In-vitro Antibacterial Activity and Phytochemical Analysis of Melaleuca cajuputi Flower Extracts

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Abstract

The spread of drug-resistant pathogens worldwide has spurred experts' interest in drug discovery. Medicinal plants are an essential source of antimicrobial agents to cure various human ailments. Even though several plants have been examined for antimicrobial compounds, the search for better and safer drugs to combat microbial resistance continues. The leaves and essential oils of Melaleuca cajuputi have been the subject of many investigations on the plant's bioactivity. Even though flowers from various plants are medicinally useful, there have been few studies on the antibacterial properties of M. cajuputi flower extracts. This study aimed to determine the antibacterial activity of M. cajuputi flower extracts against some pathogenic bacteria and phytochemical screening of the most potent extract.

M. cajuputi flower aqueous and ethanolic extracts were obtained by cold maceration, then reconstituted in 10% DMSO. The antibacterial study was carried out using broth microdilution assay to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). Phytochemical screening of the most potent extract was performed using UV-Visible spectrophotometry (UV-VIS) and Fourier Transform Infrared (FTIR) spectroscopy.

The percentage yields of the flower extracts in aqueous and ethanol were 11.02% and 8.8%, respectively. Both extracts were found to have bactericidal activity against Staphylococcus aureus, Streptococcus agalactiae, Escherichia coli, and Klebsiella pneumoniae (MBC/MIC ratio of less than 4). Ethanol extract demonstrated the lowest MIC and MBC values (Table 1) against all the tested bacterial species except for the E. coli with MIC >4 mg/mL. The UV-Visible spectrum of ethanol extract showed peaks at 368, 412, 535, 606, and 665 nm and respective absorbances of 2.510, 2.902, 0.429, 0.324, and 1.095 Au, which indicated the presence of flavonoids, alkaloids, and phenolic compounds [1]. The FTIR spectra detected the presence of alcohols, hydrocarbons, conjugated aldehyde, phenol, sulfoxide, nitro, and halo compounds in M. cajuputi flower ethanolic extract.
Table 1: MIC and MBC values of *M. cajuputi* flower extracts against the bacterial isolates

<table>
<thead>
<tr>
<th>Species</th>
<th>Aqueous extract</th>
<th>Ethanol extract</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Concentration (mg/mL)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MIC</td>
<td>MBC</td>
</tr>
<tr>
<td><em>S. aureus</em> ATCC</td>
<td>0.50</td>
<td>1</td>
</tr>
<tr>
<td><em>S. agalactiae</em> ATCC</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><em>E. coli</em> ATCC</td>
<td>ND</td>
<td>&gt;4</td>
</tr>
<tr>
<td><em>K. pneumoniae</em> ATCC</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

In conclusion, the flower extracts of *M. cajuputi* have antibacterial properties, and their potential biological activities should be further investigated in future studies.

**Keywords**

Antibacterial activity, *Melaleuca cajuputi* flower extracts, Phytochemicals

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**Reference**