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The effect of ethanol extracts of pegagan (*Centela asiatica*) urban in inhibiting the growth of *Staphylococcus aureus* and *Klebsiella pneumoniae* that caused pneumonia

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Abstract. Pegagan (*Centela asiatica* [L.] Urban) contains alkaloid, flavonoid, saponin, triterpenoid and tannin that have antibacterial activity. *Staphylococcus aureus* and *Klebsiella pneumoniae* are most common of bacteria that cause pneumonia. This study conducted to determine the effect of ethanol extracts of pegagan in inhibiting the growth of *S. aureus* and *K. pneumoniae* that caused pneumonia. The type of this study is a laboratory experiment using a completely randomized design (CRD). Testing of inhibitory growth effect was measured by Kirby Bauer disc diffusion method. The results showed that ethanol extracts of pegagan at 12.5%, 25%, 50% and 75% concentrations formed inhibition zones on the growth of *S. aureus*, on average respectively of 7.00 mm, 9.20 mm, 13.20 mm, and 14.50 mm, whereas on the growth of *K. pneumoniae*, it didn't form any inhibition zone. The results of ANOVA and Duncan ($\alpha=1\%$) tests showed that ethanol extracts of pegagan at all concentrations made a significant difference in inhibiting the growth of *S. aureus* compared to negative and positive control. The ability of ethanol extracts of pegagan to inhibit the growth of *S. aureus* at 12.5% and 25% concentrations categorized as no inhibitory growth effect, whereas 50% and 75% concentrations categorized as weak inhibitory growth effect. While the ethanol extracts of pegagan at all concentrations of the tests categorized as no inhibitory growth effect for *K. pneumoniae*. It can be concluded that ethanol extracts of pegagan inhibit the growth of *S. aureus*, but do not inhibit the growth of *K. pneumoniae*.

Key words: *Centela asiatica*, *Staphylococcus aureus*, *Klebsiella pneumoniae*.

Introduction

The incidence of pneumonia is still quite high in some countries and being the main cause of death in developing countries. This happens because the lack of availability of drugs and the emergence of the problem of resistance due to the use of antibiotics in the Community (Zampini, 2009). The development of drug resistance and the emergence of a variety of unwanted side-effects of certain antibiotics have led the research should be directed to find new antimicrobial substances from other sources. The plant became the main choice of researchers in search of antimicrobial substance from another source because it is easy to get it and used by various ethnic groups in treatment (Arora and Kaur, 2007).

Pegagan (*Centela asiatica* [L.] Urban) is one of the herbs that are used as a traditional medicine in the form of fresh ingredients, dry, or already in the form of the herb (herbs) (Lasmadiwati et al., 2003). Pegagan contains alkaloids, flavonoids, saponins, tannins and triterpenoid (Winarto and Surbakti, 2003; Santoso and Gunawan, 2004; Kristina et al., 2009). These compounds have the effect of Pharmacology, one of which is the antibacterial effects (Pittella et al., 2009). Dash et al. (2011) prove that the antibacterial effect and pegagan effects of antifungal active against pathogens in humans. The result obtained is the ethanol extract pegagan shows antibacterial activity and antifungal drag growth zones by establishing 15-19 mm against microorganisms tested.

Pegagan in many studies have demonstrated antibacterial effect, however the antibacterial effect against bacteria research isolates clinic apparently has never been done. In connection with the reality of the above research is done to identify the effect of

***In vitro* Antimicrobial Activity of different extracts of Gotu Kola and Water Spinach against pathogenic Bacterial Strains**

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Received: 08 June 2015 Accepted: 29 June 2015 Online 06 July 2015

ABSTRACT

Antimicrobial therapy has been threatened due to the global proliferation of multidrug resistance, which demanding the quest for other alternatives. The present study was conducted to investigate the organic and aqueous extract of two medicinal plants of Bangladesh against 5 pathogenic bacterial strains. Extraction of both plant samples was carried out in chloroform, acetone, ethanol and water. *In-vitro* antimicrobial properties were carried out by disc diffusion methods. Diameter of the zone of inhibition and Minimum Inhibitory Concentration was measured for each of the extracted plant sample. The highest zone of inhibition (22 mm) was shown by the ethanol extract of Gotu Kola (16 mg/ml) against *Staphylococcus saprophyticus* and the lowest (4 mm) was also by aqueous extract of Gotu Kola against *E. coli*. Water spinach was found to be more potent against *Escherichia coli*, *Salmonella typhi* and *Shigella dysenteriae* (MIC = 16 µg/ml) whereas Gotu kola to be against *Staphylococcus aureus* and *Staphylococcus saprophyticus* (MIC = 16 µg/ml).

Keywords: Gotu Kola, Water Spinach, Disc Diffusion Method, Minimum Inhibitory Concentration (MIC), Zone of Inhibition

1. INTRODUCTION

Owing to the versatile applications, plant-derived substances are recently been emerged in a great attention [1]. Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs [2]. It has been estimated that 14 - 28% of higher plant species are used medicinally and that 74% of pharmacologically active plant derived components were discovered after following up on ethnomedicinal use of the plants. The development of pharmaceuticals begins with identification of active principles, detailed biological assays and dosage formulations, followed by clinical

studies to establish safety, efficacy and pharmacokinetic profile of the new drug [3]. The same follows for plant therapeutic agents. Thorough biological evaluation of plant extracts is vital to ensure their efficacy and safety. These factors are of importance if plant extracts are to be accepted as valid medicinal agents. Many plants have been used because of their antimicrobial traits and the antimicrobial properties of plants have been investigated by a number of researchers worldwide. Ethnopharmacologists, botanists, microbiologists, and natural-product chemists are searching the earth for phytochemicals which could be developed for the treatment of infectious diseases [4] especially in light of the



BIOLOGICAL EFFICACY OF CENTELLA ASIATICA (L) urban AGAINST OPPORTUNISTIC PATHOGENS

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ABSTRACT

An assay was carried out to study the antimicrobial activity of ethyl acetate, ethanol, acetone, chloroform and petroleum ether extracts of *Centella asiatica* (L) urban herb by disc diffusion assay. The tested bacterial strains were *Staphylococcus haemolyticus*, *Staphylococcus lentus*, *Staphylococcus aureus*, *Bacillus cereus*, *Escherichia coli*, *Serratia marcescens*, *Enterobacter amnigenus*, *Klebsiella pneumoniae*, *Klebsiella oxytoca* and *Brevibacterium paucivorans*. Zone of inhibition produced by different extracts against the selected strains was measured and compared with standard antibiotic chloramphenicol (30µg). The present study demonstrated that the ethyl acetate, ethanol and acetone extract of *Centella asiatica* have higher antimicrobial activities (average 7-12 mm zone of inhibition) than *n*-hexane petroleum ether and chloroform extracts. All the extracts showed better results against the tested bacterial strains comparing with chloramphenicol (30µg). The results obtained in the present study suggest that the different extracts of *Centella asiatica* revealed a significant scope to develop a novel broad spectrum of antibacterial effect.

KEY WORDS

Centella asiatica, ethyl acetate extract, opportunistic pathogens, inhibitory effect, antibacterial activity

INTRODUCTION

Medicinal plants are used by 80% of the world population as the only available medicines especially in developing countries. [1] A wide range of medicinal plants parts is used to extract as raw drugs and they possess varied medicinal properties. While some of these raw drugs are collected in smaller quantities by the local communities and folk healers for local use, many other raw drugs are collected in larger quantities and traded in the market as the raw materials for many herbal industries [2]. Clinical microbiologists have great interest in screening of medicinal plants for new therapeutics. [3] The active principles of many drugs found in plants are secondary metabolites. The antimicrobial activities of plant extracts may reside in a variety of different components, including aldehyde and

phenolic compounds. [4] The development of drug resistance in human pathogens against commonly used antibiotics has necessitated a search for new antimicrobial substances from other sources including plants. [5] Hence the sensitivity study of bacterial strains to the plant *Centella asiatica* was evaluated.

Centella asiatica (L) urban belonging to the family Umbelliferae is a common perennial herbaceous creeper flourishing abundantly in moist areas and distributing widely in tropical and subtropical countries including Bangladesh. Various chemical constituents are reported in *Centella asiatica* like asiaticoside, madecassoside, madecassic acid, asiatic acid, glucose, rhamnose, terpenoids, sitosterol, stigmasterol, fatty oils consist of glycerides of palmitic acid, stearic acid, linoleic acid, linolenic acid vitamins like ascorbic acid. It also contains

Kartu Bimbingan

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NO	TGL	PERTE MUAN	PEMBAHASAN	PARAF MAHASISWA	PARAF PEMBIMBING
1	27/01-2020	I	Konsultasi Judul KTI	Nesya	Nadroh
2	28/01-2020	II	Acc Judul KTI	Nesya	Nadroh
3	11/02-2020	III	Konsultasi bab I	Nesya	Nadroh
4	01/03-2020	IV	Konsultasi bab II & III	Nesya	Nadroh
5	09/03-2020	V	Acc Proposal	Nesya	Nadroh
6	01/03-2020	VI	Revisian Proposal	Nesya	Nadroh
7	22/04-2020	VII	Pembahasan bab IV	Nesya	Nadroh
8	30/04-2020	VIII	Konsultasi bab IV	Nesya	Nadroh
9	04/05-2020	IX	Konsultasi bab IV & V	Nesya	Nadroh
10	26/05-2020	X	Acc bab IV & bab V	Nesya	Nadroh
11	17/06-2020	XI	Revisi akhir	Nesya	Nadroh
12	24/06-2020	XII	Acc KTI	Nesya	Nadroh

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PERSETUJUAN KEPK TENTANG
PELAKSANAAN PENELITIAN BIDANG KESEHATAN
Nomor: 01.162/KEPK/POLTEKKES KEMENKES MEDAN 2020

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 Uji Efek Antibakteri Ekstrak Daun Pegagan (*Centella asiatica* (L.) Urb)
Terhadap Pertumbuhan Bakteri *Staphylococcus aureus* dan
Escherichia coli”**

Yang menggunakan manusia dan hewan sebagai subjek penelitian dengan ketua Pelaksana/
Peneliti Utama : **Nesya Nurul Awaliah**
Dari Institusi : **Jurusan D-III Farmasi Politeknik Kesehatan 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, Juni 2020
Komisi Etik Penelitian Kesehatan
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