

# Antimicrobial Activity of Chilli Extracts (*Capsicum chinense*) Against Food Borne Pathogens *Escherichia coli* and *Staphylococcus aureus*

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## Abstract

This study was conducted to determine the effect of different concentration of extracts of *Capsicum chinense* on selected bacteria (*Staphylococcus aureus*, *Escherichia coli*). Extracts were found to be effective against the test bacteria. The extract from *Capsicum chinense* var. Noga Bhut showed a higher antibacterial activity against *Staphylococcus aureus* than from *Capsicum chinense* var. Roja Bhut. The extract from *Capsicum chinense* var. Roja Bhut showed a higher antibacterial activity against *Escherichia coli* than the one from *Capsicum chinense* var. Noga Bhut. Higher antibacterial activity was observed with 75% extract of *Capsicum chinense* variety CA1 against *Escherichia coli* with 12 mm zone of inhibition. The 75% extract of *Capsicum chinense* variety CC2 showed maximum 11 mm zone against *Staphylococcus aureus*. The extract from higher percentages of concentration were associated with higher antibacterial property.

**Index terms:** Capsicum, Extract, antibacterial activity

## INTRODUCTION

Common items have been utilized in conventional drug everywhere throughout the world. A colossal number of novel medication parts have been segregated from normal plant sources. Different plant species are investigated by ethnic social orders for their restorative applications. Different parts of plant are customarily utilized by ethnic social orders for their fundamental wellbeing treatment. Huge numbers of these plants and their concentrates were utilized in customary prescription. A unique element of higher plants is their ability to create an expansive number of natural synthetics of high structural diversity the so called secondary metabolites (Naovi et al., 1991).

Abuse of anti-infection agents has turned into the main consideration for the rise and scattering of multi-tranquilize safe strains of a few gatherings of microorganisms. The rising predominance of anti-infection agents safe pathogenic microorganisms in the most recent decades raises the interest for finding new elective antimicrobial specialists. Characteristic items from plant may offer new operators for antimicrobial use Therefore, the flow contemplate point was to assess the antimicrobial movement of some neighbourhood normal plants which have capability of treating irresistible maladies and with lesser symptoms contrasted with the engineered medication specialists.

In nourishment industry chilli is one of the most important spices utilized since antiquated occasions. Capsaicin is a characteristic aggravate that can be found in the product of Chili plant from the *Capsicum* species, Solanaceae family (Cordell et al., 1993). Capsaicin is responsible for the pungency of their fruit (Thorpe et al., 1996). Capsaicin is an alkyl vanillylamine (capsaicinoid) with the chemical formula  $C_{18}H_{27}NO_3$  and the molecular mass  $M = 305$ . The scientific name according to IUPAC is: trans-8-methyl-N-vanillyl-6-nonenamide.

There has been an expanded enthusiasm for the investigation of various concentrate obtained from chilli as potential wellspring of new antimicrobial operators. Capsaicin and related compounds (called capsaicinoids) are optional metabolites of chilli peppers that demonstrate various pharmacological and physiological properties (help with discomfort, malignant growth avoidance, gainful cardiovascular and gastrointestinal impacts; Luo et al., 2011). Capsaicin has as of late pulled in significant consideration in light of its antimicrobial and hostile to harmfulness movement.

## MATERIALS AND METHODS

### Plant Material

The plant materials were *Capsicum chinense* Var. Roja Bhut jolokia and *Capsicum chinense* var. Noga Bhut. The samples were collected from Krishi Jigyas Farm, Khetri, Kamrup(M), Assam where chilli plants used for this research were grown organically.

### Test Microorganisms

The following microbial cultures were used in this study: *Staphylococcus aureus*, American Type Culture Collection (ATCC) 25913, *Escherichia coli* ATCC 25922.

### Plant Extracts Preparation

Fresh capsicum fruits were washed then oven dried for 48 hour at 60°C, stored at room temperature, and ground to a fine powder. The acetonitrile extract was prepared by adding 60 mL of acetonitrile to 10 g of fruit powder. The mixture was shaken for 15 min and left at room temperature. The supernatant was collected. The filtrate was again mixed to 60 mL acetonitrile, shaken, and the supernatant extracted. This extraction process was repeated three times. The extract obtained was then filtered through Whatman paper No. 2. The filtrate was transferred into a vial and oven evaporated at 50°C until completely dry. The dry extract was re-suspended in distilled water to yield a final concentration of 100 mg mL<sup>-1</sup> extract (Nevry et al.,)

### Inoculum Preparation

Bacteria cultures were grown in Muller-Hinton broth over night then diluted with sterilized Muller-Hinton broth to obtain 0.5 Mac Farland. The diluted cultures were inoculated in Muller-Hinton agar and allowed to dry for 10 min at 22°C. Excess moisture was removed.

### Antibacterial Activity Screening

**Disk diffusion method.** Test disks were prepared by saturating sterilized paper disks (Hi Media) in fruits extracts of different concentration. For negative control, blotting paper disks were dipped into acetonitrile and for positive control, vancomycin and amicasin paper disks of 0.25 mg mL<sup>-1</sup> concentration were used. Disks were transferred onto the surface of Muller-Hinton agar plate inoculated with each test culture and incubated at 37°C for 18 to 24 hour. After the incubation period, the inhibition zone around each disk was measured.

### RESULTS

The *Capsicum chinense* extracts were found to be effective in inhibiting the both gram positive and gram negative bacteria. Though the response was not uniform, all Capsicum extracts were found to be effective against *Staphylococcus aureus* and *Escherichia coli*. The extract from *Capsicum chinense* var. Noga Bhut showed a higher antibacterial activity against *Staphylococcus aureus* than from *Capsicum chinense* var. Roja Bhut. The extract from *Capsicum chinense* var. Roja Bhut showed a higher antibacterial activity against *Escherichia coli* than the one from *Capsicum chinense* var. Noga Bhut. Higher antibacterial activity was observed with 75% extract of *Capsicum chinense* variety CA1 against *Escherichia coli* with 12 mm zone of inhibition. The 75% extract of *Capsicum chinense* variety CC2 showed maximum 11 mm zone against *Staphylococcus aureus*. The extract from higher percentages of concentration were associated with higher antibacterial property.

**Table 1** Antibacterial activity of Acetonitrile extracts of *Capsicum chinense* Var. Roja Bhut and *Capsicum chinense* Var. Noga Bhut using the disk diffusion assay

Acetonitrile Extract	<i>Staphylococcus aureus</i>	<i>Escherichia coli</i>
	Zone of inhibition(mm)	Zone of inhibition (mm)
<i>Capsicum chinense</i> var. Noga Bhut(CC2)		
10% extract	No zone	No zone
25% extract	9	8
50% extract	10	9
75% extract	11	10
Positive control	17	17
Negative control	No zone	No zone
<i>Capsicum chinense</i> var. Roja Bhut(CA1)		
10% extract	No zone	No zone
25% extract	8	9
50% extract	9	10
75% extract	10	12
Positive control	17	17
Negative control	No zone	No zone

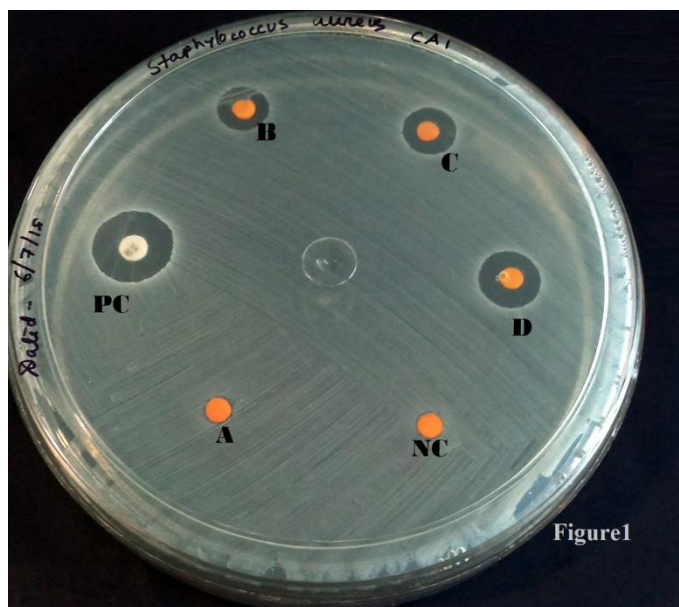


Figure 1

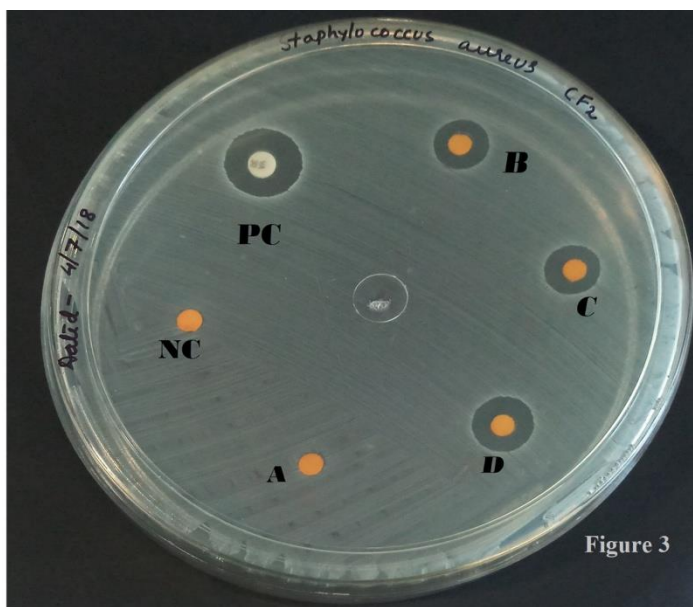


Figure 3

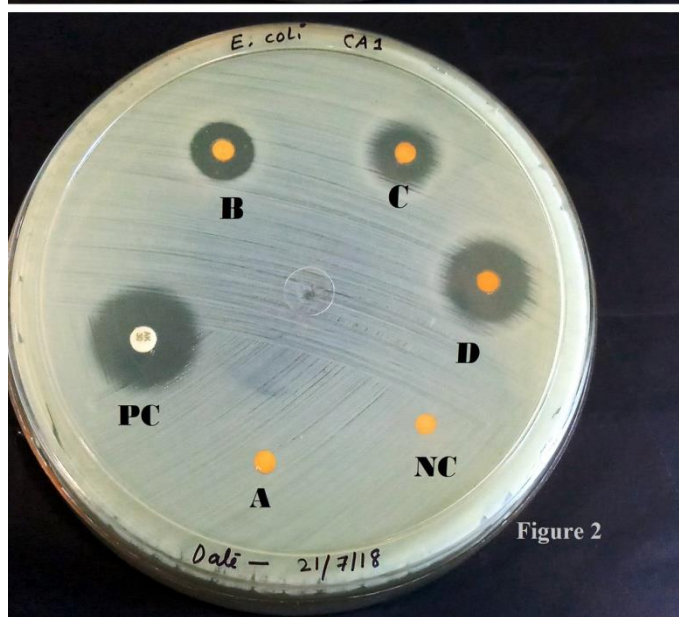


Figure 2



Figure 4

Figure1-Zone of inhibition of acetonitrile extract of *Capsicum chinense* variety Roja Bhut against *Staphylococcus aureus*

Figure2-Zone of inhibition of acetonitrile extract of *Capsicum chinense* variety Noga Bhut against *Escherichia coli*

Figure3-Zone of inhibition of acetonitrile extract of *Capsicum chinense* variety Roja Bhut against *Staphylococcus aureus*

Figure4-Zone of inhibition of acetonitrile extract of *Capsicum chinense* variety Noga Bhut against *Escherichia coli*

## DISCUSSION

Chilli has been reported to exhibit significant antimicrobial activity. The extracts of *Capsicum chinense* fruits showed wide antimicrobial activities against various pathogens such as *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Escherichia coli* etc. In the present study *Capsicum chinense* were screened for the antibacterial activities against *Staphylococcus aureus* and *Escherichia coli*. Amruthraj et al., showed that the acetonitrile extract showed maximum zone of inhibition of 20 mm and 19 mm against the gram positive (*M. luteus*) and gram negative bacteria (*V. fischeri*) respectively through disc diffusion method. The acetonitrile extract were found to be more effective compared to acetone extract at different concentration against all the tested bacteria except *Escherichia coli* And *Erwinia sp.* Anantha et al., showed that antimicrobial activity of the *Capsicum chinense* fruit extracts were determined by well diffusion method against various bacterial and fungal pathogens. The aqueous extract showed inhibition activity on *Staphylococcus aureus* (16 mm) and chloroform extract showed activity on *Escherichia coli* (10 mm), *Staphylococcus aureus* (12 mm) and butanol extract showed activity on *Escherichia coli* (10 mm), *Staphylococcus aureus* (11 mm) respectively.

## CONCLUSION:

The result shows that the acetonitrile extract of *Capsicum chinense* in different concentrations, was effective on both the gram positive and gram negative bacteria. The results concluded that the capsaicinoids and other secondary metabolites present in acetonitrile extracts of *Capsicum chinense* would contribute for the extraction and further purification of capsaicin as antibacterial agents.

## ACKNOWLEDGMENTS

The authors are thankful to the Department of Microbiology, Sri Sankaradeva Nethralaya, Beltola, Guwahati, Assam for laboratory facilities, providing bacteria, chemical, and technical material support and Mr.Kamaljyoti Das, Lab Technician for helping to conduct the research smoothly.

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