

# *In vitro* Screening of *Piper nigrum* and *Piper longum* for Antibacterial Properties

Karuna S Verma\* and Archita Puntambekar

Department of Post Graduate Studies and Research in Biological Sciences Rani Durgawati University Jabalpur (M.P.) India

Antimicrobial effect of *Piper nigrum* Linn. and *Piper longum* (Piperaceae) was evaluated on gram positive and gram negative strains of *Escherichia coli* and *Pseudomonas aeruginosa*. The solvents used for extraction of plant were petroleum ether, methanol and water. The *in vitro* antimicrobial evaluation was carried out by agar disc diffusion method. The significant antibacterial activity extracts was compared with standard antibiotic Kanamycin. The methanolic extract of *P. nigrum* fruit was found most effective against *Staphylococcus aureus* (20 mm) and *Bacillus subtilis* (18 mm).

**Keywords:** Antibacterial, *Piper nigrum*, *Piper longum*, bacterial strains

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## INTRODUCTION

The drugs derived from plants are important resource in the developing countries to combat serious diseases. Screening of medicinal plants for antimicrobial agents has gained much importance because World Health Organization (WHO) became interested in the development and utilization of medicinal plant resources for extending health care to maximum population in the developing countries (Goud *et al.* 2005).

In recent years, resistance against antibiotics became an ever-increasing therapeutic problem (Austin *et al.* 1999). Since natural products of higher plants may be a new source of antimicrobial agents, there are now many groups which are engaged in medicinal plants research (Hamil *et al.* 2003, Motsei *et al.* 2003).

*Piper nigrum* and *Piper longum* are flowering wine of Piperaceae family. *P. nigrum* is long being used to treat asthma, fever, arthritic disorders, congestion, diarrhea and cholera (Dorman and Dean 2000, Ravindran 2000).

The present study is, designed to assess the potency of different solvent extracts of *Piper longum* and *Piper nigrum* fruit and leaves on selected microorganism.

## MATERIALS AND METHODS

*In vitro* antimicrobial screening was performed with aqueous, acetonetic and methanolic extracts of plant sample (leaves and fruit) by disc diffusion method (Akinyemi 2005).

### Extraction of the plant material

The plant material, i.e. leaves and fruits were chopped into small pieces and were dried so as to grind them in to a coarse powder. This powder was packed in tight containers for future use (Mehrotra 1976).

The weighed quantity of the sample was taken to obtain their extract by using various solvents like water, acetone and methanol (Patel *et al.* 2007, Gautam *et al.* 2003).

**Bacterial strains:** *Escherichia coli*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*.

**Standard antibiotic disc:** Kanamycin (30 µg/disc).

## RESULTS AND DISCUSSION

In the present study, the antimicrobial activity of methanol, ether and acetone extracts of *P. nigrum* and *P. longum* fruit and leaves were analyzed.

Disc diffusion method was used due to its simplicity and capability to analyze a large number of test samples as many workers used it for determining antimicrobial activity

\*Corresponding author email: karunaverma@gmail.com

Fig 1. Antibacterial activity of *Piper longum* leaf extract

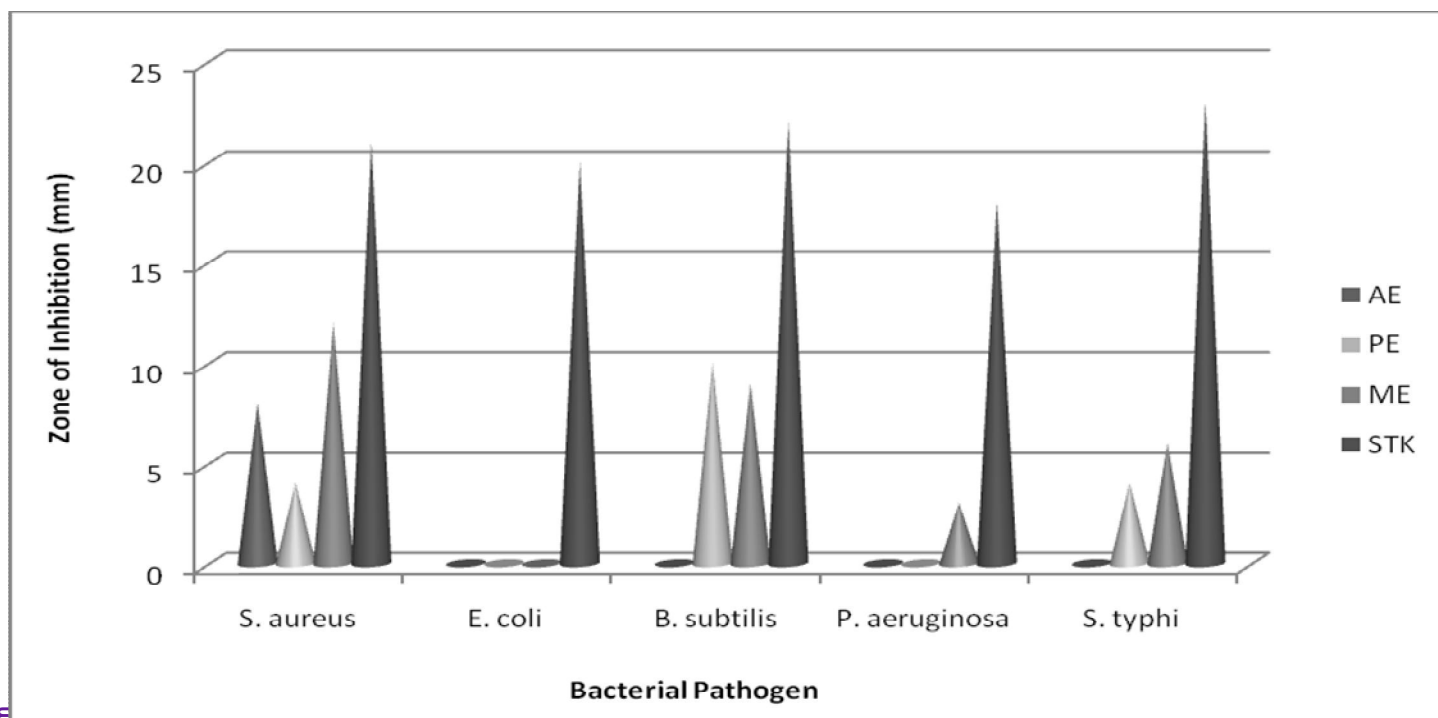
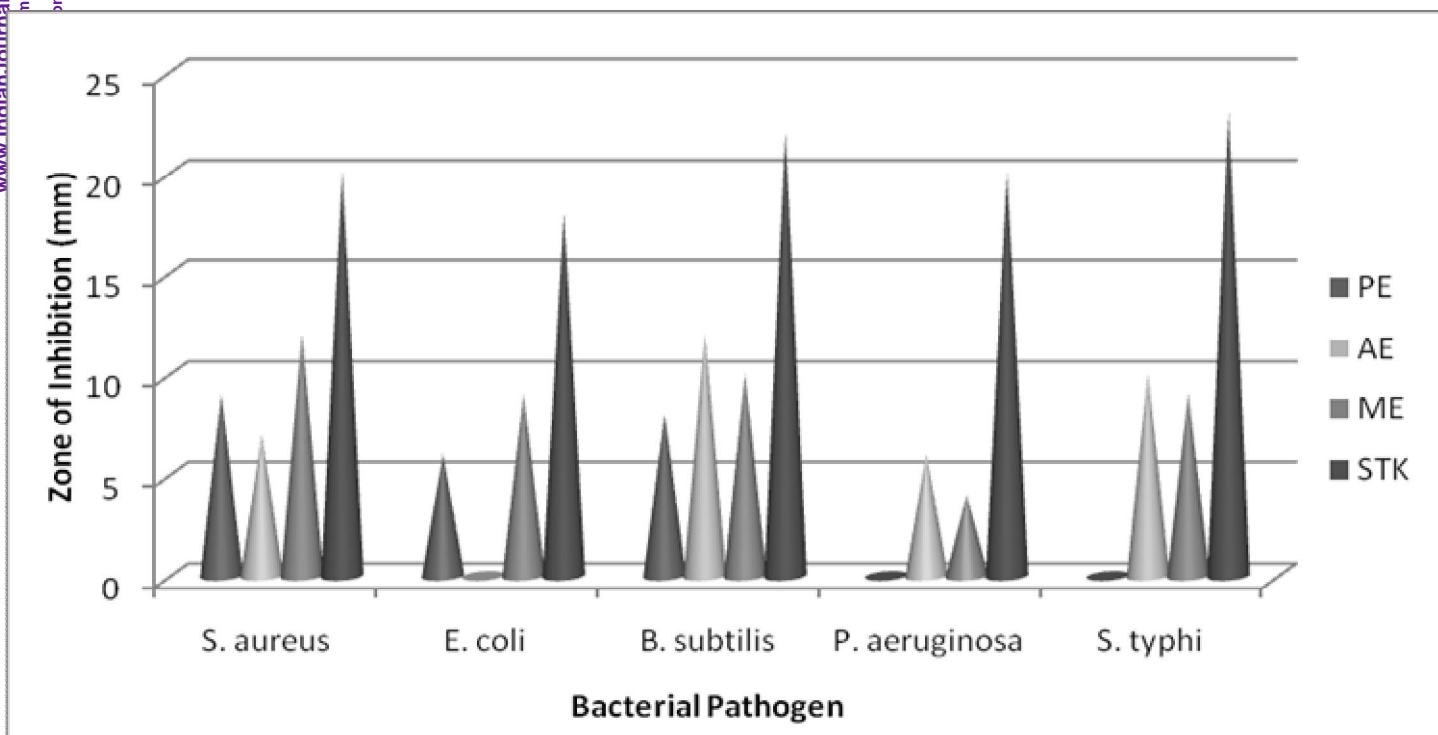


Fig 2. Antibacterial activity of *Piper longum* fruit extract



(Vuuren 2008).

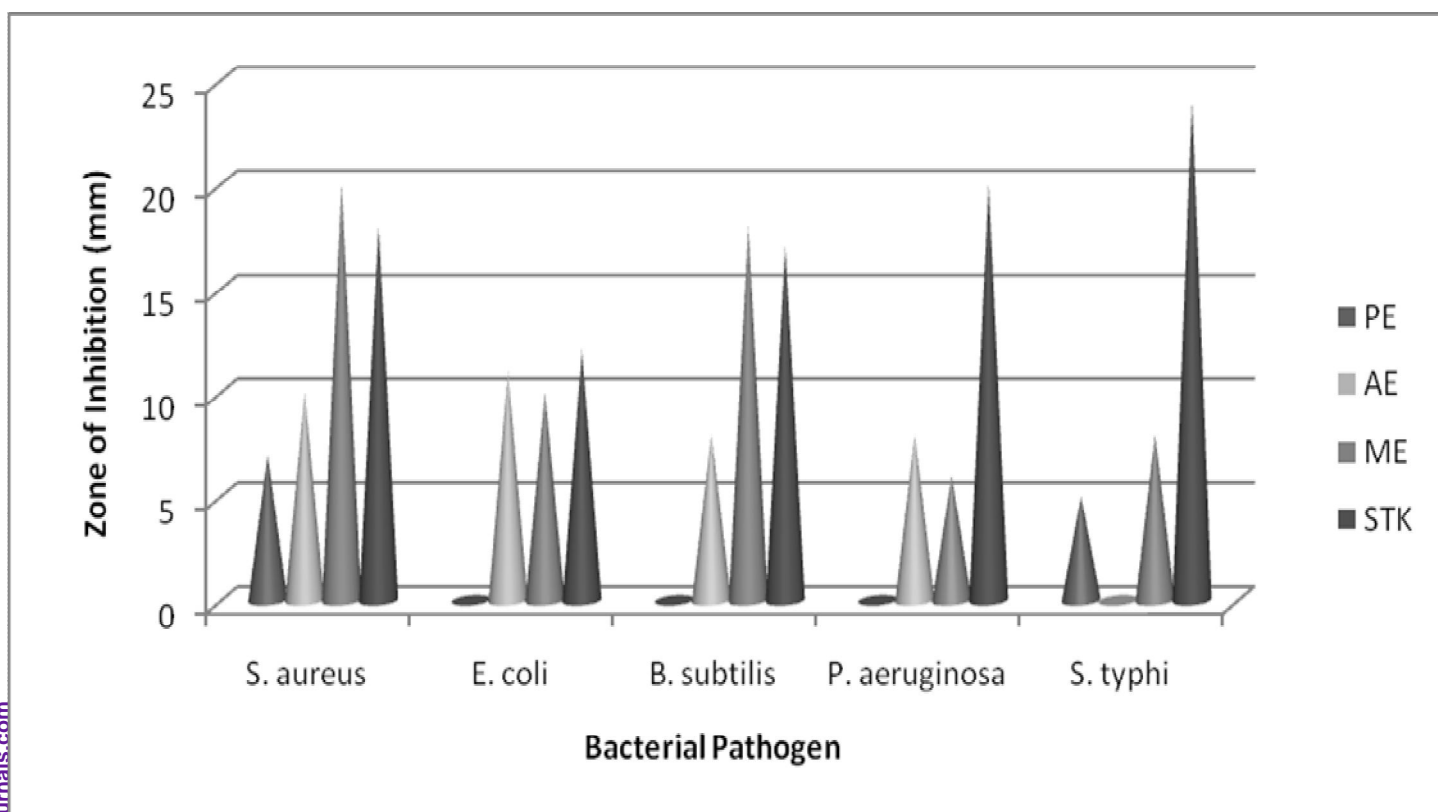
Data pertaining to the antimicrobial potential of the plant extracts are presented in Fig 1, 2 and 3.

The antibacterial properties of *P. longum* leaves (Fig 1) were displayed by its methanol extract against *Staphylococcus aureus* (12 mm) and *Bacillus subtilis* (9 mm). Most of the bacterial isolates were found to be resistant against acetone

extract. Inhibitory activity of acetone extract was observed only against the bacteria *Staphylococcus aureus*.

Fig 2 shows that the methanol and acetone extracts of *P. longum* fruit display mild to moderate activity against most of the bacteria tested. *P. longum* fruit showed maximum antibacterial activity against *B. subtilis* (10 mm) and *S. aureus* (12 mm). All the extracts were found to be resistant against *P.*

Fig 3. Antibacterial activity of *Piper nigrum* fruit extract



*P. aeruginosa*.

The methanolic extract of *P. nigrum* fruit (Fig 3) was found to be the most effective against bacteria *Staphylococcus aureus* (20 mm) and *Bacillus subtilis* (18 mm). Antibacterial activity of acetone extract was much weaker as compared to the other extracts.

Present investigations indicate that the activities of ether extract of *Piper* was not effective as compared to methanol and acetone extracts against most of the bacterial strains under test. Methanol extract showed better inhibition than other extracts indicating that the active ingredients of the plant parts can be effectively extracted with methanol.

Out of five bacterial strains, *S. aureus* was the most sensitive strain to all the extracts and our results are in agreement with those of Karsha and Laxmi (2010). The highest sensitivity of *S. aureus* may be attributed due to its cell wall structure and outer membrane (Zaika 1988).

It is evident that the Gram-positive bacteria are more sensitive to the spice and herb extracts than Gram-negative bacteria and is in accordance with the previous studies on other spices and herbs (Ceylan and Fung 2004, Lopez *et al.* 2005, Shan *et al.* 2007).

The methanolic extract of *P. nigrum* fruit was found to be most effective against bacteria *Staphylococcus aureus* and *Bacillus subtilis*. Thus the extracts obtained from various portions of *Piper* may be used against the ailments caused by Gram positive bacteria.

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