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Efficacy of fruit extracts of *Physalis minima L.* against food borne pathogens

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ABSTRACT

The dried fruits of *Physalis minima* were extracted with different organic solvents such as acetone, benzene, chloroform, hexane, methanol and petroleum ether and tested for their antibacterial activity. Acetone and chloroform extracts showed activity against all the food borne pathogens tested such as *Bacillus subtilis, B.megaterium, Escherichia coli, Enterobacter faecalis, Pseudomonas aeruginosa and Staphylococus aureus.*

KEYWORDS

Physalis minima L.;
Antibacterial activity.

INTRODUCTION

Members of solanaceae have been used as medicines since ancient times to cure number of diseases. Plants like *Solanum surattense, Datura stramonium, Solanum nigrum, Atropa belladona* and W*ithania somnifera* belong to solanaceae are being used as medicines for curing many disorders[3]. Another genus of this family *Physalis* is being employed to treat fever, oral thrash, indigestion, cough with phlegm etc.[4]. It can also be used as diuretic, laxative and antifertility agent[1,5,6]. Food samples of different types are being contaminated with many bacteria which are pathogenic to humans. We made an attempt to inhibit the growth of food borne pathogens using the dried fruit extracts of *Physalis minima. The* present paper deals with the anti bacterial activity of *P. minima* carried out by means of standard micro assays, using food borne pathogenic bacteria such as *Bacillus subtilis, B.megaterium, Escherichia coli, Enterobacter faecalis, Pseudomonas aeruginosa* and *Staphylococus aureus.*

METHODOLOGY

Plant material

Fruits of *Physalis minima L.* (Solanaceae) were collected from the village Gorantla, Guntur district of Andhra Pradesh, India in November 2002, and authenticated voucher specimen (NU-1002) has been deposited in the Nagarjuna University herbarium. The air dried fruits of

Physalis minima were extracted in different organic solvents such as acetone, benzene, chloroform,

hexane, methanol and petroleum ether using soxhlet apparatus. The solvent extracts were tested against six food borne pathogenic bacteria using the antibiotic sensitivity test.

Microorganisms and culture methods

Nutrient agar medium was purchased from Himedia laboratories, Mumbai, India and analytical grade solvents from S.D.Fine Chem. Ltd., Mumbai, India and the antibiotics from Sigma, Poole, UK. A total of six bacteria were used: *Bacillus subtilis (ATCC 6633), B.megaterium (ATCC 23564), Escherichia coli (ATCC 25922), Enterobacter faecalis (ATCC 35550), pseudomonas aeruginosa (ATCC 27853) and Staphylococus aureus (ATCC 25923*). Media were sterilized by autoclaving at 120°C for 15 min and all subsequent manipulations were carried out in a laminar air flow cabinet. All the liquid transfers were made with sterilized micro pipettes.

TABLE 1 : Antibacterial spectrum of fruit extracts of *Physalis minima*

Solvent Extract	Concentration of the product (µg)	Area of Inhibition Zone (mm^2)					
		A	B	C	D	E	F
Acetone	500	56.57	---	31.43	56.57	31.43	---
	750	88	31.43	43.21	88	43.21	---
	1000	88	31.43	71.50	125.7	56.57	31.43
Benzene	500	---	---	31.43	---	---	---
	750	31.43	---	43.21	31.43	---	---
	1000	43.21	---	71.50	56.57	---	43.21
Chloroform	500	31.43	31.43	56.57	31.43	31.43	43.21
	750	56.57	56.57	88	43.21	31.43	56.57
	1000	88	88	169.7	71.50	43.21	88
Hexane	500	---	---	---	31.43	---	31.43
	750	---	---	21.21	31.43	---	43.21
	1000	31.43	---	21.21	71.50	---	56.57
Methanol	500	31.43	---	31.43	---	---	31.43
	750	43.21	---	43.21	---	---	56.57
	1000	71.50	---	71.50	31.43	---	88
Petroleum ether	500	---	---	---	---	---	---
	750	---	---	---	---	---	---
	1000	---	---	---	43.21	---	31.43
Standard		**632**	**172**	**148**	**286**	**226**	**286**

A-*Bacillus megaterium*, B-*B. subtilis* C-*Escherichia coli*, D-*Enterobacter faecalis*, E-*Pseudomonas aeruginosa*, F-*Staphylococcus aureus* (-)No inhibition.

Streptomycin (10µg/ml) for *E.coli*, gentamycin (10µg/ml) for *P. aeruginosa* chloramphenicol (30µg/ml) for *S. aureus*, vancomycin (10µg/ml) for *B. subtilis*, rifampicin (5µg/ml) for *E. faecalis*, kanamycin (10µg/ml) for *B. megaterium*

Antimicrobial assays

Susceptibility of the test organisms to fruit extracts was determined by employing the standard disc diffusion technique[2]. Whatman No.1 filter paper discs of 3 mm diameter, placed in dry petridish were autoclaved.The sterile filter paper discs fed with organic solvent extracts were dried and carefully placed over the agar plates seeded with the test bacteria and incubated at 30±2°C for 24 h. Discs treated with antimicrobial standards alone served as control. The definite zone of inhibition surrounding the discs was measured accurately to the nearest mm by means of a metric ruler. Simultaneously the activity of six standard antibacterial compounds namely streptomycin, gentamycin, chloramphenicol, vancomycin, rifampicin and kanamycin was also tested against the bacteria under study in similar conditions so as to compare the degree of inhibition exhibited by the fruit extract of *P.minima*.

RESULTS AND DISCUSSION

Chloroform and acetone extracts of *Physalis minima* showed activity against all the tested food borne bacteria. Activity increases along with the concentration of substance from 500-1000µg. Methanol, benzene and hexane extracts showed activity against *E. coli,B. subtilis, S. aureus and Enterobacter faecalis*. Petroleum ether extracts showed activity against *S. aureus* and *Enterobacter faecalis only* at 1000µg conc. The above results reveal that fruit extracts of *P.minima* can be explored as effective bactericidal agents in food preservation.

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