and of the leaves are taken in dysentery and diarrhea, and given for treating malignant ulcers (**5**) ; the roots are administered in digestive disorders, dysentery, and other ailments; banana seed mucilage is given in cases of diarrhea in India (**6**).

The previous studies have reveal waste material of Banana peel has medicinal properties (**4,7**). Several bioactive compounds such as flavonoids, tannins, phlobatannins, alkaloids, glycosides, and terpenoids are present in banana peel which strive a pharmacological effect, especially as an antioxidant, antidiabetic, anti-inflammatory, and antibiotic (**7**). Phytocompounds extracted from several parts of the banana plant in which displayed remarkable inhibitory effect towards the foodborne pathogens, hence banana plant should be considered to be a significant natural source of antimicrobial as well as antioxidant agent (**8**). Therefore, the present study was aimed to evaluate the antimicrobial activity of fresh and dried Banana peel extracts against clinical pathogens as a comparative study.

II. MATERIAL AND METHODS

Bacterial culture

The bacterial culture S.aureus, Bacillus subtilis, P.aeruginosa, and E.coli were acquired from Microbiological laboratory of Kovai Medical Centre and Hospital (KMCH), Coimbatore and the antibacterial assay was executed in the Department of Microbiology, Dr. N.G.P. Arts and Science College, Coimbatore.

International Journal of Pharmaceutical Research and Applications
Volume 5, Issue 2, pp: 03-06 www.ijprajournal.com ISSN: 2249-7781

Sample collection

The different variety of the banana peels used for the study was acquired from the farmers in and around Coimbatore. The banana peel was air-dried and ground into powder with a mechanical blender. The powdered samples were kept in clean brown bottles at room temperature for further use.

Extract preparation

The dried banana peels powder were kept in 70% ethyl alcohol. Then, the entire mixture was homogenized in blender and left at room temperature for about 48 h. As the reaction carried out, the yellow transparent liquid turned to amber and later to an opaque black liquid that served as the indicator for completion of the reaction. After completion of the reaction, the entire slurry was filtered through Whatman filter to get banana peel extract (**9**). The filtrate was subjected to rotary vacuum evaporator to get solid solvent free curd extract and stored for further bioassay.

In vitro antibacterial assay

A loop full of bacterial cultures were infused into nutrient broth incubated at 37 °C for 18 hours and inspected the purity. The log phase bacterial suspensions were diluted with sterile nutrient broth to adjust the turbidity and compare with standard tube (McFarland number 0.5) to yield a uniform suspension containing 1.5×10^8 CFU / ml. The sterile cotton swab was dib into the standardized bacterial culture to make lawn culture on Mueller-Hinton agar surface of plates and the plates were left for 5-15 minutes at room temperature to dry. Sterile cork borer was used to cut well (6mm diameter) on lawn cultured plates. Solvent-free banana peel extracts were dissolved in Dimethyl sulfoxide (DMSO), from this 0.1ml was added to the well. DMSO and chloramphenicol were used as negative and positive control respectively. The plates were incubated at 37 °C for 18-24h and the size of the zone of inhibition was measured. Each experiment was carried out in triplicate.

Determination of Minimum Inhibitory Concentrations (MICs)

The banana peel extracts was subjected into Determination of the minimum inhibitory concentration (MIC) using the tube-dilution technique (**10**). A two fold serial dilution was made using Muller Hinton broth (MHB).The following concentrations were obtained: 1025mg/ml, 512.5mg/ml, 256mg/ml, 128mg/ml, 64mg/ml, 32mg/ml, 16mg/ml and 8mg/ml. Equal volume of extract and Muller Hinton broth (2ml) was passed into sterilized test tubes. A quantity (0.1ml) of standardized inoculum (1.5×10^8cfu/ml) was added to each of the test tubes which were incubated aerobically at 37^oC for each 24h. A tube containing broth and inoculum without extract similarly tube with broth and extract without inoculum served as organism control and extract control respectively. The lowest concentration of the extracts which inhibited microbial growth (no turbidity) was recorded as the minimum inhibitory concentration (MIC).

Statistical analysis

Each experiment was done in triplicate, and the data's were expressed as mean± standard error of mean.

Table 1. Antibacterial activity of dried banana peel sample.

Sample name	Zone of inhibition in mm			
	S.aureus	B. subtilis	P.aeruginosa	E.coli
Rashthali	9.53±0.47	9.5±0.04	12.51±0.02	9.51±0.2
Nendran	0	9.15±0.11	10.48±0.02	9.09±0.11
Kadali	0	13.5±0.04	12.26±0.17	9.09±0.12
Red banana	0	9.16±0.12	14.49±0.00	9.02±0.02
Karpooravalli	9.51±0.02	9.4±0.15	9.5±0.00	0
Robusta	9.52±0.02	10.53±0.2	10.53±0.04	9.51±0.01
Poovan	0	11.5±0.08	11.53±0.04	10.5±0.02
Pachainadan	9.15±0.12	10.5±0.08	0	11.49±0.04

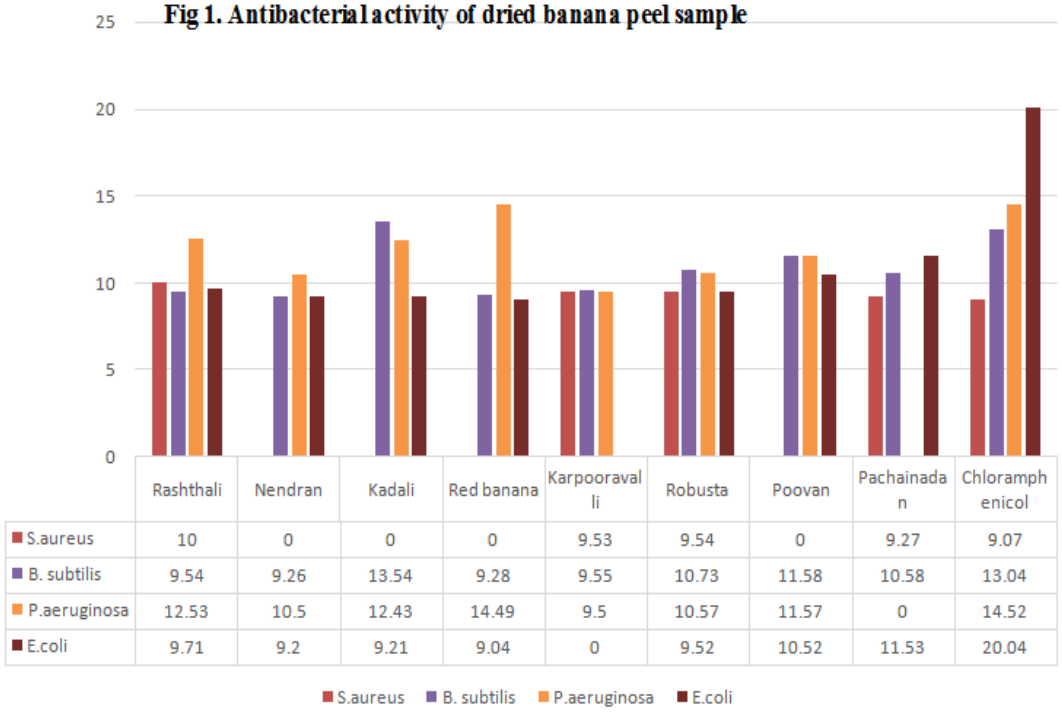
International Journal of Pharmaceutical Research and Applications
Volume 5, Issue 2, pp: 03-06 www.ijprajournal.com ISSN: 2249-7781

Chloramphenicol	9.03±0.04	13.02±0.02	14.49±0.03	20.0±0.04

III. RESULTS AND DISCUSSION

Totally eight dried peel extract of various varieties of the banana peel extracts were used for the present study. The antibacterial efficacy of dried banana peel extracts against clinical isolated were tested and the results were tabulated (Table 1). The dried peel extract of rashthali shows a significant activity against all the bacteria and robusta also has good antibacterial activity against all organisms. But nendran, kadali, redbanana, poovan shows good activity against B.subtilis, P.aeruginosa and E.coli and no activity against S.aureus. Whereas karpooravalli shows good activity against s.aureus, b.subtilis and P.aeruginosa but not against E.Coli. In case of pachainadan, it has significant activity S.aureus, B.subtilis, E.coli and no activity P.aeruginosa.

Fig 1. Antibacterial activity of dried banana peel sample



	Rashthali	Nendran	Kadali	Red banana	Karpooravalli	Robusta	Poovan	Pachainadan	Chloramphenicol
S.aureus	10	0	0	0	9.53	9.54	0	9.27	9.07
B. subtilis	9.54	9.26	13.54	9.28	9.55	10.73	11.58	10.58	13.04
P.aeruginosa	12.53	10.5	12.43	14.49	9.5	10.57	11.57	0	14.52
E.coli	9.71	9.2	9.21	9.04	0	9.52	10.52	11.53	20.04

Effect of plant constituents can combat human and plant pathogenic bacteria, fungi and viruses without toxic after effects and environmental hazards (**11**). The consumption of banana is good because of its nutritional value. It is used in anemia, stroke [**12**] depression, stress , heartburn, [**13**] etc., Banana peel which is an outer shell of banana also have been studied for the treatment of mosquito bites, [**14**] gastrointestinal disorders,[**15**], and nipple fissures caused by Staphylococcus aureus.

Previous study described the antifungal and antimicrobial properties of yellow banana fruit peel and found that it is effective against different Gram positive and negative bacteria (**16**).In our present study, we concentrated on various dried banana peel extract to screen the microorganisms were subjected to assess the impact of banana peel extracts against infectious agent.

This study revealed that dry banana peel extract has significant activity than chloramphenicol which used as positive control. The higher amount of more bioactive compounds was extracted with ethanol 70% due to its higher polarity than pure ethanol. In the present study also 70% ethanol was used for the extraction of active compounds from the banana peel, it may be the reason for the activity of the rashthali and robusta peel extracts which indicate the organic solvents like ethanol one of the extracting solvent to extract the phytocompounds.

International Journal of Pharmaceutical Research and Applications
Volume 5, Issue 2, pp: 03-06 www.ijprajournal.com ISSN: 2249-7781

Certain studies conclude that that banana peel extract not only hold back the non-spore forming bacteria but also unidentified substance extracted from banana skin has been shown to inhibit spore formation of bacteria by using plate biological assay, the unknown substance indicates inhibitory effects at pH values as high as 7.5 (**17**). In our present study the dry banana peel extract showed optimum level of inhibition against some clinical pathogens.

IV. CONCLUSION

Alcoholic peel extracts of dried banana could be considered as a good antibacterial agent against both Gram positive and negative bacteria to restore the synthetic medicines in treatment of diseases related to bacteria.

REFERENCE

[1]. Kinghorn AD, Kaneda N, Baek NI, Kennelly EJ, Soejarto, Jahan M, Warsi MK, Khatoon FD. Concentration influence on antimicrobial activity of banana blossom extract-incorporated chitosan-polyethylene glycol (CS-PEG) blended film. J Chem Pharm Res 2010; 2: 373-378.

[2]. Surathu N, Kurumathur AV. Traditional therapies in the management of periodontal disease in India and China. Periodontol 2000 2011; 56:14-24.

[3]. Shadma A, Sundaram S, Rai GK. Nutraceutical application and value addition of banana peel: A review. Int J Pharm PharmSci 2014; 6:81-5.

[4]. Imam MZ, Akter S. Musa paradisiaca L. and Musa sapientum L.: A phytochemical and pharmacological review. J App Pharm Sci 2011; 1:14-20.

[5]. Girish HV, Satish S. Antibacterial activity of important medicinal plants on human pathogenic bacteria – a comparative analysis. World Application of Science Journal2008; 5(3): 267-271.

[6]. Bhat MS, Prabhakar A, Rama KR, Madhu GM, Rao GH. Statistical optimization and neural modeling of amylase production from banana peel using Bacillus subtilis MTCC 441. International Journal of Food Engineering 2010; 56: 34-45.

[7]. Chabuck ZAG, Al-Charrakh AH, Hindi NKK, Hindi SKK. Antimicrobial effect of aqueous banana peel extract, Iraq. Res Gate Pharm Sci 2013; 1:73-5.

[8]. Fagbemi JS, Ugoji E, Adenipekun T, Adelowaotan O: Evaluation of the antimicrobial properties of unripe banana (Musa sapientum L.) lemon grass (Cympobogon citrates S.) and turmeric (Curcuma longa L) on pathogens. African J Clinic Biotech2009; 8: 1176-82.

[9]. Edwards BG. Banana peel extract composition and method for extraction. US005972344A (Patent); 1999.

[10]. Murray PR, Baron EJ, Jorgensen JH, Landry ML, Pfaller MA, editors. Manual of Clinical Microbiology. 9ed. Ch. 58. Washington, D.C.: ASM Press; 2007.

[11]. Hsieh PC, Mau J, Huang SH. Antimicrobial effect of various combinations of plant extracts. Food Microbiology 2001; 18, 35-43.

[12]. Roy A, Saraf S. Ethnomedicinal approach in biological and chemical investigation of phytochemicals as antimicrobials. Pharm Rev. 2006;4.

[13]. Girish HV, Satish S. Antibacterial activity of important medicinal plants on human pathogenic bacteria – A comparative analysis. World ApplSci J. 2008; 5:267–71.

[14]. Mokbel MS, Hashinaga F. Antibacterial and antioxidant activities of banana (Musa, AAA cv. Cavendish) fruits peel. Am J BiochemBiotechnol. 2005; 1:125–31.

[15]. Odebiyi OO, Sofowora EA. Phytochemical screening of Nigerian medicinal plants II. Lloydia. 1978; 41:234–46. [PubMed: 672462].

[16]. Pannangpetch P, Vuttivirojana A, Kularbkaew C, Tesana S, Kongyingyoes B, Kukongviriyapan V. The antiulcerative effect of Thai Musa species in rats. Phytother Res. 2001; 15:407–10. [PubMed: 11507732]

[17]. Sumathy NH, Sumathy JH: Antibacterial and Antifungal Activity of Musa Fruit Peels against Skin and Gastrointestinal Tract Diseases. Herbal Tech Industry. Short communication 2011; 9-11.

[18]. Aldean AA, Al-Jumaily EF, Al-Safar MA: The Effect of Banana Skin on the Bacterial Infections of the Chronic Gingivi tis Patients. AJPS 2010; 7 (1)145-149.