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Molecular Detection of the *kdr* T917I Mutation in Human Head Lice: Evidence of Increasing Permethrin Resistance in Malaysia

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Resistance to permethrin, a widely used pediculicide, poses a growing challenge in the management of human head lice infestations. This study evaluates changes in the knockdown resistance (kdr) status associated with permethrin by comparing two temporally distinct sampling groups of *Pediculus humanus capitis* collected approximately a decade apart. The first group comprised lice collected between 2013 and 2015 from the Klang Valley, while the second group was sampled from the same region between 2024 and 2025. The Polymerase Chain Reaction–Restriction Fragment Length Polymorphism method was used to detect the T917I point mutation in the α-subunit of the voltage-sensitive sodium channel gene, a known marker of permethrin resistance. To validate the genotyping results, selected specimens representing the susceptible (SS) and heterozygous resistant (RS) genotypes were confirmed by Sanger sequencing. In the earlier sample set, 46 out of 47 lice were homozygous susceptible (SS), and only 1 exhibited the RS genotype. In contrast, the more recent sample set showed a marked shift, with 39 out of 100 lice exhibiting the RS genotype. No homozygous resistant (RR) individuals were detected in either group. The substantial increase in RS genotypes over time suggests a rising trend in permethrin resistance, likely driven by ongoing selection pressure from extensive use of permethrin-based products. These findings highlight the importance of continuous molecular surveillance to monitor evolving resistance patterns and to guide evidence-based interventions for effective head lice control in Malaysia.

Keywords: *kdr* mutation, permethrin resistance, PCR-RFLP, *Pediculus humanus capitis*, Malaysia

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