Perubahan Morfologi dan Histopatologi Midgut Larva Aedes aegypti Diinduksi Deltametrin dan Malation = Morphological and Histopathological of Midgut Larvae Aedes aegypti Effects Induced by Deltamethrin and Malathion

Varalisa Rahmawati, author

Abstrak

Pendahuluan: Demam Berdarah Dengue (DBD) merupakan penyakit yang ditularkan melalui vektor dan masih menjadi perhatian di Indonesia. Sampai saat ini, pengendalian vektor menjadi upaya pencegahan utama karena belum adanya vaksin DBD di Indonesia. Akan tetapi, tidak ada penelitian terkait aktivitas insektisida deltametrin dan malation terhadap morfologi dan histologi midgut Ae.aegypti. Objektif: Studi ini bertujuan untuk mengetahui aktivitas larvisidal deltametrin dan malation terhadap morfologi dan histopatologi midgut larva Ae.aegypti. Metode: Desain yang digunakan dalam penelitian ini adalah eksperimental. Sampel penelitian ini berupa larva instar III-IV Ae. aegypti. Aktivitas larvasidal deltametrin dan malation diketahui dengan bioassay sesuai protocol WHO selama 24 jam pada lima konsentrasi berbeda dari tiap insektisida dan lima kali ulangan. Larva yang mati akan diamati dengan mikroskop diseksi untuk mengetahui morfologinya. Selain itu, larva yang mati akan dibuat potongan sediaan patologi anatomi dengan pewarnaan hematoksilin-eosin. Data mortalitas larva selanjutnya akan diolah dengan SPSS untuk menganalisis korelasi konsentrasi dengan mortalitas larva serta menentukan konsentrasi letal insektisida (LC₅₀dan LC₉₉). Hasil: Larva pada kontrol tidak ada yang mati dan tidak ditemukan adanya perubahan morfologi maupun histologi. Persentase mortalitas larva Ae.aegypti setelah paparan deltametrin dan malation selama 24 jam, secara berurutan, 15,2-100% dan 4,8-100%. LC₅₀dan LC₉₉ deltametrin dan malation selama 24 jam, secara berurutan adalah 0,007 ppm (95% Cl=0,006-0,009) dan 0,312 ppm (95% Cl=0,203-0,529); serta 0,053 ppm (95% Cl=0,045-0,062) dan 0,915 ppm (95% Cl=0,652-1,398). Deltametrin menyebabkan terjadinya kerusakan di toraks, abdomen, sifon, dan insang anal, serta terlepasnya setae, dan penipisan kutikula. Sedangkan, malation menyebabkan terjadinya kerusakan di kepala, toraks, abdomen, sifon, insang anal, dan kutikula serta terlepasnya setae. Nekrosis sel epitel gastrointestinal adalah perubahan histopatologis midgut utama yang ditemukan pada larva Ae.aegypti baik setelah paparan deltametrin maupun malation. Kesimpulan: Deltametrin dan malation efektif membunuh larva Ae.aegypti dengan efektivitas deltametrin yang lebih tinggi dibandingkan malation. Aktivitas larvisidal deltametrin dan malation menyebabkan perubahan morfologi dan histopatologi midgut larva melalui mekanisme yang berbeda. Sasaran kerja deltametrin dan malation untuk kerusakan morfologis meliputi kutikula, setae, segmen anal, saluran pencernaan dan pernapasan. Malation juga menyebabkan kerusakan di kepala larva. Sedangkan sasaran kerusakan histopatologisnya pada struktur midgut oleh deltametrin dan malation adalah lapisan epitel gastrointestinalnya, sel epitel, dan mikrovili. <hr /> Introduction: Dengue Hemorrhagic Fever (DHF) is a vector-borne disease that is still a concern in Indonesia. Until now, vector control has become the main prevention effort because there is no dengue vaccine in Indonesia. However, there are no studies that discuss the insecticidal activity of

deltamethrin and malathion on the morphology and histology of Ae.aegypti midgut. Objective: This study aims to determine the larvicidal activity of deltamethrin and malathion on the morphology and histopathology of midgut larvae of Ae.aegypti. Method: The design used in this study is experimental. The sample of this research is larvae instar III-IV Ae. aegypti. The larvicidal activity of deltamethrin and malathion was determined by the bioassay technique according to WHO protocol for 24 hours at five different concentrations of each insecticide and five replications. The dead larvae was observed under a dissecting microscope to find out their morphology. Also, the dead larvae was made into pieces of anatomical pathology with hematoxylin-eosin staining. The larval mortality data was processed with SPSS to analyze the correlation between concentration and larval mortality and to determine the lethal concentration of insecticides (LC₅₀ and LC₉₉). Results: None of the larvae in the control died and no morphological or histological changes were found. The mortality percentage of Ae.aegypti larvae after 24 hours of deltamethrin and malathion exposure was 15.2-100% and 4.8-100%. LC50 and LC99 deltamethrin and malathion for 24 hours, respectively 0.007 ppm (95% Cl = 0.006-0.009) and 0.312 ppm (95% Cl = 0.203-0.529); and 0.053 ppm (95% Cl = 0.045-0.062) and 0.915 ppm (95% Cl = 0.652-1.398). Deltamethrin causes damage to the thorax, abdomen, siphons, and anal gills, as well as detachment of setae, and thinning of the cuticles. Meanwhile, malathion causes damage to the head, thorax, abdomen, siphons, anal gills, and cuticles as well as detachment of the setae. Gastrointestinal epithelial cell necrosis is the main midgut histopathological change found in Ae.aegypti larvae either after exposure to deltamethrin or malathion. Conclusion: Deltamethrin and malathion were effective in killing Ae.aegypti larvae with higher effectiveness of deltamethrin than malathion. The larvicidal activities of deltamethrin and malathion cause morphological and histopathological effects in the midgut larvae through different mechanisms. The targets of action of deltamethrin and malathion for morphological damage include cuticles, setae, anal segment, gastrointestinal and respiratory tract. Malathion also causes damage to the head of the larva. Meanwhile, the targets of histopathological damage to the midgut structure by deltamethrin and malathion are the gastrointestinal epithelial layer, epithelial cells, and microvilli.</p>