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PHYTOCHEMICAL ANALYSIS AND ANTIFUNGAL ACTIVITY AGAINST *ASPERGILLUS FUMIGATUS* AND *ASPERGILLUS NIGER* ON DRY ZINGER (*ZINGIBER OFFICINALE* ROSCOE)

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ABSTRACT

Zingiber officinale Roscoe (Dry Zinger) is used in traditional Indian medicine to cure various diseases. The phytochemicals screening of Z. officinale extracts were carried out to determine the compounds using the colour test adapting standard methods and fungal strains were assayed by agar well diffusion method. The results obtained by various extracts of Z. officinale showed that ethanol extract exhibited prominent antifungal activity against Aspergillus fumigatus and petroleum ether extract of also showed activity against Aspergillus niger. The present study revealed that a phytochemical constituent present of Z. officinale used for the treatment of various diseases. The antifungal study confirms that active constituents present in Z. officinale than possess higher antifungal activity.

KEY WORDS

Zingiber officinale, Phytochemical, Petroleum ether A. fumigatus, A.niger.

INTRODUCTION

Ginger rhizome is used in several traditional systems of medicine, including Traditional Chinese Medicine, Ayurveda and Western herbal medicine [1]. The secondary metabolites found in the rhizome of ginger that are volatile compounds and nonvolatile phenolic compounds. It usually considered that the pharmacological activity of ginger rhizome resides with compounds from these classes, in particular the non - volatile phenolic compounds [2, 3].

Ginger extensively employed in medicine for the management of the different diseased condition like nausea, vomiting, motion sickness, gastrointestinal ulcers, diabetes, fever, arterial tension, rheumatoid arthritis, dry mouth xerostomia cancer, migraine headache, sore throat, minor respiratory ailments. The present study reports on the phytochemical analysis and the antifungal activity against by *A. fumigatus* and *A. niger* of using various extracts from *Z. officinale*.

MATERIAL AND METHODS

Collection of plant material

Fresh *Z. officinale collected from the nearby* market of Saibaba colony, Coimbatore Tamil Nadu, India. The authenticity of the plant confirmed in Botanical Survey of India, Tamil Nadu Agricultural University, Tamil Nadu, Coimbatore.

Preparation of extracts

The *Z. officinale* were washed with water to remove the dirt and shade drying for four weeks. The shade dried samples were powdered separately using an electric grinder. The powder was stored in screw cap bottles until further analysis. 10 g each *Z. officinale* powder was weighed using an electronic balance (Denver XS-210) and made into packets using zerohaze filter paper (A

Grade, SD's). These powders subjected to extraction with 500 ml of the solvents for 8 h using a Soxhlet apparatus [4, 5]. Petroleum ether (60-80^{0}C) extraction was followed by chloroform extraction and ethanol extraction so that the powders subjected to extraction with solvents of increasing polarity (Fig 1 & Fig 2). The *Z. officinale* extracts thus obtained were concentrated by distillation and dried by evaporation in a water bath at 40^{0}C. The residue thus obtained was stored in tightly closed glass vials in the refrigerator for further use.

Figure 1: *Z. officinale*

Figure 2: Powder of *Z. officinale*

Phytochemical screening

The phytochemicals screening of *Z. officinale* extracts were carried out to determine the presence of the following compounds alkaloids, phenols, flavonoids, terpenoids, steroids, anthraquinones, proteins, quinines and carbohydrate using the colour test adapting standard methods [6].

Test microorganism and Antifungal assay

The fungal strains used were *A. fumigatus* and *A. niger*. The activities of the plant extracts on various fungal strains were assayed by agar well diffusion method. The antimicrobials present in the plant extract are allowed to diffuse out into the medium and interact in a plate freshly seeded with the test organisms. The resulting zones of inhibition will be uniformly circular and there will be a confluent lawn of growth. The diameter of the zone of inhibition can measure in millimeters.

Agar medium procedure

The commercially available Rose Bengal Chloramphenicol agar medium (32.15g) was suspended in 1000 ml distilled water. The medium was dissolved entirely by boiling and autoclaved at 15 lbs pressure (121^{0}C) for 15 minutes. Rose Bengal chloramphenicol agar medium was prepared and poured on to the petri plates. A fungal plug placed in the centre of the plate. Wells of 6 mm diameter cut into the agar medium. Petroleum ether, chloroform and ethanol extracts poured onto the wells in the plates. Nystatin used positive antifungal control and DMSO negative control.

Statistical Analysis

The antimicrobial data was assayed by standard deviation using three replicates.

RESULT AND DISCUSSION

In the present study, preliminary phytochemical screening of *Z. officinale* extracts showed the presence of phytochemical constituents. Petroleum ether extracts of *Z. officinale* revealed the presence of alkaloids, flavonoids, proteins, phenols, quinones and carbohydrate (Table 1). In chloroform extract, alkaloids, terpenoids and carbohydrate were present. Alkaloids and quinines were present in the ethanol extracts. Similar results recorded by Gowri and Manimegalai, 2017 as stated that alkaloids, flavanoids, protein, steroids, phenols, carbohydrates and quinone presented in *Brassica oleracea* leaf and stem extracts.

Table 1: Phytochemical constituents of *Z. officinale* extracts

S.No.	TEST		*Z. officinale*		
			Pet. ether	Chloroform	Ethanol
1	Alkaloid	Mayer's Test	-	+	-
		Wagner's Test	-	-	-
		Hager's Test	+	-	+
2	Flavonoids	NaOH Test	-	-	-
		H_2SO_4 Test	+	-	-
3	Steroids	Libermann- Burchard Test	-	-	-
4	Terpenoids	Libermann- Burchard	-	+	-
5	Anthraquinone	Test	-	-	-
6	Proteins	Ninhydrin (Aqueous) Test	-	-	-
		Ninhydrin (Acetone) Test	-	-	-
		Biuret Test	+	-	-
7	Phenols	Ferric Chloride Test	-	-	-
		Libermann's Test	+	-	-
8	Quinones	Test for quinines	+	-	+
9	Carbohydrates	Molish Test	+	-	-
		Fehling's Test	-	+	-

+ Detected - Not detected

Alkaloids are the largest group of secondary chemical constituents made largely of ammonia compounds comprising basically of nitrogen bases synthesized from amino acid building blocks with various radicals replacing one or more of the hydrogen atoms in the peptide ring, most containing oxygen [9].

Flavonoid an essential group of polyphenols widely distributed among the plant flora [10]. These compounds are active antioxidants that protect against cancer and cardiovascular disease. It plays an essential role in blood clotting factors. Terpenoids have pharmacological applications as an anticancerous agent. Anthraquinone is derivatives of phenolic and glycosidic compounds [11, 12]. Plant steroids are naturally occurring plant phytoconstituents that have found therapeutic applications as arrow cardiac drugs [12].

The preliminary studies on *E. longifolia* extract exhibit moderate antimicrobial activity against fungal strains, *A. fumigatus* and *A. niger* [13]. The antimicrobial activity of rhizome extract of *Acorus calamus* actively inhibits the *A. niger* fungal strains. The inhibitory concentration of ethanol extract of *A. calamus* (19mm) observed [14] and similar results found in the present study that ethanol extract of *Z. officinal* showed the zone of inhibition in ethanol extract *18* ±1.63mm *A. fumigatus* (Fig 3 & Fig 4).

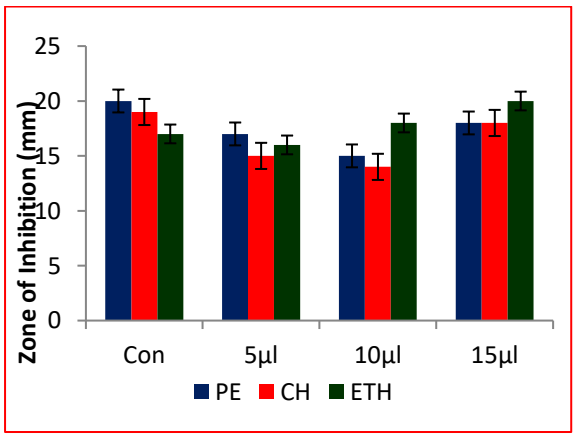

Figure 3: Antifungal activity of *Z. officinale* extracts against *A. fumigatus*

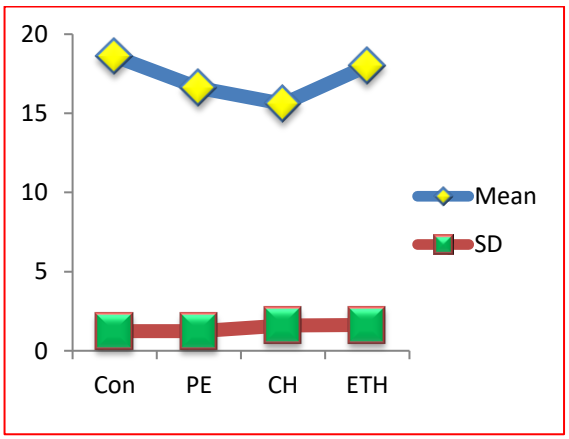

Figure 4: Antifungal activity of *A. fumigatus*

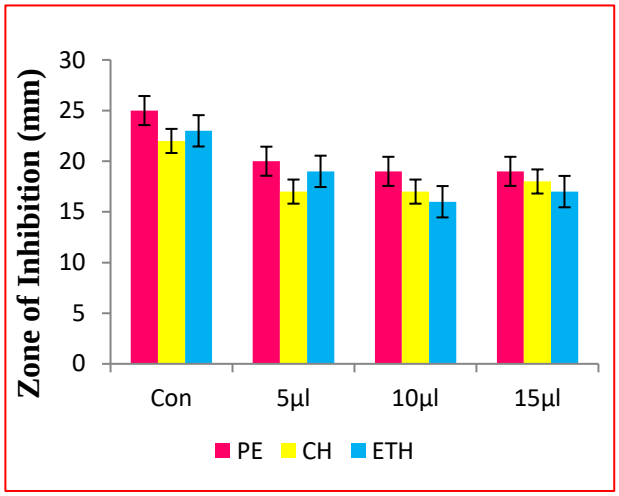

Figure 5: Antifungal activity of *Z. officinale* extracts against *A. niger*

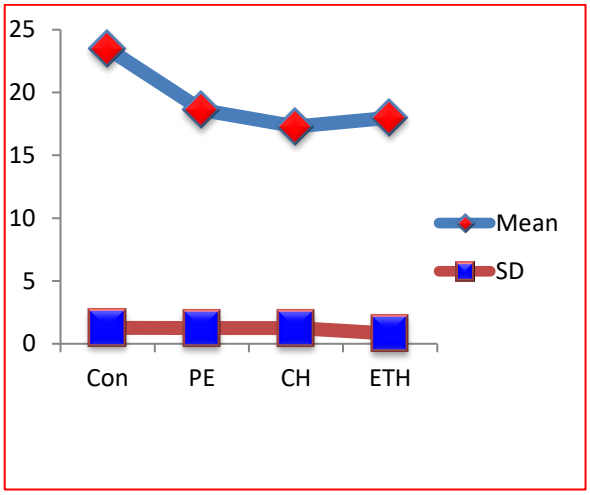

Figure 6: Antifungal activity of *A. niger*

The antifungal activity of extracts screened by agar well diffusion method was used to evaluate the antimicrobial activity by measuring the inhibition zone against the test microorganisms. The results obtained by various extracts of *Z. officinale* showed that petroleum ether extract of *A. niger* was found to have the highest zone of inhibition to this microorganism 18.6±1.24mm (Fig 5 & Fig 6). A similar result obtained by an extract of *B. oleracea* stem showed that petroleum ether extract exhibited antifungal activity against *A. niger.*

CONCLUSION

Ginger has a wide range of biological activities that attributed to its active constituents. Ginger as a herbal medicinal product that shares pharmacological properties with non-steroidal anti-inflammatory drugs. The results of this study may also be of commercial interest to research institutes and pharmaceutical industries in the development of new medicines.

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REFERENCE

1. Williamson E.M. Major Herbs of Ayurveda. Churchill Livingstone, 235, (2002).
2. Connell D.W. The pungent principles of ginger and their importance in certain ginger products. Food Technology in Australia, 21; 570-575, (1969).
3. Govindarajan V.S. Ginger - chemistry, technology, and quality evaluation. Critical Reviews in Food Science & Nutrition, 17; 1-96, (1982a).
4. Harbourne J.B. Phytochemical methods. Chapman and Hall, London. Inhibitors of fungal growth. Nature, 324; 365 – 367, (1973).
5. Vogel A.I. In: Text book of practical organic chemistry. The English language book society and Longman, London, 1368, (1978).
6. Raman N. Phytochemical techniques. 1st ed, New India Publication, New Delhi,19 – 25, (2006).
7. Gowri G., Manimegalai K. Phytochemical and XRD analysis of cauliflower leaf. World J. Pharmacy and Pha Sci, 6(7); 1277-1282, (2017).
8. Gowri G., Manimegalai K. Phytochemical analysis and antifungal activity of cauliflower stem (*Brassica oleraceae var botrytis* L.). International Journal of Applied and Pure Science and Agriculture, 3(9); 55-59, (2017).
9. Sarker S.D, Nahar L. Chemistry for Pharmacy Students General, Organic and Natural Product Chemistry. England. John Wiley and Sons, 283-359, (2007).
10. Kar A. Pharmacognosy and Pharmacy biotechnology (Revised-Expanded Second Edition). New Age International Limited Publishers. New Delhi, 332-600, (2007).
11. Maurya R., Singh G., Yadav P.P. Antiosteoporotic agents from Natural sources. In: Atta-ur-Rahman (Ed.) Studies in Natural Products Chemistry, 35; 517-545, (2008).
12. Firn R. Nature's Chemicals. Oxford University Press, Oxford, 74-75, (2010).

13. Khanam Z., Wen C.S, Bhat I.U.H. Phytochemical screening and antimicrobial activity of root and stem extracts of *wild Eurycoma longifolia Jack* (Tongkat Ali). Journal of King Saud University-Science, 27; 23-30, (2015).

14. Kumar V., Singh R., Joshi V. Antimicrobial activity of Rhizome Extract of Acorus calamus Against Different Micro-Organisms. Octa Journal of Biosciences, 2(1); 59-63, (2014).

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