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RESEARCH ARTICLE

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PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL ACTIVITY OF THE RHIZOMES OF ALPINIA CONCHIGERA

ABSTRACT

Different plant parts like dried leaves, pseudostems and rhizomes of *Alpinia conchigera* Griff. posses potential medicinal value. In this study acetone extract of *Alpinia conchigera* Griff. rhizomes was studied for antibacterial activity and different chemical tests were performed. After successful collection of *Alpinia conchigera* rhizome, this were sun dried for 20 days and then dried in an oven at 45ºC for 24 hours. Then the dried rhizomes were extracted with acetone for 3 days and the extract were collected through coarse filtration. Finally the extract was concentrated by evaporation in dry and clean air. The crude extracts were screened for their antibacterial activity against a wide range of gram positive and gram negative organism by disc diffusion method and the result were compared with those for a standard antibiotic ciprofloxacin. The extracts was then tested for presence of some chemical constituents like flavonoids, glycosides, alkaloids, carbohydrates, tannins, saponins and steroids. The crude extract showed a moderate activity against most of the organisms and the chemical tests give a positive result for flavonoids, alkaloids and carbohydrates. Due to these promising results, further in vivo studies over *Alpinia conchigera* Griff. must be conducted.

Key words : Psudostems, rhizomes, antibacterial activity, gram positive, gram negative, chemical constituents

1. INTRODUCTION

Vast natural resources of medicinal plants are being used for thousands of years for the cure of many diseases in all over the world. If we could use medicinal plants properly we could get medicines at low cost and then it might be possible to fulfill the demand of our medication. This will supply low cost medicine to our poor people and we could establish a better health care system[1] .

Recently, some higher plant products have attracted the attention of microbiologists to search for some phytochemicals for their exploitation as anti-microbials. Such plant products would be biodegradable and safe to human health [2].

Alpinia conchigera Griff. (Family: Zingiberaceae; Bengali: Burkill), a slender herb, about 0.6 to 1.5 m tall, is native to Bangladesh, Cambodia, India and Indonesia and naturalized to Laos, Malaysia, Myanmar, Thailand and Vietnam. Traditionally it is used in gastric pain, diarrhea and dysentery in the southeast region of Bangladesh [3].

The rhizomes of *Alpinia conchigera* Griff. are used in traditional Thai medicine to relieve gastro-intestinal disorders and in the preparation of Thai food dishes. The aqueous extract of the rhizomes has been shown to prevent the contraction of the bronchial tubes of guinea pig [4].

2. MATERIALS AND METHODS

2.1. Collection of plant materials

The rhizome parts of the plant *Alpinia conchigera* was collected from Baluchora, Chittagong. The plant parts was identified by The Bangladesh Council of Scientific and Industrial Research (BCSIR) Baluchara, Chittagong and informed the scientific name of the plants. All other ingredients used are of analytical grade.

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2.2. Extraction of the sample

The rhizomes were sun dried for 20 days and then in an oven at 45ºC for 24 hours. The rhizomes were ground into coarse powder with the grinder and stored for extraction. Then the powder was stored in a cool, dark and dry place and in an airtight container until extraction started. 300 gm of dried powder was weighted and placed in a clean amber glass container. Then 1.5 liter of acetone was added gradually. The container was sealed and kept for 3 days with occasional shaking and stirring. Then the whole mixture was filtered to coarse filtration by filter paper. The filtrate was concentrated by evaporation in dry and clean air [5].

2.3. Microbiological assay

Antimicrobial study of the plant extract was performed by standard disk diffusion method[6]. In this method the sample solution was applied on the paper discs, which was then placed on the nutrient agar media seeded with the organism. A wide variety of gram negative and gram positive organism were used here. Ciprofloxacin (100 µg/disc) was used as the standard antibiotic.

2.4. Chemical tests

2.4.1. Test for flavonoids

A few drops of NaOH and conc. Hydrochloric acid were added to a small amount of plant extract. If the solution become colorless indicate the presence of flavonoids [7].

2.4.2. Test for glycosides

Molisch's Test was performed to investigate the presence of glycosides. To 1 ml of extract, 2 drops of Molisch's regent was added in a test tube and 2 ml of concentrate H_2SO_4 was added carefully keeping the test tube slightly curved. Formation of violet ring at the junction indicated the presence of glycosides [8].

2.4.3. Test for alkaloids

Most alkaloids are precipitated from neutral or slightly acidic solution by Mayer's reagent . About 0.5 gm of extract was stirred with 5 ml of 1% hydrochloric acid on a steam bath and filtered, 1 ml of the filtrate was treated with a few drops of Mayer's reagent[9].

2.4.4. Test for carbohydrates

Molisch's test and Benedict's test were performed for the determination of carbohydrates[(9, 10)].

2.4.5. Test for tannins

Ferric chloride test were performed to indicate the presence of tannins. About 0.5 gm of an alcoholic extract of the leaves was dissolved in 5-10 ml of the distill water and then filtered. A few drops of 5% ferric chloride solution were added to the filtrate[7].

2.4.6. Test for saponins

Frothing test was widely used in determining the presence of saponons. 0.1 gm of the powdered plant material were boiled with 10 ml of water for 3-5 minutes and filtered after cooling. 5 ml of the filtrate were diluted with water and shaken vigorously[11].

2.4.7. Test for steroids

Salkowskis test was performed to determine the presence of steroids. Chloroform solution of the extract was shaken with concentrated sulphuric acid and on standing if yields red colour indicate the presence of steroids[12].

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3. RESULTS AND DISCUSSION

3.1. Microbiological assay

The extract obtained were evaluated for their inhibitory potential by comparing their respective zone of inhibition against four bacteria by using agar disc diffusion assay are presented in Table 1. Antibiotics ciprofloxacin were used as comparison for the antibacterial potentials. The extract of the plant parts studied showed weak inhibition as they inhibited the bacteria. The inhibitions against bacteria exhibited similarity in their antimicrobial potential. The extract showed moderate antimicrobial activity against *Vibrio Cholera* with the greatest diameter of inhibition zone of 13 mm and 12 mm inhibition zones in case of the *Staphylococcus aureus,* followed by 10mm and 8 mm against *Bacillus subtilis* and *Salmonella typhi* respectively. Antimicrobial activities of the *Alpinia conchigera* and *Alpinia galangal* against a wide spectrum of microorganisms were demonstrated from many previous studies[13,14,15,16].

3.2. Chemical tests

The chemical composition of the rhizome extract studied is presented in Table 2. Among the compounds identified were flavonoids, alkaloids, carbohydrates. In comparison to previous studies on *A. conchigera* and other species, especially *Alpinia galangal* we were unable to confirm the presence of glycosides, tannins, saponins, steroids as reported from many previous studies[17,18,19].

4. TABLES

Name of the bacteria	Zone of inhibition	
	Sample extract (100µg/disk)	Standard (100µg/disk)
Bacillus subtilis	10	14
Staphylococcus aureus	12	16.5
Vibrio cholera	13	15
Salmonella typhi	8	12.5

Table 1 – The diameter in mm of the zone of inhibition of *Alpinia conchigera* extract against four bacteria

Test For	Name of the test / Reagent	Result
Flavonoids	NaOH and Conc. HCl	Present
Glycosides	NaOH reagent	Absent
Alkaloids	Mayer's reagent	Present
Carbohydrates	Molisch's test	present
	Benedict's test	present
Tannins	Ferric chloride test	Absent
Saponins	Foam test	Absent
Steroids	Salkowskis test	Absent

Table 2 - The results of various chemical tests for the detection and identification of chemical constituents

5. CONCLUSION

Alpinia conchigera is used in the treatment of various physical ailments in both traditional and modern system of medicine. It is an important source of various compounds with antibacterial activity. A very less study related to antibacterial activity and phytochemical contents is performed on this plant, therefore a comprehensive antifungal and antibacterial activities and quantitative analysis of the phytochemical contents of this plant should be performed to explore the useful application in both pharmaceutical and medicinal field.

6. ACKNOWLEDGEMENT

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