

Stem Cell Research&Annual Congress on Pediatrics 2018 – Bio efficiency of Cinnamomum verum loaded niosomes and its microbicidal and mosquito larvicidal activity against Aedes aegypti, Anopheles stephensi and Culex quinquefasciatus (Diptera: Culicidae)

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The emergence of mosquito vector borne diseases is considered as a perpetual quandary ecumenically in tropical countries. Outbreak of several diseases such as chikungunya, zika viral infection and dengue pyrexia has engendered a massive threat towards living population. Frequent utilization of synthetic insecticides like DDT ineluctably had its adverse deleterious effects on humans as well on the environment. Since there are no perennial vaccines, obviation, treatment or drugs available for these pathogenic vectors, WHO is more concerned in eradicating their breeding sites efficaciously without any side effects on humans and environment by approaching plant derived natural eco-cordial bio-insecticides. The aim of this study is to investigate the larvicidal potential Cinnamomum verum essential oil (CEO) loaded niosomes were yare utilizing trans-membrane pH gradient method utilizing cholesterol and surfactant variants of Span 20, 60 and 80 and treated against II to IV instar larvae of Aedes aegypti, Anopheles stephensi and Culex quinquefasciatus. The synthesized CEO loaded niosomes were characterized by zeta potential, particle size, Fourier Transform Infrared Spectroscopy (FT-IR), GC-MS and SEM analysis to evaluate charge, size, functional properties, composition of secondary metabolites and morphology. The Z-average size of the composed niosomes was 1870.84 nm and had good stability with zeta potential -85.3 meV. The entrapment efficiency of the CEO loaded niosomes was tenacious by UV-Visible Spectrophotometry. Evaluation of synthesized niosomes against gram-positive (Bacillus subtilis) and gram-negative (Escherichia coli) bacteria and fungi (Aspergillus fumigatus and Candida albicans) at sundry concentrations were assessed for its bio-potency. The larvicidal activity was evaluated at sundry concentrations for 24 h and LC50 and LC 90 values were calculated. The results exhibited that CEO loaded niosomes has more preponderant efficiency against mosquito larvicidal property and withal the results suggest that niosomes could be utilized in sundry applications of biotechnology and drug distribution systems with more pre-

ponderant stability by altering the drug of interest.

Keywords:

Anopheles subpictus, Culex tritaeniorhynchus, medicinal plant extracts, larvicide

Introduction

Cinnamon is a prevalent spice utilized by different cultures around the world for several centuries. It is obtained from the inner bark of trees from the genus Cinnamomum, a tropical evergreen plant that has two main varieties; Cinnamomum zeylanicum (CZ) and Cinnamomum cassia (CC) (adscitiously kened as Cinnamomum aromaticum/Chinese cinnamon). In addition to its culinary uses, in native Ayurvedic medicine Cinnamon is considered a remedy for respiratory, digestive and gynaecological ailments. CZ, withal kened as Ceylon cinnamon (the source of its Latin designation, zeylanicum) or 'true cinnamon' is indigenous to Sri Lanka and southern components of India. Three of the main components of the essential oils obtained from the bark of CZ are trans-cinnamaldehyde, eugenol, and linalool, which represent 82.5% of the total composition. Trans-cinnamaldehyde, accounts for approximately 49.9–62.8% of the total quantity of bark oil. In-vitro and in-vivo studies in animals and humans from different components of the world have demonstrated numerous salutary health effects of CZ, such as anti-inflammatory properties, anti-microbial activity, minimizing cardiovascular disease, boosting cognitive function and truncating risk of colonic cancer. This paper aims to systematically review the scientific literature and provide a comprehensive summary on the potential medicinal benefits of 'True Cinnamon' (Cinnamomum zeylanicum).

Aedes aegypti withal carries chikungunya, zika, and yellow pyrexia urban viruses; so its monitoring and control are compulsory. Vector control in Brazil currently occurs with the uti-

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lization of magnification regulators of infantile stages, such as diflubenzuron, and the control of adult mosquitoes with alpha-cypermethrin, deltamethrin, malathion, and others according to recommendations of the WHO Pesticide Evaluation Scheme, which are nonspecific products that cull resistant insects due to their great genetic plasticity, with consequent environmental contamination. There is currently a great deal of interest in alternative methods and selective principles for the control of mosquitoes with less environmental damage. In this sense, substances extracted from plants present a great perspective for the control of *Ae. aegypti*. Among the plants with bioactive substances, there is *Tagetes patula* L., popularly known as “cravo-francês,” “cravo-de-defunto,” or “botões-de-solteirão”. *T. patula* belongs to the family Asteraceae, which is one of the oldest groups of higher plants, with approximately 300 genera and 3000 species in Brazil, and its flavonoids patuletin and patulitrin are considered consequential taxonomic markers. Immature forms of *Ae. aegypti* were obtained from the insectary of the Malaria and Dengue Laboratory, Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Brazil. The insectary commenced with the amassment of eggs in the field by utilizing traps (egg traps). All the procedures for the maintenance of mosquitoes and the utilization of animals for blood repast were sanctioned by the Animal Experiment Ethics Committee.

Mosquitoes transmit earnest human diseases, causing millions of deaths every year and the development of resistance to chemical insecticides resulting in rebounding vectorial capacity. Plants may be alternative sources of mosquito control agents. The present study assessed the role of larvicidal activities of hexane, chloroform, ethyl acetate, acetone, and methanol dried leaf and bark extracts of *Annona squamosa* L., *Chrysanthemum indicum* L., and *Tridax procumbens* L. against the fourth instar larvae of malaria vector, *Anopheles subpictus* Grassi and Japanese encephalitis vector, *Culex tritaeniorhynchus* Giles (Diptera: Culicidae). *Culex quinquefasciatus* is a peridomestic mosquito seldom found far from human residence or activity, and rarely alimments on avian, mammalian or human hosts. The larvae are typically found in the eutrophic dihydrogen monoxide of artificial containers or man-made impoundments including open ponds, ditches and drains containing human or animal sewage. As such, *Culex quinquefasciatus* was uniquely acclimated to the

environs of historical sailing ships outfitted for long voyages where polluted dihydrogen monoxide and livestock were prevalent. Since adult mosquitoes can fly short distances to shore and infantile forms could be carried ashore in dihydrogen monoxide casks taken to be refilled, it is likely that this mosquito was spread ecumenical by commercial sailing vessels involved in the Atlantic slave trade. Today, adult *Cx. quinquefasciatus* are among the most commonly intercepted mosquitoes in passenger airline cabins and their larvae can still be found in exposed cargo (tyres and heftily ponderous equipment) and containers on modern ships.

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