ABSTRACT

Lymphatic filariasis (LF) is an infectious tropical disease caused by nematode parasites *Wuchereria bancrofti*, which is transmitted by *Culex quinquefasciatus*. There is a need to develop effective vector control strategies to break the disease cycle as traditional insecticides impose the problem of resistance in mosquitoes and environmental hazard. *Eupatorium odoratum*, has been traditionally known for its insect repellent property. In the current study we chose to investigate if chemical compounds derived from this plant are effective on mosquito, *C. quinquefasciatus*.

Plant extract of *E. odoratum* has shown mosquito larvicidal activity. The extract was subjected to fractionation and the bioactive fractions were further fractionated. The chemical nature and the structures of the compounds in the bioactive fraction were identified using NMR and Mass spectrometry. Three flavonoid compounds were identified from the bioactive fraction 1. All the compounds have shown larvicidal activity with acetylcholinesterase inhibitory effect. They were also found to have minimal toxic effect on mammalian cell lines.

Phytosterols and alkanols were identified from the bioactive fraction 2 of the plant extract. Stigmasterol and hexacosanol were identified to be the chief orchestrators of larvicidal activity and their mode of action has been observed to be neurotoxicity. At a molecular level both stigmasterol and hexacosanol were found to be inhibiting acetylcholinesterase activity in *Culex & Aedes*. The Neurotoxic effects of these compounds were confirmed *in vitro* using recombinant acetylcholinesterase. Electrophysiological studies using Electroantennography confirmed the activities

Neurotoxic effect of stigmasterol and hexacosanol was responsible for the mortality of *C. quinquefasciatus* larvae. The acetylcholinesterase inhibition was also observed in

Aedes aegypti & *Chironomus riparius* but in HEK293 cells the inhibition was negligible. These compounds were also observed to be toxic to the adult stages of mosquitoes. EAG studies confirmed the enhanced neuro-transmission of these compounds was responsible for larvicidal activity. We believe these could be potential larvicidal compounds, for the vector control. Field trials are pending in addition to molecular analysis to take this further.