Pengaruh 6-Paradol terhadap Kerusakan Ultrastruktur serta Aktivitas Asetilkolinesterase, Glutation-S-Transferase, dan Sitokrom C-Oksidase pada Pediculus humanus capitis: Studi Eksperimental In Vitro = Effects of 6-Paradol on Ultrastructural Damage and Acetylcholinesterase, Glutathione-S-Transferase, and Cytochrome C-Oxidase Activity in Pediculus humanus capitis: In Vitro Experimental Study

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Abstrak

Infestasi Pediculus humanus capitis banyak terjadi di negara berkembang namun masih terabaikan. P. h. capitis telah menjadi resisten terhadap insektisida umum di dunia. Sebagai alternatif, diperlukan senyawa aktif yang berasal dari ekstrak tanaman yang dapat memberantas infestasi P. h. capitis. Penelitian ini bertujuan untuk mengevaluasi toksisitas in vitro 6-paradol terhadap P. h. capitis dan mendeskripsikan mekanisme toksisitas tersebut yang dimediasi oleh pengamatan aktivitas enzim detoksifikasi dan perubahan ultrastruktur P. h. capitis. Stadium dewasa P. h. capitis dipaparkan dengan kertas filter yang ditetesi larutan 6 paradol (0,5; 1,0; 1,5 ppm) dan permethrin (1%). Perubahan ultrastruktur P. h. capitis diperiksa dengan scanned electrone microscope (SEM). Bioassay in vitro dilakukan selama 10, 20, 30, dan 60 menit. Aktivitas asetilkolinesterase (AChE), glutation-S-transferase (GST), sitokrom C-oksidase (COX) dianalisis menggunakan metode CDC (Centers for Disease Control). Berdasarkan hasil penelitian, 6-paradol menyebabkan kerusakan yang serius (bentuk kepala, toraks, abdomen tidak normal, kerusakan spirakel di bagian abdomen, kerusakan lapisan kitin, serta kerusakan rambut sensori). Permethrin tidak menyebabkan perubahan ultrastruktur yang berarti. 6-paradol memperlihatkan toksisitas yang lebih tinggi dibandingkan dengan permethrin. 6-paradol meningkatkan aktivitas AChE, GST dan COX. Permethrin meningkatkan aktivitas AChE, GST, dan COX. 6-Paradol bersifat lebih toksik dan lebih merusak ultrastruktur P. h. capitis dibandingkan permethrin melalui peningkatan aktivitas AChE, GST, dan COX.

.....Pediculus humanus capitis infestation happens a lot in some developing country but still neglected. P. h. capitis has become resistant to common insecticides worldwide. As an alternative, bioactive compound from plant extracts are needed so that it can eradicate P. h. capitis. This study aims to evaluate the in vitro toxicity of 6-paradol against P. h. capitis and to describe the mechanism of the toxicity which mediated by detoxification enzymes activity and changes in the ultrastructure of the headlice. Adult stage of P. h. capitis were exposed to filter paper that has been dripped with 6-paradol (0.5, 1.0, 1.5 ppm) and permethrin (1%). Ultrastructural changes P. h. capitis was examined with scanned electrone microscope (SEM). In vitro bioassays were performed for 10, 20, 30, and 60 minutes. The activities of acetylcholinesterase (AChE), glutathione-S-transferase (GST), and cytochrome C-oxidase (COX) were analyzed using the CDC (Centers for Disease Control) method. As a result, 6-paradol caused serious damage (abnormalities in head, thorax, and abdomen, spiracle damage in the abdomen, chitin layer damage, and sensory hair damage). Permethrin did not cause significant ultrastructural changes. 6-paradol showed higher toxicity than permethrin. 6-paradol increases the activity of AChE, GST, and COX. Permethrin increases AChE, GST, and COX activity. 6-paradol is more toxic and causes more damage in the ultrastructure of P. h. capitis than permethrin by increasing the activity of AChE, GST, and COX.