INTISARI

Latar Belakang. *Aedes aegypti* merupakan vektor utama dalam penyebaran penyakit Demam Berdarah Dengue (DBD). Indonesia merupakan daerah hiperendemis dengan penyebaran kasus baik di wilayah perkotaan sampai pedesaan. Tahun 2016 Kecamatan Palu Barat menduduki peringkat pertama daerah rawan DBD dan 2 orang meninggal. Penelitian dilakukan di 2 desa di Kecamatan Palu Barat, Balaroa dan Siranindi. Balaroa dikategorikan sebagai daerah endemik dengue tinggi sementara Siranindi adalah daerah endemik dengue rendah. Telah dilaporkan bahwa nyamuk Ae. aegypti di Kota Palu telah resisten terhadap malation dan insektisida sipermetrin, tetapi mekanisme resistensi tidak diketahui dengan baik.

Tujuan Penelitian. Penelitian ini bertujuan untuk menentukan status resistensi nyamuk *Ae. aegypti* ke malation dan sipermetrin, untuk menentukan aktivitas esterase nonspesifik *Ae. aegypti* ke organophosphate dan untuk menentukan mutasi *voltage gated sodium channel* (VGSC) dikaitkan dengan resistensi piretroid di daerah endemis dengue tinggi dan rendah.

Metode Penelitian. *Aedes aegypti* yang dikumpulkan dari setiap desa direaring sampai dewasa dan uji kepekaan terhadap malation dan sipermettrin menggunakan metode CDC botol *bioassay*. Aktivitas esterase nonspesifik menggunakan uji biokimia. Primer PCR AaSCF1 dan AaSCR4 digunakan untuk skrining mutasi gen IIS6 VGSC. Primer PCR AaSCF7 dan AaSCR7 digunakan untuk skrining gen IIIS6 VGSC. Identifikasi lokasi mutasi disekuensing dan di *align* dengan *GenBank* (akses No. AB914689 dan AB914690) untuk mutasi gen IIS6 VGSC dan di align dengan *GenBank* (akses No. AB914687 dan AB914688) untuk mutasi gen IIIS6 VGSC menggunakan Mega versi 7.0.18 dan Bio Edit versi 7.2.6.

Hasil Penelitian. Status kerentanan *Ae. aegypti* terhadap malation toleran pada daerah endemis dengue tinggi dan rendah, terhadap sipermetrin resisten pada daerah endemis dengue tinggi dan toleran pada daerah endemis dengue rendah. Aktivitas esterase nonspesifik lebih tinggi di daerah endemis dengue tinggi daripada endemis dengue rendah, nilai absorbansi rata-rata masing-masing 0,639 dan 0,591. Ditemukan titik mutasi ganda pada S989P dan V1016G, mutasi homozigot *Ae. aegypti* dari daerah endemis dengue tinggi dan rendah, ada mutasi titik tunggal hanya di daerah endemik dengue yang tinggi *target site* V1016G dan ada mutasi heterozigot hanya di daerah endemik dengue yang tinggi *target site* S989P.

Kesimpulan. Nyamuk *Ae. aegypti* dari daerah endemis tinggi dan rendah resisten sedang terhadap malation. Nyamuk *Ae. aegypti* dari daerah endemis tinggi dan rendah resisten dan resisten sedang terhadap sipermetrin. Aktivitas enzim esterse non spesifik meningkat. Nyamuk *Ae. aegypti* dari daerah endemis tinggi dan endemis rendah terdapat mutasi pada target site S989P dan V1016G.

Kata kunci *: Aedes aegypti*, organofosfat, piretroid, enzim esterase, mutasi gen VGSC.

ABSTRACT

Background. *Aedes aegypti* is a major vector in the spread of Dengue Hemorrhagic Fever (DHF). Indonesia is a hyperendemic area with the spread of cases in both urban and rural areas. In 2016, Palu Barat District was ranked first in dengue-prone areas and two people died. The study was conducted in 2 villages in Palu Barat District, Balaroa and Siranindi. Balaroa is categorized as high dengue endemic area while Siranindi is low dengue endemic area. It has been reported that *Ae. aegypti* mosquitoes in Palu City has been resistant to malathion and cypermethrin insecticide, but the resistance mechanism are not well known.
Objectives. This study aimed to determine the susceptible status of *Ae. aegy*pti to malathion and cypermethrin, to determine nonspecific esterase activity of *Ae. aegypti* to organophosphate and to determine the mutation of voltage-gated sodium channel (VGSC) was associated with pyrethroid resistance in high and low dengue endemic areas.
Methods. *Aedes aegypti* collected from each village was reared to adult and assayed for susceptibility test to malathion and cypermethrin using the CDC bottle bioassay method. The nonspecific esterase activity using biochemical assay. PCR primers of AaSCF1 and AaSCR4 were used for screening of IIS6 VGSC gene mutation. PCR primers of AaSCF7 and AaSCR7 were used for screening of IIIS6 VGSC gene mutation. The identification of mutation sites were sequenced and aligned to GenBank (accession Number: AB914689 and AB914690) for IIS6 VGSC gene mutation and aligned to GenBank (accession Number AB914687 and AB914688) for IIIS6 VGSC gene mutation using Mega version 7.0.18 and Bio Edit version 7.2.6.
Results. The susceptibility status of *Ae. aegypti* to malation were moderately resistant in high and low dengue endemic areas, to cypermethrin were resistant in high dengue endemic area and moderately resistant in low dengue endemic area. The nonspecific esterase activity increased in high and low dengue endemic areas, The average absorbance value (AV) were 0.639 and 0.591 respectively. It was found double point mutation at S989P and V1016G, homozygous mutant in *Ae. aegypti* from high and low dengue endemic areas, there was a single point mutation only in hight dengue endemic area at target site V1016G and there was a heterozygous mutant only in hight dengue endemic area at target site S989P.
Conclusion. *Aedes aegypti* from high and low dengue endemic areas were resistant to malathion and cyperpethrinn, the nonspecific esterase activity increased to organophosphate and the two alleles (V1016G and S989P) have a major role in the occurrence of cypermethrin resistance.

Keywords: *Aedes aegypti*, organophosphate, pyrethroid, esterase enzyme, VGSC gene mutation.