

ANTIBACTERIAL ACTIVITY IN FRUITS AND VEGETABLES

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ABSTRACT

The study of medicinal plants was neglected by medical man all over the world but more so in this subcontinent. These were contemptuously referred to as "old womens" remedies.

However importance of plant derived materials have been realized for the last few years. Studies on phytochemical, pharmacological and antimicrobial activity of plant extracts present a unique challenge to strike new sources of medicine.

The objective of present study is to screen ten commonly used fruits and vegetables for antibacterial activity by agar diffusion method. Eight % of these exhibited broad spectrum antibiotic activity.

INTRODUCTION

Plants have been a source of medicinal compounds since time immemorial. All parts of plant are used for the treatment of diseases in different systems of medicine. The reason for extensive use of herbal drugs may be the fact that plants are available everywhere. Dymock's vegetable materia medica of western India represents a very valuable work on the indigenous drugs of India. In the beginning of nineteenth century Kirtikar and Basu contributed a valuable paper on the medicinal plants of the subcontinent (Now Pakistan, India and Bangla Desh).

The importance of plant materials in present day therapy cannot be under estimated (Mushtaq and Chughtai, 1961; Baqir *et al.*, 1985, 1987; Shaikh *et al.*, 1985; Burdi *et al.*, 1991; Kazmi *et al.*, 1991; Senar *et al.*, 1992; Siddiqui *et al.*, 1993; Zafar *et al.*, 1993; Bakhuni *et al.*, 1974), since useful compounds of plant origin such as digitonins, rutene, pepain, morphine, codine, and many others exhibited a broad range of pharmacological activity. The studies on phytochemical, pharmacological and antibacterial activity of plant extracts present a unique challenge to strike new sources of medicine. Existing antibiotics have numerous drawbacks whereas the drugs of plant origin have no side effect or only marginal.

During the present studies medicinal value of some fruits and vegetables have been determined by evaluating their antibacterial activity.

EXPERIMENTAL

The fruits and vegetables used were procured, identified and the voucher specimens were preserved.

Preparation of extract

500 grams each of fruits and vegetables to be tested were washed and dried. The air-dried material was powdered mechanically and extracted with 50% ethyl alcohol by three cold percolations.

The combined extracts were concentrated below 40°C under reduced pressure. The dried material thus obtained was dissolved in 50% ethanol to give a concentration of 5 mg/ml.

Antibacterial assay

Antibacterial activity was determined against ten different species of gram negative and Gram positive bacteria by using the method of Bhakuni *et al.* (1974).

The inoculum was prepared by inoculating the test organism in trypticase soy broth. The broth was incubated at $37 \pm 1^\circ\text{C}$ overnight.

For assay, petri dishes (100 mm) were prepared with trypticase soy agar, 0.1 ml of the 1:100 diluted overnight culture in saline was poured on each plate. The plates were dried and 2 wells of 6 mm diameter were made with a sterile borer. One well was filled with the extract the other with 50% ethanol in water. The plates were checked for zones of inhibition after 24 hours incubation at 37°C. The test were run in triplicate. Average of the three readings was recorded as zone of inhibition in mm.

RESULTS AND DISCUSSION

The results of antibacterial activity are summarized in Table 1. As indicated by the results 8 plant extracts out of 10 (80%) showed broad spectrum activity against most of the Gram positive and Gram negative bacteria used in the study whereas two plant extracts did not show any antibacterial activity. In the present study ten different species of bacteria were used including pathogenic as well as non-pathogenic species.

Among the plants studied *Allium sativum* (garlic) was effective against Gram positive as well as Gram negative bacteria. The results obtained confirm the results of Lehman (1930) against *Escherichia coli* and *Staph. aureus*. Chester and John (1944) isolated a substance "Allium" which had antibacterial activity against Gram positive and Gram negative species. The present studies of *Allium* are also in conformity with

those of Datta and Siddique (1948) and Lucas and Lewis (1948).

Allium cepa (onion) is also found to exhibit broad spectrum activity against Gram positive as well as Gram negative bacteria. The present results are in confirmation with the work of Dhar et al. (1968).

Musa sapientum (banana) showed significant antibacterial activity against all Gram positive and Gram negative bacteria. The present study confirms the work of William et al. (1949) that more than one active substances were present in different parts of banana. They further reported that bacteria and fungi used in the study were inhibited differently.

Carica papaya (papaya), *Momordica charantia* (karela) and *Zingiber officinalis* (ginger) are inhibitory against Gram positive as well as Gram negative bacteria. The present result confirm by the study of Dhar et al. (1968) and Baqir et al. (1985).

Eugenia jambolana (jaman) showed excellent broad spectrum activity against all the Gram positive and Gram negative bacteria. The present work confirmed the work of Baqir et al., (1987).

The result obtained with *Sphaeranthus indicus* (mundi) exhibited excellent antibacterial activity against Gram positive as well as Gram negative bacteria. The results obtained confirm the work of Narasimha and Nigam (1970) and Dhar et al. (1968). Keeping in view the use of *S. indicus* in eastern system of medicine attempts were made to isolate partially purified and purified fraction of active components. Four previously unknown alkaloids were isolated which were designate as S, S1, S6 and S7. Further studies are in progress.

Hence the present work will help in the isolation of new products which act as food as well as drug. As the work for development of herbal medicines is in progress the world over.

Table 1
Results of screening for antibacterial activity

Botanical name of fruits and vegetables	Common name	Antibacterial activity against									
		A	B	C	D	E	F	G	H	I	J
<i>Allium sativum</i>	Garlic	22	25	25	20	18	2	22	22	20	20
<i>Allium cepa</i>	Onion	18	15	15	15	20	18	18	20	20	18
<i>Musa sapientum</i>	Banna	15	16	16	15	18	18	20	20	20	20
<i>Carica papaya</i>	Papaya	20	20	20	18	16	15	15	15	15	15
<i>Usmordica charantia</i>	Karela	15	18	18	15	12	15	14	14	12	12
<i>Zingiber officinalis</i>	Ginger	15	18	18	15	16	16	16	18	18	16
<i>Eugenia jambolana</i>	Jaman	25	20	20	22	24	25	30	28	28	28
<i>Sphaeranthus indicus</i>	Mundi	25	25	28	22	25	30	30	30	30	30
<i>Ipomoea battatas</i>	Sweet potato	-	-	-	-	-	-	-	-	-	-
<i>Citrus vulgaris</i>	Watermelon	-	-	-	-	-	-	-	-	-	-

A = *Bacillus subtilis*, B = *Staphylococcus aureus*, C = *Staphylococcus epidermidis*, D = *Streptococcus faecalis*, E = *Escherichia coli*, F = *Proteus vulgaris*, G = *Salmonella typhi*, H = *Salmonella paratyphi A*, I = *Shigella shigi*, J = *Shigella flexneri*.

Numericals indicate zone of inhibition measured in mm.

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