ARTIKEL PENELITIAN

AKTIVITAS ANTIJAMUR INFUSA DAUN SIRSAK TERHADAP CANDIDA ALBICANS

ANTIFUNGAL ACTIVITY OF SOURSOP LEAF INFUSION AGAINST CANDIDA ALBICANS

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ABSTRACT

Introduction: Candidiasis is a disease caused by Candida sp, mainly Candida albicans. Antifungals used to treat candidiasis have side effects, such as disruption in liver and kidney functions, also produce resistency. Annona muricata, known as soursop, have been used as folk medicine as antimicrobe and anticancer. In Indonesia, traditional remedies are often processed by boiling, such as infusion and decoction.

Objectives: To detect antifungal activity of soursop leaf infusion (SLI) against C. albicans in vitro.

Methods: This was a laboratory experimental study. The SLI was prepared in various concentrations: 20% w/v, 40% w/v, 60% w/v, 80% w/v, and 100% w/v. Antifungal activity of SLI was assessed by macrodilution methods and continued with colony counting. Ketoconazole 0.5 mg/ml was used as positive control. Negative control was fungal suspension in Sabouroud dextrose broth. Statistical analysis was performed using Kruskal-Wallis test and post hoc Mann-Whitney from SPSS 17.

Results: Total colony counting from SLI 20% w/v, 40% w/v, 60% w/v, 80% w/v, and 100% w/v were 206 (185-262), 162 (161-176), 14 (9-25), 8 (6-12), 3 (0-3), consecutively. Whereas, total colony counting from negative control was 451 (371-561), and no colonies was found in positive control. Antifungal activity of SLI 100% w/v has no significantly difference with positive control (p=0.114).

Conclusion: The SLI has antifungal activity against C. albicans in vitro.

Key Words: soursop, Annona, infusion, C. albicans, antifungal

ABSTRAK


Tujuan: Mendeteksi aktivitas antijamur infusa daun sirsak (IDS) terhadap C. albicans secara in vitro.
INTRODUCTION

Candidiasis is disease caused by infection of Candida sp, mainly by Candida albicans. This disease is often suffered by infant, elderly, pregnant women, oral contraception user, diabetic patient, and other immunocompromised conditions. The symptoms depend on body part that were affected, both superficial or systemic infection. Antifungal therapies have undergone a tremendous transformation in recent years. There are several antifungal agents, such as polyenes, allylamines, imidazoles, triazoles, antimetabolites, and the newest one echinocandins. All of antifungal agents have systemic preparation (oral or intravenous), but only allylamines, imidazoles, and polyenes which have topical preparations. However, these drugs can cause side effect, such as fever, nausea, vomiting, diarrhea, hepatotoxic, nephrotoxic, visual and skin disturbance. Candida resistance to these drugs has been reported, such as resistance to fluconazole, echinocandin, and flucytosine. Only minimal resistance to amphotericin B has also developed, however the main problem associated with the use of this drug is its well-known side effect and toxicity.

Leaf of soursop has already been used as folk medicine in Indonesia since long time ago to treat many condition, such as infection, cancer, common cold, and asthma. People usually take traditional remedies after boiling it. Types of boiling method are infusion and decoction. However, there is still no experimental research to detect antifungal activity from soursop leaf infusion (SLI). This study was done to detect antifungal activity of SLI against C. albicans.

METHODS

Research Design

This study was experimental research in vitro that was done at microbiology, parasitology, and biochemistry laboratories, Atma Jaya Catholic University of Indonesia, Jakarta.
**Soursop leaf infusion**

Soursop leaves was obtained from Bogor Botanical Institute. The infusion was made based on Nurani’s method. Drying was done with oven at 40-50 °C in 3 days. Dried soursop leaves was blended. A 10% w/v SLI was made with aquadest as solvent, then be heated 90 °C in waterbath for 15 minutes with stirring occasionally. Then, this mixture was filtered by flannel cloth and concentrated with rotavapor until the volume was 50 mL (200% w/v) as stock solution.\textsuperscript{11,12}

**Macrodilution method**

*C. albicans* was obtained from fungal collection of Parasitology Department, Atma Jaya Catholic University of Indonesia, Jakarta. *C. albicans* was cultured and incubated for 24 hours in 37 °C. Fungal suspension was made by adding 24 hours *C. albicans* in normal saline until the density was in accordance with the 0.5 McFarland standard turbidity, then diluted 1:2000 with Sabouroud dextrose broth (SDB).\textsuperscript{13}

There were 5 groups of SLI: 20% w/v, 40% w/v, 60% w/v, 80% w/v, and 100% w/v, by means of diluting stock solution with SDB. Positive control was fungal suspension added with ketoconazole 0.5 mg/mL. Negative control was fungal suspension in SDB. All groups were incubated in 37 °C for 24 hours. Total colony was counted by culturing at Sabouroud dextrose agar (SDA). This study was done in triplicate.

**Data Analysis**

Statistical analysis was done by Kruskal-Wallis test with Post hoc Mann-Whitney with SPSS 17.

**RESULTS**

The result of this study showed that SLI have antifungal activity against *C. albicans*. The colony of *C. albicans* in all groups were shown in figure 1. Statistical analysis with Kruskal-Wallis test
showed that there was significantly difference among groups (p=0.003). By Post Hoc Mann Whitney test, there was shown that total colony of SLI 100% w/v had no significantly difference with positive control (p=0.114). Results of statistical analysis were shown in table 1.

### DISCUSSION

Soursop leaves are often used as folk medicine in many countries, especially in tropical countries to treat cancer, gastroenteritis, fever, inflammation, and as larvisidal. Many techniques can be done to get the benefit of soursop plant, such as decoction, maseration, or infusion.\(^{14-16}\) By screening method of phytochemistry and thin layer chromatography, it was showed that SLI contains flavonoids, polyphenols, and alkaloids, that predicted as antifungal.\(^{11}\) Flavonoids and polyphenol are phenolic substances, commonly used as antiseptic and disinfectant by means of protein denaturation and coagulation. In low concentration of phenolic, it can be formed weak protein-phenolic complex, that will degrade sooner, followed by phenolic penetration that cause protein presipitation and denaturation. Concentration of these compounds are higher in leaves than other part of soursop plant.\(^{16}\) This study showed that SLI in all tested concentration has antifungal activity against *C. albicans*. Higher concentration has higher antifungal activity, vice versa.

Many studies have been done to investigate antibacterial properties of soursop leaves, but few studies about its potency as antifungal, especially in medical mycology area. In the study of Massilia et al., higher concentration of soursop extracts have higher antibacterial effect to *Listeria sp.*, *Salmonella sp.*, and *Staphylococcus sp.*\(^{14}\) The 85% w/v of SLI has antibacterial to *Staphylococcus aureus*.\(^{11}\) The methanol extract of *A. muricata* has antifungal activity to *Colletotrichum capsici*, fungal patogen of pepper.\(^{17}\)

More repetitions were suggested to be done in the next study, because many statistical results in this study were in borderline. For example, statistical analysis between negative control and SLI 20% w/v was 0.05, it was difficult to conclude

### Tabel 1. Statistical analysis of total colonies among groups

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Median (minimum-maximum)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive control (K+)</td>
<td>3</td>
<td>0</td>
<td>0.003</td>
</tr>
<tr>
<td>Negative control (K-)</td>
<td>3</td>
<td>451 (371-561)</td>
<td></td>
</tr>
<tr>
<td>SLI 20% w/v (A)</td>
<td>3</td>
<td>206 (185-262)</td>
<td></td>
</tr>
<tr>
<td>SLI 40% w/v (B)</td>
<td>3</td>
<td>162 (161-176)</td>
<td></td>
</tr>
<tr>
<td>SLI 60% w/v (C)</td>
<td>3</td>
<td>14 (9-25)</td>
<td></td>
</tr>
<tr>
<td>SLI 80% w/v (D)</td>
<td>3</td>
<td>8 (6-12)</td>
<td></td>
</tr>
<tr>
<td>SLI 100% w/v (E)</td>
<td>3</td>
<td>3 (0-3)</td>
<td></td>
</tr>
</tbody>
</table>

Post Hoc Mann Whitney Test: K+ vs K- p= 0.037, K+ vs A p= 0.037, K+ vs B p= 0.037, K+ vs C p= 0.037, K+ vs D p= 0.037, K+ vs E p= 0.114, K- vs A p= 0.050, K- vs B p= 0.050, K- vs C p= 0.050, K- vs D p= 0.050, K- vs E p= 0.046, A vs B p= 0.050, A vs C p= 0.050, A vs D p= 0.050, A vs E p= 0.046, B vs C p= 0.050, B vs D p= 0.050, B vs E p= 0.046, C vs D p= 0.127, C vs E p= 0.046, D vs E p= 0.046.
Aktivitas antijamur infusa daun sirsak terhadap Candida albicans

the significance. It is possible that more data will make antifungal activity of SLI 20% w/v significant. The other suggestion for next study is in vivo study and detection of possible side effect, because the antifungal activity of SLI 100% w/v was as same as ketoconazole 0.5 mg/mL, statistically. The SLI has potency to be new antifungal.

CONCLUSION

The SLI has antifungal activity against C. albicans in vitro, especially the SLI 100% w/v that has antifungal activity as same as ketoconazole 0.5 mg/mL

DAFTAR PUSTAKA


Fakultas Farmasi Universitas Ahmad Dahlan. 2006


