ABSTRACT

Malaria is a global health problem resulting in 435,000 deaths annually with 90% of the deaths occurring in sub-Saharan Africa. Over 70% of the Kenyan population is at risk of malaria and western Kenya is an endemic region with prevalence of 38%. The *Anopheles gambiae* complex and *Anopheles funestus* are the main vectors of human malaria in Africa with *Anopheles gambiae sensu stricto* and *Anopheles gambiae arabiensis* being the main vectors in western Kenya. *Anopheles gambiae sensu stricto* and *Anpheles arabiensis* are the predominant species in Bumula and Nyando respectively, while *Anopheles funestus* is the main vector in Ndhiwa, western Kenya. However, there is widespread resistance to the insecticides used in malaria vector control, with reports of vectors population upsurge in western Kenya. Hence there is need to evaluate alternative insecticides for mosquito control. Chlorfenapyr and Clothianidin insecticides are non-repellent, slow acting toxins that have been shown to be effective against other insects in experimental studies. This study evaluated the efficacy of chlorfenapyr and clothianidin insecticides against *Anopheles* malaria vectors of Nyando, Bumula and Ndhiwa areas. Specific objectives were to determine the diagnostic doses of chlorfenapyr and clothianidin on laboratory reared *Anopheles gambiae sensu stricto*, Kisumu strain, and to determine the susceptibility status of *Anopheles* malaria vectors of western Kenya. CDC Bottle bioassay was used to determine diagnostic doses using laboratory reared *Anopheles gambiae*, Kisumu strain, as well as susceptibility of wild mosquitoes, following WHO guidelines. A total of 6000 adult Kisumu strain female mosquitoes were exposed to a series of concentrations of each insecticide (ranging between 0-100µg/ml for chlofenapyr and 0-250µg/ml for clothianidin) for 1 hour, in four replicates. Mosquito deaths were recorded after 24_h, 48_h and 72-h recovery period respectively and survival curves were made for each insecticide to determine the diagnostic dose. For susceptibility test, both indoor collected mosquitoes and larvae samples were transported to KEMRI-CGHR insectary. Larvae reared to 3-5 days old while adult mosquitoes were allowed to rest for 48 hour before being aspirated into control bottles and test bottles coated with the determined diagnostic doses of chlorfenapyr and clothianidin for a 1 hour exposure period. The mortality rates were calculated as a percentage of individual mosquitoes that died within 72_h recovery period. Convectional PCR was used for species identification. The diagnostic doses of chlorfenapyr and clothianidin were 50 µg/ml and 150µg/ml respectively. All mosquitoes species were highly susceptible with 100% mortality at diagnostic doses of 50 µg/ml and 150 µg/ml for chlorfenapyr and clothianidin, respectively, within 72-h recovery period. The mean mortality of chlorfenapyr was 95.27% at 24 _h, 98.42% at 48_h and 72-h was 100% while clothianidin had 93.03% at 24_h, 97.82% at 48_h and 100% at 72_hwere used. These results show that chlorfenapyr and clothianidin are effective in killing *Anopheles* malaria vectors. Therefore, they should be incorporated to be used in malaria vector control, to complement existing pyrethroid in areas of high pyrethroid resistance.