

# Toxicity and Compound Identification of *Padinaustralis* Extract

Tri Saptari Haryani, Bina Lohitasari, Triastinurmiatiningsih

**Abstract:** People awareness of the importance of health has increased significantly in the last decade, it forces people to find alternative treatments which are cheaper and safer when compared with the use of synthetic drugs. Research on antibacterial activity of *Padina australis* against *Escherichia coli* have been conducted, but it does not identified yet which active compounds in the *Padina australis* extract that has potential as an antibacterial. Identification phytol compounds from the extracts of *Padina australis* and toxicity tests have been conducted using BSLT and GCMS methods. The results of this research identify that *Padina australis* extract with ethanol has antibacterial activity value of  $LC_{50}$  177.83 ppm. Phytochemical test results show that active ingredient of *Padina australis* extract is terpenoid compounds, and that triterpenoids has potential as an antibacterial. GC-MS test result shows that active compound of *Padina australis* extract consists of phytol compound which has 90-99% similarity with steroids, phenols, fatty acids, carboxylic acids, hydrocarbons, and proteins. Compound identification test of active *Padina australis* extracts through GC-MS methods show that phytol compounds are useful as antibacterial and the toxicity test results show that phytol compounds are not cytotoxic.

**Index Terms:** Antibacterial, Extract *Padina Australis*,  $LC_{50}$ .

## I. INTRODUCTION

People awareness of the importance of health has increased significantly in the last decade [1]. It forces the public to find an alternative treatment that is economically cheaper and safer when compared with the use of synthetic drugs. Many people change their lifestyle by going back to nature and use medicines from natural ingredients. As an island country with coastline length of 81,000 km, Indonesia is an enormous source of many natural resources. In spite of that, land-based plant's properties still tend to be explored more than water-based or sea-based plant's, including seaweed's. According to Rasyid (2004), several species of seaweed in Indonesia can be used as a medicine, but it is currently experiencing problems because the research is not developed yet [2]. Therefore, the use of seaweed as medicine is still limited. The research conducted by [3] showed that *Padinaustralis*, has antibacterial activity against *Escherichia coli*, but which bioactive compounds from the extracts of *Padinaustralis* that has potential as an antibacterial has not been tested.

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*Padinaustralis* is a seaweed that comes from the class of Phaeophyceae (brown seaweed). *Padinaustralis* can be found on rocky and choppy coasts. This seaweed contains fucoxanthin (brown), violaxanthin, chlorophyll a, chlorophyll c,  $\beta$ -carotene, and xanthophyll pigments. In pharmaceutical industry, algin or alginic acid from *Padinaustralis* is used to make pills, ointments, toothpaste, lotions, and creams [4]. Fucoxanthin is part of carotenoid with formula C<sub>42</sub>H<sub>58</sub>O<sub>6</sub>. This pigment is found in some types of brown algae, including *Padinaustralis*. Based on [5], fucoxanthin has the ability as an anti-carcinogenic, antibacterial, anti-inflammatory, protecting cells against harmful ingredients such as H<sub>2</sub>O<sub>2</sub>, and free-radical scavengers or antioxidants. As a health food supplement, fucoxanthin has been shown to have no toxic properties [6]. Testing the activity and toxicity of plant extracts can be done using Brine Shrimp Lethality Test (BSLT), the method used to isolate the bioactive compounds of plant extracts. BSLT method is often utilized in a preliminary test for screening or to screen pharmacological activity of medicinal plants to support the use of medicinal plants in traditional and modern treatment. It is also utilized to detect toxic effects of fungi, the toxicity of the plant extract, heavy metals, pesticides and cytotoxicity [7]-[8]. Meanwhile, to identify active compounds in a material, GC-MS method (Gas Chromatography Mass Spectrophotometry) is utilized. It is a method used to identify a compound contained in the gas mixture and also to determine the concentration of a substance in gas phase.

## II. MATERIALS AND METHODS

Identification of the active compound and *Padinaustralis* toxicity extract tests were conducted in Bogor Agriculture Institute's Laboratory of Microbiology and University of Pakuan's Laboratory of Pharmacy, both located in Bogor. Materials that were used for this research are *Padinaustralis* seaweed from Coastal Waters of Bayah, Banten, distilled water, ethanol 96%, materials for phytochemical test, and substances for GC-MS and BSLT tests. Tools used in this research are a set of GCMS (Gas Chromatography Mass Spectrophotometry) tools to identify active compounds inside *Padinaustralis* extract, a set of BSLT (Brine Shrimp Lethality test) method toxicity test tools, and glass tools and other tools commonly used in microbiology laboratory and pharmacy.

### A. Moisture and Ash Content Establishment

Moisture establishment was done by using a moisture balance tool. One gram of *simplicia* was set in the



## IV. DISCUSSION

### A. Moisture Concentration and Ash Content of *Padina australis*

The obtained moisture concentration of *Padina australis* at the temperature of 105°C is 6.68%. This is almost equal to the value in the research conducted by [16], which is 6.4% extraction of *Padina australis* is conducted by maceration method using ethanol 96%.

The amount of dry *Padina australis* extract in ethanol 96% obtained through that method is 26.72 grams. The amount obtained is used to calculate the amount of yield extract. The obtained amount of yield extract of dry *Padina australis* extract in ethanol 96% is 10.68%. This indicates that *Padina australis* contains bioactive components which tend to dissolve in polar solvents. The process of extracting some herbal plants using different solvents conducted by [17] produced the highest yield in polar solvents. The magnitude of the yield extract shows that a large number of active components are being extracted by the compound during the maceration process. This is similar to the report of [18] that the high yield value indicates the number of bioactive components.

### B. Phytochemical Test

These results are consistent with the research of [19]-[20] who argued that the phytochemical compounds detected in *Padina australis* extract—alkaloids, phenols, steroids, triterpenoids, tannins and saponins— are effective as an antibacterial and antifungal.

### C. Active Compound Test Using GC-MS Method

Active compound test of *Padina australis* extract in 96% ethanol by using GC-MS method produces 17 compounds. The test result of positive activity against dry extract *Padina australis* in ethanol 96% is the activity as an antibacterial namely class terpenoids, alkaloids, and steroids. Terpenoids compounds that have antibacterial activity are monoterpenoid, linalool, diterpenoid, phytol, triterpenoids, and saponins [21]-[23]. Based on the previous phytochemical test results, the possible compounds contained in the sample are terpenoids, phenolics, saponins, alkaloids, and tannins. The GC-MS test indicates that the sample containing 96% ethanol has a good concentration of terpenoids, saponins, alkaloids, phenolics, steroids and fatty acids, from all of the possible compounds found in the sample.

### D. Analysis of Toxicity Extract Using BSLT

This research shows that LC<sub>50</sub> value of *Padina australis* extract samples with 96% ethanol is 177.83 ug/ml. [24], explained that chemical compound is potentially bioactive if it has LC<sub>50</sub> values less than 1000 pg/ml, and has potential as an antibacterial when it is less than 200 ug/ml. Therefore, *Padina australis* extract in 96% ethanol can be said to have potential as an antibacterial.

## V. CONCLUSION

The phytochemical test of dry *Padina australis* extract in 96% ethanol shows strong positive results in triterpenoid, and shows that *Padinaaustralis* is effective as an antibacterial.

The Active compound test of *Padina australis* extract in 96% ethanol by using GC-MS method produces 17 compounds and compounds suspected phytol potential as antibacterial.

LC<sub>50</sub> value obtained through toxicity test of *Padina australis* extract samples in 96% ethanol by utilizing BSLT method is 177.83 gr/ml. Therefore, *Padina australis* extract in 96% ethanol can be said to have potential bioactivity as an antibacterial.

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