



EVALUATION OF MICROBIAL POTENTIAL OF DIFFERENT COLORED BANANA PEELS

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ABSTRACT

This study analysed the anti-bacterial potential of yellow, green and red coloured peels from banana against 10 clinical pathogens in comparison with standard antibiotics. Three different colored banana peels were dried separately for 30 days. The powdered material was extracted independently with methanol chloroform (8:2) at room temperature. Among the peels, the red one exhibited the highest antibacterial activity with the maximum zone of inhibition of 27 mm against *Psuedomonas citrii*, followed by 18 mm against *Staphylococcus aureus*. The green banana peel showed inhibition zone of 19 mm against *Salmonella typhi* and *Aeromonas hydrophila*. The yellow banana peel exhibited 20 mm against *Aeromonas hydrophila* followed by 13 mm against *Staphylococcus aureus*. Interestingly all three extracts of banana peels not showed the activity against the normal flora of human body. The banana peel is the potential source of anti-bacterials, with promise for making waste material into wealth.

Key Words: Banana peel, Clinical pathogen, Antibacterial potential, Antibiotics.

INTRODUCTION

In recent years the whole world is looking for remedy for number of serious problems. It is known that medicine plays the pivotal role in our daily life. The by-products of some vegetables and fruits represent an important source of sugars, minerals, organic acid, dietary fiber and phenolics that have a wide range of action. Banana is one of the most popular fruits and several studies have indicated that the banana peel contain antibacterial and antioxidant principles [1-2]. Banana should be considered to be a good source of natural antioxidant for foods and functional food source against cancer and heart disease [3]. Hence the present study, antibacterial activity of methanol chloroform extracts was assayed *in vitro* by well diffusion method against ten different human bacterial strains.

MATERIALS AND METHODS

Sample collection and extraction methods

The ripened red, green and yellow bananas were collected from the local market of Chidambaram, Tamil Nadu, India. The fruits were washed thoroughly with water and the peels were separated carefully. Peel of the fruits were cut into small pieces and dried separately under shade for 30 days. Dried samples were then powdered using mortar and pestle. Ground material (100 g) was extracted independently with methanol chloroform in the ratio of 8:2 at room temperature. Extraction was carried out for 7 days with occasional shaking. The resulting extracts were filtered using filter paper (Whatman No. 1) and each filtrate was concentrated with a rotary evaporator (Eyela, Japan). All the extracts were kept in refrigerator at 4°C until use.

Test organism

Ten bacterial cultures *Psuedomonas citrii*, *Escherichia coli*, *Shigella sp.*, *Salmonella typhimurium*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Staphylococcus aureus*, *Proteus vulgaris*, *Aeromonas hydrophila* and *Serratia marsescens* were used for the present

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investigation collected from our own laboratory and the strains were maintained on agar slant at 4°C and activated at 37°C for 24 h on nutrient agar prior to any screening.

Antibacterial activity determination

To determine the antibacterial activity the microorganisms were cultured in nutrient broth at 36°C overnight. Three-five µL of the inocula was added to 3.5 mL soft nutrient agar and well shaken. The soft nutrient agar was then added on a Petri dish containing 15 mL hard agar. The extracts obtained above were screened for their antibacterial activity in comparison with standard antibiotics like Ciprofloxacin (5 µg), Tetracycline (30 µg), Levofloxacin (5 µg), Amoxicillin + Clavulanate (20/10 µg), Gentamicin (10 µg), Ampicillin (10 µg *in-vitro* by well diffusion method [4].

RESULT AND DISCUSSION

Plant bioactive compounds continue to serve as exclusive source of drugs for the majority of the world population and several plant based drugs are in extensive clinical use [5]. Three different color banana peels were screened for anti-bacterial activity. The result revealed that the red banana peel extract showed the maximum anti-bacterial activity against *Psuedomonas citrii* 27mm (it was higher than the standard antibiotic Ciprofloxacin, which showed 25mm of inhibitory activity), *Staphylococcus aureus* 18mm, *Proteus vulgaris* 12mm and *Serratia marsescens* 16mm. Similarly the green banana peel extract

showed 19 mm zone of clearance against *Salmonella typhi* (it was higher than that of standard antibiotic Ampicillin, which showed 17mm of inhibition), 19mm against *Serratia marsescens*, 13mm against *Proteus vulgaris*, 11mm against *Staphylococcus aureus*. And the yellow banana peel extract showed the maximum inhibitory activity 20mm against *Aeromonas hydrophila*, 13mm against *Staphylococcus aureus*, 12mm against *Psuedomonas citrii*, 11mm against *Serratia marsescens* and the least activity among the three different color banana peel extract showed 8mm against *Proteus vulgaris* observed from yellow banana peel extract. Whereas the standard antibiotics Ciprofloxacin showed the inhibitory activity against *Psuedomonas citrii* (25mm), *Salmonella typhimurium* (21mm), 31mm against *Proteus vulgaris* and 31mm against *Serratia marsescens*. Tetracycline showed the 20mm against *Escherichia coli*, 19mm against *Shigella sp.*, than the antibiotic Levofloxacin 31 mm zone of inhibition against *Klebsiella pneumoniae*. And the antibiotic Amoxicillin + Clavulanate showed the maximum activity 39mm against *Staphylococcus aureus* when compared to all the banana peel extracts. Gentamicin showed the 18mm against *Aeromonas hydrophila* and Ampicillin showed the activity 17mm *Salmonella typhi* it was minimum activity when compared to green banana peel extract. Similar findings were reported in chloroform and ethyl acetate extract of green and yellow banana peel extract [6]. Aqueous and ethanol extract of unripen banana peel extracts were screened against various clinical bacterial pathogens [7].

Table 1. Antibacterial activity of banana peel extract

Sl. No.	Materials	Yellow Banana	Green Banana	Red Banana	Control (Methanol)	Standard
	Microorganisms	Diameter of zone of inhibition (mm)				
1	<i>Psuedomonas citrii</i>	12	-	27	-	25 ^a
2	<i>Escherichia coli</i>	-	-	-	-	20 ^b
3	<i>Shigella sp.</i>	-	-	-	-	19 ^b
4	<i>Salmonella typhimurium</i>	-	-	-	-	21 ^a
5	<i>Klebsiella pneumoniae</i>	-	-	-	-	31 ^c
6	<i>Salmonella typhi</i>	-	19	-	-	17 ^f
7	<i>Staphylococcus aureus</i>	13	11	18	-	39 ^d
8	<i>Proteus vulgaris</i>	8	13	12	-	31 ^a
9	<i>Aeromonas hydrophila</i>	20	-	-	-	18 ^e
10	<i>Serratia marsescens</i>	11	19	16	-	31 ^a

(a)-Ciprofloxacin 5 µg; (b)-Tetracycline 30 µg; (c)-Levofloxacin 5 µg; (d)-Amoxicillin + Clavulanate 20/10 µg; (e)-Gentamicin 10 µg; (f)-Ampicillin 10 µg.

CONCLUSION

Based on our results, it can be concluded that peels three different color banana fruits possess significant antibacterial activity without affecting the normal flora of human body. The results also suggest that parts of fruit like peels serve as potential source of bioactive compounds and can be utilized effectively without being wasted. Further research is needed towards isolation and identification of

active principles present in the extracts, which could possibly be exploited for pharmaceutical use.

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