

## PLANT PHARMACOGNOSY FOR DENGUE FEVER: BACK TO NATURE

Dear Editor,

Cases of dengue fever increase every year with approximately 18,000 deaths recorded annually and half of the world population is currently at risk of this fatal infection transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes. Every year, approximately 50-100 million dengue infections take place Worldwide and half a million people develop severe symptoms such as nausea, headache, joint pains and skin rash, and need hospitalization. This disease has spread to more than 100 countries with South East Asia and the Western Pacific being the most affected regions for global incidence. Furthermore, 2.5% of people who develop severe dengue fever disease die [1].

Dengue fever is caused by dengue virus (DENV), a positive RNA virus, which belongs to the genus flavivirus. This virus particle is about 50 nm in diameter, and four serotypes of the virus have been identified (DENV - 1, 2, 3 and 4). The epidemic of dengue fever has become a major problem due to the increase in human population, worldwide travel, poor sanitation and urbanization providing latent and appropriate conditions for vector proliferation and outbreaks of this disease. At the present time, there are no special treatments to cure or treat this fatal disease; only fluid balance maintenance, supportive care and bed rest [2].

Several studies reported the potential of traditional plant medicine to treat dengue fever. Papaya leaves (*Carica papaya*), lemon grass (*Cymbopogon citratus*), leaves of holy basil (*Ocimum sanctum*), rhizoms of finger root (*Boesenbergia rotunda*) and neem leaves (*Azidarahta indica*) were among the species that have been reported to have anti-dengue activity [3]. A number of compounds have been isolated, identified and evaluated from medicinal plants to have anti-dengue activity such as galactomanan, hyperoside and 4-hydroxy-panduratin [4]. Besides that, marine sources also have been found to have significant anti-dengue activity such as *Zostera marian* (marine eelgrass) and *Gymnogongrus torulosus* (red seaweed). Zoasteric acid and galactan isolated from marine eelgrass and red seaweed, respectively were found to possess antiviral activity against DENV [5,6].

Exploitation of natural products for the treatment of dengue is necessary and over the last decade, a variety of compounds have been discovered to have potential to become an anti-viral agent against DENV serotypes. Bioactive compounds with a high potential of anti-dengue activity should be further tested for toxicity (*in-vivo* and *in-vitro* assays) and clinical tests for the application in the production of the novel anti-dengue compounds from nature should be performed. Further, understanding of the life cycle, synthesis of viral RNA, functional genome of this virus and the mechanism of virus infection are also important to develop the appropriate drug. This approach could lead us to a new insight of the development of dengue antivirals from nature.

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