Association Between ACE Gene Polymorphism and Functional Outcome of Ischemic Stroke


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Introduction

Insertion/deletion polymorphism in ACE gene (ACE I/D) is known to be associated with the occurrence of ischemic stroke through its effect on pathogenesis of atherosclerosis and hypertension. This study was aimed to examine the association between this polymorphism with functional outcome of ischemic stroke.

Methods

This was a cross sectional study. The subjects were patients with ischemic stroke in a reference hospital in Yogyakarta, Indonesia. Data on demographic characteristics, stroke risk factors, comorbidities, and stroke severity were assessed on admission. The functional outcome (Barthel Index/BI) was assessed when the patients were discharged from the hospital. ACE I/D genotype were identified by PCR.

Results

In total 61 patients were included. Of these, 38 patients (62.3%) had II polymorphism, 22 patients (36.1%) had ID polymorphism, and 1 patient (1.6%) had DD polymorphism in the ACE gene.

![PCR and sequencing of ACE gene. a. Gel electrophoresis of PCR products. b. Sequencing result of D allele. c. Sequencing results with 287 bp of intron 16 insertion (allele I). Mk: Marker, W: water.](image)

**Figure 2.** Comparison of Barthel index at discharge between patients with and without D allele.

There were significant differences in the functional outcomes between patients without D allele (II polymorphisms) and patients with D allele (ID and DD polymorphism) (mean BI on discharge: 75 ± 23.57 and 60.68 ± 27.15 respectively; p=0.034).

**Table 1.** Multivariate analysis of factors affecting Barthel Index at discharge

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>18.363</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Non-lacunar ischemic stroke</td>
<td>-0.275</td>
<td>0.010</td>
</tr>
<tr>
<td>Antihypertensive medication</td>
<td>0.235</td>
<td>0.027</td>
</tr>
<tr>
<td>(diuretic) before stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia complication</td>
<td>-0.254</td>
<td>0.019</td>
</tr>
<tr>
<td>NIHSS on admission</td>
<td>-0.413</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ACE polymorphism (D and DD allele)</td>
<td>-0.232</td>
<td>0.024</td>
</tr>
</tbody>
</table>

Multiple linear regression model showed that availability of D allele is an independent variable negatively associated with functional outcome as assessed by BI (β=-0.232, p=0.024).

Conclusions

This study showed that the D allele in ACE I/D polymorphism is associated with worse functional outcomes. This highlights the possibility of further research to improve functional outcomes of ischemic stroke by inhibiting the ACE system, especially in patients with D allele in the ACE gene.

References