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Original Article

Larvicidal Potential of Selected Indigenous Lichens against Three Mosquito Species- *Culex quinquefasciatus*, *Aedes aegypti*, and *Anopheles stephensi*

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ABSTRACT

Objective Mosquitoes are the major transmitting vectors of serious human diseases, causing millions of deaths every year with undesirable effects, including toxicity to non-target organisms. Some plants with insecticidal properties have been used in recent years for the control of a variety of pest insects and vectors. In the quest for alternative natural biological control agents against mosquito larvae lichens were selected. **Method** Larvicidal activity was assessed with methanolic extracts of *Parmotrema reticulatum*, *Parmotrema kamatti*, *Parmotrema tinctorum*, *Parmelia erumpens*, *Leptogium papilosum*,and *Roccella montagnei* against *Aedes aegypti*, *Anopheles stephensi*, and *Culex quinquefasciatus*. The standard WHO protocols with minor modifications were adopted and the bioassay was evaluated at the concentrations of 100-500 µg/mL for each lichen. Since all the lichen extracts showed complete mortality against *C. quinquefasciatus* in 100 µg/mL, the concentrations were decreased to 100, 50, 25, 12.5, and 6.25 µg/mL for *C. quinquefasciatus*. Larval mortality was observed for 24 h after treatment. **Results** All the lichen extracts exhibited activity against third instar larvae of *A. aegypti* and *A. stephensi* at 100 µg/mL, and 100% mortality was observed against the vector *C. quinquefasciatus* at 100 µg/mL. The highest larvicidal activity was found with *L. papilosum* against *A. aegypti* (LC_{50} = 81.127 µg/mL) and *A. stephensi* (LC_{50}=89.10 µg/mL). Similarly, *P. tinctorum* and *R. montagnei* when tested against *C. quinquefasciatus* with minimum concentration <100 µg/mL exhibited significant activity with LC_{50} valuesof 5.32 and 6.97 µg/mL. **Conclusion** The bioassay results revealed larvicidal potential of lichens especially against *C. quinquefasciatus* with high mortality even at lower concertation. Hence, lichens can be used as an ideal sustainable approach for the control of lymphatic filariasis caused by vector *C. quinquefasciatus*.

Key words: larvicidal; lichen; mortality; mosquito; vectors

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1. Introduction

One of the most dangerous creature mosquitoes in the world are referred to as “flying syringes”, which can transmit more diseases than any other groups of arthropods. These tiny creatures have the potential lethal capacity to affect and kill millions of people throughout the world. Mosquito like *Aedesaegypti*, *Anopheles stephensi*, and *Culexquinquefasciatus* are vectors for the pathogens of various diseases like dengue, chikungunya, yellow fever, malaria, filariasis, and Japanese encephalitis. More than 700 million people suffering from these diseases were annually died (Taubes 1997). Mosquito borne diseases affect major commercial income and labour outputs mainly in tropical and subtropical countries but other parts of the world is still not free from vector-borne diseases (Fradin and Day 2002).

Yellow fever and chikungunya caused by *A. aegypti* vector are widely distributed in tropical, subtropical zones (Hales et al, 2002), and India (Taubitz et al, 2007), where *C. quinquefasciatus* causing lymphatic filariasis, which is extensively dispersed in tropical zones affecting 120 million people worldwide with 44 million people having similar chronic manifestation (Govindarajan et al, 2015). Vector control is by far the most successful method for reducing incidences of mosquito-borne diseases (Lima et al,2006). Chemical pesticide is the most effective way against mosquitoes. In the context of increasing trend to use more powerful synthetic