

## Research Article

# In Vitro Studies and Antibacterial Activity of *Alpinia Purpurata*

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## Abstract

Medicinal plants are the most exclusive source of life saving drugs for the majority world's population. The rhizomes of the Zingiberaceae family are a vegetable widely used in many Asian countries, and their medicinal functions have been broadly discussed and accepted in many traditional recipes. *Alpinia purpurata* commonly called as red ginger is native to tropical and subtropical Asia. Though it is mostly cultivated as an ornamental plant, due to the beauty of its inflorescence its potential in therapeutics also has been studied. *In vitro* studies of the plant *Alpinia purpurata* (leaves, roots and rhizomes) for its antibacterial activity, were conducted using the solvent extracts (hexane, ethanol, chloroform and 2,4D-dichloro methane) against bacteria using disc diffusion assay. *E. coli* and *Lactobacillus* were used for measuring the antibacterial activity of the plant. Ethanol extracts of plant (leaves, roots) showed highest inhibition zone of 3.5 cm was recorded against *E. coli* and *Lactobacillus*. Hexane, chloroform, 2,4 D-dichloro methane extracts did not show any significant results. The antimicrobial activity of extracts of *A. purpurata* is well studied and confirmed.

**Keywords:** *Alpinia purpurata*; Antibacterial; Hexane; Ethanol; Chloroform

## Introduction

In India, our lives and culture has been associated with native flora and fauna. Both have been used as food as well as medicine. Many plants have got medicinal values and used to treat various health ailments. Plants have been a major source of drug in modern as well as traditional medicine throughout the world. Plants belonging to Zingiberaceae (Ginger family) are known for a number of medicinal properties [1-3]. The Zingiberaceous are tuberous or non-tuberous rhizomes, which have strong aroma and medicinal properties. It is commonly called as ginger and exists in about 50 genera and 1,300 species across the world. Zingiberaceous plants are also used as food additive in powder form in many Asian countries. Medicinal properties and functions of these plants for treating diseases like diarrhea, coryza, dermatosis disorders and rheumatism are mentioned in traditional remedies [4]. *Alpinia* is the largest genus in ginger family in which *Alpinia purpurata* (Vieill.) K. Schum. is a very popular garden plant in India [5]. Rhizome has sharp odour, improves appetite, taste and voice. Phytochemical studies on *A. purpurata* revealed that it possess flavonoids, rutin, kaempferol-3-rutinoside and kaempferol-3-olucronide. One of the major biological properties of flavonoids is their antimicrobial activity and their main role in plants is to act as protective compounds against disease caused by microorganism such as fungi, bacteria and viruses [6]. To ascertain the potentiality of a medicinal plant it is tested against various pathogenic bacteria [7]. Even though exhaustive research had been done with almost all *Alpinia* species including antimicrobial work, less work has been done on *A. purpurata* in terms of antimicrobial activity. The main objective of this study is to assess the antimicrobial activities of extracts obtained from leaves, roots and rhizomes of *A. purpurata* using four different solvents hexane, ethanol, chloroform and 2,4D-dichloromethane.

## Material and Methods

### *A. purpurata*

**Plant source:** *A. purpurata* plants were collected and purchased from traditional markets and local growers in Hyderabad. The rhizomes were removed from the plant and thoroughly cleaned before using.

**Extract preparation:** Each 20gm of dried powder of leaves and roots were soaked separately in 50ml of each of the solvent viz Hexane, Ethanol, Chloroform and 2,4D-dichloromethane, to these solvents 50 ml, 0 ml, 20 ml, 50 ml water was added respectively. Each mixture was stirred using a sterile glass rod at room temperature. At the end each extract was passed through whatman No. 1 filter paper and filtrates were concentrated in vacuum rotary evaporator. The time subjected for rotary evaporator varied from solvent to solvent. The time taken to concentrate the extracts of Hexane, Ethanol, Chloroform, 2,4D-dichloromethane are 30mins, 20mins, 40mins, 1h respectively. The extracts were stored in labeled screw bottles and kept in refrigerator at 4°C.

**Microbial strains and culture media:** Two bacteria, *E. coli* and *Lactobacillus* were used in this study. For this, the stock cultures were subcultured in 10 ml of nutrient broth for incubation at 37°C for 24h.

**Antimicrobial assay:** For antimicrobial assay Muller broth was prepared and it was poured into two Petri dishes. It was left undisturbed till the solidification of media. Wells were made on the solidified media in the Petri plates. 1000 µl of each solvent extract is introduced into wells and then 100 µl of *E. coli* and *Lactobacillus* sub cultures are introduced into the wells of both Petri dishes using pipette. The plates were incubated at 37°C for 24h in an incubator. The results were taken by considering the zone of growth and inhibition of the organisms by the test fractions. Antimicrobial activity was

**Table 1:** Antimicrobial efficacy of different extracts of leaves, roots and rhizomes of *Alpinia purpurata* against bacteria (Zone of inhibition in cm).

Extraction	Parts	Parts	
		<i>E.coli</i>	<i>Lactobacillus</i>
Hexane	Leaves	1	0.8
	Roots	0.8	0.7
	Rhizomes	1.5	1
Ethanol	Leaves	3.5	2
	Roots	3.2	2.2
	Rhizomes	3.3	2.5
Chloroform	Leaves	0.5	0.3
	Roots	0.4	0.4
	Rhizomes	0.7	0.8
2,4D-dichloromethane	Leaves	2	1.5
	Roots	1.4	1.3
	Rhizomes	1.8	1.8

evaluated by measuring the diameter of the Inhibition Zone (IZ) around the disc.

## Results and Discussion

Table 1 shows the zones of inhibition of four solvent extracts (hexane, ethanol, chloroform, 2,4D-dichloromethane) of three different plant parts (leaves, roots, rhizomes). Ethanolic extracts of leaves and roots showed significant activity against the tested bacteria. Highest inhibition zone of 3.5 cm and 2.8 cm was recorded for the ethanolic extracts of leaves against *E. coli* and *Lactobacillus* respectively. This study finding gives a scope to further screen the chemical constituents of the extracts which will be very useful to combat infections caused by this bacteria. Biochemical studies on

other species of *Alpinia* reports flavonoids as antibacterial compounds responsible for activity [8]. Moreover wide range of flavonoids is extracted only using ethanol as solvent [9]. Thus we ensure the antibacterial potential of leaves of *A. purpurata* where ethanol could be a prescribed solvent for extraction. It is also suggested that more research be conducted to identify and elucidate active components especially flavonoids.

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