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LAMPIRAN

Lampiran 1

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Antimicrobial efficacy of extracts from *Alpinia purpurata* (Vieill.) K.Schum. against human pathogenic bacteria and fungi

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ABSTRACT

The antimicrobial activity of three solvent extracts (ethanol, petroleum ether & chloroform) of three different plant parts of *Alpinia purpurata* (leaves, roots and rhizomes) was studied *in vitro* against six reference strains of bacteria and four pathogenic fungi using disc diffusion assay. Ethanolic extracts of rhizomes showed a wide spectrum of activity against all tested bacteria, but no notable activity against any fungi except *Candida albicans*. Highest inhibition zone of (14.4 ± 0.4 mm) was recorded for the ethanolic extracts of rhizomes against *Enterobacter aerogens*. Petroleum ether and chloroform extracts did not show any highlighting results. The antimicrobial potential of rhizomes of *A. purpurata* is well substantiated than any other parts tested.

Keywords: Leaves, roots, rhizomes; organic extracts; antimicrobial activity; *Alpinia purpurata*; disc diffusion assay.

INTRODUCTION:

Medicinal plants have been used to cure disease since antiquity. Plants still constitute one of the major source of drugs in modern as well as traditional medicine throughout the world (Suri *et al.*, 1992). Plants belonging to Zingiberaceae (Ginger family) are known for a number of medicinal properties (Basu, 2002; Kumar *et al.*, 2006; Prajapati *et al.*, 2005). A spectrum of essential oils are present in the members of Zingiberaceae (Ibrahim and Zakaria 1987). Rhizome extract of some members of the medicinal Zingiberales are widely used in dietary intake as well as in traditional systems of medicine (Ibrahim *et al.*, 2007). *Alpinia* is the largest genus in ginger family in which *Alpinia purpurata* (Vieill.) K. Schum. is a very popular garden plant in India (Sabu, 2006). Rhizome has sharp odour, improves appetite, taste and voice. It is also used for head-ache, rheumatism, sore throat and renal disease (Prajapati *et al.*, 2003). Phytochemical studies on *A. purpurata* revealed that it possess flavonoids, rutin, kaempferol-3-rutinoside and kaempferol -3-olucronide (Victorio *et al.*, 2009). 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 (Wang *et al.*, 1989). To determine the potential medicinal use of plants it is important to screen them for activity against a wide range of pathogenic bacteria (Fazilatun *et al.*, 2004). Although extensive research had been done with most *Alpinia* species including antimicrobial work (Pant, 1999; Janssen and Scheffer 1985; Morita and Itokawa 1988; Haraguchi *et al.*, 1996; Miyazawa and Hashimoto 2002; Ray and Majumdar 1975; Ray and Majumdar 1976; Prudent *et al.*, 1993; Lima *et al.*, 1993; De pooter *et al.*, 1995) little or no work in terms of antimicrobial activities have been performed in *A. purpurata*. The objective of the present study is to assess the antimicrobial activities of extracts obtained from leaves, roots and rhizomes of *A. purpurata* using three different solvents ethanol, petroleum ether and chloroform.

MATERIALS AND METHODS

A. Purpurata

Plant Source: *A. purpurata* plants were collected from Carmel College, Botanical garden Mala, Trichur Dt., Kerala. They were identified at The Rapinat Herbarium, St. Joseph's College (Autonomous) Tiruchirappalli, S. India and was grown in green house of Rapinat Herbarium, Tiruchirappalli and a voucher specimen was also deposited.

Lampiran 2

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Antimicrobial and antioxidant activity of the methanolic extract of *Alpinia purpurata* rhizomes

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Abstract

The present study was undertaken to determine antimicrobial and antioxidant activities of the methanolic extract of rhizomes of *Alpinia purpurata*. Antimicrobial activity was tested against *Escherichia coli* (MTCC 25922), *Enterococcus aerogenes* (MTCC 29212), *Pseudomonas aeruginosa* (MTCC 27853), *Staphylococcus aureus* (MTCC 25923) and *Proteus vulgaris* (MTCC 7299) by disc diffusion assay method. Antioxidant activity was determined by DPPH free radical scavenging assay. The rhizomes of *Alpinia purpurata* exhibited significant antioxidant inhibitory activities with an 93.82% and 88.56% respectively at the concentration 80 µg/ml and 100 µg/ml and well compared with standard ascorbic acid drug. As the concentration of rhizomes of *Alpinia purpurata* increased from 20-100 µg/ml, the inhibitory actions of the *Alpinia purpurata* increased towards all the strains used in this study. At concentration 100 µg/ml, the rhizomes of *Alpinia purpurata* exhibited the antimicrobial activity all the five bacteria and five fungal pathogens, but was more susceptible against *Escherichia coli* (20 mm), *Staphylococcus aureus* (19 mm) at concentration 100µg/ml., followed by the highest activity against *Aspergillus flavus* and *Candida albicans* (10 mm zone of inhibition) at 100 µg/ml, followed by the highest activity against *Aspergillus niger*, *Candida vulgaris* and *Candida tropicalis* (9 mm zone of inhibition). The result confirms that the rhizomes of *Alpinia purpurata* antibacterial and antifungal activity against the tested bacteria.

Keywords: Rhizomes, *Alpinia purpurata*, antioxidant, DPPH free radical scavenging assay, antimicrobial

Introduction

Medicinal plants are the backbone of traditional medicine and the antibacterial activity of plant extract is due to different chemical agent in the extract, which was classified as active antimicrobial compound (Kumar *et al.*, 2009; Ignacimuthu *et al.*, 2009; Doughari *et al.*, 2007; Adegoke and Adebayo-tayo, 2009) [1-4]. In recent years, pharmaceutical companies have been doing phytochemical research and investing billions of dollars in developing natural remedies to produce drugs in affordable price to general population (Doughari, 2006) [5]. The rising incidence in multidrug resistance amongst pathogenic microbes has further necessitated the need to search for fewer antibiotic sources from plants (Mohamed Khadeer Ahamed *et al.*, 2007) [6]. *Alpinia purpurata* (Vieill.) K. Schum (red ginger) is a herbaceous perennial plant, internationally known in the ornamental plant market as potted plant, landscape accent and cut flower (Moron, 1987) [7]. The rhizome has sharp odour, which could improve appetite, taste and voice. It is also used for headache, rheumatism, sore throat and renal disease (Prajapati *et al.*, 2003) [8]. The plant possesses moderate antibacterial and anticancer activities, which may be due to the presence of secondary metabolites in the leaves of *A. purpurata* (Villaflores *et al.*, 2010) [9]. In addition to the proposed anti-inflammatory activity, its phytomedicinal potential to treat tuberculosis is also described (Raj *et al.*, 2012) [10]. The chemical constituents shows that the presence of volatile oil, chiefly sesquiterpene, hydrocarbons, sesquiterpene alcohols, gingerole., starch, tannins flavonoids like galangin (Cheah and Gan, 2010; Bisset and Wichtl, 2001; Altman and Marcussen, 2001; Deepti *et al.*, 2012) [11-13]. Therefore, in the present study, the antimicrobial and antioxidant activities of the methanolic extract of rhizomes of *Alpinia purpurata* were evaluated employing *in vitro* assay methods.

Materials and methods

Collection of plant material

The rhizomes of *Alpinia purpurata* were collected in the month of May from the mullipatti, pudukkottai, Tamil Nadu, India. The plant was identified and rhizomes of *Alpinia purpurata* were authenticated and confirmed from Dr. S. John Britto, Director, Rapinat herbarium, St. Joseph College, Tiruchirappalli, and Tamil Nadu for identifying the plants. The voucher specimen number SGP001 (7.07.2019).

Lampiran 3



KEMENTERIAN KESEHATAN REPUBLIK INDONESIA
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**PERSETUJUAN KEPK TENTANG
 PELAKSANAAN PENELITIAN BIDANG KESEHATAN
 Nomor: 1453-/KEPK/POLTEKKES KEMENKES MEDAN 2021**

Yang bertanda tangan di bawah ini, Ketua Komisi Etik Penelitian Kesehatan Politeknik Kesehatan Kemenkes Medan, setelah dilaksanakan pembahasan dan penilaian usulan penelitian yang berjudul:

“Studi Literatur Perbandingan Efektivitas Antibakteri Ekstrak Lengkuas Merah Dengan Berbagai Pelarut Terhadap Bakteri *E. coli* (*Eschericia coli*)”

Yang menggunakan manusia dan hewan sebagai subjek penelitian dengan ketua Pelaksana/ Peneliti Utama : **Yusril Muhammad Hasibuan**
 Dari Institusi : **Jurusan D-III Farmasi Poltekkes Kemenkes Medan**

Dapat disetujui pelaksanaannya dengan syarat :

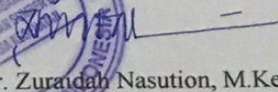
- Tidak bertentangan dengan nilai – nilai kemanusiaan dan kode etik penelitian kesehatan
- Melaporkan jika ada amandemen protokol penelitian.
- Melaporkan penyimpangan/ pelanggaran terhadap protokol penelitian.
- Melaporkan secara periodik perkembangan penelitian dan laporan akhir.
- Melaporkan kejadian yang tidak diinginkan.

Persetujuan ini berlaku sejak tanggal ditetapkan sampai dengan batas waktu pelaksanaan penelitian seperti tertera dalam protokol dengan masa berlaku maksimal selama 1 (satu) tahun.

Medan, April 2021
 Komisi Etik Penelitian Kesehatan
 Poltekkes Kemenkes Medan



Ketua



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Lampiran 4

POLITEKNIK KESEHATAN
JURUSAN FARMASI
JL. AIRLANGGA NO. 20 MEDAN

**KARTU LAPORAN PERTEMUAN BIMBINGAN KTI
MAHASISWA TA. 2020/2021**

Nama : YUSRI MUHAMMAD HASIBYAN
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Pembimbing : Ernawatiya, S.Farm., M.Gi., Apt

PAS PHOTO
2X3

NO	TGL	PERTEMUAN	PEMBAHASAN	PARAF MAHASISWA	PARAF PEMBIMBING
1	10/01/21	1	Penentuan judul KTI		
2	22/01/21	2	Acc judul KTI		
3	09/02/21	3	Revisi BAB I		
4	17/02/21	4	Revisi BAB II dan III		
5	22/2/21	5	Revisi BAB I, II dan III		
6	12/3/21	6	Bimbingan KTI		
7	23/3/21	7	Revisi BAB IV dan V		
8	4/4/21	8	Revisi BAB IV dan V		
9	10/5/21	9	Acc BAB IV dan V		
10	20/5/21	10	Getminal hasil		
11	20/5/21	11	Revisi BAB IV dan V		
12	14/6/21	12	Acc Final KTI		

Ketua

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