



INTISARI

Latar Belakang: Demam berdarah dengue (DBD) merupakan penyakit yang disebabkan virus dengue dengan vektor utama *Aedes aegypti*. Saat ini, pengendalian populasi *Aedes aegypti* dewasa utamanya menggunakan insektisida piretroid. Piretroid bekerja dengan mengikat *voltage-gated sodium channel* (VGSC). Penggunaan senyawa ini secara berlebihan dapat mendorong munculnya resistensi piretroid melalui mutasi pada gen VGSC yang dikenal sebagai *knock-down resistance* (*kdr*). Di wilayah Asia Tenggara termasuk Indonesia, berbagai mutasi *kdr* telah dilaporkan. Salah satu mutasi yang kerap dilaporkan melibatkan transversi valin menjadi glisin di domain II (V1016G). Hingga saat ini, penilaian mutasi V1016G melibatkan pemeliharaan nyamuk, isolasi DNA, dan PCR. Untuk menyingkat alur kerja tersebut, penelitian ini mengevaluasi penggunaan metode *direct* PCR dari sampel nyamuk kering yang ditekan pada kertas saring *genomic*

Tujuan: Untuk mengetahui status mutasi V1016G pada *Aedes aegypti* dewasa dengan metode *direct* PCR, termasuk angka keberhasilan metode, frekuensi alel resisten (G) dan alel sensitif (V), serta frekuensi genotipe (V/V, V/G, dan G/G).

Metode: Penelitian ini menggunakan desain deskriptif analitik. Sampel berupa 54 ekor nyamuk *Aedes aegypti* dewasa yang berasal dari Pogung, Sleman. Secara singkat, nyamuk ditekan pada kertas saring *genomic* dan dikeringkan. Selanjutnya, sediaan nyamuk kering tersebut diperiksa dengan metode *direct* PCR menggunakan pendekatan *allele-specific*. Data yang diperoleh digunakan untuk menghitung frekuensi alel dan distribusi genotipe.

Hasil: Dari 54 sampel yang dianalisis, 50 sampel (92,59%) berhasil diamplifikasi. Hasil analisis menunjukkan frekuensi alel resisten (G) sebesar 88% dan alel sensitif (V) sebesar 12%. Distribusi genotipe didominasi oleh homozigot resisten (G/G) sebesar 84%, sedangkan genotipe V/V dan V/G masing-masing sebesar 8%.

Kesimpulan: Metode *direct* PCR efektif digunakan untuk mendeteksi mutasi V1016G pada *Aedes aegypti* dewasa dengan angka keberhasilan 92,59%. Dominasi alel resisten G (88%) dan genotipe homozigot resisten G/G (84%) menunjukkan adanya indikasi potensi resistensi terhadap insektisida piretroid.

Kata kunci: *Aedes aegypti*, *genomic filter paper*, *direct* PCR, AS-PCR, V1016G



ABSTRACT

Background: Dengue hemorrhagic fever (DHF) is a disease caused by the dengue virus, with *Aedes aegypti* as its primary vector. Currently, the control of adult *Aedes aegypti* populations mainly relies on pyrethroid insecticides. Pyrethroids act by binding to the voltage-gated sodium channel (VGSC). Excessive use of these compounds can promote the emergence of pyrethroid resistance through mutations in the VGSC gene, known as knock-down resistance (kdr). In Southeast Asia, including Indonesia, various kdr mutations have been reported. One frequently reported mutation involves a transversion of valine to glycine in domain II (V1016G). To date, assessment of the V1016G mutation involves mosquito rearing, DNA isolation, and PCR. To shorten this workflow, this study evaluated the use of the direct PCR method from dried mosquito samples pressed onto genomic filter paper.

Objective: To determine the status of the V1016G mutation in adult *Aedes aegypti* using the direct PCR, including the method success rate, frequencies of the resistant (G) and sensitive (V) alleles, and genotype frequencies (V/V, V/G, and G/G).

Methods: This study used a descriptive-analytic design. The samples consisted of 54 adult *Aedes aegypti* collected from Pogung, Sleman. Briefly, mosquitoes were pressed onto genomic filter paper and dried. The dried mosquito preparations were then examined using the direct PCR method with an allele-specific approach. The obtained data were used to calculate allele frequencies and genotype distributions.

Results: Of the 54 samples analyzed, 50 samples (92,59%) were successfully amplified. The analysis showed a resistant allele (G) frequency of 88% and a sensitive allele (V) frequency of 12%. The genotype distribution was dominated by the homozygous resistant genotype (G/G) at 84%, while the V/V and V/G genotypes each accounted for 8%.

Conclusion: The direct PCR method is effective for detecting the V1016G mutation in adult *Aedes aegypti*, with a success rate of 92.59%. The dominance of the resistant G allele (88%) and the resistant homozygous G/G genotype (84%) indicates a potential for resistance to pyrethroid insecticides.

Keywords: *Aedes aegypti*, genomic filter paper, direct PCR, AS-PCR, V1016G