

Resistance Profile of *Anopheles Gambiae* Species Complex Against Common Pyrethroids from North-Eastern Tanzania

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Background:

Mosquitoes belonging to the *Anopheles gambiae* complex are considered to be the main malaria vectors in sub-Saharan Africa. In East Africa, *Anopheline* mosquitoes are developing resistance to all classes of insecticides used in mosquito control. Pyrethroids, in particular, are extensively incorporated in Long-Lasting Insecticide Nets (LLINs) and Insecticide Residue Spray (IRS) because of their relative safety at low dosage, rapid knockdown rate, and killing effects. This raises a solid rationale to investigate the resistance mechanism on a species complex level to generate evidence for a strategic approach to managing resistance within *Anopheles gambiae* species complex and, consequently, malaria control.

Methods: Larvae sampling was conducted from 20 different settlements within the Tanga region, raised into an adult in laboratory conditions, and subjected to WHO procedure for testing susceptibility to insecticides using a diagnostic dose of Permethrin (0.75%) and Deltamethrin (0.05%). Each test included at least four replicates of 15-25 mosquitoes and a control of 20 male mosquitoes. All mosquito samples exposed to insecticides were subjected to sibling species identification using PCR and knockdown resistance (kdr) analysis using TaqMan qPCR assay.

Results: In total, 1053 and 1253 mosquitoes were tested against Permethrin and Deltamethrin, respectively, from 20 settlements. The average Percentage mortality for Permethrin was 56.47% and 52.47% for Deltamethrin. TaqMan assay for kdrEast mutation revealed 78% susceptible strains while 14% were homozygous for kdrE and 8% for Heterozygous kdrE.

Conclusion: Primary malaria vectors from the Tanga region exhibited a high level of both phenotypic and genotypic resistance against common pyrethroids, which are used in LLINs and IRS for mosquito control. Pyrethroids, which are commonly used to control mosquitoes in the country, are not suitable to be used in the Tanga region. Other classes of insecticides such as Organophosphate and Carbamates should be explored.

