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Reduced susceptibility to synthetic pyrethroids in malaria vectors, *Anopheles culicifacies* and *Anopheles subpictus* in three districts of Sri Lanka

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The status of pyrethroid insecticide resistance in malaria vectors *Anopheles culicifacies* and *An. subpictus* was monitored in Kurunegala, Moneragala and Batticaloa districts of Sri Lanka from January to October 2010. Adult female mosquitoes (2 – 3 day old) were tested against former and current World Health Organization (WHO) recommended discriminating dosages of pyrethroids: bifenthrin (2%), cyfluthrin (0.15%), λ-cyhalothrin (0.1% former; 0.05% new), deltamethrin (0.025% former; 0.05%; new), etofenprox (0.1% former; 0.5% new) and permethrin (0.25% former; 0.75% new). Resistance studies were carried out using WHO standard bio-assay techniques. Involvement of mono-oxygenases in metabolic resistance was tested by exposing the mosquitoes to the mono-oxygenase inhibitor piperonyl butoxide (PB) prior to bio-assays. All *An. culicifacies* populations were fully susceptible (100% mortality) to bifenthrin, cyfluthrin and new dosages of deltamethrin, permethrin and etofenprox and former dosage of λ-cyhalothrin. All populations showed moderate resistance with former dosages of deltamethrin, permethrin and etofenprox and new dosage of λ-cyhalothrin. New recommended dosages of deltamethrin, permethrin and etofenprox were higher than the former recommended dosages but for λ-cyhalothrin new dosage was lower than the former. Therefore, current dosages may hide deltamethrin, permethrin and etofenprox resistance but may allow identifying λ-cyhalothrin resistance. *An. subpictus* populations from all three districts were fully susceptible to bifenthrin. Kurunegala and Moneragala populations showed resistance to former and new dosages of all other insecticides tested. Batticaloa population was fully susceptible to cyfluthrin, new dosages of deltamethrin and permethrin but showed resistance to former dosages of deltamethrin and permethrin and both new and former dosages of etopfenprox and λ-cyhalothrin. Pre-exposure to PB reduced the resistance in both species from all three districts indicating the active role played by monooxygenase in pyrethroid resistance in *An. culicifacies* and *An. subpictus* populations in all three districts. This study highlights the need for specifying discriminating dosages for local vectors in order to detect species specific resistance levels which can be effectively used for malaria vector control interventions in Sri Lanka.

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