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Evaluation of anti-bacterial, anti-fungal and sun protective property of butanolic extracts of peel of fruit of *Musa paradisiaca*

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ABSTRACT

The extract was obtained by using the peel of the ripe banana fruit (*Musa paradisiaca*). The alcohol extract was prepared by homogenization and allowing to react for at least 48-72 hrs by using normal butanol, butanol with acidic and basic conditions. The entire slurry was filtered. The butanolic extract of peel of *Musa paradisiaca* (BEPMP) was used and tested for antimicrobial activity and sun protective activity (*in vitro*). Also a BEPMP obtained by soxhlation using *n*-butanol for 3 hrs and the BEPMP was used for the anti-microbial activity and sun protective activity. Each BEPMP was evaporated to 2 ml and tested for antimicrobial and sun protective activity using suitable techniques. The BEPMP obtained by maceration and soxhlation methods were found to show antimicrobial and sun protective activity. The BEPMP was tested in a spectrophotometer as UVA (400-315nm) and UVB (315-280nm) effects are short lived and reversible, these effects include sunburn and tanning. The aim of the present investigation was to evaluate peel BEPMP with regard to UV absorption spectra in view of a possible anti solar agents. The BEPMP obtained by different methods showed λ_{max} of 370nm with an optical density of 1.98 and 2.24 respectively which showed the antioxidant activity and photoprotective activity due to the presence of phenolics.



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INTRODUCTION

Musa paradisiaca (E.Sondheimer, 1978) is a perennial tree like herb commonly known as kela or banana. Banana is the second most important fruit crop in India. The fruit is a rich source of carbohydrate Vit B, K, Ca, Mg and P. It is used to treat Anaemia, Heart diseases, Ulcers and Cancer. It is a good anti-oxidant. Peels are often waste part

of the fruit the by-product of the banana fruit is the peel which constitutes 30% of the weight and causes environmental problems due to the presence of high content of N, P and water. The medicinal parts like peels, leaves, juice and fruits were used for anti-microbial property. The fruit has been used as a potential source of anti-fungal and anti-bacterial activity of some medicinal plants is documented their antimicrobial activities vary widely depending on the type of the part of the plant (Tchobanoglous G *et al.*, 1983; Zhang P *et al.*, 2005; Larrauri J *et al.*, 1999; Rodriguez de sotillo, D *et al.*, 1994; Subiago A *et al.*, 1996). Solar UV radiations are of 3 types UV-A (320-400nm), UV-B (280-320nm) and UV-C (200-280nm). UV-C is most damaging radiation but it is absorbed by ozone layer. Mostly UV-B radiation is responsible for inducing skin cancer a better extent by UV-A. The different alcoholic extracts from the biodegradable waste products of fruits and plants such as banana fruit are of interest in determining

Table 1: Preparation of nutrient agar media

S.NO	Name of the Components	Weight
1	Beef extract	5gms
2	Peptone	5gms
3	Salt(Sodium Chloride)	0.5gms
4	Agar	25gms
5	Double distilled water	1000ml
6	pH	7.2±0.2

Table 2: Preparation of potato dextrose agar media

S.NO	Name of the Components	Weight
1	Peeled potatoes(boiled pulp)	25gms
2	Dextrose	20gms
3	Agar	25gms
4	Double distilled water	1000ml

Table 3: Absorbance of n-butanolic extract of peel of banana fruit

λ	EE	n-butanol	n-butanol (A)	n-butanol (B)	n-butanol(GAA)
290	0.0150	0.8300	0.223	0.176	0.724
295	0.0817	0.7608	0.213	0.172	0.712
300	0.2874	0.7265	0.193	0.161	0.698
305	0.3278	0.7123	0.186	0.160	0.683
310	0.1864	0.7014	0.172	0.158	0.670
315	0.0837	0.6830	0.165	0.156	0.650
320	0.0180	0.6704	0.150	0.150	0.625
SPF Value		7.164	1.860	1.600	6.830

the SPF value by *in vitro* screening methods by spectrophotometry.

The medicinal parts like peels, leaves, juice and fruits were used for anti-microbial property. The fruit has been used as a potential source of anti-fungal and anti-bacterial activity. Although anti-microbial activity of some medicinal plants is documented but their anti-microbial activities vary widely depending on the type of the part of the plant.

The aim of the study was to investigate the potency of peel of fruit of banana on some pathogens as well as sun protective activity by spectrophotometric method.

MATERIALS AND METHODS

Microbial Pathogens

Different bacteria (*Escherichia coli*, *Bacillus pumilis*, *Bacillus subtilis*, *Proteus vulgaris* and *staphylococcus aureus*.) and fungi (*Aspergillus Niger*, *Candida albicans*, *Candida utilis*). Were collected and cultivated in pure culture at the lab.

Fruit Peel Collection

Fresh bananas were collected from local market at Kurnool town. Bananas were washed under water, then peels were taken and air dried for 3 days under shade. The peels were powdered by using mortar and pestle and sieved under sieve no. 40.

Extraction method

The dried powdered peel of fruit was extracted with n-butanol by using soxhlation and maceration method. All the butanolic extracts (acidic, basic, glacial acetic acid) at different conditions were subjected to evaporation to obtain concentrated extracts and were preserved.

Phytochemical screening

Preliminary Phytochemical screening was done as per the standard procedure

Antimicrobial activity

Antibacterial activity was done by using nutrient agar media and anti-fungal activity was done by using potato dextrose agar media. Antimicrobial activity was determined by disc diffusion method. The microorganisms were cultured in nutrient broth at 37°C. overnight. A loop full of inoculum was added to the nutrient agar media and shaken well. The agar was added to a petridish, filter paper discs were impregnated with different concentrations and allow to dry completely for 10-15 min and placed in the petridish containing nutrient broth. Gentamycin was used as a standard. Minimum inhibitory concentrations for different extracts were determined.

Sun protective factor determination

Initial stock solution was prepared by taking 1% W/V of extract in n-butanol. Absorbance values of each extract was determined between 290 – 320 nm at 5nm intervals taking n-butanol as blank

using ELICO UV Visible double beam spectrophotometer. Absorbance values were taken and multiplied with respective EE x I values and their summation were taken and multiplied with correction factor.

$$SPF = CF \times 290 \sum_{320} EC \times I \times Abs(\lambda)$$

SPF = Sun protective factor

CF = Correction factor

EE = Erythmogenic effect

I = Solar intensity

Abs = Absorbance at particular wave length

RESULTS AND DISCUSSION

Preliminary phytochemical screening of the different n-butanolic extracts at different conditions of *peel of fruit of musa paradisiaca* reveals the presence of Alkaloids, Saponins, Carbohydrates, Tannins, Amino acids, Flavonoids and Glycosides in the extract.

CONCLUSION

The present investigation revealed that various n-butanolic extracts of peel of fruit of banana was found to have antimicrobial and sun protective activity (SPF determination) n-butanolic extract (maceration) and n-butanolic extract in the presence of GAA (maceration) showed high antimicrobial and sun protective activity.

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