Introduction

- Coronavirus disease 2019 (COVID-19) is a respiratory infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which first spread in Wuhan, China.
- Globally, the total confirmed cases of COVID-19 (09/29/20) were 33,206,004 cases which are 999,239 people death from 211 countries, including Indonesia.
- No currently FDA-approved drug or vaccine for COVID-19 but 194 candidate vaccines are still in the clinical and preclinical trial stages.
- Natural products, especially derive from medicinal plants, are a good starting point for drug discoveries.

Aim

This research aimed to evaluate the activity of phyllanthin and hypophyllanthin, isolated from Phyllanthus niruri, in inhibiting spike glycoprotein (6W41) and main protease (5RTY) which play as target receptors of COVID-19.

Materials and Methods

Receptors (6W41 and 5RTY)

Docking analysis

Drug-like evaluation

Docking analysis performed using Biovia Virtual Docking 6.0

The toxicity properties prediction analyzed using protCVM server

Result

Drug-like evaluation of phyllanthin and hypophyllanthin

Table 1: Drug-like evaluation and the toxicity properties prediction

<table>
<thead>
<tr>
<th>Compounds</th>
<th>Drug-like activity</th>
<th>Toxicity properties</th>
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<tbody>
<tr>
<td></td>
<td>MW (Da)</td>
<td>LogP</td>
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<tr>
<td>Lipininp</td>
<td>≤ 500</td>
<td>≤ 5</td>
</tr>
<tr>
<td>Phyllanthin</td>
<td>418.24</td>
<td>2.488</td>
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<tr>
<td>Hypophyllanthin</td>
<td>430.20</td>
<td>2.078</td>
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Discussion

Phyllanthin and hypophyllanthin demonstrated to possess greater binding affinity than the lower rerank score toward the COVID-19 in inhibition sites than their native ligand (Table 2). Phyllanthin predicted has the higher biological activity as the viral entry inhibitor (6W41) whereas hypophyllanthin predicted has the higher biological activity as the viral translation and replication inhibitor (5RTY) (Fig. 2–3). The both ligands represent a good feasibility of oral bioavailability due to satisfy the Lipinski’s rule and also predicted to safe because have no toxic effect through AMES toxicity and hepatotoxicity model (Table 1).

Conclusion

Our study conclude that phyllanthin and hypophyllanthin predicted to have strong antiviral activity by inhibiting the entry step (6W41) and the life-cycle (5RTY) of COVID-19 based on in silico study. These results suggest that P. niruri forecast to be a potential candidate as an antiviral agent for COVID-19. Further research is needed to support the development of P. niruri as inhibitor agents of COVID-19 through bioassay studies.

References