

A Study On Antibacterial Activities' Potential Of Aqueous And Ethanolic Extracts Of Rhizome: *Alpinia Galangal* L. (Zingiberaceae) From Anantagiri Area, R.R. District, Telangana, India.

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Abstract: The study was carried out to analyze and assess the anti-bacterial affability of *Alpinia galangal* L.'s (Zingiberaceae) rhizomes. To this study *A.galangal*'s rhizomic extracts were used. Used solvents to get Aqueous and Ethanolic rhizomic extracts of *A. galangal* L. were Distilled water and Ethanol. Nutrient Agar Media and Nutrient Agar broth were used. Eight (8) bacterial strains were sued for the anti-bacterial efficacy assay. Most of the bacteria were pathogens. Chosen method was Agar Disc Diffusion method. The aqueous rhizomic extract of *A. galangal* had potential to inhibit all the chosen bacteria. Same inhibitory zones were appeared against *Staphylococcus aureus*-2654, *Escherichia coli*-2831 and *Proteus vulgaris*-2027. The highest anti-bacterial activity was showed against *Klebsiella pneumoniae*-2457 by the same extract. Ethanolic rhizomic extract of *A. galangal* also showed a significant inhibition of the chosen bacteria and same inhibitory zones were formed against *Bacillus megaterium*-2326, *Salmonella typhimurium*-2501 and *Proteus vulgaris*-2027. Throughout the study it was recorded that both Aqueous and Ethanolic extracts of *Alpinia galangal*'s rhizomes had tremendous potential of anti-bacterial activity.

Key words: *Anti-bacterial activity, rhizomic aqueous extract, Ethanolic extract of rhizome, and zone of inhibition.*

INTRODUCTION:

Distribution: This species is globally distributed across India and Tropical Asia *Alpinia Galangal* rhizome is cultivated for its rhizomes and used as anti-fungal, antitumor, Anti-helminthic, anti-ulcerative, anti-dementia. The extract of rhizome plant is used to cure whooping cough in children, bronchitis, anti-asthma, disease of heart, chest pain, kidney disease and diabetes. The rhizome is also used as anti-microbial, anti-bacterial. In this study, aqueous and ethanolic rhizomic extracts of species *Alpinia galanga* L. was analyzed and their antibacterial activity was evaluated. The efficiency of inhibition capacity (antibacterial activity) of the two extracts (aqueous and ethanolic rhizomic extracts) is discussed.

MATERIALS AND METHODS

Collection of plant material: The plant *Alpinia galangal* L. (*Zingiberaceae*) was identified by referring (Compendium of medicinal plants) and rhizomes were purchased from local market at Anantagiri area, Rangareddy District, Telangana, India. The rhizomes were washed thoroughly with water and sliced; they were dried in a tray-dryer in shade to make them powder.

Preparation of the Extracts: The dried *A. galangal*'s rhizomes were ground in a mixer to make powder. About 100 g of rhizomic powder was taken into a 500 ml conical flask and about 250 ml of 45% ethanol was added to the conical flask to get extract, which was sealed with a sterile cotton plug to avoid contamination. The rhizomic powder and solvent ethanol added conical flask was placed at 37^oC temperature for 7 days and was shaken at regular intervals for proper dissolution of the extract. After 7 days this solution was filtered by Whatman A filter paper. The filtrate was taken into a china dish and placed in water bath and heated at 45^oc temperature to get crude extract. After evaporation of solvents distilled water and ethanol the crude extract was collected and placed in a desiccator to evaporate all the moisture content in the crude extract. The extract was prepared under the guidance of Miss Y.B.Manju latha, Faculty of Microbiology.

Dilution Preparation: About 1g of crude extract was taken into a sterile test-tube and it was diluted by adding about 10 ml of ethanol to it to get diluted ethanolic rhizomic extract of *A. galangal* L. Similarly about 1g of crude extract of the same was taken into a sterile test tube and about 10 ml of distilled water was added to the test tube to get aqueous and ethanolic rhizomic extracts. Both aqueous and ethanolic extracts were screened to evaluate their efficacy of antibacterial activity.

Test Organisms: The chosen bacterial strains *Slamonella typhimurium*-2501, *Klebsiella pneumoniae*-2457, *Escherichia coli*-2831, *Bacillus cereus*-2461, *Pseudomonas aeruginosa*-2037, *Staphylococcus aureus*-2654, *Proteus vulgaris*-2027 and *Bacillus megaterium*-2326 were procured from National Collection for Industrial Microorganisms (N.C.I.M.) Pune, India. The pure cultures were sub-cultured and maintained on Nutrient Agar slants and stored in a refrigerator at 4^oc for further use.

Inoculum preparation: Bacterial inoculum was prepared by inoculating a loopful of test organism's culture into about 5 ml of Nutrient Agar broth, incubated at room temperature for 24 hours and it was used for antibacterial assay.

Antibacterial Potential Assay by Agar Disc Diffusion Method: The potential of Antibacterial activity of, chosen plant species's (*A. galangal* L.) aqueous and ethanolic rhizomic extracts; were determined by Agar Disc Diffusion method. Nutrient Agar was used as media. Molten Nutrient Agar medium of 20 ml was inoculated with each test organism (bacterial strain) and was poured in to sterile Petri plate which was left for solidification of media. After solidification of Nutrient Agar 05 mm of bores were made with borer in the media. Bores were inoculated by aqueous and ethanolic rhizomic extracts and Petri plates were placed in a refrigerator for 20 minutes for diffusion purpose. After that Petri plates were incubated at 37° C temperature for 24 hours to examine inhibitory zone against inoculated Bacterial strain.

RESULTS AND DISCUSSION:

The use of natural antimicrobial agents is gaining interest due to consumer and producer awareness on health problems. *A. galanga* had strong bactericidal activity against both Gram negative and Gram positive bacteria but more potent in Gram negative strains. The results from this study suggested that *A. galanga* has a promising and natural potential preservative properties of food. (Siriporn Okonogi et al.) In the carried out study aqueous rhizomic extract of *Alpinia galangal* L. (*Zingiberaceae*) showed the highest inhibitory zone - twenty one (21) mm diameter against pathogenic bacterium, *Klebsiella pneumoniae*-2457. And higher inhibitory zone was eighteen (18) mm diameter, showed against *Salmonella typhimurium*-2501. It showed moderate inhibitory zones formation i.e., thirteen (13) mm diameter and twelve (12) mm diameter against *Bacillus cereus*-2461 and against both *Pseudomonas aeruginosa*-2037 and *Bacillus megaterium*-2326 respectively. The same inhibitory zones were appeared against three bacterial strains such as *Staphylococcus aureus*-2654, *Escherichia coli*-2831 and *Proteus vulgaris*-2027, the zone diameter was eight (8) mm diameter. (Table-1)

The seven herbs in Thai red curry paste including *A. galangal* L. showed natural antibacterial activities against *S. Typhimurium* DT104b in all three extraction conditions: Kaeng Kathi (fresh coconut milk extraction model), Kaeng Kathi (UHT coconut milk extraction model), and Kaeng Pa (aqueous extraction model). The Ethanolic rhizomic extract of *A. galangal* L. showed the highest and same inhibitory zones i.e., (16) mm diameter against three bacteria like *Salmonella typhimurium*-2501, *Bacillus megaterium*-2326 and *Proteus vulgaris*-2027. It showed fifteen (15) mm diameter inhibitory zones against *Klebsiella pneumoniae*-2457. It produced fourteen (14) mm diameter zones of inhibition against both *Staphylococcus aureus*-2654 and *Pseudomonas aeruginosa*-2037. Moderate inhibitory zones (9) mm diameter and (7) mm diameter were showed against *Bacillus cereus*-2461 and *Escherichia coli*-2831 respectively. (Table-2). Natta, L., *Orapin, K., Krittika, N. and Pantip, B. reported that Hydrodistilled, ethanolic and Petroleum ether extracts of *A. galangal* L. rhizomes had efficient inhibitory activity against *B. cereus* and *S. aureus*.

Aqueous rhizomic extract of *Alpinia galangal* L. (*Zingiberaceae*) showed the effective inhibitory zones against pathogenic and medically significant bacterial stains like *Klebsiella pneumoniae*-2457 and *Salmonella typhimurium*-2501; Respective inhibitory zones were twenty one (21) mm diameter and eighteen (18) mm diameter. Both aqueous and ethanolic rhizomic extracts showed potential in resisting/inhibiting the growth of all the chosen bacteria to study. (Table-3). The studies of Irayudi Lazuardi, Treuktongjai Saenghiruna* and Patchanee Yasurin* concluded that herbs contained in Thai red curry paste have a great potential to become the alternative source of natural antibacterial activity in order to combat *S. Typhimurium* DT 104b.(10).

Table-1: Antibacterial Potential of *A. galangal* Aqueous Extract

<u>S.No & Test Organism</u>	<u>Antibacterial Potential</u>
1. <i>Bacillus megaterium</i> -2326	12
2. <i>Staphylococcus aureus</i> -2654	8
3. <i>Bacillus cereus</i> -2461	13
4. <i>Klebsiella pneumoniae</i> -2457	21
5. <i>Escherichia coli</i> -2831	8
6. <i>Salmonella typhimurium</i> -2501	18
7. <i>Proteus vulgaris</i> -2027	8
8. <i>Pseudomonas aeruginosa</i> -2037	12

* Potential of Inhibitory zone in mm

Table-2: Antibacterial Potential of *A. galangal* Ethanolic Extract

<u>S.No & Test Organism</u>	<u>Antibacterial Potential</u>
1. <i>Bacillus megaterium</i> -2326	16
2. <i>Staphylococcus aureus</i> -2654	14

3. Bacillus cereus-2461	9
4. Klebsiella pneumoniae-2457	15
5. Escherichia coli-2831	7
6. Salmonella typhimurium-2501	16
7. Proteus vulgaris-2027	16
8. Pseudomonas aeruginosa-2037	14

* Potential of Inhibitory zone in mm

Table-3: Antibacterial Potential of *A. galangal* aqueous and ethanolic RhizomicExtracts

S.No	Test organism	Antibacterial potential	
		Aq.	Eth.
1	Bacillus megaterium-2326	12	16
2	Staphylococcus aureus-2654	8	14
3	Bacillus cereus-2461	13	9
4	Klebsiella pneumoniae-2457	21	15
5	Escherichia coli-2831	8	7
6	Salmonella typhimurium-2501	18	16
7	Proteus vulgaris-2027	8	16
8	Pseudomonas aeruginosa-2037	12	14

* Potential of Inhibitory zone in mm,

Aq. – Aqueous Rhizomic Extract

Eth.- ethanolic RhizomicExtract

CONCLUSION:

After screening the aqueous and ethanolic rhizomic extracts of *A. galangal* L., the study is concluded that chosen plant species has significant capacity of bacterial resistance which can be useful in the treatment of bacterial diseases like Typhoid and Pneumonia after further research.

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